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The Influence of Entrepreneur's Learning Ability on Enterprise Innovation Performance

ZHANG Chunxia

Doctor of Management

Supervisors:
PhD Virginia Trigo, Professor Emeritus,
ISCTE University Institute of Lisbon

PhD SHAO Yunfei, Professor,
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June, 2020

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Jury:

PhD Renato Costa, Assistant Professor,
ISCTE University Institute of Lisbon
PhD Virginia Trigo, Professor Emeritus,
ISCTE University Institute of Lisbon
PhD Renato Pereira, Assistant Professor,
ISCTE University Institute of Lisbon
PhD WANG Jincheng, Associate Professor,
Instituto Confúcio da Universidade de Lisboa,
Faculdade de Letras da Universidade de Lisboa,
PhD XIAO Yangao, Professor
University of Electronic Science and Technology of China
PhD LI Qiang, Associate Professor
University of Electronic Science and Technology of China

June, 2020

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Full name ZHANG Chunxia

Course Doctor of Management

Student number 2016 79290

Email address zhangc201609@outlook.com

Personal email address zhangc201609@outlook.com

Telephone number +86 13386535387

ISCTE-IUL, 12/4/2020

Signed

Abstract

All activities of an enterprise are directly or indirectly related to entrepreneur's individual capabilities. Entrepreneur's learning ability is the basis for enterprises to conduct organizational learning and innovation activities (Wu, Gao, and Wei (2007). Scholars and business practices alike have addressed the importance of entrepreneur's learning ability and its effect on innovation performance. This essential characteristic of entrepreneurs promotes resource integration and resource creation ultimately benefiting innovation performance. The main objective of this thesis is to study the influence of entrepreneur's learning ability on innovation performance and the mechanisms that may accelerate this effect, namely the mediating role of absorptive capacity and the moderating effect of market orientation and policy support.

Based on comprehensive literature review a conceptual model was designed and six hypotheses are proposed. A pilot questionnaire was administered to 100 respondents to finetune the questions and the scales, and then distributed to 450 participants. After screening, 278 valid questionnaires were obtained. Regression analysis was then employed to test the path of entrepreneur's learning ability, absorptive ability and innovation performance and the bootstrap method was used to test the mediation and moderation effects.

Results show that entrepreneur's learning ability positively affects innovation performance which is consistent with Wu, Gao, and Wei (2007) and Nonaka, Toyama, and Nagata (2000). Meanwhile, absorptive capacity positively mediates the relationship between entrepreneur's learning ability and innovation performance. Market orientation negatively moderates the relationship of entrepreneur's learning ability and innovation performance, which is consistent with Bennett and Cooper (1981). In addition, results show that policy support negatively moderates the relationship under study, indicating that this construct inhibits the positive impact of entrepreneur's learning ability on innovation performance.

Keywords: entrepreneur's learning ability; organizational learning; market orientation; policy support; innovation performance

JEL: C31; M12

Resumo

Todas as atividades de uma empresa estão direta ou indiretamente relacionadas com as capacidades individuais do empreendedor, incluindo a capacidade de aprender, que é a base da aprendizagem organizacional e da inovação (Wu, Gao, and Wei (2007). Esta característica essencial dos empreendedores promove não só a integração de recursos, mas também a sua criação beneficiando o desempenho da inovação. Esta tese tem como objetivo principal estudar a influência da capacidade de aprendizagem do empreendedor no desempenho da inovação e os mecanismos que podem acelerar esta relação, designadamente o papel mediador do construto "capacidade de absorção" e o efeito moderador da "orientação para o mercado" e de "políticas de apoio".

Com base numa extensa revisão de literatura, elaborou-se um modelo conceptual e propuseram-se seis hipóteses. Para recolha de dados foi primeiro administrado um questionário piloto a 100 respondentes, na sua maioria empreendedores, para tornar as perguntas e as escalas não só mais entendíveis como mais adequadas. O questionário foi depois enviado a 450 participantes e obtiveram-se 278 respostas válidas. Os dados obtidos foram sujeitos a análise de regressão para testar as relações dos contrutos "capacidade de aprendizagem do empreendedor", "capacidade de absorção" e "desempenho da inovação". Para testar os efeitos de mediação e moderação propostos nas hipóteses foi utilizado o método de inicialização (bootstrap).

Os resultados mostram que a capacidade de aprendizagem do empreendedor afeta positivamente o desempenho da inovação o que é consistente com resultados anteriores (e.g. Wu, Gao, and Wei (2007) Nonaka, Toyama, and Nagata (2000) e que a capacidade de absorção tem um efeito mediador entre a capacidade de aprendizagem do empreendedor e a capacidade de inovação. Os dados da amostra estudada mostraram ainda que a orientação para o mercado modera negativamente esta relação o que é consistente com os resultados obtidos por Bennett and Cooper (1981). O mesmo acontece com o efeito moderador do construto "políticas de apoio" indicando que ele exerce um efeito inibidor no desempenho da inovação.

Palavras-chave: capacidade de aprendizagem do empreendedor; aprendizagem organizacional; orientação para o mercado; políticas de apoio; desempenho da inovação

JEL: C31; M12

摘要

企业的所有活动都直接或间接与企业家的个人能力有关。企业家的学习能力是企业开展组织学习和创新活动的基础（吴晓波等，2007）。学者和商业实践都谈到了企业家学习能力的重要性及其对创新绩效的影响。企业家的这一基本特征促进了资源整合和资源创造，最终使创新绩效受益。本文的主要目的是研究企业家学习能力对创新绩效的影响以及可能加速这种效应的机制，即吸收能力的中介作用以及市场导向和政策支持的调节作用。

在综合文献综述的基础上，本研究设计了一个概念模型，并提出了六个假设。对 100 名受访者进行了初步问卷调查，以对问题和量表进行微调，然后分发给 450 名参与者。筛选后，获得了 278 份有效问卷。然后，采用回归分析来检验企业家的学习能力，吸收能力和创新绩效的路径，并使用 bootstrap 法检验中介和调节效应。

结果表明，企业家的学习能力会对创新绩效产生积极影响，这与吴晓波等（2007）以及 Nonaka，Toyama 和 Nagata（2000）一致。同时，吸收能力积极地调节了企业家的学习能力与创新绩效之间的关系。市场导向消极地削弱了企业家的学习能力与创新绩效之间的关系，这与 Bennett 和 Cooper（1981）一致。此外，结果表明，政策支持会对研究中的关系产生负面影响，表明这种结构抑制了企业家学习能力对创新绩效的积极影响。

关键词：企业家学习能力；组织学习；市场导向；政策支持；创新绩效

JEL: C31; M12

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Chapter 1: Introduction

1.1 Research background

1.1.1 Practical background

The actual operation of Chinese private enterprises shows that most of them are still dominated by entrepreneur’s individual ability, that is to say, personal characteristics of entrepreneurs often occupy a dominant position in the firm's operation and innovation. From the existing business practices, it can be found that personal characteristics or abilities of entrepreneurs are often the main factors that determine whether a firm can achieve sustainable development and long-term prosperity. Especially, at the start-up stage, when the enterprise is small, human capital is insufficient, and resource endowment is lacking, a stronger entrepreneur ability such as learning ability, organizational ability, leadership ability, and innovation ability, plays a more positive role on the firm development than any other resource. In other words, the entrepreneur's own capabilities and characteristics will directly or indirectly affect the growth and performance of the enterprise.

For example, due to Zong Qinghou’s pragmatism, creativity, keen insight and enlightened internalized characteristics, his enterprise, the Wahaha Group, grew rapidly and ranked the first in the 2010 Forbes List of Rich People in mainland China. It is no exaggeration to say that Wahaha’s success has a direct relationship with its entrepreneur. In turn, Zhang Ruimin, Haier Group’s founder, can be called a “myth”. In 1984, Zhang Ruimin began to serve as the director of Haier’s predecessor, Qingdao Refrigerator General Factory. In the 16 years since he took office, Haier set a magical record of 80% annual turnover growth and created one myth after another. The main founder of these myths was exactly Zhang Ruimin, who created Haier with his innovative pursuit of quality and market concept. Ren Zhengfei, president of Huawei group, founded Shenzhen Huawei. Since its establishment, the company has developed rapidly with the significant increase of annual sales, becoming a leader in global system for mobile communications (GSM) equipment, switch products and access systems in the Chinese market. When in its infancy, Huawei did not have enough capital to roll up quickly, so it had to rely on risk-taking and even “touch ball”. Huawei is now a model among private enterprises in China, not only because its assets have expanded a thousand times in the past decade, but also because

of the unique corporate culture created by its president Ren Zhengfei. This culture is permeated with Ren's super learning innovation ability and strategic ability. From these cases, it can be inferred that the success of these enterprises is inseparable from the capability of their entrepreneurs.

Li (2018) believes that everything about enterprises is directly or indirectly related to entrepreneurs. An organizational goal is exactly an entrepreneur's goal. The formulation and implementation of an organization's strategy are exactly the process to accomplish an entrepreneur's wish, and performance is exactly the criterion to measure an entrepreneur's success (failure). Since major entrepreneurs are both owners and operators of their enterprises, most business decisions in enterprises are made by entrepreneurs. Strong individual capability of entrepreneurs can help to cope with complicated business operation, complex environmental changes and rapid information flow. As the most important human resources in enterprises, entrepreneurs with strong information integration and processing ability are more likely to select good plans and implement them effectively.

In addition, innovation is the first driving force for development. The dynamic changes in the environment and the widely dispersed innovation resources urge the innovation paradigm to move from closed to open. In light of open innovation, whether the vitality of the organization is strong depends on whether the exchange with the outside can get the driving force of metabolism. If firms want to achieve technological breakthroughs and collaborative innovation in a dynamic competitive environment, they must not only do their part in the established industry structure and obtain resources for innovative activities, but also break through the tangible and intangible barriers among organizations, industries and cognition, as well as integrate and absorb multiple knowledge. Ma (2018), founder of Alibaba Group, believes that the future is not competition for knowledge, but competition for creativity and imagination, competition for learning ability, and competition for independent thinking. Moreover, Liu Chuanzhi, founder of Lenovo Group also holds that an entrepreneur requires learning ability, including IQ, EQ, knows how to adjust himself, how to make a strategy, and how to lead a team (Qian, 2016).

Therefore, for entrepreneurs, the advanced ability to perceive, learn, integrate, and coordinate organizational resources is an inevitable ability for innovation entities to build self-adaptability in the context of innovation paradigm changes and dynamic environments. For Chinese private enterprises, if they want to be successful, they must keep pace with the times, keep learning, keep curious about the future, maintain respect and grasp for trends, and maintain

a sustained learning ability, which construct an entrepreneur’s instincts and abilities. The entrepreneur's vision has a decisive effect on the development of an enterprise, whilst the entrepreneur's learning ability is related to innovation speed and organization’s survival.

1.1.2 Theoretical background

Innovation is one of the core competencies required for the continuous growth of corporate innovation performance, especially in the high-tech industry, and creates sustainable competitive advantage and value for the enterprise and shareholders, with the advent of the knowledge economy. Schumpeter (1911), Austrian-American and economist, was one of the first to put forward a theory of innovation and gave it a new connotation. He suggested that innovation is the internal driving force of economic growth and the key factor to promote the healthy growth of firms. By introducing a "new combination" of production factors that has never been introduced into the production system, firms manufacture new products, apply new processes, open new markets, obtain new sources of raw material supply, and achieve new industrial organizations. In this light, enterprises effectively utilize their own resources through innovation, integrate factors such as personnel, organizational structure, technology, processes, and *Guanxi* (relationships) to form an advantage based on competitiveness. At the same time, this will also be the core of companies to distinguish from competitors (Huang et al., 2018).

However, Arenhardt, Battistella, and Grohmann (2015) also believe that due to the costless imitation of other companies, the competitive advantage formed by corporate innovation is difficult to sustain. Throughout the entire process of innovation, the integration of internal and external innovation resources is essential. Entrepreneur's learning ability aiming for value-adding integrates various elements and organizations, realize external resource capture, absorption and utilization, and achieve the effect of "1 + 1 + 1> 3". Besides, entrepreneurs' effective participation in innovation can reduce innovation costs and risks and shorten new product development cycles. Research shows that entrepreneur’s learning ability is the basis for enterprises to carry out innovative activities, promote organizations to learn, and carry out innovative behavior activities (Wu, Gao, & Wei, 2007). Entrepreneur’s learning ability has a positive impact on the stable adjustment and enlargement of resource integration. By integrating complementary knowledge from different channels, it has an important role in the absorption and re-creation of resources, and it can ultimately and effectively promote the growth of corporate innovation performance.

Since the 1970s, great and profound changes have taken place in the external environment

of enterprises under the influence of economic globalization and the wide application of information network technology and enterprises have entered an era of super competition in which competitive advantage appears abruptly and then disappears rapidly. In this context, resource integration ability, innovation, rapidity and agility have increased, that is, absorptive capacity has increasingly become a key factor in promoting the spillover effect of technological innovation in enterprises, affecting innovation performance and being an important condition for gaining competitive advantages. In light of this change, Temchenko (2017) proposes that it is difficult to support the long-term development of enterprises only through the accumulation and re-creation of knowledge and capabilities within the enterprise. Increasing commercial competition requires firms to obtain sustainable competitive advantages through continuous innovation. The development of innovation activities is based on organizations, which are the main implementers of enterprise innovation and determine its success. However, the organization's innovation behavior is not a simple sum of individual employee innovation, which has some connection with the innovation consciousness or idea of the enterprise manager, because the efficiency of the resource absorptive capacity of an enterprise depends more on its own resource endowment in the short term; however, in the long run, the desire and enthusiasm for acquiring resources is more critical. In other words, entrepreneur’s learning ability plays a vital role in the establishment of organizational learning mechanisms.

Both in high-tech and traditional industries, the winners of competition in the global market are those firms that can respond to changes in the external environment in time and realize product innovation quickly and flexibly. This ability to quickly adapt to environmental changes and continuously carry out product innovation is a kind of absorptive ability, that is, the ability to update enterprise technologies and increase performance (Jian, Bo, & Chen, 2016). Cohen and Levinthal (1990) view absorptive ability as the ability to identify new external ideas, which enhances the availability and timeliness of enterprises' access to external scientific knowledge, as well as facilitates the ability to search for uncertainty in the process of new inventions. Innovation activities are a series of activities from the generation of new ideas to the design, trial production, production, marketing, and commercialization of new products. They are also the process of knowledge creation, transformation, and application. The essence is the production of new technologies and commercial applications.

Under this trend, fundamental changes have taken place in the production organization methods of Western developed countries, and a change has been achieved from the Ford system to the post-Ford system. In taking a historical view, the change of production mode was

accompanied by the change of international competitive strength and political status of various countries. At the beginning of the 20th century, the rise of the American economy was accompanied by the Ford production method; in the 1970s, with the lean production method, Japan became the most competitive country around the world while the formation and development of cluster production in northern Italy made the country rank 5th among the 28 most developed countries around the world.

The above-mentioned change in production mode is actually a process of continuous organizational learning and innovation. Meanwhile, social cognitive theory contends that the external environment, individual cognition, and organizational behavior interact with each other. When an individual is placed in the environment, the individual is not simply a spectator, but an activist himself and his experience, that is the result of the interaction of personality and the ability and belief to master the situation to achieve goals in a dynamic environment (Locke, 1987). Therefore, the learning ability of entrepreneurs can form novel and creative ideas or solutions in the process of innovation and strive to put these ideas into practice through organizational absorption, so as to achieve continuous growth of corporate innovation performance.

Herrmann and Guenther (2017) argue that in the era of changing external environmental, the absorptive ability of an organization is the key to the survival and long-term growth of an enterprise. Zhou et al. (2018) empirical study also shows that, compared with technology and capital, companies searching, absorbing, learning and recreating internal and external explicit or implicit information, knowledge, technology and other resources are becoming conditions of economic globalization. Su and Cui (2011) believe that in a highly uncertain environment, the effective implementation of enterprise innovation activities requires entrepreneurs to have the ability and orientation to learn and take risks. Entrepreneur's learning ability, as an enterprise-level variable, effectively promotes organizational learning through different transformation methods.

Moreover, continuous change of the external environment, causes firm's innovation activities gradually to become a community of various participating actors. Enterprise innovation is no longer a separate activity, but an overall activity of a dynamic and complex innovation network of actors involving multiple levels, multiple organizations and multiple stages. Enterprise innovation is a spiral rising in circular activity. In an open system, no organization can independently obtain all resources that meet its development. Innovation is a continuous exchange process where resources, information and potential energy interact with

the external environment. From the perspective of innovation and development, the absorption and learning of organizational resources has always run through the entire process of enterprise innovation. From the perspective of the natural system, due to the "economic man", to carry out innovation enterprises need external innovation resources such as market orientation and policy support, which have a purposeful moderating effect on their innovation activities. First, innovation activities, such as innovation input, output, and income, will be affected by market-oriented factors such as market demand, technological development, market environment, and future market development trends.

When a firm innovates, firms' absorptive ability will be affected by market orientation. The improvement of corporate innovation performance is based on absorptive ability, whilst the absorptive ability will be affected by the learning ability of entrepreneurs. Thus, market orientation has a moderating effect on corporate innovation activities. Secondly, the government acts as a coordinator of the national innovation system. By providing a good policy environment and infrastructure and by guiding and interfering with the technological innovation activities of enterprises through its own social resources, the government implements flexible and efficient incentives and updates the innovation development model. In the end, innovation continues to emerge.

In Chinese private firms, entrepreneurs, as the main decision-makers, will directly influence the overall firm operation and the direction of development and change. The interaction and feedback of innovation behaviors which is entrepreneur-centered is to continuously improve the innovation performance. Therefore, it is necessary to study entrepreneur's learning ability and enterprise innovation performance. Existing research has emphasized the importance of entrepreneur's learning ability, which is first of all a process of coping with and adapting to changes in the internal and external environment of an enterprise. The significance of entrepreneur's learning ability for business activities is that it can play an important role in the acquisition, accumulation, absorption and utilization of resources. Therefore, the learning ability of entrepreneurs plays multiple roles in the development of enterprises. First, it has directly contributed to the continuous improvement of corporate innovation performance; second, it has indirectly affected the improvement of corporate performance by promoting corporate organizational absorptive ability. In addition, the impact of entrepreneur's learning ability on innovation performance is also affected by external factors, such as market orientation and policy support. These external factors promote the continuous learning of entrepreneurs and the continuous innovation activities, greatly enhance the ability

of enterprises to adapt to the new environment and dynamic change.

1.2 Research questions, purposes and significance

1.2.1 Core questions and purposes

The driving factors of innovation performance have always been the core issues deserving concern from theoretical and practical fields. According to the resource-based view, the competitive advantage of an organization comes from the endowment of core resources owned by the organization, and the core resources that can produce lasting competitive advantages should have at least four characteristics that are rare, valuable, difficult to imitate, and organization dependent (Cardeal & Antonio, 2012). How entrepreneurs use these characteristics to pursue corporate efficiency constitutes an important resource (Zhang & Liu, 2016) and is worth of studying.

In addition, if we cannot understand how entrepreneur's learning ability drives performance, it will be difficult for firms to form sustainable competitive advantages. To study the issues of entrepreneur's learning ability and innovation performance, this thesis concentrates on the following:

(1) Clarification of the influence path of entrepreneur's learning ability on corporate innovation performance.

(2) Analysis of the factors that affect the learning process of entrepreneurs, including the process of resources (information, knowledge, technology) capture, and accumulation.

(3) Analysis of how external factors such as market orientation and policy support, affect the process of entrepreneur's learning ability and innovation performance. The aim is to find out which moderating effects these two variables have on entrepreneur's learning ability and innovation performance.

The main purposes of this thesis are:

(1) To design a general theoretical framework of the relationship between the entrepreneurs' learning ability and the innovation performance of enterprises in the context of an economy in transition such as China's. The thesis aims, through an empirical study, to understand the path of the learning ability of private entrepreneurs in the Chinese market.

(2) To expand the connotation of the learning ability of private entrepreneurs in the Chinese context and summarize relevant attributes; to examine the mediator and moderators on

the relationship of entrepreneur’s learning ability and innovation performance, namely absorptive capacity, market orientation and policy support. Specifically, at first, conduct a regression analysis on the relationship between entrepreneur's learning ability, absorptive capacity and innovation performance. Next, conduct bootstrap test on the mediating role of absorptive capacity between entrepreneur’s learning ability and innovation performance, and then use bootstrap method to examine the moderating effect of market orientation and policy support.

(3) To contribute to clarify the contextual factors such as market orientation and policy support. Thus, the thesis aims to be beneficial to establish the importance of continuous growth of innovation performance, form policy suggestions for stable growth of performance and prevent management traps caused by management inertia in the innovation process of enterprises.

1.2.2 Research significance

Rather than from the perspective of the external macro-environment or enterprises’ growth, it is perhaps more useful to study the innovation performance of Chinese private enterprises from the perspective of entrepreneurs, because the strategy, plan, organization, innovation, and actual operation in a SME are inseparable from the strategic planning and business decisions of the entrepreneur. In other words, to study the sustainable competitive advantages and innovation performance of enterprises, the learning ability of entrepreneurs should be the start. Herron and Robinson Jr (1993) indicate that the importance attached to the problem of entrepreneurs is not only out of theoretical needs; in practice, venture capitalists also consider the entrepreneur factor as an important one for success or failure. Therefore, with entrepreneurs as the starting point, this thesis discusses the paths of the impact of entrepreneurs’ ability on innovation performance and looks forward to finding better methods and paths to improve it.

In practice, competitive capability is the core of the success (failure) of enterprises, which determines innovation performance, market and implementation efficiency. Competitive advantage concerns enterprises’ ability to gain the upper hand in any conditions, and is generated through strategies (Abbot & Guijt, 1998). The antecedent of the competitive advantage of SME firms can be traced back to entrepreneurs’ ability and is the embodiment of the values and capability of entrepreneurs. Common observation of Chinese SME firms, for example, shows that the strength of entrepreneurs' learning ability has a direct or indirect relationship with their growth and performance. Therefore, the research on the competitive

advantage and innovation performance of enterprises can start from the learning ability of entrepreneurs.

From a theoretical perspective, this thesis aims to establish a theoretical model on the relationship between entrepreneur’s learning ability and innovation performance and to explore how entrepreneur’s learning ability affects corporate innovation performance. Entrepreneurs' innovation activities and learning behaviors are closely related to the market environment and policy environment of their enterprises. Therefore, this thesis includes market orientation and policy support as a moderator of the relationship between entrepreneurs' learning ability and innovation performance, with a view to discovering in which way market environment and policy environment of an enterprise can moderate entrepreneurs' innovation performance.

Most of the previous studies on entrepreneurs and innovation performance have predominantly focused on the ability of entrepreneurs to influence innovation performance, and the results of empirical studies are divergent with most of these studies overemphasizing personality characteristics of entrepreneurs, like psychological characteristics, educational background and previous experience and there is still a lack of research on the subject of entrepreneur’s learning ability in China. Moreover, although Chinese scholars have explained performance from the perspective of entrepreneurs' learning ability, most studies are qualitative and lack quantitative empirical tests.

1.3 Contributions

First, this thesis aims to contribute to entrepreneur’s learning ability and innovation studies. In terms of research objects, it explores the impact of entrepreneur’s learning ability on corporate innovation performance from an applied perspective. Focusing on entrepreneurs' learning ability, absorptive capacity, market orientation, and policy support, the thesis combines literature research, interviews, surveys and empirical analysis to analyze and test the relationships mentioned above in order to identify how entrepreneur’s learning ability affects innovation performance and explore how market orientation and policy support moderate entrepreneur’s learning ability and innovation performance, and then discover how to better cultivate and improve the learning ability of entrepreneurs in business operations.

Second, this thesis raises questions that may be instructive for studying the relationship between entrepreneur’s learning ability and innovation performance. The thesis establishes a comprehensive theoretical model that considers environmental factors that affect the innovation

performance of firms, such as market orientation and policy support. As for the measurement of entrepreneur's learning ability and innovation performance, mature scales are used as much as possible. Meanwhile, this thesis is not limited to demographic analysis of entrepreneurs, because entrepreneurs' learning ability can be improved through acquired learning, which has greater practical significance.

Third, this thesis comprehensively combines several methods, including survey, interview and the in-depth analysis. Then, based on the results of a large-scale survey, statistical analyses are conducted.

1.4 Research methods and technical routes

1.4.1 Research methods

This thesis adopts theoretical and empirical study as well as qualitative and quantitative analysis, and uses SPSS21.0, to process the relevant data. Specifically, the following methods are included:

1.4.1.1 Literature analysis

Relevant literature was collected from several databases, like Elsevier Science, Emerald, Springer-link, Pro Quest, EBSCO, CNKI, VPCS, Wanfang. Reviewing and sorting the literature allowed to refine the connotation and scales of all variables. Then, combined with organizational learning, innovation management and organizational behavior theories, this thesis focuses on analyzing and summarizing the research statuses, research gaps, and finally constructs the research framework.

1.4.1.2 Survey

Based on literature review and field study, this thesis has perfected the scale items, and then distributed questionnaires. After a small-scale pioneer test, final sample data was collected from several provinces by several channels such as E-MAIL, QQ, forums, MBA / EMBA / DBA alumni. Survey respondents covers entrepreneurs and top managers.

1.4.1.3 Statistical analysis

This thesis has conceived a theoretical model and then adopted scale item analysis, validity and reliability tests, and correlation and multicollinearity tests. Then it adopted regression analysis and bootstrap method to analyze the relationships among entrepreneur's learning

ability, absorptive capacity, innovation performance, market orientation and policy support.

1.4.2 Technical routes

The technical route is as depicted in Figure 1-1.

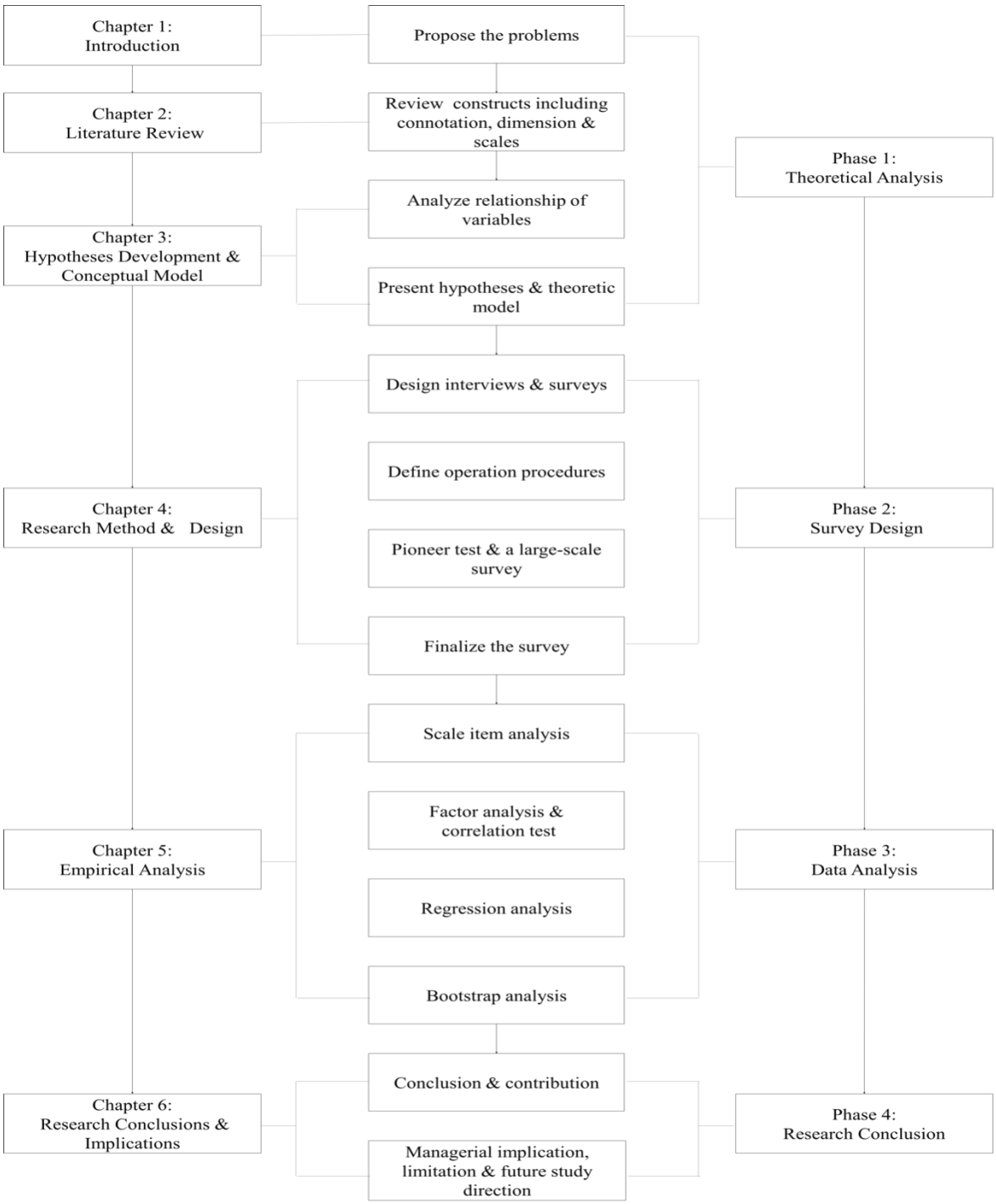

Figure 1- 1 Technical route

1.5 Layout of the thesis

Following the technical route and methods, the layout of this thesis is as follows.

Chapter 1: Introduction – This chapter raises the core questions to be solved, clarifies the background and importance, and explains the significance and purpose of this research. Finally, the research methods, technical route and thesis structure are introduced.

Chapter 2: Literature review – This chapter summarizes the related theories, defines concepts, analyzes the five variables under study (entrepreneur's learning ability, innovation performance, absorptive capacity, market orientation and policy support), focuses on analyzing and summarizing their connotation, dimension and measurement. This chapter provides theoretical support for hypotheses and scales development.

Chapter 3 – Hypothesis development and conceptual model: By overviewing organizational learning and innovation theories, this chapter proposes theoretical analyses and constructs a theoretical framework in which entrepreneur's learning ability is the independent variable, absorptive capacity is a mediator, market orientation and policy support are two moderators and innovation performance is the dependent variable.

Chapter 4: Research method and design – This chapter selects proper methods according to the hypotheses. Next, the main constructs in the thesis are operated. Through the pre-test survey, unreasonable items are eliminated, and the formal survey was finalized. Finally, the measurement of all variables is described in detail, and the selected research objects, survey collection methods and sample selection criteria are explained. In addition, the descriptive analysis of sample characteristics is carried out.

Chapter 5: Empirical analysis – On the basis of descriptive statistical analysis and overall survey item analysis, reliability and validity tests, factor analysis and correlation test of each variables are, in turn, reported in this chapter. Then, the chapter shows results of regression and mediation and moderation tests with bootstrap method.

Chapter 6: Research conclusions and implications – This chapter summarizes the results of the research findings, theoretical contributions and practical implications and finally pinpoints research limitations and gives possible directions for future research.

Chapter 2: Literature Review

This chapter reviews and summarizes relevant theories and works on entrepreneurs' learning ability and innovation performance. Besides, the connotation, antecedents and measurement of entrepreneurs' learning ability, absorptive ability, market orientation, policy support, and innovation performance are included. Such review aims at laying a solid foundation for hypothesis development.

2.1 Related theories

2.1.1 Entrepreneur’s learning ability

Entrepreneur’s learning ability stems from the extension of the concept of entrepreneurship (O’Rourke, 2014). As technologies interwind profoundly and the complexity and risks of technological innovation increase, resources like information, technology and knowledge play a foundation role on survival and prosperity. Resource transfer, distribution and spillover brings important promotion for sustainable growth. Such competitiveness by enterprise innovation is mainly due to the process of continuous organizational learning and resource diffusion while the learning ability of entrepreneurs determines resources distribution and organizational learning.

Organizational behavior is dominated by entrepreneurs. The entrepreneur’s learning ability is the innovative entrepreneurial skills gained from the cognitive and behavioral processes (Breslin & Jones, 2012). Entrepreneur’s learning ability emphasizes that the decision-maker of a firm needs to have the ability to impart knowledge, the ability to set and implement corporate business decision-making goals, the ability to effectively coordinate and resolve important events in the business process, which lead to the establishment of a learning organization, and can transform individual learning into organizational learning (Cui & Jiao, 2009).

Entrepreneurs' learning ability determines the degree to which enterprises acquire and discover new knowledge. Thus, entrepreneur’s learning ability can prompt new technologies and capabilities development, so that manufacturing and logistics tasks can be completed quickly. The learning ability of entrepreneurs can also effectively help firms build a framework

for understanding the external market environment, so that new innovation opportunities may probably be found. Besides, the learning ability of entrepreneurs can increase the collective and shared awareness and identification, and thereby it is beneficial for individuals to share and absorb learning experiences.

Previous studies on learning ability concentrate at the organizational level, but it is entrepreneurs who dominate business decisions in Chinese private enterprises (Yuan, Pan, & Wang, 2001). They are generally viewed as key learning agents who have huge impact on organizational learning and innovation processes, because their decision directly determines the survival and development of an enterprise (Wei & Jiao, 2007). Entrepreneurs are exposed to the internal and external environment of organizations and rely on linear and non-linear learning methods to explore and use the explicit or implicit resources existing inside and outside the organization, so as to obtain more resource reserves, learning, absorption and re-use opportunities. Through the process of absorption and learning, analyze and transform innovative resources, the acquisition of learning ability is ultimately obtained and then changes existing innovation capabilities in the enterprise. Therefore, benefits of learning ability on enterprise development are mainly manifested in the development of enterprises, collective learning and the ability to use internal and external resources.

2.1.2 Organizational learning

Organizational learning, as explained by many scholars, has long been considered to be the ability of an organization grounded in existing experience or accumulation of resources. Organizational learning involves the acquisition of organizational resources, such as developing and creating information, knowledge, technologies, sharing resources and experience, and absorbing and transferring resources (Argote, 2011; García-Morales, Jiménez-Barrionuevo, & Gutiérrez-Gutiérrez, 2012). Knowledge acquisition, transfer, information compilation, and storage are most closely related to organizational learning. Organizations need to continuously learn in order to effectively adapt to dynamic changes. Therefore, organizational learning is a way for organizations to transmit individual or acquired, innovative information, technology, and knowledge resources into organizational resource systems through collective or organizational behavior or activities.

Forrester (1975) defines organizational learning as the process of finding and correcting mistakes. He believes that organizational learning is an extension of individual learning by learning activities among organizational members. Besides, the organizational learning system

is also influenced by an analogous social ecosystem composed of various elements. This organizational learning process operates through the search and sharing of resources, diffusion, and re-creation within and outside the organization's system, which boosts the interaction, absorption, and learning of the implicit and explicit resources. Organizational learning enables new capabilities and new resources to be transformed into organizational innovation capabilities, which can enhance the growth of innovation performance.

Previous studies on innovation highlight that organizational learning relates to innovation. What is more, the absorptive ability of a firm has a positive and significant impact on innovation performance (Flor, Cooper, & Oltra, 2018). Different learning (e.g. exploratory learning and exploitative learning) can transform potential resources into actual innovation capabilities through absorption, thereby increasing innovation performance (Kang & Lee, 2017). Therefore, the higher the degree of enterprise innovation, the greater the depth and breadth of learning required.

Since innovation is embedded in a knowledge flow, firms increasingly rely on outside resources to innovate and improve performance, especially in a knowledge-intensive business environment. However, many organizations are often subject to the core rigidity and path dependence and they find it difficult to benefit from external resources learning. In light of this concern, firms should develop their own absorptive ability (Kostopoulos et al., 2011). Absorptive ability is one of the basic processes of learning, which reflects the ability of individuals or organizations to identify, absorb and use resources (e.g. information, technology, knowledge) from the environment. In turn, absorptive ability can boost the exchange of existing and newly acquired resources and with integration and re-creation, more novel products/services are created (Flor, Cooper, & Oltra, 2018). Hence, innovative depth and scope are positively related to firms' learning and absorptive ability. The increase of innovation performance depends on the organization's innovation resource base, whilst effective absorption and learning are beneficial to the development of innovation pool (Cohen & Levinthal, 1990).

2.1.3 Innovation management

2.1.3.1 Technological innovation

Austrian economist Joseph Schumpeter was one of the first to put forward a concept of innovation in *The Theory of Economic Development* that has been explored to this date (Schumpeter, 1911). After that, he continued enriching innovation theory and divided

innovation into five types, including developing novel products, introducing novel methods, creating new markets, exploring novel materials and searching novel models. Besides, he also argued that technological innovation can drive unbalanced economic growth and highlighted the importance of technological innovation.

At present, technological innovation theory is generally divided into four schools: neoclassical school, neo-Schumpeterian school, institutional innovation school, and national innovation system school.

Due to different views and contexts, the connotation of technological innovation has not gained consensus. Leonard‐Barton (1992) proposes that technological innovation includes multiple aspects, specifically talent innovation, management innovation, value innovation, and organizational innovation. Other scholars argue that technological innovation is composed of technology, production, and marketing. Among them, technology plays a dominant role and is an important manifestation of the competitive strength, while the role of production is to convert resources into products; and that of marketing is a way for firms to gain customers' recognition. Wei and Xu (1995) divide technological innovation mainly into five dimensions, namely decision-making, R&D, production, marketing and organizational ability. Cao and Wang (1998) propose that technological innovation includes R&D, financial management and output capabilities. Liu et al. (2008) argue that technological innovation includes the ability to invest in innovation, the ability to implement innovation, and the ability to innovate corporate management systems. Dong (2017) believes that technological innovation mainly includes manufacturing, management, marketing, resource input level, and R&D level.

From the above studies, it can be summarized that despites different focus of technological innovation studies, they shed some insights for the theoretical studies and business. In terms of the components of technological innovation, scholars believe that technological innovation is not just a single dimensional construct, but a multi-dimensional one. These different dimensions are according to academic background (e.g. R&D capability and resource inputs).

2.1.3.2 Management Innovation

Management innovation is often mentioned to combine new management means, management modes, management methods and other management elements, and apply them to the enterprise management system in order to provide support for attainment of strategic development. In view of this situation, managers must continuously introduce innovative management methods, attach importance to management values, reform management

technologies and business processes, and gradually increase the requirements for modern assembly and production. Therefore, enterprises must establish their own management innovation model in accordance with their actual conditions and offer a certain theoretical foundation for the development of management innovation in China.

(1) Process of management innovation. Management innovation, in fact, is an all-inclusive and time-consuming task, which needs to consider all kinds of factors. Research on management innovation is an important perspective of innovation studies. Therefore, it is necessary to build a process research model through clarifying the inherent logic of management innovation. Feng (2010) work explains the mechanism of management innovation process, and offer a model that includes innovation desire, innovation positioning, the choice of management innovation scheme, innovation behavior and innovation evaluation.

Zhang and Wang (2014) divided the process model of management innovation into four stages: enterprise perception evaluation, enterprise decision-making, enterprise implementation and enterprise routinization. Simultaneously, the process is supported by enterprise-driven discussion, enterprise scheme formulation and corresponding adaptation evaluation. Compared with the perspective of management innovation among foreign enterprises the study of such process in China highlights the core role played by relevant managers and entrepreneurs and recognizes that the fundamental driving force of enterprise management innovation mainly lies in the leading role of entrepreneurs in the management innovation process. This has resulted in the formation of a top-down management innovation model in Chinese enterprises, that is to say, starting from entrepreneurs or some managers, and then gradually deepening and transitioning to ordinary employees who, in turn, must agree with the innovation management plan so as to actively participate.

(2) Decision-making mechanism of management innovation. Decision-making is an important link of management innovation since its quality directly affects the performance and implementation of management innovation. Therefore, decision-making is also a key perspective of the study of innovation. While studying the decision-making mechanism of management innovation, many scholars mainly study the role and influence of entrepreneurs and senior managers. Some studies on how managers innovate show that individual characteristics, including charm, political bias, moral hazard, are important to firms' management decisions and directly determine whether the decisions are correct and appropriate. Liu et al. (2010) carried out systematic practical research and established the decision-making model of management innovation according to the responsibility division function in each stage

of the management innovation process. This model covers constructs such as social networks, cognitive deviation, mental outlook of managers and comprehensive quality. Some scholars also study the influencing factors of management innovation decision-making, including its complexity, risk technicality and compatibility, enterprises' internal and external environment, enterprises' internal teamwork, corporate culture, management ability and talent storage. To achieve enterprise development, managers must make a series of important decisions for enterprises to keep pace with the times.

(3) Effectiveness of management innovation. Many enterprises have implemented pertinent management innovation but have failed. In an attempt to solve this problem, many scholars regard the effectiveness of management innovation as a new key research perspective combining it with the specific actual situation of enterprises. In this line, Jia et al. (2015) found that achieving management innovation involves factors such as the creativity and adaptability of enterprises. In other words, it is necessary for enterprise departments to integrate themselves organically to carry out reflection or two-way learning, so as to obtain new knowledge of management innovation and enhance its effectiveness. Jing and Niu (2014) found that the internal organization of an enterprise can directly influence the performance of the internal organization through management innovation. This is mainly because firm's performance comes from learning across functions and collaborative efforts of various functions.

On the basis of the effectiveness of management innovation, scholars also study the influence of culture creation and knowledge management. To create innovative culture, management innovation has a positive and innovative atmosphere, which is good for arousing employees' motivation. In terms of knowledge management, the firms' culture and operating philosophy both matter allowing customers to see firms' positive facets. Therefore, it is necessary for enterprises to allow internal organizations to learn from each other when carrying out management innovation and to improve corporate culture and business philosophy among customers and employees, to create a certain cultural atmosphere, and thus to enhance the effectiveness of management innovation and to achieve management innovation transformation.

2.2 Related studies on entrepreneur's learning ability

2.2.1 Connotation of entrepreneur's learning ability

2.2.1.1 Connotation of entrepreneur

The word entrepreneur originates from French and means intermediary agent. In the Middle Ages, entrepreneurs referred to actors or persons in charge of organizing mass production projects. After the 1960s, the person who signs fixed-price contracts with governments and takes on risky profits or losses is called "entrepreneur".

Earlier on, Cantillon, a French economist, first introduced the concept of entrepreneur into economics in 1755 (Fairbairn, Barr, & Fairburn, 1974). Cantillon called everyone who engaged in economic behavior an entrepreneur and believed that the function of an entrepreneur is to take risks. From his discussion, it can be seen that entrepreneur is a person who succeeds in the market by making full use of unrecognized profit-making opportunities. Cantillon (1755) proposed in his book *Essay on the Nature of Commerce in General* that the function of entrepreneurs is to engage in market exchange at a risk, that is, buying goods at a given price and selling them at another uncertain price. Thus, entrepreneurs gain uncertain profits.

After Cantillon, Jean Baptiste Say popularized the term entrepreneur. At that time, as a businessman, he often visited England, where he was familiar with the books by economists Adam Smith and Thomas Malthus (Say, 1880). However, in Adam Smith's *An Inquiry into the Nature and Causes of the Wealth of Nations*, there is no formal classification between the owner of capital and the manager or "undertaker" who organizes and operates the enterprise (Smith, 2003). Say was unsatisfied with the words "undertaker" and "promoter" previously used, thus creating a new expression "entrepreneur". Say notes that the roles and responsibilities of capitalists and undertakers were different, even when the two roles were integrated (Say, 1880). Entrepreneurs transfer resources from areas with lower productivity to areas with higher productivity. Say not only separates entrepreneurs from ownership, but also entrusts entrepreneurs with the responsibility of increasing productivity and output (Say, 1880).

The British economist Marshall (2011) was the first to propose and consider entrepreneurs as independent production factors. Bals and Tate (2018) analyzes the role of entrepreneurs. In his opinion, sellers and consumers cannot precisely predict demand and supply, which leads to market imbalance. At this time, entrepreneurs act as a special force to alleviate the imbalance. Entrepreneur is a special professional class, with its particularity being the courage to take and

bear risks.

Within entrepreneurship research, Schumpeter (1911) proposes that entrepreneurs are the leaders of economic development and innovators who can realize the recombination of factors of production. Schumpeter regarded entrepreneurs as the subjects of innovation, whose role is to creatively destroy the balance of the market. Gray (1980) believes that entrepreneurs are sensitive to profit-making information and will not hesitate to take advantage of opportunities for arbitrage. In *Entrepreneurship and Development*, Leibenstein (1968) says that entrepreneurs are people who succeed in preventing organizations to which others or they themselves belong from low efficiency. Mcmullen (2015) introduces the concept of entrepreneur judgment and defines entrepreneur as a person who makes decisions about scarce resources. The so-called judgment decision refers to the decision that depends entirely on the individual judgment of the decision maker. There is no obvious correct rule in the decision process which only uses open available information for the use of the decision maker. Drucker echoes Say's definition of entrepreneur and develops Schumpeter's theory. He uses a whole chapter to define the concepts of entrepreneur and entrepreneurship. Drucker (2007) believes that entrepreneur refers to (1) greatly increasing the output of resources; (2) greatly creating something new and different and changing value; (3) creating new markets and new customer; (4) considering change as the norm, responding them, and taking advantage of it. Thus, the essence of entrepreneur is to provide value and satisfaction to customers via products/services.

Li (2018) believes that entrepreneurs are enterprise managers with innovative spirit and good at innovation, so not all enterprise managers are entrepreneurs, since entrepreneurs are only those who have the spirit and ability of innovation.

Other scholars argue that entrepreneurs are not only an economic category, but also a political category, and with the change of the social and economic systems, the connotation of entrepreneurs is also slightly different. Entrepreneurs are people who take their own human resources as capital to obtain income, take the management and operation of enterprises as their profession, and lead enterprises to obtaining great economic and social benefits as their objective. W. Y. Zhang (2018) analyzes the phenomenon of the combination of managers, entrepreneurs and capitalists in classical enterprises. In his opinion, in a state of equilibrium, individuals will be divided into four occupations: those who have both ability and property and have a low risk aversion attitude will become entrepreneurs; those who are neither capable nor have property and who have a high risk aversion attitude will become workers; those who are capable but lack property will be employed as managers by capital owners; those who are

incapable but rich will become the pure capital owners who hire managers. The definitions of entrepreneur are shown in Table 2-1.

Table 2- 1 Definition of entrepreneur

Literature	Definition
Cantillon (1755)	The function of entrepreneurs is to engage in market exchange at risk
Say (1880)	Entrepreneurs have the responsibility of increasing productivity and output.
Schumpeter (1911)	Entrepreneurs are leaders in economic development and innovators who realize the reorganization of production elements
Leibenstein (1968)	Entrepreneurs are people who avoid the inefficiency and success of others or their own organizations
Gray (1980)	Entrepreneurs are sensitive to profit-making information
Drucker (2007)	The essence of entrepreneur is purposeful and organized system innovation
Bals and Tate (2018)	Entrepreneurs are a special occupation whose distinctiveness is the courage to take risks and take risks
Li (2018)	Entrepreneurs are those with innovative spirit and good at innovation

2.2.1.2 Connotation of capability

Teece (2012) divides entrepreneurs' capability into opportunity ability, relationship ability, thinking ability, organization ability, strategic ability and commitment ability. Sun (2018) believes that entrepreneurs' capability should include dedication and innovation, risk awareness and organizational coordination. In turn, He, Pan, and Lian (2007) configured the entrepreneurs' ability system into strategy, relation and innovation ability.

In today's society with the rapid economic development, the global environment has become more complex and changeable and the competition faced by enterprises is also fiercer. How to improve the competitiveness is a valuable topic to discuss. Recently, the issue of ability (capability) has been widely discussed, and the definition and connotation of capability have aroused closer attention.

Some scholars define capability very broadly, while others define it in much detail. However, in any case, capability is generally defined as a trait that can make work performance

better. To comprehend capability, we can trace back to the source to discuss the composition of capability, the level of capability and our further research objectives. Capability forms on the course of education, training and practices and can be arranged by the working environment. More and more important management training is caused by a wide range of procedural changes but do not change the organization nor the behavior of individuals. In order to maintain a change in behavior, we must create a new need for a new behavior. Next, the close combination of enterprise performance and employee skills makes it urgent for enterprises to be in need of a manifestation of entrepreneurs' ability and enterprise performance. That is to say, we must find out the stable personal traits that exist in the individual managers of an organization and which can manifest innovation performance desirably.

In fact, this performance-related trait can be a person's motivation, characteristics, self-image, social role, skills, knowledge (Xie et al., 2007). Similarly, Ikebuaku and Dinbabo (2018) define capability as a skill and willingness and, more importantly, they believe that capability is a broader concept than "skill", which combines knowledge, skills, understanding and willingness. According to the definition by (Terziev & Georgiev, 2018), capability also includes knowledge, attitudes and skills. These authors cite an example of a degree management program that ignores the knowledge and attitudes in capability, which would lead to inefficient management and failure. In their opinion, what is important is that the excellent performance of these skills, talents and knowledge at work can be combined with specific values and attitudes.

2.2.1.3 Features of ability

The characteristics of entrepreneur's learning ability are embedded in the changing environment. The practical problems faced by entrepreneurs often lack key answers or one-to-one corresponding solutions, which makes it impossible for entrepreneur's learning to simply imitate successful experiences or directly apply the knowledge in books to solve practical problems. Learning is a process that starts unconsciously under the change of environment, which is often full of uncertainty and makes the learning ability of entrepreneurs show exploratory characteristics. In the process of integrating the acquired empirical knowledge with their own real environment, entrepreneurs produce their own unique empirical knowledge, which is more suitable for their own actual environment, so as to better solve the practical problems encountered by enterprises during their development. This is also the process of entrepreneurial evolution from simple learning to innovation. There is an inevitable relationship between the adaptive and exploratory characteristics of entrepreneur's learning ability. From

the practical perspective, the activities of entrepreneurs can also be summarized into two types as exploitation and exploration (Nooteboom, 2000). Exploitation means that entrepreneurs can effectively use their existing ability and resources to attain the short-term goal of enterprise survival while exploration means that entrepreneurs discover and develop new abilities and resources to attain the long-term goal of survival and development of enterprises. The occurrence of these dynamic activities is based on the real economic system, while the operating rules of the economy, the market or other realistic systems are the long-term summary and understanding of human beings to their past experience, their future possible events and the effectiveness of their innovation activities.

2.2.2 Essence of entrepreneur's learning

Entrepreneur's learning is a gradual process. With all kinds of opportunities and challenges emerging, the existing ability and knowledge of entrepreneurs may be out of sync with the development requirements of enterprises, resulting in the gap between the required and the original knowledge. In order to bridge or even eliminate this gap, entrepreneurs must take learning actions, so as to improve their relevant knowledge and capability, optimize their knowledge structure, enhance ability to deal with complex activities, and finally synchronize with the development of enterprises.

As mentioned before, Schumpeter put forward his concept of innovation. He analyzed innovation and capitalism from the point of view of dynamics and development and considered that the function of entrepreneurs is exactly to realize innovation (Schumpeter, 2000). Since then, the research on entrepreneur's learning has aroused more and more attention from scholars who try to realize innovation through entrepreneurs' learning by developing and enriching the concept of entrepreneur's learning. This thesis summarizes these definitions and holds that the definition of entrepreneur's learning can be roughly divided into the categories of process, empirical development, social learning, and dynamic process, as explained below.

Firstly, the process view holds that entrepreneur's learning is the acquisition and variation of skills, knowledge, habits and attitudes, accompanied by behaviors. This is to understand entrepreneur's learning from the perspective of psychology. Young and Sexton (1997) regard entrepreneur's learning as a psychological process to acquire, store and reuse knowledge, whilst attitudes, emotions, motives and entrepreneur personalities will have an impact on this process.

Secondly, studies on experiences have found that entrepreneur's learning is a kind of learning based on experience or an action orientation, emphasizing that learning is a process of

continuous acquisition and correction from experiences, and that the result of learning is only a reflection of past experiences, instead of future knowledge. Deakins and Freel (1998) suggest that such experiences include learning among peers, feedback from customers and suppliers, finding solutions from failures, and identifying and resolving difficulties.

The experiences of failure have a certain negative impact on the learning of entrepreneurs, but they may also have a positive impact depending on the entrepreneur himself. However, experience learning does not mean the repetition of past experiences since they will be affected by key events, changes in the environment, resulting in changes in entrepreneurs' behavior. The essence of this view is learning-by-doing.

Thirdly, social learning holds that the learning of entrepreneurs is related to the social network of entrepreneurs (Bosma et al., 2012). The learning of entrepreneurs is a process of cooperative participation, in which learning is closely related to various factors. This view puts learning into social networks and social relations, beyond the scope of enterprises. In this learning process, there are two sources of learning, namely, industry network and personal network, the existence of which can effectively reduce the cost of learning (Sol, Beers, & Wals, 2013).

Fourthly, dynamic process holds that the learning of entrepreneurs is dynamically-evolving and path-dependent. Cressy and Storey (1995) pointed out that in the market, effective enterprises can survive, and ineffective enterprises would fail. The difference of enterprises in scale is not due to the abundance of funds, but to the understanding of its own effectiveness. At the beginning of their work, entrepreneurs do not have a clear understanding of their own management skills and the possibility of success. With the growth of enterprises, entrepreneurs gradually recognize their own management skills, change their behavior and achieve success. Therefore, the only way to learn is to go deep into the enterprise and regard the enterprise as a place for entrepreneurs to learn.

Although many literature defines entrepreneurs' learning (see Table 2-2), it is still necessary to continue paying attention to the specific situation and to the entrepreneur's learning style. The entrepreneur's learning is hereby considered as the active learning of entrepreneurs who acquire and store knowledge through the situated learning style.

Table 2- 2 Views about entrepreneur's learning

Literature	Views

Young and Sexton (1997)	Entrepreneur's learning is a psychological process to acquire, store and reuse knowledge
Baron (2000)	Entrepreneurs require high information processing ability
Yuan, Pan, and Wang (2001)	Entrepreneur's learning can be categorized to knowledge acquisition, storage and reuse
Wei and Liu (2005)	Entrepreneur's learning is the result of the interaction of various factors
Pech and Cameron (2006)	Entrepreneurs' decision-making process is not linear or continuous

In conclusion, this thesis holds that entrepreneur's learning is a gradual process of transforming the experience of oneself and others into knowledge, that is, engaging in the transformation, absorption and behavior change from experience to knowledge through the guidance of mentors, entrepreneurial networks and key events. This is closely associated with entrepreneur's growth and firm development. Specifically, it has the following meanings:

(1) Entrepreneur's learning is a process of transformation from experience to knowledge. Therein, experience is not only entrepreneurs' own experience, but also the experience of other network actors (e.g. mentors).

(2) Mentors, entrepreneur networks and key events are the main ways of entrepreneurial learning, each of which can be carried out alone or in cooperation with each other.

(3) Entrepreneur's learning is the keyway to realize the development of enterprises and the growth of entrepreneurs themselves.

To explore the essence of entrepreneur's learning, below the comparison between entrepreneur's learning and the learning in its general sense is presented.

(1) The particularity of the cognitive process. Entrepreneurs have very different cognitive processes from managers, and that there is a common culture related to entrepreneurship. In such a culture, the cognitive processes of entrepreneurs are homogeneous, and they are good at discovering and identifying opportunities, and then using the necessary resources to develop opportunities that are beneficial to the enterprises.

Pech and Cameron (2006) have constructed a model to describe the information process of entrepreneurs from receiving information to making decisions. In this model, the entrepreneurs' decision-making process is not linear or continuous. The model describes information flow and decision screening, and the two processes are continuous in some parts

and circular in others. They all have feed-forward and feedback paths, which are distributed in a parallel way. This model contains such factors as the psychological mechanism of entrepreneurs, the information used in decision-making, personality characteristics, traits, emotions and attitudes. These factors are an indispensable part of the learning process of entrepreneurs, and they also distinguish the learning process of entrepreneurs from the learning process of other managers.

Baron (2000) believes that because of the environment faced by entrepreneurs, their information processing ability needs to be higher. However, the high degree of uncertainty, novelty and pressure will greatly influence entrepreneur’s learning process. Therefore, compared with other people, the learning process of entrepreneurs has its particularities. For example, entrepreneurs have more counterfactual insights than others when experiencing negative outcomes.

(2) Complexity of the learning process and method. In addition to the particularity manifested in the cognitive process, entrepreneur’s learning is of great significance because of the complexity of the learning process and method. Schön and Argyris (1996) propose a double loop of learning and reflection learning. This is a general process of organizational learning and it has some guiding significance for entrepreneurial learning, which is a progressive process divided into several stages. Yuan, Pan, and Wang (2001) for example, categorize entrepreneur’s learning into knowledge acquisition, storage and reuse. In the process of knowledge acquisition, entrepreneurs will carry out self-guided learning, including two modes: linear and nonlinear learning.

Rae and Carswell (2000) regard entrepreneurship as a dynamic process, instead of the static property of an individual. Accordingly, entrepreneur’s learning has different characteristics from individual learning in general. Through experience learning entrepreneurs can bring new ideas and effectively change their behavior. Therefore, in the opinion of Rae and Carswell (2000), the biggest difference between entrepreneur’s learning and other individuals' learning is that this process is not an ordinary cognitive process or a double-loop learning process, but a complex system.

In addition, entrepreneurs' different learning behaviors come from their own sources of knowledge. According to different knowledge resources, entrepreneurs will show different learning behaviors. In view of the knowledge resources derived from the education system, the essential incentive contained in the enterprise management and the knowledge resources embedded in the social networks, the learning of entrepreneurs is manifested in two different

learning models: based on "key events-solutions" and based on social networks. All the above learning models are unique to entrepreneurs, they do not exist independently, but can promote each other.

(3) Entrepreneur's learning is a kind of contextual learning. All the above viewpoints about learning models are grounded in a cognitive view, which may be insufficient in explaining the learning process from experience to knowledge. Other scholars, as for example Wei and Liu (2005), studied the learning process of entrepreneurs from the perspective of networks. In their opinion, in different stages of enterprise development, entrepreneurs' networks present different characteristics, and correspondingly, there are different models of entrepreneurial learning. In the start-up period of an enterprise, the learning of entrepreneurs is an absorptive learning model from unconsciousness to consciousness, from passiveness to activeness. In the period of enterprise growth, entrepreneur's learning is conscious, active and gradual learning, which bears systematic, procedural and sustainable characteristics. In addition, during the transition, entrepreneur's learning is a triggered and nonlinear learning model based on key events.

Although the learning model of Wei and Liu (2005) considers the specific environment of enterprises, their construction of learning model ignores the personal perception process of entrepreneurs and the specific situation of enterprises. They believe that entrepreneur's learning is the result of the interaction of many factors in the concrete practice, among which the specific situation is the key factor in the entrepreneur's learning mechanism.

2.2.3 Models of entrepreneur's learning

Some research findings show that there are some binary learning concepts such as low-level/high-level and adaptive/creative learning and, according to (Kaffka & Krueger, 2018) the individual learning of entrepreneurs also contains a similar binary classification.

On the one hand, low-level learning is referred to as adaptive learning, or single-loop learning, shallow learning, or exploitative learning. Low-level learning is progressive learning. It is mainly to use, select, optimize and execute the existing behaviors and paths of organizations or individuals. On the other hand, high-level learning is referred to as creative learning, double-loop learning (Chatti, 2012) or exploratory learning. High-level learning is reflective advanced learning. It is mainly to question and reflect on the existing behaviors and paths, which requires the development of a new way to examine things. Both high-level and low-level learning play a positive role in organizations. However, it is generally believed that high-level learning is more valuable to organizations or individuals than low-level learning, especially in highly

competitive markets.

Yukongdi and Lopa (2017) examine the impact of entrepreneurs' exploratory learning and exploitative learning on opportunity identification as an empirical transformation model from a theoretical and practical perspective.

2.3 Related studies on absorptive capacity

2.3.1 Connotation of absorptive capacity

Absorptive capacity is defined as the assimilation of new knowledge, new technologies, new ideas into the organizational processes. As a great driving force of organizational performance (Cohen & Levinthal, 1990; Easterby-Smith et al., 2008), absorptive capacity belongs to the categories of dynamic capability, organizational learning, and knowledge management. From a practical perspective, firstly, absorptive capacity focuses on external environment of an organization, emphasizing that the organization needs to search, identify and obtain information, technology, knowledge from the outside; secondly, absorptive capacity highlights how to learn from experience.

Cohen and Levinthal (1990) first studied the concept of absorptive capacity arguing that it refers to the ability of an enterprise to identify, absorb, and utilize resources such as knowledge from the organizational environment. Resource acquisition is conducted by the managers of the enterprise and spans across organizations. Therefore, entrepreneur’s learning ability can effectively increase organization's absorption and the learning process. From the business level, absorptive capacity emphasizes how a firm obtains resources from the organizational environment and transforms them into business.

According to previous studies, absorptive capacity mainly includes three aspects: how to identify the value of resources, how to absorb and use resources, and how to apply new external resources to business activities (Van Den Bosch, Van Wijk, & Volberda, 2003). Besides, absorptive capacity of an organization is affected by the level of organizational resource search and organizational environment. To be more specific, absorptive capacity depends on individual-level absorption and learning, however, it is not just the sum of individual learning results. Absorptive capacity is a multi-dimensional structure and there is an obvious relationship between absorptive capacity and organizational learning. Prior knowledge, environment constraints, and path dependencies of an enterprise are generally considered to limit the ability to obtain, integrate, and utilize resources from the external environment. In private enterprises,

managers with a high level of entrepreneurial learning ability probably may break the path dependence and inertia effectively, and absorb and integrate external resources, thereby transforming them into innovation ability. Table 2-3 shows a summary of some literature about absorptive capacity.

Table 2- 3 Views about absorptive capacity

Literature	Views
Cohen and Levinthal (1990)	Absorptive capacity is the ability to identify, absorb and utilize resources can effectively improve enterprise's value creation
Van Den Bosch, Van Wijk, and Volberda (2003)	Absorptive capacity mainly includes three aspects: how to identify the value of resources, how to absorb and use resources, and how to apply new external resources to business activities
Cadiz, Sawyer, and Griffith (2009)	Absorptive capacity describes an organization's ability to use past experience to enhance the ability to learn and utilize new knowledge
Camisón and Forés (2010)	Absorptive capacity is a dynamic capability of an enterprise

2.3.2 Absorptive capacity and firm's innovation

In knowledge-intensive business environments, firms must acquire and use resources from the external environment to innovate and improve their performance. Knowledge spills are one of the antecedents of innovation. Prior studies suggest that technological changes originating from outside have an important role in boosting innovation (Qian, Acs, & Stough, 2013). Many firms are not easy to obtain resources from the outside and need to develop their own absorptive capacity, which is also considered to be the source of the firm's competitive advantage in innovative activities. Firms use absorptive capacity to conduct exploratory learning, transformational learning, and exploitative learning (Tzokas et al., 2015).

The knowledge spillover effect of absorptive capacity establishes a link between organizational learning, knowledge, and entrepreneur's learning, since it can increase the interaction of the absorptive capacity and resource endowment of an enterprise. Entrepreneurs with higher learning ability can effectively improve organizational absorptive capacity, thereby increasing corporate innovation performance. Qian and Acs (2013) believe that the entrepreneur's learning ability represents the absorptive capacity of resource spillovers, and the ability of entrepreneurs to understand and recognize the value of new knowledge which may

increase the commercialization of organizational resources.

Enterprises, especially Chinese private enterprises, are faced with dynamic and complex changes when carrying out innovation activities, which are often characterized by high risk, high investment, and high uncertainty. Absorptive capacity, however, may help firms adapt to the dynamics and complexity of changes. Serving as a screening or intermediary mechanism for resources such as information, technology, and knowledge, absorptive capacity can effectively help firms use external resources to build organizations' innovative and competitive advantages (Tzokas et al., 2015). First, absorptive capacity helps firms scan the organizational environment, search and identify industry information in a timely manner, observe industry technology development routes, and explore opportunities for new resources. Searching the organizational environment can expand the depth and breadth of organizational resource acquisition, that is to say, expand the search of organizational innovation resources. Secondly, resource acquisition is necessary for effective resource application. Only when members in the organization have the ability to apply and use innovative resources can they effectively digest and absorb those that are externally acquired and turn them into commercial applications (Roberts, 2015). Finally, firms are required to continuously adapt to market demands, and take advantage of new innovation opportunities to turn them into product competitiveness (Zou, Ertug, & George, 2018).

The application and re-creation of resources by absorptive capacity requires enterprises to be able to skillfully turn innovative resources into new products and services. This conversion process is a dynamic and frequent interaction process of resources, whilst the entrepreneur's learning ability effectively enhances the resource sharing and the acceptance of new ideas and technologies so as to adapt to changes. Therefore, absorptive capacity is a self-value-added and value-creation process of enterprise resource creation, making it easier to effectively use external resources, and easier to adapt to changes, and increase innovation speed.

2.3.3 Measurement of absorptive capacity

According to organizational learning theory, the ability to identify, absorb and utilize resources can effectively improve enterprise's value creation (Cohen & Levinthal, 1990). Managers can shift individual-level learning in the organization into organization-level learning. Through absorptive capacity the ability to absorb and utilize new knowledge, new technologies and other resources from other organizations can be enhanced (Todorova & Durisin, 2007). Besides, social cognitive theory holds that the interaction of behavior, cognition, and the

environment makes an individual. Through the cognitive process, the environment can influence individual behavior (Volberda, Foss, & Lyles, 2010).

The interaction of resources in an organization is affected by the cognitive structure of the organization. Such cognitive structure guides individuals to identify, select, and process resources and determines individual behavior and decisions. Moreover, establishing learning relationships with other organizations to gain more control and reduce external dependencies creates a link between the resource dependency theory and absorptive capacity (Davis & Cobb, 2010). The resource dependency theory states that interaction among organizations and the openness of external resources are key factors for innovation (Cohen & Levinthal, 1990). Resource transfer depends on the process of interaction with the recipient. Therefore, enterprises need capable individuals, because they have a keener ability to acquire, store and process external resources. Dynamic capabilities theory holds that the ability to establish and reconfigure internal and external resources of an organization can effectively meet the challenges of the external environment (Eisenhardt & Martin, 2000). The interaction of resources in an organization effectively enhances the organization's dynamic capabilities since it encourages the organization to learn. As a dynamic capability, absorptive capacity can continuously absorb external resources, update the reserves of existing resources, and develop new resources.

Huang et al. (2018) emphasize that previous studies on absorptive capacity have focused on the mediating or moderating effect of absorptive capacity on innovation. However, these measures of absorptive capacity are more about R&D investment intensity and willingness.

Cadiz, Sawyer, and Griffith (2009) as well as Jiménez-Barrionuevo, García-Morales, and Molina (2011) believe that absorptive capacity describes an organization's ability to use past experience to enhance its ability to learn and utilize new knowledge. According to these authors, the measurement of absorptive capacity mainly includes three aspects: the first is evaluation or identification of valuable resources that meet customer needs; the second is transformation and sharing of new resources; the third is application of new resources.

Camisón and Forés (2010) and Flatten, Greve, and Brettel (2011) state that absorptive capacity is a dynamic capability of an enterprise, which has an important impact on its innovation activities since it helps enterprises to adapt to changes in the organizational environment and also to search, absorb, transform and develop external resources in various ways. The first is to effectively search and identify external resources; the second is to effectively analyze, process and internalize the acquired resources; the third is to improve the

interaction of resources such as explicit and implicit knowledge by digesting the acquired knowledge and other resources; the fourth is to re-integrate the acquired resources to re-create and realize the development or innovation of new products, services, and processes. Therefore, the measurement of absorptive capacity needs to be consider in a multi-dimensional perspective (Apriliyanti & Alon, 2017)

2.4 Related studies on market orientation

2.4.1 Connotation of market orientation

Market orientation presents the extent to which a firm pays attention to market actors during the formulation of business strategy and when making operation decisions. Ho et al., (2018) define market orientation as the integration and responsiveness of market information related to current requirements and potential demands. Market orientation is an antecedent of value creation, improving corporate competitiveness and enhancing corporate financial performance. Studies on market orientation are an important part of marketing and enterprise management. Earlier studies on market orientation have made some progress in marketing theory, however the impact of these studies on practice was minimal until the concept of market orientation emerged in the literature. Since the use of the term "marketing orientation" was easy to be misunderstood and to narrow down the scope of marketing, Kohli, Jaworski, and Kumar (1993) advocated the use of "market orientation" rather than "marketing orientation" to better reflect the essence of specific marketing activities. The use of the term "market orientation" means that the entire organization needs to generate market information about current and future customer needs and the departments concerned should disseminate such information and respond accordingly. Market orientation embodies firm's culture that could affect the corresponding behavior, and create excellent value for customers (Narver & Slater, 1990).

Market orientation involves how to meet customers' market needs, how to match these needs with corporate capabilities, and how to obtain information from customers' feedback on technological innovations or product improvements. Market orientation requires firms to have the ability to quickly identify customer needs, improve product innovation efficiency, and be able to effectively formulate strategies to enhance their competitive advantage. Some scholars argue that market-oriented strategy means that firms' focus is on learning, which involves the process of organizational behavior change and performance improvement.

Market orientation pushes functional coordination between organizations, effectively

promotes the coordinated application and re-creation of organizational resources and, along with learning orientation, can effectively improve organizational performance. Therefore, the connotation of market orientation mainly involves customer-oriented, positioning of competitors and coordination of functions among departments. These three aspects provide a whole framework for enterprises to obtain, identify, diffuse and use market information. The goal of enterprise market orientation is grounded in customer insight and competitor analysis, and thus can provide customers with outstanding value.

2.4.2 Market orientation and firm's innovation

Marketing scholars have defined market orientation as the key framework for achieving sustainable development. Focusing on market actors, market orientation integrates corporate functions and creates superior value for customers (Najafi-Tavani, Sharifi, & Najafi-Tavani, 2016). More and more studies show that market orientation has an impact on corporate innovation. Customers and competitors have a positive impact on corporate innovation, because market orientation affects firm's performance by understanding customer needs, especially its leading customers (Beck et al., 2011).

As a marketing concept in the corporate value chain, market orientation indicates that participants in all links of the corporate value chain are committed to meeting buyer's requirements and interact strategically with participating members in other value chain links so as to create an outstanding value in horizontal or vertical marketing systems. Through cross-function coordination, it is possible to increase the spread and sharing of resources, which help firms gain insights and discover new innovation opportunities from market resources. Through the coordination between different functions, a good atmosphere of organizational innovation can be established, and the establishment of trust relationships across departments can create good conditions for the absorption, learning and re-application of market information. Besides, the market orientation of customer demand can promote enterprises to pay close attention to market customer needs, predict product development trends, and then improve or innovate the products of the enterprise to meet customer needs.

Finally, market orientation grounded in competitor's positioning can also effectively promote corporate innovation. Through locating and evaluating competitors, exploring their advantages and disadvantages organizations can make up for their own strategic deficiencies, and stimulate the distinctiveness of their products or services from competitors (Newman, Prajogo, & Atherton, 2016). Therefore, market orientation enhances the source of sustainable

competitive advantage analysis for an enterprise, and then promotes the organization's integration and utilization of external resources. Hence, market-oriented enterprises can better promote the organization's search, absorption, and utilization of external resources and can actively respond to market requirements, and also to the generation, absorption, and integration of resources in the market.

2.4.3 Measurement of market orientation

In light of the measurement of market orientation, there are mainly two kinds of measurement scales. Narver and Slater (1990) developed a MKTOR measurement questionnaire, in which the market orientation scale included three dimensions, namely, customer orientation, competition orientation and cross-departmental coordination in a total of 14 items measured in a seven-point Likert scale. Kohli et al. (1993) put forward the MARKOR scale which features 20 five-point Likert scale items including the generation of market information, the dissemination of market information in the organization, and the organizational activities and reactions with regard to market information. The MARKOR scale has a high requirement on the subjects of investigation who should have a comprehensive understanding of the operation of enterprises. In general, both scales are based on the cooperation between customers, competitors and departments. Although they measure market orientation from different perspectives, they both emphasize the importance of obtaining customer and competitor information from the external network in recognition that the coordination and digestion of external information is very important for enterprises. It can be said that market orientation is a continuous process ranging from acquisition to response against market information. Research on market orientation must take departments and even the whole enterprise as the object. Therefore, no matter how the market orientation dimension is divided and measured, its essence will not change.

Among the studies around market orientation and outcome variables, most of them highlight the influences of a market-oriented strategy over firm's performance, specially over innovation performance. Others divide market orientation into more detailed dimensions to explore the impact of different dimensions. Some scholars use the binary analysis method to compare the different effects of "inside-out" strategy and "outside-in" strategy over innovation performance. The results show that the former has a direct effect on innovation performance, while the latter has an indirect effect. The "outside-in" here means market orientation, because researchers use two types of market orientation to describe it.

Newman, Prajogo, and Atherton (2016) point out that customer-oriented strategy is different from competitor-oriented strategy, leading to different impacts on exploratory innovation and utilization-type innovation. They also explain the effect of ownership structure on variable relationships. Dessart, Veloutsou, and Morgan-Thomas (2015) explored that entrepreneurship interwinding with market-oriented strategy would impose a moderation effect on product generation. Empirical results revealed that when a firm pays more attention to market actors and becomes more market-oriented, it is going to have a better performance in fundamental innovation, with innovation ability playing a moderating role. With regard to domestic scholars, Li and Wang (2015) explain the difference between market orientation and government orientation on Chinese enterprise innovation based on the institutional theory. Zhu and Chen (2016) explored the action mechanism of iterative innovation of market-oriented start-up enterprises and put forward different innovation paths for responsive and proactive market-oriented start-ups. Other scholars explored the role of market orientation in different situations in such aspects as new product development, technological innovation and enterprise growth performance.

In conclusion, in recent years, research on market orientation has begun to pay attention to the effect of market actors on enterprise innovation, as well as has tried to explore some organizational mechanisms of market orientation. The process for enterprises to realize innovation with market as orientation is still unclear.

2.5 Related studies on policy support

2.5.1 Policy support and firm's innovation

The innovation advantages of enterprises not only come from their resources and capabilities, but also from the policy environment of their geographical location. Wei and Liu (2005) argue that the support of government policies on corporate R&D activities improves the innovation performance of enterprises. Arthurs et al. (2009) state that government policy support enhance firm's innovation outputs, profitability, and growth. Actually, existing research shows that policy support has a positive role in supporting innovation in private enterprises and that government support policies, such as promotion of corporate innovation subsidies, tax incentives and loans reduce the risk of innovation failure (Kang & Park, 2012).

In the high-tech industry, government funding programs for industry research and development have become more and more popular and many governments encourage corporate

innovation and the transformation of industrial development structures by supporting corporate research and development projects, thereby achieving high-quality economic and social development (Jaumotte & Pain, 2005). Studies on corporate innovation show that the government provides project research and development support to private enterprises in the form of public policies, which promotes the growth of corporate innovation performance. As to classification, policy support can be divided into horizontal-support policy and vertical-support policy (Wei & Liu, 2015).

Horizontal support is related to the government's policies that will bring externalities to enterprises (Lazzarini, 2015). Specifically, since the innovation process is closely related to the organizational environment, horizontal policy support is to improve the ratio of R&D investment and potential innovation benefits. Because horizontal policy support does not focus on a certain industry or enterprise, it is more about creating a good business environment, increasing the inflow of external resources to the enterprise, and promoting innovation by the market power, horizontal policy support is more related to the formulation of regional innovation policies and tax credit policies. Through these policies, firms are encouraged to participate extensively in R&D, which improves the innovation outcomes of firms in the region.

Vertical support policies are developed by formulating corresponding policy support for a specific industry or enterprise and are more related to government subsidies as it is the case of knowledge-intensive industries, which need a large amount of capital in carrying out innovation activities. The government's R&D supplement is an important external resource to help enterprises carry out innovation activities, which reduces the time for enterprises to engage in innovation risks. Besides, government's R&D supplement can ease the obstacles caused by enterprises' R&D investment and competitors' imitation. A significant feature of China's innovation system is that government R&D investment is mainly dominated by government. Government subsidies for scientific research projects can promote the transfer of knowledge from universities and public research institutions to enterprises, thereby promoting enterprises to obtain external resources to develop new knowledge and to improve innovation performance (Xu, Huang, & Xu, 2014). Therefore, the government's policy support has established a virtuous cycle path for firm's innovation activities: government subsidies → enterprise R&D investment → basic and applied technological breakthroughs → the introduction of new products and services → high profits through existing model → additional R&D investment.

2.5.2 Measurement of policy support

In China, as a coordinator of the national innovation system, the government aims to achieve national scientific and technological innovation and increase firms' innovation abilities by providing a good policy environment and infrastructure, and by guiding and intervening in technological innovation activities through social resources in its possession. An effective policy helps to share the risk of corporate innovation, reduce its cost, accelerate its speed, and improve its efficiency, as well as the overall efficiency of policy support. Government policies play an active role in the process of corporate innovation. The government provides enterprises with support in terms of capital, technology, and talents, information, consulting, and personnel training services, special funding support and by reducing market entry barriers, thus having a positive effect on the technological innovation of enterprises (Zhang & Peng, 2008)

Policy support is an indispensable move for a country, region or industry to improve its economic competitiveness. However, due to different public governance systems, the state, market, and society play different roles. The policy support systems for enterprises are different. They are neither a unilateral action by national actors, nor its equivalent to government top-down command and administrative governance. The government influences enterprise innovation activities in various ways, thereby affecting the development model and the trajectory of enterprise technology innovation in the future and promoting its development through creating incentive systems and policy environments.

In China, the impact of government policy on technological innovation is achieved through two approaches. One is by encouraging mutual cooperation among firms for technical cooperation; the other is to protect the R&D outcomes of enterprises through policy support. Previous research on policy support and innovation divide government policies at different levels into industrial policies and regional policies. Industrial policy is more concerned with the sum of a series of various policies formulated by the central government in order to achieve the formation or development of an industry. Industrial policy, as the main means of implementing the national innovation development strategy, has an important impact on the cultivation and improvement of corporate competitiveness, improvement and innovation performance of powerful enterprises. Industrial policies can effectively promote the targeted accumulation, diffusion, sharing, and flow of resources, and build a sustainable competitive advantage that supports dynamic adjustment (Feng, 2019). Industrial policies mainly include public utilities policy, science and technology policy, education policy and financial policy. To be more specific, industrial policy includes R&D support subsidies, R&D grants, tax incentives for R&D, and

low-interest loans for R&D. Regional policies are more normative laws and regulations that are formulated by local governments based on the macro-industry policies of the central government and can only take effect within the local area. Regional policies mainly include regional investment promotion policies, regional tax policies, regional basic environmental policies, and regional innovation environmental policies.

2.6 Related studies on innovation performance

2.6.1 Connotation of innovation performance

Innovation performance is the conversion of an enterprise's innovation input to R&D outcomes, and it reflects the efficiency and effectiveness of technological innovation activities carried out by an enterprise or organization.

Innovation performance in a narrow sense can be measured with the efficiency and effectiveness of the introduction of an enterprise invention and creation into the market process. In a broad sense it refers to achievements made in the process from the emergence of an idea to the creation of new products and is a way to evaluate the efficiency of enterprise production and operation activities.

When considering the definition of innovation, the most influential is the one used in the Community Innovation Survey (CIS), a large-scale questionnaire survey on corporate innovation activities and conditions conducted jointly by European countries and covering more than 30 countries (OECD, 2005). In the manual of this questionnaire the definition of innovation is clearly given as implementing or executing a new or significantly-improved products/services/process, a new marketing method, or a new organizational approach in business practice, in organizational work or in external relations (OECD, 2005). This definition of innovation has been affirmed by a considerable number of scholars, and the concept definition applied to specific research has been derived accordingly. For example, Crossan and Apaydin (2010) restated the above concept considering that innovation is an act of production or adoption, assimilation and utilization that can produce value in economic and social life. It not only includes products, services, market renewal and expansion, but also the development of new production methods and the implementation of new management systems. They held the opinion that innovation is both a process and an output. This definition of innovation echoes the definition of innovation in CIS, but the former is more targeted than the latter.

The performance of enterprise innovation is a comprehensive reflection of the result of

enterprise innovation behavior, so it is difficult to define its concept clearly. However, the innovation performance of enterprises may help them to recombine the resources needed for innovation, so that they can be more in line with the competition requirements of the market. Under the concept of management, innovation performance is also divided into broad sense and narrow sense. Freeman and Soete (1997), for example, hold that innovation performance in a narrow sense refers to the process whereby enterprises introduce their innovative products into the market, that is the speed at which new products and new technologies are produced. Ahuja and Lampert (2001) defined innovation performance in a broad sense holding that it is the whole process of producing innovative products from the generation of its concept to its introduction in the market.

In this process, enterprises should not only pay attention to technological innovation, but also to the market prospect of innovative products. Ahuja and Lampert (2001) synthesize prior studies and explore innovation performance both in a broad and a narrow sense respectively.

Gao, Wang, and Wei (2004) consider that the innovation performance of an enterprise is the innovation efficiency in the process of enterprise innovation, the output effect of innovative products and the market contribution rate of innovative products. This includes the process performance and output performance in enterprise innovation performance. Mai and Nie (2003) propose that the national economy and the policy system would influence firm's innovation performance. Xie et al. (2007) states that organizational culture and enterprise incentive system would affect innovation performance. In turn, Xiang and Liu (2011) studied Chinese and foreign literature around enterprise innovation and summarized the measurement of enterprise innovation performance from various perspectives.

In conclusion, this thesis holds that innovation performance is the commercialization value that is finally produced by investing necessary resource elements and combining a series of their allocation and combination processes. It not only includes the efficiency of a process, the results of an output and their contribution to commercial success (Gao, Wang, & Wei, 2004), but also considers the effectiveness of contribution to the society, including the economic and public benefits of enterprises.

If a certain innovation activity of an enterprise yields a better result, it represents the innovation performance of that enterprise and it will be applied in the next stage of production. Then the enterprise will get more innovation opportunities, which will continue to cycle back and forth to improve its market competitive advantage and economic benefit. Innovation performance consists in reforming and developing the traditional performance mode, so as to

improve the original performance model. Table 2-4 shows some views about innovation performance.

Table 2- 4 Views about innovation performance

Literature	Definition
Freeman and Soete (1997)	The speed at which new products and new technologies are produced
Ahuja and Lampert (2001)	Whole process of producing innovative products from the generation of its concept to its introduction in the market.
Gao, Wang, and Wei (2004)	Innovation efficiency in the process of enterprise innovation, the output effect of innovative products and the market contribution rate of innovative products
OECD (2005)	a new or significantly improved products/services/process, a new marketing method, or a new organizational approach in business practice, in organizational work or in external relations
Crossan and Apaydin (2010)	An act of production or adoption, assimilation and utilization that can produce value in economic and social life

2.6.2 Antecedents of innovation performance

After economist Schumpeter (1911) proposed the concept of technological innovation, studies on antecedents of innovation performance from the aspects of innovation sources and innovation environment have been rising. Horta, Camanho, and Da Costa (2012) study antecedents of new product development process to verify their impact on innovation performance. Demirdöğen, Erdal, and Akbaba (2018) study the effect of technology sourcing strategies on innovation speed, development cost and innovation performance. Lu et al. (2018) discuss the effect of R&D projects on product innovation performance in such aspects as market and environment. Grounded in the characteristics of innovation activities, Xu, Huang, and Xu (2014) propose that self-transcendence could indirectly affect innovation performance through such dynamic abilities as organizational learning and technological innovation.

Research on the antecedents of innovation performance started relatively late in China, but scholars have also made some progress by combining the practice of Chinese enterprises. Grounded in industry practice and through the regression analysis of innovation performance indicators, Lu et al. (2018) conclude that R&D input and identification with the role of innovation were the key factors that affected innovation performance. Zhou et al. (2018) believe

that the performance of technological innovation is affected by many factors, but the direct determining factors are innovation input (e.g. capital investment, R&D personnel input, technology input) and innovation output (e.g. products, processes and other tangible products and patents, goodwill, technology and other intangible products). From the point of view of resource acquisition, Wang, Wu, and Wang (2018) thoroughly analyze how corporate social capital affected the technological innovation performance of enterprises through its role in resource acquisition. Tang, Chen, and Peng (2014) discuss the influence of network structure on innovation performance and enterprise performance within the cluster. The results show that the network density, contact strength, network scale, stability and the degree of resource abundance among other factors embedded by enterprises have a positive impact on innovation performance.

Xie et al. (2007) constructed a conceptual model including innovation environment, individual innovation, collective innovation, the level of innovation by all people and innovation performance based on the relevant practice and research on the operation of innovation by all people in enterprises to explore the operation mechanism between innovation and innovation performance. Lu, Guan, and Li (2018) put forward an open innovation system stating that each innovation source could make up for the shortage of internal innovation resources of enterprises by obtaining market information and technical resources, and then affect innovation performance. Song (2018) believes that in the process of new product development, the flexibility of strategy (including the flexibility of resources and the flexibility of coordination) play a regulatory role in the relationship between product innovation and innovation performance. Other studies have examined the impact of different actors (e.g. customers, suppliers, competitors, intermediaries, research institutions, government agencies) on innovation performance from the cooperative network of small and medium-sized enterprises.

In spite of this research, there is still a lack of systematic theoretical research on the antecedents of enterprise innovation performance including innovation environment and innovation input. The innovation environment is the guarantee to achieve innovation performance, including the formulation and implementation of innovation strategy, organizational structure, corporate culture (Chen & Chen, 2008), entrepreneur quality, management team (Zhang & Zhang, 2018), environmental adaptability (Yao & Fu, 2018), organizational learning mechanism, network resource integration ability and flexibility (Ke, Shi, & Gan, 2018). Shi (2011) argues that the adventurous spirit and innovation consciousness of

entrepreneurs increase the probability of enterprises discovering innovation opportunities and guide enterprises to correctly judge when, where and how to innovate, so as to improve the quality of innovation output. He further argues that the willingness of employees to innovate is directly related to the overall innovation ability and level of enterprises. Therefore, if employees have a stronger willingness to innovate, it will be easier for enterprises to accept new ideas, new opinions and new things from the grass-roots level, and the motivation and ability of knowledge transfer will be enhanced more effectively, so that the innovation performance of enterprises can be improved.

Innovation input mainly includes technology research and development, human resource input, venture fund input, daily operation input and enterprise material reserve input. Guo (2014) states that the larger the number of R&D personnel, the higher the quality of innovation will be and the more it will promote the research and development of innovative products. In addition, the continuous improvement of the proportion of R&D capital input could also facilitate enterprises' introduction of advanced equipment, technology and talents so as to improve innovation performance. Hu and Zhong (2011) have conducted an empirical test on 1562 high-tech enterprises in industries of new materials, electronic information and new energy in Jiangsu Province. Results show that there is no obvious correlation between the proportion of R&D personnel and the performance output of technological innovation, and that there is an obvious negative correlation between the input intensity of R&D expenditure and the output of innovation performance. Innovation networks provide enterprises with many channels for knowledge exchange and flow, which greatly promotes resource integration and mutual learning.

Through research and analysis, Yi (2012) concludes that the more frequent the frequency of interaction between enterprises and external members is, the more it can improve the mutual cognition ability and knowledge transfer ability among members, so as to improve innovation performance. In turn, Yang (2018) shows that it is difficult to draw a consistent conclusion about the impact of enterprise size on innovation performance; on the one hand, large enterprises with resource advantages can often achieve a higher innovation scale effect; on the other hand, technological innovation is related to the complexity of innovation activities themselves, and cannot be simply evaluated by enterprise size. In fact, there may be a U-shaped curve relationship between the two.

In addition, exogenous factors should also be considered. They mainly refer to non-controllable variables other than actively controllable ones within enterprises, including

political factors, macroeconomic factors, regional resource endowments, national ownership structure, science and technology level factors. Analyzing external factors can help enterprises to recognize threats and chances embedded in the environment and many scholars have concluded that policy and environmental factors are significantly related to innovation ability.

Guo (2014) proposes that the market provides all kinds of necessary production factors for enterprise innovation. Only by matching the market demand can innovation activities of enterprises improve the quality and sales of innovative products and enhance market competitiveness. Empirical results obtained by Zhang and Lu (2013) show that the national policy environment has a significant impact on the development and innovation of enterprises, and the government can often affect the innovation decision-making through finance, taxation and resource allocation. If an enterprise can interpret the national policy well, it can greatly reduce its transaction costs and obtain more information and resources. In addition, the nature of the industry to which the enterprise belongs, and its industrial basis will also affect innovation performance since the perfection of the industrial chain and the renewal speed of the product itself will also require technological innovation. Through the formation of a benign competitive atmosphere in the whole industry, the innovation output and innovation performance of the whole industry will be improved. In addition, the differences in ownership and the nature of property rights will also lead to differences in the corporate governance structure and operation mode of enterprises (Jiang, Zhang, & Wang, 2009).

2.6.3 Measurement of innovation performance

As mentioned before, innovation performance is a comprehensive evaluation of the efficiency and effectiveness of enterprise innovation activities. Academic research on innovation performance is relatively mature, and because of the diversity and difference of scholars' research perspectives, different views on the measurement dimensions of innovation performance have been put forward. To sum up, innovation performance can be measured in the following aspects: (1) In the form of innovation results, including new products, new technologies, new brands and new intellectual property rights. N. Zhang (2018), for example, proposes that measurements be carried out in such aspects as R&D input, the number of patents filed, and the quantity and speed of new product development; (2) In the form of innovation benefits and, in this case, the innovation performance of enterprises is not only reflected in the commercialization of the market, but also includes the comprehensive benefit level such as value realization; and (3) In the form of innovation type, such as product innovation or process

innovation.

Innovation performance is embodied not only in product and process innovation, but also in system, structure and management innovation, and includes both new product research and development and new patent application.

Lee, Hwang, and Chen (2017) use the Korean Innovation Survey to measure innovation performance. Liu et al. (2008) use five items to evaluate the product innovation performance of enterprises subjectively. When studying openness of knowledge search and enterprise innovation, Salge et al. (2013) divided product innovation into novel product generation and commercialization. The creativity of new products is measured with the average score of three items, each one being measured by a 5-point Likert scale, while the success of new products is measured with the average value of the three items, which in turn are measured with a 3-point Likert scale (Gatignon et al., 2002).

2.7 Research comments

Based on the research findings of some scholars, it is found that some progress has been made in what concerns entrepreneurs' learning ability, absorptive capacity, market orientation, policy support, and innovation performance studies. However, few researchers in China have analyzed the impact of entrepreneur’s learning ability on innovation performance.

First, technological innovation contributing to economic growth has long been recognized from theoretical and empirical perspectives (Xie et al., 2007). Many studies have also theoretically expounded that entrepreneurs’ learning ability have an impact on economic growth. As Schumpeter (2000) stated, entrepreneurs, as innovators, contribute to national economic growth and their creative destruction has broken the balance of the economic system and creates opportunities for economic rents. In the process of balancing adjustment, more entrepreneurs enter business operations.

Since the beginning of economic reform in the 1980s, China has increasingly recognized the important role of entrepreneurs because of the needs of economic development and, as this chapter expounds, many Chinese scholars have discussed the function of entrepreneurs on the growth of enterprises from the perspective of their innovation ability. For example, Zhao (2014) studied the formation mechanism of entrepreneurial ability, entrepreneurial innovation and organizational ability, and proposed that the ability of entrepreneurs to discover opportunities has a very significant impact on innovation performance, and that the ability to establish

relationships has also an important impact on the growth of enterprises in each life cycle, while their innovation ability reduces transaction costs and then creates economic benefits. In terms of improving organizational ability, entrepreneurs try to enhance organizational innovation ability by such means as establishing a corporate culture with the characteristics of learning, innovation and reform, establishing an organizational structure based on mutual cooperation and good communication among departments and employees, and establishing knowledge sharing platforms.

Li (2018) proposes that entrepreneurs should guide the direction of innovation by working out clear and scientific strategic plans, integrate and allocate internal and external resources of enterprises, provide strong organizational system guarantee, establish the foundation of innovation, encourage learning and knowledge exchange within the organization, cultivate organizational ability, construct the enterprise culture of organizational innovation, and constantly improve employees' innovation willingness and enthusiasm to enhance the innovation ability of their enterprises.

Yang (2012) has carefully sorted out previous literature and identified seven kinds of entrepreneurial abilities including: opportunity identification, relationship weaving, organizational competences, strategic acumen, dedication, learning and innovation ability. In the explanation of entrepreneurial ability regarding innovation performance, it was found that entrepreneur's strategic acumen, learning, innovation and opportunity abilities play strong explanatory roles. In the competitive advantage of enterprises, innovation and customer response play a major role but, it is worth noting that, in this study, entrepreneur’s learning does not affect innovation performance. Han (2015) studied the innovation performance in logistics enterprises and analyzed the meanings, levels and forms of such three latent variables as corporate social capital, entrepreneurship and knowledge management and concluded that knowledge management does play a mediating role in the influence of social capital.

Although scholars have long been noticing entrepreneurs and their learning ability, there is still no clear understanding on how entrepreneurial ability acts on the organization within the enterprise, so as to improve innovation ability.

2.8 Summary of this chapter

Chapter 2 gives detailed review toward relevant theories and studies. The connotation, dimension and measurement of all constructs have been sorted out and summarized. Although

prior studies have somewhat explored the influences that entrepreneurs’ learning imposes over outcomes variables, less attention has been paid to how entrepreneur’s learning capabilities affect corporate performance. In a knowledge-intensive competition environment, the level of entrepreneur’s learning ability affects firms’ innovation activities. The literature reviewed has shown that external factors (i.e. market orientation and policy support) do affect the relationship mentioned above. Therefore, this thesis addresses the pathway from a selected sample of Chinese private entrepreneurs' learning ability to corporate innovation performance, explores how absorptive capacity mediates the above pathway, and analyzes the moderating role of market orientation and policy support and then carries out corresponding empirical analysis.

Chapter 3: Hypothesis Development and Conceptual Model

As shown in chapter 2, an increasing number of publications believes that entrepreneur's learning ability has a positive impact on the innovation performance of an enterprise. Grounded in related theories, this chapter aims to refine hypotheses and construct a conceptual model representative of the relationships of entrepreneur's learning ability, absorptive capacity and innovation performance and the moderating role of market orientation and policy support on the direct effects mentioned above.

3.1 Theoretical foundations

According to basic views of organization learning theory as described in Chapter 2, in a complex and ever-changing environment, entrepreneur's learning ability represents the key for an enterprise to adapt itself to environment changes and achieve sustainable development. Entrepreneur's learning also serves as the foundation for the enterprise to establish an innovative organization and to establish core competitive advantages by increasing R&D inputs (Chen, 2009). Acting as an important value and culture, entrepreneur's learning imposes influences over firm's development and competitiveness in the supply chain. For those companies that pursue a leading and competitive position in technological innovation, it is a necessity for company's managers, namely entrepreneurs, to build a continuous learning climate, establish a learning organization, link learning with work and encourage transformation. Thus, it helps firms achieve survival and enhances elasticity, flexibility and adaptability.

Some scholars point out that entrepreneur's learning can help enterprises establish learning organizations to quickly adapt to complex innovation environments and effectively improve absorption and innovation outcomes. First of all, the commitment to learning is conducive to enterprises establishing a positive innovative thinking, changing cognitive models and inertia and correcting wrong decisions and weaknesses in the innovation through continuous learning, so as to accumulate entrepreneur's learning ability and improve innovation performance.

Second, willingness to share encourages organizational members to communicate, and thus to some extent reduces innovation conflicts, and improves the firm's ability in strategic

planning, new product development, internal and external information responding capabilities, and market development.

Finally, open-mindedness can improve learning desires. When challenging traditional theories and assumptions in the process of innovation, it is beneficial to break the organizational path dependence and defenses, and constantly adjust learning and innovation models to improve resource efficiency and then absorptive capacity and innovation performance.

Therefore, entrepreneur’s learning ability can enhance the construction of learning climate, provide inspiration and intelligence. By learning and absorbing resources, firms probably apply innovative methods to solve technical or management problems. Entrepreneur’s learning ability is also a critical source to gain learning advantages since it allows leaders to openly commit to learning so as to build a learning organization that will act as a driving force for the development of innovation and of a common vision (García-Morales, Jiménez-Barrionuevo, & Gutiérrez-Gutiérrez, 2012). All in all, entrepreneur’s learning ability can effectively prompt the establishment of a learning organization and stimulate resource assimilation, which forms the cornerstone of innovative activities. Diverse knowledge and technologies existing in the organization enhance innovation while the absorption, transformation and re-application of resources by the organization, will increase the level of enterprise innovation and promote the realization of more innovative products. Therefore, enterprise innovation depends on resource diversity and couplings, and the establishment of the resource base is largely derived from the leader or manager of the enterprise. Their learning ability is good for the establishment of a resource base, for increasing learning and absorption ability and then improving enterprise innovation ability.

3.2 Hypothesis development

3.2.1 Entrepreneur’s learning ability and absorptive capacity

Entrepreneur’s learning ability is a dynamic cognitive and behavioral process of entrepreneurs' perception, acquisition and application of cognitive resources. It features in learning by doing, non-linearity, experience-based and key events. Entrepreneur's learning will affect other participants in the enterprise. At the same time, entrepreneur's learning can be divided into knowledge acquisition, digestion, accumulation and application. Therefore, it will impose strong influences on firm’s assimilation and performance (Zeng, 2012).

Entrepreneur’s learning is firstly an adaptation process in which the entrepreneur copes

with changes and survives; and secondly, it is a course of reflection and innovation in the adaptation process (Li, 2009). From the perspective of organizational learning, the outcomes obtained at the learning level must be converted into practical activities that are feasible at the implementation level, so as to be applied to the survival and development of an organization.

Considerable research emphasizes the importance of entrepreneur's ability. Whether the entrepreneur's learning ability is regarded as a basis or a supporting ability or as one of the dimensions exclusive to entrepreneurs, the significance of entrepreneur's learning ability lies in promoting the growth and development of an enterprise in the process of acquiring, storing and utilizing entrepreneur's knowledge to solve certain problems. In such process, entrepreneur's learning ability effectively plays dual functions: (i) promote the corporate growth directly and (ii) strengthening related abilities on the one hand, and on the other hand, making an indirect impact on corporate development (Zhao, 2004).

Absorption involves a firm's actions in searching, assimilating and configurating resources. It includes not only imitation learning of technological innovation or management innovation processes of other enterprises, but also the ability to conduct exploratory activities of basic scientific applications (Cohen & Levinthal, 1990). Absorptive capacity has become the core content of studies on organizational theories (Lane, Koka, & Pathak, 2002). The feedback path of absorptive capacity – absorptive capacity--learning--new absorptive capacity – is affected by the organizational environment and the successful response measures of the enterprise. Facing the turbulent environment of change, enterprises tend to expand their innovation resource base through effective search, absorption, utilization and learning of external resources.

As the cognitive and behavior process of entrepreneurs' perception, acquisition and use of cognitive resources, entrepreneurs' learning ability is an important way to promote organizations to absorb, acquire, and promote the absorption and application of knowledge. Deakins and Freel (1998) believe that entrepreneur's learning is generally discrete and nonlinear, and that the learning performance is based on key events. Meanwhile, they state that the objects of experience learning targets could be peers, customer feedback, experimentation, finding and solving problems. Young and Sexton (1997) identify learning procedures as external and internal learning procedures, and further divide them into self-learning, temporary visits to another person to obtain information/co-learning, frequent visits to another person and other indicators. Politis (2005) proposes that when considering entrepreneur's learning in a process view, it is easy to conclude that it facilitates knowledge generation and variation. He holds that entrepreneur's learning is about the exchange of experiences, including innovation,

management and industrial experience. Additionally, he analyzes factors influencing the learning process and found that results of previous events (experience), dominant logic and career orientation affect learning outcomes. In the complex process of entrepreneur's learning, experience learning was found to be the most important factor.

In studying the model of entrepreneur's learning, Collins, Smith, and Hannon (2006) consider that the learning process includes co-learning, cooperation, collective action, consultation and other learning approaches. Zollo and Winter (2002) assume that entrepreneur's learning ability, as a result of long-term learning and accumulation, represents a dynamic concept that can be strengthened or reduced. To sum up, entrepreneur's learning ability includes experience discovery, repeated observation, abstract concepts, and active practice. At the same time, it has adaptable and explorable characteristics.

Therefore, entrepreneur's learning ability also includes the ability to sharply perceive the external environment, discover innovative resources, integrate and make use of resources (Yuan, Pan, & Wang, 2001). These capabilities can help entrepreneurs correctly identify the external environment, better explore or use organizational resources, and integrate and re-create accumulated innovation resources, thereby promoting long-term prospects. In addition, the entrepreneur's learning ability also has exploitative and exploratory features. Therefore, entrepreneur's learning ability can also include the ability to provide insights into the external environment (Wang, 2001; Li, 2009). These capabilities can help entrepreneurs correctly identify the external environment, better explore or use organizational resources, integrate, and re-create accumulated innovation resources, thereby promoting the long-term development of enterprises.

First, entrepreneur's learning ability can stimulate a firm to use innovation resources through the integration of external and internal knowledge to innovate (Cui & Jiao, 2009). It can therefore help companies search, acquire, and evaluate external knowledge resources. When searching for external knowledge resources, the learning ability of entrepreneurs reflects their minds and vision. With excellent learning ability, entrepreneurs can quickly discover valuable knowledge resources in a dynamic environment and further maintain flexibility and resilience, which is conducive to the openness of enterprises to face technological changes, seize the technological opportunities therein, and promote the effective absorption, learning and utilization of external resources (Wei, Shen, & Fan, 2005).

Second, entrepreneur's learning ability helps firms to shape a good learning atmosphere, to solve creative problems in a creative way by opening up innovation, and to improve the

absorption and utilization efficiency of innovation resources (Hurley & Hult, 1998; Stock & Zacharias, 2011). In enterprises, the searching, absorption, failure, utilization and re-creation of innovation resources connect with the accumulation of entrepreneur’s learning capabilities thus affecting the motivation and efficiency of employees in innovation and knowledge management (Zhao, 2010).

Third, entrepreneur’s learning ability benefits the integration of innovation resources and helps to enhance the absorptive capacity of enterprises. It also benefits new knowledge creation as well as accumulation, absorption, optimization, and update of new knowledge and new technologies (Cui, Jiao, & Ding, 2009). Therefore, multi-level efficiency improvement in information and resource processing and management can promote the absorption and innovation learning of enterprises.

In addition, entrepreneur’s learning ability helps enterprises to effectively store, manage and optimize knowledge. The improvement of the application efficiency of knowledge helps to promote the diffusion of explicit and implicit resources. Entrepreneurs can effectively absorb and use external resources by the learning process, so as to obtain the experience and skills necessary for the operation process of enterprises. At the same time, entrepreneur's learning ability can also promote entrepreneur's own experience or consciousness to propagate internally and finally realize a learning organization (Cui & Jiao, 2009).

Therefore, this thesis proposes the following hypothesis:

H1: Entrepreneur’s learning ability is positively correlated with absorptive capacity.

3.2.2 Absorptive capacity and innovation performance

Confronted with a fast-changing business environment, it is urgent for firms to maintain absorbing ability and then achieve the targets to increase innovation profits and thus establish a sustainable competitive advantage. Absorptive capacity is the ability to effectively obtain and the way to re-use knowledge, and this ability will positively affect the innovation activities and business performance (Mamun et al., 2019). Grounded in the existing knowledge base, a firm with great absorptive capacity often absorbs and utilizes novel knowledge from the outside to adapt to the changing environment. Zahra and George (2002) believe that knowledge absorption experiences four recursive steps, namely, acquisition, absorption, transformation, and utilization.

By effectively absorbing and utilizing resources, the knowledge capacity of enterprises

can be improved, as well as innovation performance. By absorbing external knowledge and innovating, firms can compensate innovation projects for necessary resources which in return, reduces inside research and development costs and lowers down, to some extent, innovation risks.

From a theoretical perspective, scholars believe that firm's absorptive capacity can be divided into two types according to potential ability and actual ability (Scuotto, Del Giudice, & Carayannis, 2017). The former refers to the ability of a firm to identify, value and acquire external knowledge. To make a comparison, it is easy to find that the latter highlights knowledge conversion and utilization. Knowledge conversion refers to deconstruct knowledge elements from original couplings and integrate these elements into the firm's knowledge base. Knowledge utilization allows firms to build relationships with their stakeholders (Escribano, Fosfuri, & Tribó, 2009). By integrating tacit and explicit knowledge, enterprises' innovation capabilities can be enhanced. Therefore, the innovation performance of enterprises depends on how to use this knowledge to generate novel products/services.

Absorptive capacity is viewed by scholars and business operators as a key source of firm's accomplishments. As previous studies found, it is positively related to innovation performance (Huang et al., 2018). Considering the fact that novel knowledge elements are important to the entire innovation course, and that absorptive capacity represents an important driving force for recombing knowledge coupling, maintaining firm-level absorbing ability stimulates a firm to R&D expenditure and leads to innovation performance improvement (Yusr, Othman, & Mokhtar, 2012). Therefore, firm-level absorptive capacity can, to some extent, effectively accelerate technological innovation pace and outcomes. Those firms equipped with strong absorbing ability often gain a certain first-mover advantage when carrying out innovation activities, and can quickly respond to customer needs, avoiding falling into the core rigidity and capability trap. Therefore, this thesis predicts the following:

H2: Absorptive capacity is positively correlated with innovation performance.

3.2.3 Mediating role of absorptive capacity

How to learn the knowledge required for organizational innovation concerns the improvement of organizational absorptive capacity. Entrepreneur's learning ability helps organizations to reflect on and summarize technology development and technological innovation when carrying out innovative activities, so as to accumulate basic experience in developing organizational learning ability. Besides, it also helps enterprises to find and solve

problems in innovation practice, effectively adjust technological innovation strategies, and promote technological change (Wu, Gao, & Wei, 2007).

The upper echelons theory (Hambrick & Mason, 1984) holds that the characteristics of leaders, such as their learning ability, is an antecedent for enterprises to generate innovative outputs. Absorptive capacity has long been considered by firms or individuals to acquire, learn, and reuse resources (Salim & Sulaiman, 2011) and acts as a key source of innovation success. Absorptive learning is a construct with various dimensions other than a single dimension that involves in optimal processing and re-creation of resources (Beamish & Lupton, 2009). Entrepreneur's learning ability can stimulate intertwined resources like information, knowledge and technology. As the leader and manager of the enterprise, the stronger the entrepreneur's learning ability, the more it can motivate organizational members to participate in organizational learning and knowledge creation (García-Morales, Lloréns-Montes, & Verdú-Jover, 2008).

Therefore, entrepreneur's learning ability improves the absorptive capacity of a firm. The leader of a firm can make great efforts to improve the absorptive capacity by designing an organizational structure suitable for the characteristics of organization development, increasing the R&D investment.

Overall, the ability of entrepreneurs to learn has a significant impact on their absorptive capacity (Beamish & Lupton, 2009; Kiss, Danis, & Cavusgil, 2012) which, in turn, enables firms to adapt to environmental changes and improve innovation performance. Therefore, this thesis proposes the following hypothesis:

H3: Absorptive capacity positively mediates the relationship between entrepreneur's learning ability and innovation performance.

3.2.4 Entrepreneur's learning ability and innovation performance

Grounded in economic globalization, knowledge and information have become the most important strategic resources for an enterprise, and knowledge creation and variation processes (acquisition, integration, utilization) have represented a main carrier of innovation performance. Innovation relies on knowledge, the nature of which is exactly learning and creation. Mainstream literature believes that, by absorbing knowledge, the firm improves organizational learning ability, which can generate a sustainable force for innovation performance. In line with scholars' research results, this thesis argues that entrepreneur's learning ability relates to innovation performance.

Entrepreneur's learning ability can promote innovation performance and it is embodied in a knowledge-intensive innovation network. Bain and Mabey (1999) also hold that entrepreneur's learning ability is the key factor maintaining the innovation performance of the enterprise which can achieve a success in innovation by acquiring, integrating and utilizing knowledge in the innovation network. Therin (2003) believes that if an organization has abilities to acquire new knowledge, new information and integrate and utilize the same, then the organization could have better performance in the production or sales; in other words, the stronger entrepreneur's learning ability is, the higher innovation performance is achieved. According to Batjargal (2007), the work experience, technology level and amount of knowledge owned by the members of an organization are important sources of innovation performance, and innovation success depends on whether business operators has the ability to integrate the absorbed knowledge with new products.

Scholars in China have also conducted a large number of research on the relation between entrepreneur's learning ability and innovation performance. Chen and Li (2001) conducted an empirical study on enterprises in Jiangsu, Zhejiang and Shanghai, and analyzed the effects made by the dimensions of entrepreneur's learning ability on innovation performance and confirmed once again that it can indeed be promoted. Xie, Zhang, and Chen (2012) conducted a field investigation on 142 enterprises in southern China, and their empirical results show that entrepreneur's learning ability has a marked role in promoting management and technological innovation. Chen (2013) also carried out an empirical research on the subject and considered that if an enterprise lacks learning ability, then it could not share knowledge and information with others, thus significantly reducing the possibility of innovation through cooperation.

The learning ability of an entrepreneur influences others at the enterprise. Entrepreneur's learning includes implicit and explicit learning. As Seger (1994) states, the process of implicit learning has three characteristics. Firstly, the knowledge acquired through implicit learning cannot be completely perceived by the entrepreneur, who fails to clearly express in words neither what he has learned nor what it means; secondly, implicit learning represents an occasional unperceived process, in which abstract knowledge will be generated; thirdly, implicit learning excludes consciously hypothesis testing. Generally, entrepreneurs have an inspiration or sense to complete a certain task or get aware of the function mechanism of a certain system. Meanwhile, over time, business operation naturally raises learning requirements for them. Such learning results in increase on their long-term memory and knowledge, and thereby strengthens the entrepreneurial ability to be adapted to the environment. This represents a process of

problem resolving in a well-defined way, enhancing people's long-term memory and improving entrepreneurial ability to be adapted to the environment in return. Sequentially, the entrepreneur's learning has three stages: knowledge acquisition, knowledge storage, repeated use and development of entrepreneurial expertise.

After all, corporate growth is the growth of entrepreneur's ability, which is an outcome of the mixture of the born-with elements and deliberate learning. Among all factors, entrepreneur's learning ability and exploratory ability play a decisive role. As for entrepreneurs at a firm or a business system, the continuing learning and adaptation abilities are the core abilities required by the survival in the fierce competition. Through the above-mentioned discussion, this thesis considers that entrepreneur's learning ability promotes innovation performance. Knowledge acquisition through entrepreneur's learning can enable organizations to accumulate knowledge. By storing and integrating this knowledge through the enterprise's knowledge platform, knowledge can be shared within the organization, which develops its value and enables firms to increase the efficiency and effectiveness of new product development, encourages continuous innovation behavior, and thereby improves firm-level innovation performance. Hence, the thesis predicts the following:

H4: Entrepreneur's learning ability is positively correlated with innovation performance.

3.2.5 Moderating role of market orientation

Market orientation emphasizes that an enterprise should pay close attention to customer and competitor trends, innovatively provide and reconstruct innovation resources and meet customers' demand more desirably so as to win over the competition. Market orientation helps the enterprise obtain intangible and other key resources, which serve as the foundation on which it constructs its competitive advantage (Amit & Schoemaker, 1993). Huang (2019) demonstrated that market orientation does somewhat explain gaps in innovation performance and that, with the increase of market orientation, innovation performance is enhanced. Market orientation can weaken or amplify the impact of knowledge search on enterprise innovation outcomes. Prospective market orientation enhances the role of the scope of knowledge search in boosting firm's innovation performance, whilst responsive market orientation weakens the role of knowledge search in boosting firm's innovation outcomes (Xu et al., 2019).

Du and Liu (2014) studied the moderating role of market orientation on a sample of 180 firms. They found that two types of market-oriented strategies both negatively moderate the pathway from entrepreneurial orientation to breakthrough and incremental innovation. Gao

(2007) further discussed the moderation effects that a market-oriented strategy may impose on breakthroughs. His work revealed that a non-linear U-shaped moderation relationship exist other than a linear moderation. When a degree of market orientation decreases beyond a certain marginal level, that is, when the market orientation changes from reactive to proactive, it will have a marginal diminishing effect. Zhao and Wang (2015) view market orientation as a significant moderator and explored the effect of market orientation on external knowledge sources. This work found that market orientation imposes completely opposite influences over different knowledge sources of organizational learning and enterprise innovation.

Although market orientation emphasizes information integration and share from the market actors (e.g. customers and competitors), this resource transfer process will make it difficult for companies to find more common ground to promote knowledge interaction and integration. Moreover, due to the diversity and heterogeneous input and dispersion of resources, learning costs and path dependence may hinder companies from expanding their existing resource boundaries and induce resource lock-in, which will obviously hamper companies from carrying out innovation activities. Because companies must invest more learning costs to overcome resource differences, such increase reduces company's innovation performance. Therefore, when the enterprise market orientation is too high, the enterprise pays too much attention to the changes in the external market and ignores the synergy and co-creation of resources within the enterprise and the external market, which consumes more learning costs and energy. Thus, market orientation has a diminishing marginal moderation effect on innovation performance. The transformation of entrepreneurial learning ability into innovation performance is a spiral process. As the level of market orientation increases, market orientation will also impede entrepreneurs' learning ability from increasing innovation performance. That is, as the level of market orientation increases, the impact of entrepreneurs' learning ability on innovation performance will gradually weaken. In conclusion, this thesis predicts the following:

H5: Market orientation negatively moderates the relationship between entrepreneur's learning ability and innovation performance.

3.2.6 Moderating role of policy support

Operation and development of an enterprise is significantly affected by a certain institutional background. Such impact is especially remarkable in an economy undergoing transformation (Hoskisson et al., 2000) such as China's. Scholars have gradually established and perfected institutional theories, which, together with the resource-based and industrial

organization theories, are the three most fundamental on strategic management research (Hoskisson et al., 2000). Under the transformation economic background, the policy environment represents the main dimension of the external environment (Hillman & Hitt, 1999). How Chinese governments at all levels allocate multiple resources required by corporate development has an important impact and even makes a decisive effect. Thus, government is an important institutional factor influencing corporate growth (Li & Atuahene-Gima, 2001). Economy, technology, talents, knowledge as well as policies are all important external factors that affect enterprise innovation.

Regarded as a non-market regulatory force, government policy or support, includes education and training, technology development strategies, technology policies, tax subsidies, and financial support. The impacts of policy support from government are presented as four levels in corporate innovation and development. At the first level is the national policy support which is embodied mainly in institutional guarantee at the national level, including two aspects: (1) formulating national-level laws and regulations for supporting corporate innovation and development, and creating a fair, effective soft environment of institutions for corporate innovation and development; (2) providing macro guidance for corporate innovation and development, constructing infrastructures and perfecting managerial institutions at all levels.

At the second level is industrial policy support which is about economic incentive policies on the one hand, concerning the support of corporate innovation and technical research and development through effective economic policies; and, on the other hand, it is about preferential tax policies, which are to offer support to high-tech innovative enterprises in tax credit and other forms.

At the third level is market policy support which concerns offering support on technological marketization of high-tech innovative enterprises and also support and guidance in terms of market access, technical exchange, financing, information acquisition and other aspects, and creating desirable conditions for the cooperation between high-tech innovative enterprises with banks, intermediary agencies, industrial associations, scientific research institutes, institutions of higher education and other units.

At the fourth level is technical policy support as the government should make relevant technical policies and provide high-tech innovative enterprises with support for technical development. On the one hand, the government can take part in and promote fundamental research and provide innovative enterprises with policy support; on the other, the government should participate and direct the formulation and generalization of technical standards in high-

tech industries, and offer effective support for high-tech industries and enterprises.

At the same time, industrial or regional policies determine R&D investment scale, pace, direction and even outcomes (Q. H. Zhang, 2005). Song and Wang (2017) propose that government policies such as fiscal support can change the resource allocation among industries and within industries through resource replenishment and allocation mechanisms, thereby effectively promoting key industry growth; the completeness of government information and the sufficiency of industrial competition have a significant moderation effect on the financial resource allocation effect. Considering different research and new products demands, Qin and Wang (2016) regard innovation policies implemented by governments at all levels, as a moderator, which could change external R&D activities and outcomes. To be specific, the study found that with more innovation policies support, firm’s external R&D activities and outcomes increase. Luo (2009) believes that there must be many obstacles, differences and disputes that affect innovation cooperation between the company's technological innovation activities and the actual R&D and cooperation process, which requires government support (coordination, management, promotion, incentives and guidance) to regulate and intervene, thereby reducing the risks between the three parties' cooperation.

Zhou and Jie (2012) administered a questionnaire on the moderation effect of technological innovation policies at various levels of government on the motivation of inter-enterprise cooperation in technological innovation and found that policy factors amplify the positive effect of technological capabilities on learning motivation. In addition, entrepreneur’s learning ability represents the premise and basis of enterprise innovation. However, policy support increases the likelihood of resource transformation from acquired resources into economic benefits, thereby improving effectiveness of enterprise innovation. In the transformation of entrepreneur’s learning ability, innovative enterprises need to coordinate the interests and resources of all actors. In this process, it is no doubt that the effective support of the government can promote technology transformation efficiency. Under the economic background of transformation, enterprises obtain innovative resources at a higher transaction costs (Hoskisson et al., 2000), and government support can offer resource guarantee for innovative firms so as to encourage the technology transformation of enterprises.

Fundamental research shows that policy support exerts influence over high-tech industries upgrading, and many enterprises have no resources and abilities for such fundamental research. The government can coordinate and integrate various resources for industry-university-research cooperation to conduct fundamental research and provide enterprises with theoretical support

for the improvement in technology transformation efficiency. The effective policy support offers multi-level support of fund, information and technology for technology transformation, so as to improve the degree of the impact made by entrepreneur's learning ability on innovation performance.

To sum up, this thesis proposes the following:

H6: Policy support positively moderates the relationship between entrepreneur's learning ability and innovation performance.

3.3 Conceptual model

From the literature analysis, although the importance of entrepreneurs has been emphasized in research, there is still room to extend research on entrepreneur learning ability. This thesis provides a framework linking entrepreneurs' learning ability with innovation performance, addresses the mediation mechanism of absorptive capacity and the moderation mechanism of market orientation and policy support.

On the basis of above theoretical review and logical deduction, this thesis analyzes and explores the path and process of entrepreneur's learning ability affecting innovation performance and puts forward corresponding hypotheses. Figure 3-1 presents the overall conceptual framework of the thesis.

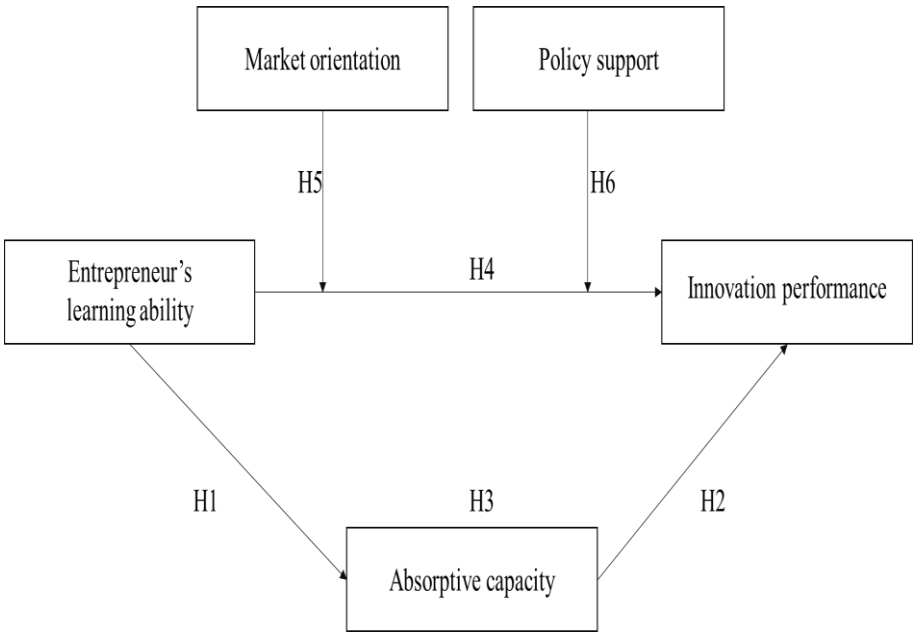

Figure 3- 1 The conceptual model of this thesis

3.4 Summary of this chapter

According to logical reasoning, this chapter proposes six hypotheses, which predict that entrepreneur’s learning ability influences innovation performance and considers the mediating role of absorptive capacity in this relationship. Besides, it also considers that market orientation as well as policy support moderate the effect of entrepreneur’s learning ability on innovation performance. A total of 6 hypotheses are proposed in this chapter. The chapters that follow will clarify the methods to pave the way for hypothesis testing.

Chapter 4: Research Method and Design

This chapter introduces the research method and design and specifies their main principles including the design process and measurement of the variables. Sample screening and empirical tests have been conducted to provide valid data for hypothesis examination.

4.1 Research method

4.1.1 Data collection

Grounded in relevant literature, various documents and materials related to the research problem have been collected allowing theoretical hypotheses to be formulated. Respondents were identified, their relevant background information was sorted out, the interview outline was prepared, and a semi-structured interview was conducted to provide drift for survey design. Next, a pioneer survey was designed, its validity and reliability were checked, after which an improved survey was formally conducted.

4.1.2 Analytical method

The analytical methods include descriptive statistics, reliability analysis, validity analysis, correlation analysis, regression analysis by the use of SPSS21.

(1) Descriptive statistics. By describing basic information (e.g. industry, the number of employees, firm age and overall capital) descriptive statistics was firstly conducted to identify whether the data would meet the research requirements.

(2) Reliability and validity analysis. The results of the reliability test show the reliability of the scale. Cronbach's α was used to measure the internal consistency of different items. The cut-off value of reliability is 0.4. When it is lower than the threshold of 0.4, indicators should be generally deleted; when it is lower than 0.5, it means the reliability of indicator is poor; when it is between 0.5 and 0.7, it means the reliability of indicator is acceptable; when it is greater than 0.7, it means the reliability of indicator is excellent.

The validity test was used to test the degree to which the indicator exactly measures the constructs, which shows the effective level of the results. Specifically, the validity test includes

content validity, convergence validity and discriminant validity.

(3) Correlation analysis. In this thesis a correlation matrix is presented to evaluate whether the survey variables are correlated. Generally speaking, scholars employ Pearson correlation coefficient to measure linear correlation within the range of [-1,1]. When the coefficient approaches 1, positive correlation is strong. When the coefficient approaches -1, negative correlation becomes strong.

(4) Regression analysis and bootstrap method. This thesis adopts regression analysis and bootstrap method to test hypotheses. Specifically, regression analysis was used to test H1, H2 and H4 and bootstrap method was adopted to test H3, H5 and H6.

4.2 Survey design

4.2.1 Basic contents of the survey

The design, objective and theoretical basis of the survey determined its overall arrangement of items. The survey designed for this research aims to collect viewpoints of the entrepreneurs and top managers on their learning ability and innovation performance. Statistical analysis was performed on valid scale to obtain valid data related to the research purpose. Therefore, around the above purpose, the survey designed in this thesis mainly includes the following parts (see more in Appendix): (1) preface: describing the identity of the respondent, investigation purpose, sampling method, security measures and acknowledgement; (2) fill-in description: directing the respondent to answer the survey correctly; (3) basic information of the individual; (4) basic information of the enterprise; (5) specific items of entrepreneur's learning ability, innovation performance, absorptive capacity, market orientation and policy support.

4.2.2 Measurement error control

Error in the survey includes systematic error and random error. The error is unavoidable but can be reduced by paying attention as much as possible to scientifically measure it in the research process. In this thesis, the following measures were taken to reduce the error:

(1) Survey design. The survey includes personal information of the respondent, firm's basic information, and measures of the constructs entrepreneurs' learning ability, absorptive capacity, market orientation, policy support and innovation performance.

When designing the survey, we chose a mature, validated scale that has been commonly used in previous studies, adjusted them in accordance with the context of this thesis, and modified them according to the advice of the instructor. After the scale was initially completed, we invited 2 entrepreneurs to fill in the answers, and then modified the items according to their opinions, and deleted the meaningless ones. The items used in this thesis were measured using Likert 5 scales, where 1 = strongly disagree; 2 = disagree; 3 = uncertain; 4 = agree; 5 = Strongly agree. After improvement, the questionnaire was distributed to 100 entrepreneurs and top managers and a pilot survey was conducted to further ensure reliability and validity of the scales.

(2) Survey Distribution. The respondents are mainly entrepreneurs and top managers. The final survey was distributed to 350 respondents following a snowball selection method through the network of relationships. MBA students occupying positions as entrepreneurs and top managers made up for large part of sample. The survey was distributed through three channels: 1) face-to-face; 2) through MBA class; 3) through a network of personal relationships.

In the beginning the questionnaire provides information on the research purpose and commitments of confidentiality to dispel the concerns that the filling-in respondents might have. After collection the sample data was screened and those copies with missing data or that had carelessly answered were disregarded.

(3) Pre-test of the survey. Prior to the formal survey, a pre-test was made. By conducting the reliability and validity analysis of the pre-test data and according to the improvement suggestions proposed by experts, the unsatisfying items were deleted or modified.

(4) Common method bias and non-response bias. Harman's one-factor test was used to test whether the sample data collected for this research had any common method bias by using SPSS 21.0. Independent-sample t test was used to test whether the sample data for this research had any non-response bias in the time sequence. The sample was divided into two parts and conducted the independent-sample t test by adopting the industry, total amount of capital, firm age and the number of the employees as part of the questionnaires. The results showed that the two parts of samples had no significant difference, and accordingly, it was inferred that the sample data for this research had no great non-response bias.

4.3 Measurement of variables

Concept operationalization refers to a process in which an abstract concept is studied and operated in detail and empirical observations are applied to explain relevant concepts. Generally,

when the questionnaire design is used to operationalize the concepts, in order to make sure that the operationalization can reflect as much as possible the connotation of concepts defined in this research, we conducted the following work in the research and design process:

(1) Independently design the scales according to the research and practical needs based on the analysis of existing scales and related literature. In order to ensure the reliability and validity, this research was conducted by identifying the existing reliable variables through the analysis of relevant literature. These scales have been used by different researchers in a different research environment and for different investigated groups. Repeated applications made sure that they could measure the concepts and variables that they represent (validity) and confirm the stability and accuracy of these variables (reliability). Hence, the use of mature scales brings lower risks. However, as is known to all, there is a great difference between traditional Chinese culture and Western culture. The connotation of national culture and the influence on mentality and behavior cannot be ignored although the process of fast-growing modernization has reduced cultural differences (Egri & Ralston, 2004).

Therefore, in conducting the research on entrepreneur's learning ability, special attention was paid to the uniqueness of Chinese culture and the limitations of western theories and scales, and it was necessary to design the scales considering the distinctiveness of China's national conditions. For instance, *Guanxi* (i.e. connections) well known to Chinese people, represents exactly an extremely complex social phenomenon. It was only twenty years ago when connections were researched from the perspective of management (Zhang, Wang, & Fan, 2008) and in particular, it remains at the initial stage that the impact of entrepreneurial connection ability on enterprise innovation performance has been researched, making it difficult to identify the available scales for the operationalization of certain concepts in the scales.

(2) Achieving concept operationalization combining theory and practice in the form of interviews. Research thinking was developed before the questionnaire design. Before the completion of variable operationalization, to identify the connotation and denotation of each concept and select those concepts related to the theme of the research, we communicated with the entrepreneurs, middle-level managers, employees with rich experience in enterprise practice, experts and scholars engaging in studying enterprise management through interviews, collected and arranged their understandings of the entrepreneur's learning ability and the connotation and denotation of related concepts, compared the findings of the interviews with the existing documents and conducted due integration, thus completing the concept related to the theme of the research and its operationalization based on the combination of theory and practice.

4.3.1 Entrepreneur's learning ability

The operationalization of this construct was achieved based on prior studies by He, Pan, and Lian (2007), Zhang (2007) and Zhang, Wang, and Fan (2008) and pilot study results. The measurement of entrepreneur's learning ability is made up of 5 items (see Table 4-1).

Table 4- 1 Entrepreneur's learning ability scale

No.	Items	Sources
ELA1	Willing to try new methods and new solutions	He, Pan, and Lian (2007), Zhang (2007), Wang (2008)
ELA2	Ability to summarize and absorb the experience and lessons of the enterprise itself and its competitors	
ELA3	Ability to learn and think, able to find good strategies, develop business, resolve crisis	
ELA4	Quickly update the knowledge structure, be able to sum up experience and apply what you have learned	
ELA5	Good at innovation in business philosophy and management methods, product management and services, marketing and supply	

4.3.2 Absorptive capacity

In consistency with Cohen and Levinthal (1990), absorptive capacity in this thesis refers to the ability of an enterprise to identify, utilize external knowledge and apply it to business development and application purposes during the innovation process, including acquisition, assimilation, transformation and exploitation capabilities. In terms of measurement, following Flatten, Greve, and Brettel (2011), Jiménez-Barrionuevo, García-Morales, and Molina (2011), Cadiz, Sawyer, and Griffith (2009), and Camisón and Forés (2010), the specific measurement includes 4 items (see Table 4-2).

Table 4- 2 Absorptive capacity scale

	Items	Sources
AC1	Effectively search, identify and track knowledge in new technology areas	Flatten, Greve, and Brettel (2011); Jiménez-Barrionuevo, García-Morales, and Molina (2011) Cadiz, Sawyer, and
AC2	Effectively acquire knowledge in new technology areas needed internally or externally	

AC3	Effectively disseminate and share knowledge in new technology areas created or acquired within the company	Griffith (2009), and Camisón and Forés (2010)
AC4	Effectively integrate and apply the knowledge of new technology areas created or acquired to different context	

4.3.3 Market orientation

Following Narver and Slater (1990), Kohli, Jaworski, and Kumar (1993) and Conduit and Mavondo (2001), this thesis defines market orientation as the philosophical perspective and cultural form held by innovative companies on the market, that is, views of innovative companies on competitors and customers. Market orientation as an organization-level values affects the beliefs of all innovative employees, can guide the behavioral model of innovative companies, encourage companies to value customer needs and customer value, and establish a sustainable competitive advantage in market competition.

Customer orientation means that the company attaches great importance to the analysis and evaluation of customers in the process of innovation, can deeply understand and grasp customer needs and changing trends, attaches importance to providing customers with excellent products and services of value, and improves customer satisfaction and gain sustainable growth. Competitor orientation means that the company attaches importance to the analysis and evaluation of competitors in the process of innovation, fully analyzes and understands existing and potential competitors and, according to the development features of high-tech industries, the resources to make corresponding strategies. Net-functional integration within an organization refers to coordinating internal and external resources, integrating the link between the internal and external of the organization, improving the flexibility of resource interaction between the enterprise and the channel, and creating a higher value.

Under these premises the market-oriented scale design measurement includes 5 items are shown in Table 4-3.

Table 4- 3 Items of market orientation

No.	Item	Sources
MO1	Establish competitive advantages by fully understanding and grasping the customer demands in innovation	Narver and Slater (1990), Kohli, Jaworski, and Kumar (1993) and Conduit and Mavondo (2001)
MO2	Get to know customer demands through information collection in innovation	

MO3	Carry out response strategy quickly to the threatening acts of the competitors	
MO4	Provide the targeted customers with relevant services according to your own competitive advantages	
MO5	Coordinate internal and external resources for innovation activities based on market changes	

4.3.4 Policy support

Following Li and Atuahene-Gima (2001) and Qian, Cao, and Takeuchi (2013), this thesis defines policy support as a variety of supporting policy measures provided by the government for the innovation of high-tech enterprises. The specific measurement includes 4 items and are shown in Table 4-4.

Table 4- 4 Measurement items of policy support

No.	Item	Sources
PS1	The level of innovative technical service conditions in the company's region is good	Li and Atuahene-Gima (2001) and Qian, Cao, and Takeuchi (2013)
PS2	The local government has developed and implemented some policies and procedures that are beneficial to business operations	
PS3	The government often provides consulting, free training for startup companies	
PS4	The government directly provides financial support to promote the development of enterprises	

4.3.5 Innovation performance

Innovation performance emphasizes the outcomes of the enterprise's innovative behaviors or activities, reflects the outputs of the enterprise's R&D investment and satisfaction of outputs. Following Cooper and Kleinschmidt (1995), Hagedoorn and Cloodt (2003), this thesis establishes the following evaluation index system for innovation performance and adopts 5 items to measure it (see Table 4-5).

Table 4- 5 Items and sources of innovation performance

No.	Item	Sources
IP1	Increase in the number of innovative projects	

IP2	High success rate of new product development	
IP3	High quality of new product	Cooper and Kleinschmidt (1995), Hagedoorn and Cloodt (2003)
IP4	Higher speed of new product development	
IP5	Greater number of patent licensing	

4.4 Sample selection and data collection

This section mainly discusses the sample selection and survey distribution, describes the sample characteristics, applies statistical software SPSS to conduct reliability and validity analysis, correlation analysis and regression analysis, and finally tests the hypotheses.

4.4.1 Sample selection standards

In order to ensure that the sample selected meets the purpose of the research, the sample selection standards have been limited as follows:

(1) The size of the sample enterprise: if the enterprise is too small, its innovation performance is hard to be reflected fully; if the enterprise scale is too similar, the research would be difficult to compare.

(2) The age of the sample firm: theoretically, if the sample firm has a longer life, the relation between enterprise growth and innovation performance can be reflected more exactly. However, since the subjects of this thesis are relatively special and it was very difficult to collect the sample, this thesis is not strict with this condition and the firm age was divided into start-up period, growing period, mature period, and declining period.

(3) The position of respondent: according to our definition of an entrepreneur, both the owner and the operator of an enterprise are the subjects of our thesis. Accordingly, the respondents shall be the general manager or chairman of the enterprise.

(4) The industry in which the sample enterprise operates: in order to make the research results more representative and generalized, the sample selected should not be concentrated in a certain industry but should be moderately dispersed across various industries.

(5) The location in which the sample enterprise operates: in order to make sure that the research results are not disturbed by local policies and environments and be more representative and persuasive, the sample selected should not be concentrated in a certain area but should be

moderately dispersed across multiple areas.

(6) Sample size: the minimum sample size should be at least 10 observations for every variable. Therefore, the valid survey of this research should meet this minimum requirement at least. In consideration of the particularity of research objects and the great difficulty in sampling, the sample size selected cannot be too large.

The data collection standards are related to research objects and questions to be answered. Accordingly, the process of sample selection for this research is based on the following three standards: (1) meeting the requirements of the research subjects; (2) meeting the representativeness and generality requirements; (3) meeting the requirements of benefiting the investigation and survey.

4.4.2 Data collection

(1) Channels to issue the survey. To achieve the research purpose, the investigation sample for this research was mainly obtained through the following channels: 1) MBA students who were entrepreneurs or managers and above the middle level from different enterprises in different industries; 2) recommendations by familiar entrepreneurs, a method that gradually expanded the sample scope and increased the response rate and the valid response rate; 3) an e-survey sent to graduate students from this specialty, who would hand them over to entrepreneurs, leaders, chairmen, general managers and senior management who would fill them.

The survey respondents should understand the information provided and know well about the purpose, significance, content and issues to be investigated in the research. Based on the foregoing conditions, the investigated persons in this research were identified as entrepreneurs and top managers.

(2) Response of the survey. Totally we have issued 450 surveys since June 2018, both in paper and email. These two channels were used to guarantee a higher effectiveness of response rate. A total of 360 questionnaires were collected with a response rate of 80%. After screening, 82 invalid surveys were excluded and 278 valid surveys were obtained, and hence the final response rate was 77.22%. No differences in filling out the surveys and incomplete fillings were the main causes for invalid responses. All calculations and results were obtained by the application of the statistical software SPSS.

4.4.3 Descriptive analysis

From Table 4-6, male entrepreneurs accounted for 60.43% of the total, and female

entrepreneurs accounted for 39.57% of the total. Entrepreneurs with a middle school or technical secondary school education accounted for 6.12% of the total sample, entrepreneurs with a junior college accounted for 28.06% of the total sample, and full-time undergraduate entrepreneurs accounted for 38.85% of the total sample, while postgraduate and above entrepreneurs accounted for 28.06% of the total sample. This shows that the average sample of respondents has a higher level of education.

Table 4- 6 Statistics of respondents (N=278)

Variables	Classification	Frequency	Percentage
Gender	Female	168	60.43%
	Male	110	39.57%
Age	< 35 years old	73	26.26%
	> 36-45 years old	147	52.88%
	> 46 years old	58	20.86%
Level of education	Middle school or technical Secondary school	17	6.12%
	Junior college	75	26.98%
	Full-time undergraduate	108	38.85%
	Postgraduate and above	78	28.06%
Approaches to get the current position	Internal promotion	90	32.37%
	External recruitment	94	33.81%
	Self-employment	82	29.50%
	Inheriting the undertaking of the ancestors	12	4.32%
Satisfaction of the current income	Very satisfied	27	9.71%
	Relatively satisfied	97	34.89%
	Generally satisfied	109	39.21%
	Not very satisfied	35	12.59%
	Very dissatisfied	10	3.60%
Satisfaction of the current social status	Very satisfied	20	7.19%
	Relatively satisfied	88	31.65%

	Generally satisfied	127	45.68%
	Not very satisfied	38	13.67%
	Very dissatisfied	5	1.80%

The proportion of people who are promoted as executives from the internal promotion accounted for 32.37% of the total sample, 33.81% of the total number are externally employed corporate executives, and 29.5% of the total number are entrepreneurs who started self-employment. Entrepreneurs who inherited the undertaking of the ancestors represents 4.32% of the total sample. Approximately, 3.6% of respondents are very dissatisfied with the current income level, 12.59% are not satisfied with the current income level, 39.21% believe that the current income level is average while 34.89% are satisfied with the current income level and 9.71% are very satisfied with the current income level. In turn 1.8% of respondents are not very satisfied with the current social status, 13.67% are not satisfied with the current social status, and 31.65% are quite satisfied with the current social status, while 7.19% are very satisfied with their current social status.

Table 4-7 shows that approximately, 15.11% of the sampled enterprises are wholly state-owned or collectively owned enterprises, 46.4% are private enterprises, 22.66% are joint-equity enterprises, 8.99% are foreign-investment enterprises and 6.83% are partnership enterprises. Next, 19.42% are at the start-up stage, 38.85% of the enterprises are at the growth stage, 33.81% at the mature stage, and 7.91% at the declining stage.

Table 4- 7 Statistics of sample firms (N=278)

Enterprise background	Classification	Frequency	Percentage
Ownership	SOE	42	15.11%
	Joint-equity enterprises	63	22.66%
	Private enterprise	129	46.4%
	Foreign investment	25	8.99%
	Partnership enterprise	19	6.83%
Enterprise lifecycle stage	Start-up stage	54	19.42%
	Growth stage	108	38.85%
	Mature stage	94	33.81%
	Degenerating stage	22	7.91%

Firm size	< 50 employees	73	26.26%
	51-200 employees	39	14.03%
	201-500 employees	41	14.75%
	501-1000 employees	39	14.03%
	1001-5000 employees	32	11.51%
	> 5000 employees	54	19.42%
Industry	Manufacturing	86	30.94%
	Scientific research and general technical services	15	5.4%
	Electronic information industry	34	12.23%
	Social service industry and manufacturing industry	24	8.63%
	Extractive industry	5	1.8%
	Financial industry	21	7.55%
	Architecture	9	3.24%
	Real Estate	10	3.6%
	Export trade	13	4.68%
	Other	61	21.94%

Of the total sample, there are 86 manufacturing enterprises, 15 scientific research and comprehensive technology service enterprises, 34 electronic information industry enterprises, 24 social service manufacturing enterprises, 5 extractive enterprises, and 21 financial enterprises. There are 9 architecture enterprises, 10 real estate, 13 export trade, and 61 enterprises in other industries. In the total sample, there are 73 enterprises with less than 50 people, accounting for 26.26%; 39 companies with 51-200 employees, accounting for 14.03%; 41 enterprises with 201-500 employees, accounting for 14.75%; 39 enterprises with 501-1000 employees, accounting for 14.03%; 32 enterprises with 1001-5000 employees, accounting for 11.51%; and 54 enterprises with more than 5,000 employees, accounting for 19.42%.

The analysis of the foregoing characteristics showed that male entrepreneurs were in the majority and generally they have a high level of education. The enterprise types mainly included wholly state-owned or collectively owned enterprises, and most of them were at the growth stage, mainly manufacturing enterprises and with evenly distributed scales of the enterprises.

4.5 Summary of this chapter

This chapter discusses the survey design and content, data collection, and descriptive statistical analysis in detail. This chapter also discusses measurements of the main constructs of the research, namely: entrepreneur's learning ability, absorptive capacity, market orientation, policy support, and innovation performance.

Chapter 5: Empirical Analysis

This chapter adopts regression analysis and bootstrap method to test the hypotheses proposed in Chapter 3. Before conducting an empirical analysis, this chapter firstly conducted scale item analysis and then validity and reliability tests, and correlation and multicollinearity tests. Regression analysis is used to analyze the relationships among entrepreneur's learning ability, absorptive capacity and innovation performance (H1, H2, H4). The bootstrap method is used to analyze the mediating effect of absorptive capacity (H3) and the moderating effects of market orientation and policy support (H5 and H6) on the relationship between entrepreneur's learning ability and innovation performance.

5.1 Scale item analysis

The purpose for scale item analysis is to test the reliability of the scale and individual items. Results of scale item analysis can be used as the basis for item selection or modification.

First, we summed up the scores of all respondents, and calculated the total score of each surveyed person. According to the scores, respondents were classified into different groups (high score group, middle score group, low score group). Detailed results are shown in Appendix. In grouping, we selected the critical scores due to the differential analysis (in norm-referenced test, if the score distribution is normal distribution, the scores corresponding to the position of 27% are usually identified as index). Through calculation 278 × 27%, the thesis got the threshold value of 75. In ascending order, the score of the 75th person is 89, and in descending order, the score of the 75th is 103.

Then, according to these two scores, the total survey was sorted into three groups, if the score is higher than 103, this one belongs to the high score group, if the score is lower than 89, this one belongs to the low score group. Thus, there are three groups, low score group (if the score is lower than 89, the variable level is 1), middle score group (if the score ranges from 90-102, the variable level is 2), high score group (if the score is higher than 103, the variable level is 3).

Next, we carried out the independent-sample t test to those groups, and the serial number of two groups are 1, 3. The independent-sample t test is to test whether the mean value

difference of each item measured in different group is significant or not ($p<0.05$), so as to understand whether the different averaged scores of the samples in entrepreneur's learning ability, absorptive capacity, market orientation, policy support and innovation performance are caused by the different groups or not.

Take item ELA1 as an example (detailed data is reported in Table 5-1). The average score of the high score group is 4.354 and the standard error (SE) is 0.892; the average score of the low score group is 3.61 (SE=0.83); the greater the difference between two groups, the more significant the difference is. There are 79 observed samples in the high group, whilst there are 77 samples in the lower group. There are valid differences in both the high score group and the low score group, because the number of different groups is not the same, which is common in the critical ratio statistics analysis. Results of independent sample t test are reported in the Appendix.

Table 5- 1 Group statistics

Total points (split bin)		N	Mean	SE	SE of Mean
IP1	<=89	77	3.506	1.034	0.118
	103+	79	4.785	0.414	0.047
IP3	<=89	77	3.792	0.908	0.103
	103+	79	4.797	0.435	0.049
IP5	<=89	77	3.442	0.881	0.100
	103+	79	4.810	0.426	0.048
IP4	<=89	77	3.494	0.912	0.104
	103+	79	4.696	0.585	0.066
IP2	<=89	77	3.545	0.897	0.102
	103+	79	4.797	0.464	0.052
ELA2	<=89	77	3.610	0.876	0.100
	103+	79	4.532	0.713	0.080
ELA1	<=89	77	3.610	0.830	0.095
	103+	79	4.354	0.892	0.100
ELA3	<=89	77	3.519	0.852	0.097
	103+	79	4.658	0.575	0.065
ELA4	<=89	77	3.727	0.772	0.088
	103+	79	4.772	0.505	0.057

ELA5	<=89	77	3.494	0.821	0.094
	103+	79	4.519	0.749	0.084
AC3	<=89	77	3.714	0.886	0.101
	103+	79	4.722	0.553	0.062
AC1	<=89	77	3.636	0.842	0.096
	103+	79	4.734	0.524	0.059
AC2	<=89	77	3.623	0.828	0.094
	103+	79	4.772	0.479	0.054
AC4	<=89	77	3.325	0.993	0.113
	103+	79	4.722	0.505	0.057
MO5	<=89	77	3.740	0.834	0.095
	103+	79	4.823	0.446	0.050
MO2	<=89	77	3.649	0.943	0.107
	103+	79	4.595	0.707	0.080
MO3	<=89	77	3.442	0.966	0.110
	103+	79	4.785	0.472	0.053
MO1	<=89	77	3.636	0.887	0.101
	103+	79	4.810	0.395	0.044
MO4	<=89	77	3.805	0.874	0.100
	103+	79	4.899	0.304	0.034
PS4	<=89	77	2.844	1.268	0.144
	103+	79	4.899	0.343	0.039
PS2	<=89	77	3.039	1.163	0.133
	103+	79	4.886	0.320	0.036
PS3	<=89	77	2.857	1.073	0.122
	103+	79	4.810	0.455	0.051
PS1	<=89	77	2.948	1.146	0.131
	103+	79	4.797	0.490	0.055

The thesis firstly found out if the standard errors of the groups are equal, then the t-value of equal variances assumed will be observed; if the standard errors of groups are not equal, then the t-value of equal variances not assumed will be observed. To determine the equality of variances the Levene test is used to test if there is homogeneity between different groups. In

terms of ELA1, the results of Levene F-value test (F=0.112, P=0.000<0.05) accept the opposite hypothesis, $H_1: \delta_{X1}^2 \neq \delta_{X2}^2$, indicating that the variances of the two groups are not equal. Thus, t test data need to care about the value (equal variances not assumed) in the second column, namely, t=-5.396, P=0.000<0.05, showing whether the critical ratio of this item is significant. If P>0.05, then accept the hypothesis $H_0: \delta_{X1}^2 = \delta_{X2}^2$, showing the variance of two groups are equal, and the t-value corresponding P-value in the first column will be observed. In the above t test statistic, all items of t test results are significant (double tail).

5.2 Validity test

After the scale item analysis, in order to test the construct validity, we carried out exploratory factor analysis.

Table 5-2 shows the Kaiser-Meyer-Olkinde sampling applicableness quantity (KMO). Kaiser (1974) suggested that the mediocre standard for factor analysis is at least 0.6. In this case, KMO=0.889, meanwhile Bartlett sphericity test $\chi^2 = 5089.705$, df=253 (p=0.000<0.05), indicating that the net correlation matrix of variances is not identity matrix and there are common factors among the correlation matrixs. In addition, the diagonal data MSA of the anti-image correlation matrix are all greater than 0.5 (see Appendix), indicating that there are common factors among those variances, and they are suitable for factor analysis.

Table 5- 2 KMO result

KMO		0.889
Bartlett sphericity test	Approximate chi square distribution	5089.705
	df	253.000
	Sig.	0.000

The estimated commonality of all the items is higher than 0.20, that is, the variables have commonality with each other.

Table 5-3 shows the results of using the principal component analysis to extract the principal components. The rotation method is the orthogonal variation method. There are 5 eigenvalues greater than 1, which are also the number of common factors extracted during factor analysis. The five common factors can explain 76.197% of the variation.

Table 5- 3 The total variance explained of whole scale

Component	Initial characteristic value			The sums of squared load extraction			Rotation sums of squared loadings		
	sum	Variance %	accumulation %	sum	Variance %	Accumulation %	sum	Variance %	Accumulation %
1	8.005	34.804	34.804	8.005	34.804	34.804	3.978	17.297	17.297
2	4.533	19.709	54.512	4.533	19.709	54.512	3.799	16.519	33.816
3	2.054	8.932	63.444	2.054	8.932	63.444	3.463	15.058	48.874
4	1.691	7.350	70.794	1.691	7.350	70.794	3.426	14.896	63.769
5	1.243	5.402	76.197	1.243	5.402	76.197	2.858	12.428	76.197
6	0.656	2.852	79.049						
7	0.578	2.512	81.561						
8	0.508	2.209	83.770						
9	0.435	1.889	85.659						
10	0.408	1.773	87.432						
11	0.389	1.692	89.124						
12	0.367	1.596	90.720						
13	0.307	1.334	92.054						
14	0.274	1.192	93.245						
15	0.248	1.079	94.325						
16	0.226	0.982	95.306						
17	0.213	0.927	96.234						
18	0.203	0.882	97.115						
19	0.170	0.741	97.857						
20	0.149	0.648	98.505						
21	0.127	0.551	99.056						
22	0.119	0.517	99.573						
23	0.098	0.427	100.000						

Figure 5-1 shows the results of factor scree. It can be found from the figure that after the sixth factor, the slope line is relatively flat, indicating that there are no special factors worth extracting, so it is appropriate to retain the first five factors.

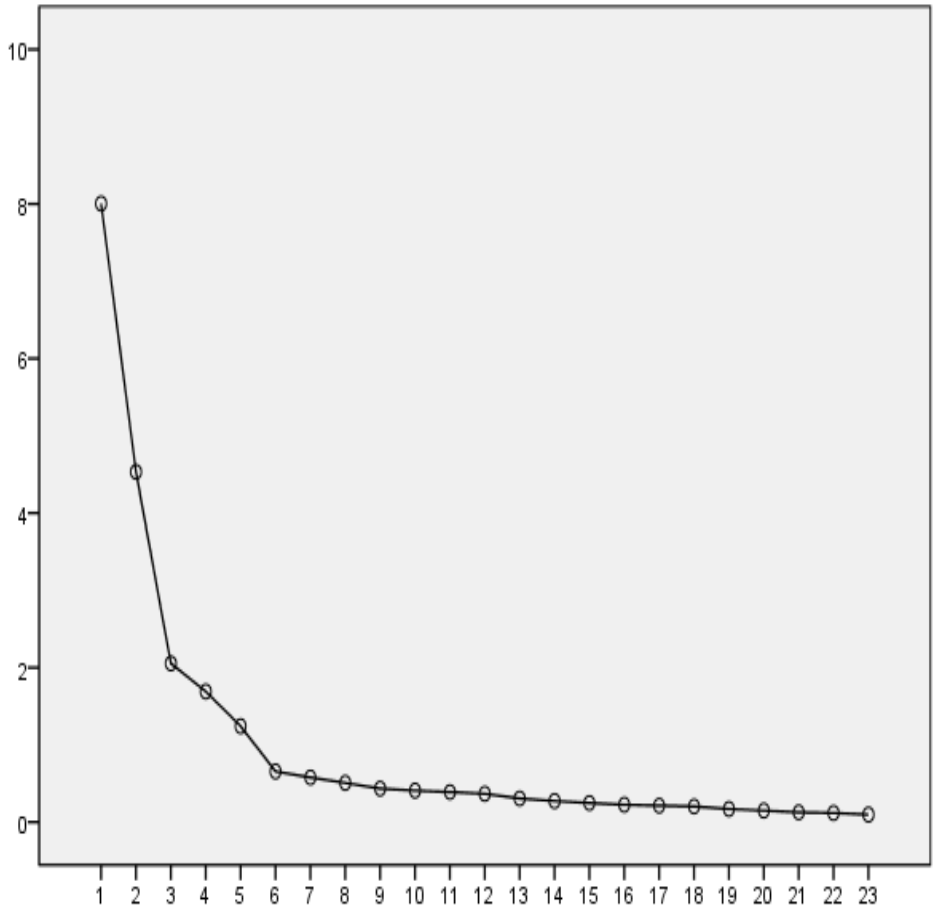

Figure 5- 1 Factor scree plot

Table 5-4 shows the factor matrix after the rotation axis. The maximum variation method is used to transfer the values. The rotation axis is processed by the default Kaiser normalization method. A total of 7 iterations are required for the rotation axis. The factor load selection criterion is 0.45 to test. In the factor analysis, the selection criterion of the factor load is preferably above 0.45, and the common factor at this time can explain that the score ratio of the item variable is 20%. Factor one contains five items: ELA1, ELA2, ELA3, ELA4, and ELA5. This factor name is "entrepreneur's learning ability". Factor two includes PS1, PS2, PS3, and PS4. The four items can be named "policy support". The third factor that includes IP1, IP2, IP3, IP4, and IP5 can be named "innovation performance". The fourth factor including MO1, MO2, MO3, MO4, and MO5 can be named "market orientation". The fifth factor including AC1, AC2, AC3 and AC4 can be named "absorptive capacity".

Table 5- 4 Component matrix after rotation

Item	Component				
	1	2	3	4	5
ELA1	0.836	-0.078	0.109	-0.065	0.133
ELA3	0.799	0.096	0.322	0.078	-0.018
ELA5	0.790	0.063	0.139	-0.012	0.128
ELA2	0.769	-0.077	0.385	0.014	0.061
ELA4	0.756	0.084	0.335	0.075	0.153
PS1	0.011	0.908	0.062	0.219	0.065
PS4	0.007	0.891	0.154	0.209	0.069
PS2	0.067	0.887	0.016	0.240	0.134
PS3	-0.005	0.870	0.154	0.302	0.062
IP2	0.408	0.128	0.782	0.107	0.039
IP4	0.320	0.073	0.757	0.073	0.095
IP1	0.161	0.083	0.740	0.146	0.242
IP3	0.347	0.053	0.713	0.121	0.228
IP5	0.549	0.125	0.663	0.134	0.086
MO1	0.092	0.272	0.149	0.816	0.053
MO3	-0.041	0.296	0.146	0.803	0.110
MO2	-0.143	0.012	0.320	0.779	-0.011
MO4	0.116	0.295	-0.027	0.752	0.200
MO5	0.099	0.324	-0.049	0.718	0.255
AC1	0.110	0.114	0.155	0.097	0.880
AC2	0.236	0.070	0.136	0.119	0.878
AC3	0.010	-0.009	0.366	0.117	0.801
AC4	0.105	0.429	-0.101	0.250	0.574

5.3 Reliability test

The scale designed is based on relatively mature scales that already have a high level of reliability. However, because the reference scale was modified according to the research need and considering the influence of Chinese social and cultural background factors, it was

necessary to test the reliability of the scale. Cronbach's α is used for reliability analysis to assess the internal consistency of scales. Generally, when Cronbach's α is greater than 0.7, it means the reliability of the sale is good; when it is greater than 0.9, it means the reliability of the scale is excellent.

5.3.1 Reliability of entrepreneur's learning ability

Cronbach's α of entrepreneur's learning ability is 0.897 (see Table 5-5), higher than 0.7, indicating that the internal consistency of the construct is good.

Table 5- 5 Reliability results of all variables

Variable	Cronbach's α
entrepreneur's learning ability	0.897
absorptive capacity	0.847
market orientation	0.811
policy support	0.952
innovation performance	0.901

5.3.2 Reliability of absorptive capacity

Cronbach's α of absorptive capacity is 0.847 (Table 5-5), indicating that the internal consistency of the construct is good.

5.3.3 Reliability of market orientation

Cronbach's α of market orientation is 0.811 (Table 5-5), indicating that the internal consistency of the construct is good.

5.3.4 Reliability of policy support

Cronbach's α of policy support is 0.952 (Table 5-5), above 0.9, indicating that the internal consistency of the construct is excellent.

5.3.5 Reliability of innovation performance

Cronbach's α of innovation performance is 0.901 (Table 5-5), above 0.9, indicating that the internal consistency of the construct is excellent.

5.4 Correlation and multicollinearity tests

Table 5-6 reports the mean, the standard deviation and the correlation of each variable. It also shows that individual variables are highly correlated with other variables. Thus, to diagnose whether there is a multicollinearity problem among the variables the variance inflation factor (VIF) test was used. When VIF is greater than 5, there will be a high correlation between the independent variables. The VIF value of the variables ranges from 1.086 to 1.509, suggesting that the correlation between the variables does not lead to serious multicollinearity problems.

Table 5- 6 Correlation analysis result

	Mean	SD	1	2	3	4
1. Entrepreneur's learning ability	4.100	0.718	1.000	0.281**	0.093	0.661**
2. Absorptive capacity	4.169	0.714	0.281**	1.000	0.328**	0.389**
3. Policy support	3.942	1.084	0.093	0.328**	1.000	0.241**
4. Innovation performance	4.220	0.716	0.661**	0.389**	0.241**	1.000
5. Market orientation	4.232	0.692	0.103	0.378**	0.540**	0.311**

N = 278; ***p < 0.001, **p < 0.01, *p < 0.05

5.5 Hypothesis test

5.5.1 Entrepreneur's learning ability, absorptive capacity and innovation performance

Tables 5-7 to 5-9 are regression analyses of entrepreneur's learning ability, absorptive capacity and innovation performance. From these tables, H2 which assumes that absorptive capacity positively affects innovation performance is not rejected. H4 which hypothesizes that entrepreneur's learning ability positively affects innovation performance is also not rejected.

Table 5- 7 Model abstract[c]

Model	R	R^2	Adjusted R^2	Evaluated SE
1	.661[a]	0.437	0.434	0.539

2	.694[b]	0.481	0.478	0.518

a. Predicted variables: (constant), entrepreneur's learning ability; b. Predicted variables: (constant), entrepreneur's learning ability, absorptive capacity; c. Dependent variable: innovation performance

Table 5- 8 Anova[c]

Model		Sum of squares	df	Average square	F	Sig.
1	regression	62.009	1	62.009	213.828	.000[a]
	residual	80.038	276	.290		
	Sum	142.047	277			
2	regression	68.378	2	34.189	127.626	.000[b]
	residual	73.669	275	.268		
	Sum	142.047	277			

a. Predicted variables: (constant), entrepreneur's learning ability; b. Predicted variables: (constant), entrepreneur's learning ability, absorptive capacity; c. Dependent variable: innovation performance

Table 5- 9 Parameter[a]

Model		Non-standardized parameter		Standardized parameter	t	Sig.
		B	SE	Beta		
1	(constant)	1.519	0.188		8.100	0.000
	ELA	0.659	0.045	0.661	14.623	0.000
2	(constant)	0.849	0.227		3.748	0.000
	ELA	0.597	0.045	0.599	13.230	0.000
	AC	0.221	0.045	0.221	4.876	0.000

a. Dependent variable: innovation performance

5.5.2 Mediating role of absorptive capacity with bootstrap analysis

Through using the SPSS procedures to perform the mediation test, we selected Bootstrap = 5000, and the confidence interval is 95%, with the independent variable (X) = entrepreneur's learning ability, mediation variable (M) = absorptive capacity, dependent variable (Y) = innovation performance. The test results are shown in Table 5-10.

Table 5- 10 Mediating analysis of absorptive capacity with bootstrap method

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Outcome: AC

Model	Coeff	SE	t	P	LLCI	ULCI
constant	3.204	.239	12.657	.000	2.554	3.494
ELA	.279	.057	4.866	.000	.166	.392

********** TOTAL, DIRECT, AND INDIRECT EFFECTS **********

Total effect	Effect	SE	t	P	LLCI	ULCI
ELA	.659	.045	14.623	.000	.570	.748

Direct effect	Effect	SE			LLCI	ULCI
ELA	.597	.045	13.230	.000	.508	.686

Indirect effect	Effect	BootSE			BootLLCI	BootULCI
AC	.062	.022			.026	.116

From Table 5-10, the coefficient on absorptive capacity is significantly positive (Coeff = 0.279, P < 0.001). Hence, H1 that predicts entrepreneur's learning ability positively affects absorptive capacity is not rejected.

From the perspective of mediation, the interval (BootLLCI = 0.026; BootULCI = 0.116) does not include 0, that is to say mediation exists. Therefore, absorptive capacity has a positive mediating role in the relationship between entrepreneur's learning ability and innovation performance. Therefore, H3 is not rejected.

5.5.3 Moderating role of market orientation with bootstrap analysis

Next, we continued to use the bootstrap method to test the moderating effect of market orientation, selecting Bootstrap = 5000, with a confidence interval of 95% and centralizing the interaction between market orientation and entrepreneur's learning ability. The test results are shown in Table 5-11.

Table 5- 11 Moderation analysis of market orientation with bootstrap method

R	R^2	MSE	F	P	Df1	Df2
.723	.522	.248	64.462	.000	3.000	274.000
Model	**Coeff**	**SE**	**t**	**P**	**LLCI**	**ULCI**
constant	4.230	.031	138.544	.000	4.170	4.290
MO	.226	.051	4.403	.000	.125	.327
ELA	.626	.051	12.244	.000	.526	.727
int_1	-.197	.064	-3.059	.002	-.323	-.070
Conditional effect (MO)	**Effect**	**SE**	**t**	**P**	**LLCI**	**ULCI**
-.692	.763	.068	11.220	.000	.629	.896
.000	.626	.051	12.244	.000	.526	.727
.692	.490	.068	7.250	.000	.357	.624

Table 5-11 shows that the interaction coefficient of market orientation and entrepreneur's learning ability is significantly negative (Coeff = -0.197, $P < 0.01$). Based on the mean and mean ±1 standard deviation, we drew a moderation plot as per Figure 5-2. All interval values of market orientation under different levels (low (0.629, 0.896), medium (0.526, 0.727), and high (0.357, 0.624)) do not include 0. Therefore, market orientation has a negative moderating role in the relationship between entrepreneur's learning ability and innovation performance and H5 is not rejected.

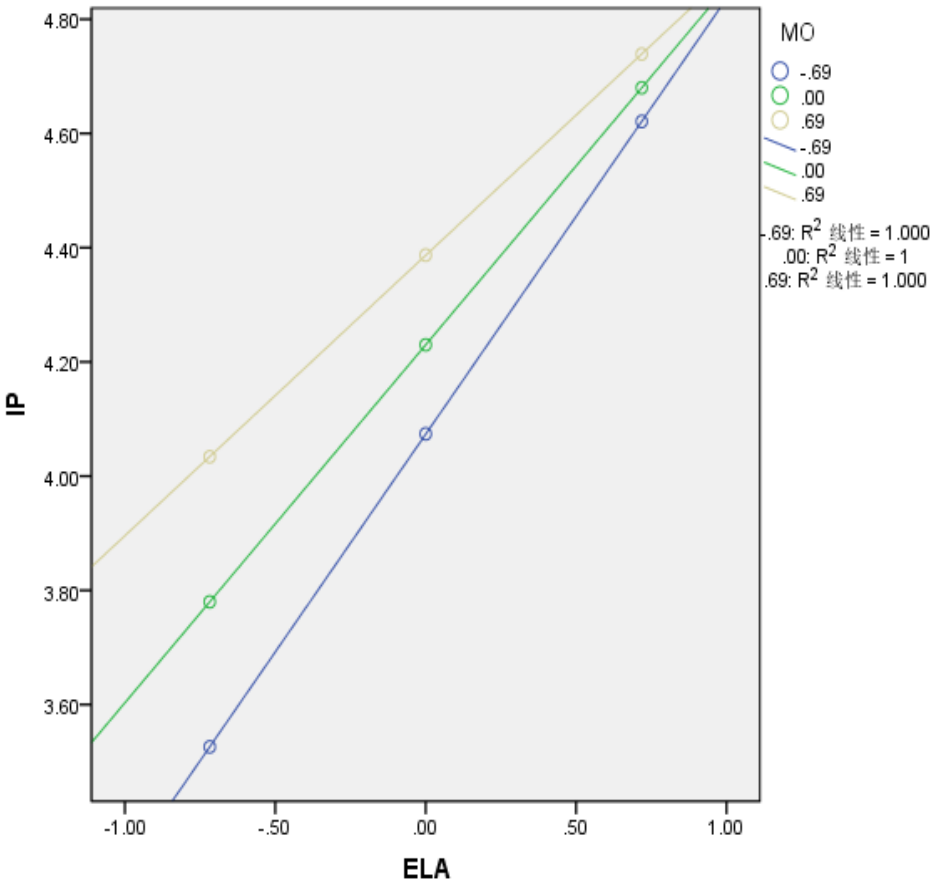

Figure 5- 2 Moderating plot of market orientation

5.5.4 Moderating role of policy support with bootstrap analysis

Finally, we used the bootstrap method to test the moderating effect of policy support, selecting Bootstrap = 5000, with a confidence interval of 95% and centralizing the interaction between policy support and entrepreneur's learning ability. The test results are shown in Table 5-12.

Table 5- 12 Moderation analysis of policy support with bootstrap method

R	**R^2**	**MSE**	**F**	**P**	**Df1**	**Df2**
.725	.525	.246	95.452	.000	3.000	274.000
Model	**Coeff**	**SE**	**t**	**P**	**LLCI**	**ULCI**
constant	4.235	.030	139.774	.000	4.176	4.295
PS	.114	.026	4.398	.000	.063	.166
ELA	.637	.048	13.337	.000	.543	.731

int_1	-.211	.036	-5.923	.000	-.281	-.141
Conditional effect (PS)	**Effect**	**SE**	**t**	**P**	**LLCI**	**ULCI**
-1.084	.865	.052	16.504	.000	.762	.968
.000	.637	.048	13.337	.000	.543	.731
1.058	.414	.068	6.049	.000	.279	.549

Table 5-12 shows that the interaction coefficient of policy support and entrepreneur's learning ability is significantly negative (Coeff = -0.211, P < 0.001). Based on the mean and mean ±1 standard deviation, we drew a moderation plot as per Figure 5-3. All interval value of market orientation under different levels (low (0.762, 0.968), medium (0.543, 0.731), and high (0.279, 0.549)) do not include 0. Therefore, policy support has a negative moderating role in the relationship between entrepreneur's learning ability and innovation performance and H6 is rejected.

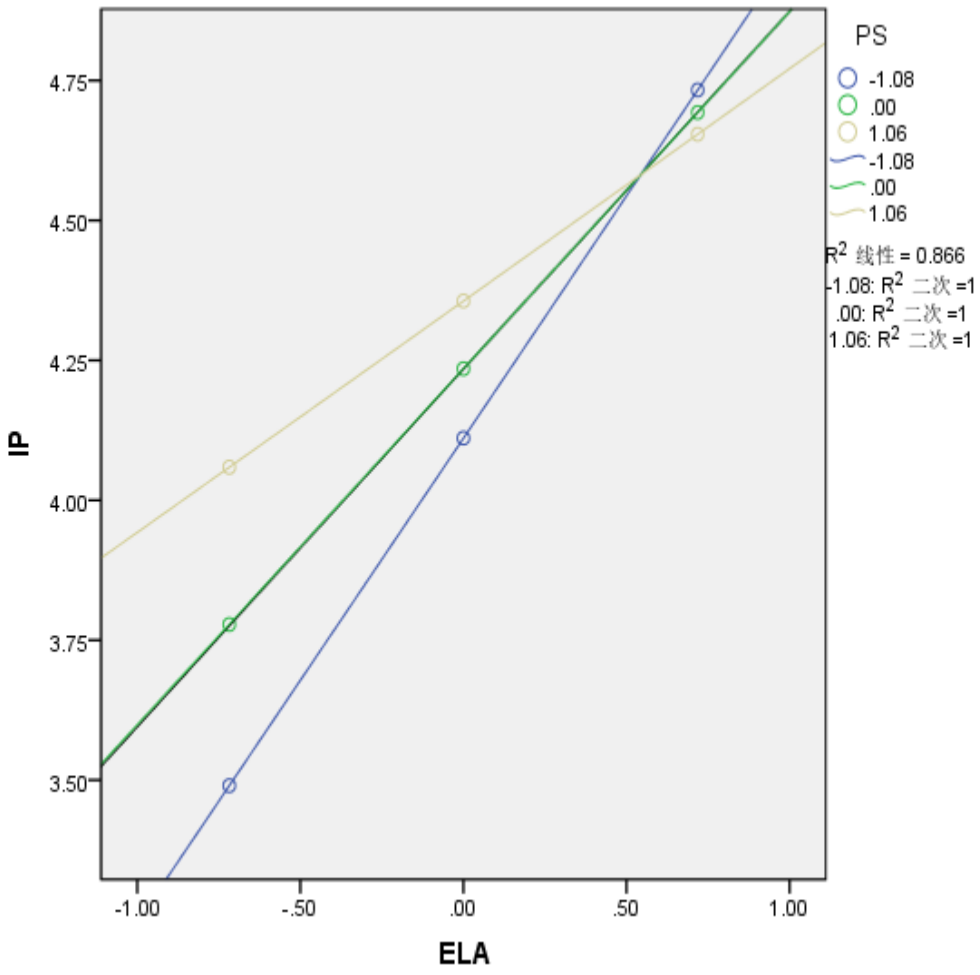

Figure 5- 3 Moderating plot of policy support

5.6 Summary of this chapter

This chapter uses empirically (regression analysis and bootstrap method) test the hypotheses and the conceptual model proposed in Chapter 3. The results of the test are reported in Table 5-13.

Table 5- 13 Empirical test results of all hypotheses

	Hypothesis	Empirical result
H1	Entrepreneur's learning ability is positively correlated with absorptive capacity.	not rejected
H2	Absorptive capacity is positively correlated with innovation performance.	not rejected
H3	Absorptive capacity positively mediates the relationship between entrepreneur's learning ability and innovation performance.	not rejected
H4	Entrepreneur's learning ability is positively correlated with innovation performance.	not rejected
H5	Market orientation negatively moderates the relationship between entrepreneur's learning ability and innovation performance.	not rejected
H6	Policy support positively moderates the relationship between entrepreneur's learning ability and innovation performance.	rejected

Chapter 6: Discussion, Conclusions and Implications

This thesis focuses on the key research question: i.e. how does entrepreneur’s learning ability impact innovation performance? This thesis begins with an introduction of practical and theoretical background, research questions, aim and research contributions. Next, chapter 2 contains a literature review of the related variables. In Chapter 3, the conceptual model and proposed corresponding hypotheses were developed. Chapter 4 follows with a detailed description of the methods used and with the scale that was constructed. Processing and analyses of the data collected follows in Chapter 5. Results of a series of tests including regression and bootstrap analysis are reported too. Finally, the findings and their corresponding implications as well as for the practice of management are discussed in Chapter 6.

6.1 Discussion and conclusions

6.1.1 Role of entrepreneur’s learning ability

This thesis demonstrated that entrepreneur’s learning ability positively affects innovation performance, which is in line with the findings of Wu, Gao, and Wei (2007), Nonaka, Toyama, and Nagata (2000). To the best of our knowledge, previous studies only verified the direct effect of entrepreneur’s learning ability on innovation performance in a single model. Empirical findings confirmed that entrepreneurs with strong learning ability help firms assess, acquire and integrate information and knowledge internally and externally, thereby effectively improving their absorptive capacity and innovation performance.

In a dynamic competitive environment, innovation is a key factor for the growth of corporate performance, while innovation performance is considered to be a direct manifestation of corporate performance. The behavior of entrepreneurs has a direct impact on the innovation of enterprises and their learning ability enhances the initiative, competitiveness and enthusiasm of corporate innovation, so that it can effectively spur the improvement of corporate innovation performance.

Entrepreneur's learning ability is conducive to the firm's continuous review and reflection on technology management, and to gain new knowledge in reflection, which ultimately helps to improve the firm's learning ability and innovation performance. Entrepreneur's learning

ability is conducive to improving the company's knowledge learning and absorptive ability, while the latter is an important foundation for entrepreneurs' learning ability to improve innovation performance. All in all, entrepreneur's learning ability is conducive to improving enterprise's resource integration ability and resource efficiency, and ultimately improve the innovation performance of the enterprise.

6.1.2 Role of absorptive capacity

This research also confirmed the mediating role of absorptive capacity, i.e. entrepreneur’s learning ability positively affects innovation performance through absorptive capacity in the sample examined. As noted, absorptive capacity enhancing organizational performance or innovation outcomes has been confirmed by most scholars (Terziovski, 2010). However, few scholars have regarded as a mediator linking entrepreneur’s learning capabilities and innovation in the context of innovation activity and this thesis tried to contribute to mend this research flaw. Entrepreneur’s learning capabilities are essential to increase the use of new and existing knowledge to identify market opportunities. Firms with strong absorptive capacity tend to support new and novel ideas, and further increase investment in new product R&D and extensive and intensive knowledge activities embedded. It is therefore a key input in the process of organizational learning.

Absorptive capacity is the use of innovative resources through scientific knowledge management methods to achieve value creation and enhance organizational innovation performance. Enterprises with strong absorptive capacity can quickly develop new products and new services that meet market demand, occupy leading positions and first-mover advantages in the market, and effectively transform entrepreneurs' learning ability into corporate competitive advantages. All in all, absorptive capacity is critical to firm’s innovation success. Only by focusing on accumulating and improving the efficiency of resource utilization can an enterprise improve its innovation performance.

6.1.3 Moderating role of market orientation

As market orientation increases, the positive impact of entrepreneurs’ learning ability on innovation performance weakens, indicating that under a given entrepreneurs’ learning ability, the stronger the market orientation, the lower the innovation performance, which, to a certain extent, confirms Bennett and Cooper (1981)’s research. The reason for such negative moderation effect may be that market orientation enables companies to develop uncompetitive

and incremental innovation rather than radical innovations (J. Zhang, 2005). Moreover, existing research on market orientation and performance has also shown diversified results. Some scholars believe that market orientation positively relates to firm's performance and some believe that market orientation, on the contrary, weakens firm's performance (Huang, 2019). At the same time, purely market-oriented companies pay too much attention to consumers and focus on the current needs that customers can clearly express, so they are likely to miss a good opportunity to develop new products that customers cannot express. That is to say, if the customer orientation is overemphasized, it will cause the enterprise to focus only on minor changes and improvements to the product, and only on meeting the current needs of customers, thereby easily inhibiting radical innovation. It is of course not conducive to the company's long-term advantage that deviates from company's strategy and marketing path (Shi, 2006).

Therefore, to take full advantage of the positive role of market orientation, we must pay attention to the real needs of consumers, and the essence of true technical innovation, namely, the function and value of the product. Through developing and meeting customer needs, firms maintain customer loyalty and protect enterprises in the long-term development (Liu & Shi, 2006). For companies, in the process of technology R&D, they must emphasize market research and competitor analysis, be sensitive to changes in customer needs and competitors, and continue to collect information related to customer needs and changes in competitors, which can improve corporate satisfaction and further shed light on innovation direction. For example, each component of market orientation will affect the enterprise's innovation performance in different forms. Customer orientation, cross-sector collaboration, and competitor orientation have different influence on enterprise innovation performance (Ren & Li, 2003). At the same time, market orientation clearly pointed out the need to pay attention to and share the information of customers and competitors, emphasizing and promoting the originally invisible information collection and knowledge search, so that the originally invisible information flow can be managed. Enterprises have a path-dependent feature in the processing and application of knowledge, that is, the creation of new knowledge depends on the existing capabilities and organizational routines. Therefore, enterprises need to continuously integrate knowledge by acquiring new knowledge and reorganizing their own knowledge, so as to continuously improve the existing capabilities, enhance the value conversion efficiency of organizational learning that matches the technology strategy of the enterprise with the competitive environment, and better realize the enterprise's technology strategy that improves the value of learning.

6.1.4 Moderating role of policy support

According to our results, policy support negatively moderates the positive relationship between entrepreneurs’ learning ability and innovation performance, indicating that policy support can suppress the positive effect of entrepreneurs’ learning ability on innovation performance. Due to the economy characteristics of the innovation actor, the property rights limitation of innovation elements, the locking effect of technological innovation products, and the huge uncertainty of collaborative innovation, designing an innovation policy system is difficult to coordinate. The information asymmetry between public policy and enterprise's innovation decision-making will lead to diminishing marginal effects of entrepreneurs' learning ability.

Enterprise innovation has a certain degree of uncertainty and externality, and government policies have certain boundaries for the support of enterprise innovation activities. In addition, enterprises as innovation actors also have certain opportunistic behaviors. At the same time, based on a new understanding of the function of the innovation policy system, the main reasons for the failure of policy support may be as follows: first, due to the lack of organizations and public institutions or imperfect development, there is a lack of institutional mechanisms; second, there is an improper connection or lack of connections among the entities that hinders the flow of innovative resources, individual rational and irrational competition behaviors, and a lack of a coordinated channel. The third is the unreasonable allocation of resources at the enterprise, industry or national level, which may lead to the blockage of innovative resources and bring about the "isolated island effect” (Li & Liu, 2008; Xie, 2010).

Entrepreneurs' learning ability features in uncertainty. Although policy support can reduce the learning cost of entrepreneurs to a certain extent and increase learning benefits, policy support may also have certain efficiency losses and constraints due to other policy objectives. The externality and uncertainty of innovative products are the roots of independent innovation policies. The role of policies is to correct the distortion of market innovation costs and benefits, so that innovators can form reasonable expectations and stimulate independent innovation behaviors. It may also lead to "failure" due to efficiency losses and other policy objectives (Deng, 2010). For example, She, Wang, and Zhang (2019) found that the comprehensive innovation policy issued for the construction of innovative cities does not promote the improvement of urban innovation capabilities.

The research on the innovation system has paid attention to various innovation failures

and focused on analyzing the impact on innovation from the institutional level. Due to market failures, governments in developed countries have fostered a good atmosphere for innovation and entrepreneurship, strengthened the relationship between public R&D institutions and enterprises and promoted enterprise innovation performance (Wang, Sun, & Liu, 2012). From the perspective of information asymmetry and agency theory, some scholars believe that before the government provides support to enterprises, it does not fully understand the enterprise's own situation and related information. The lack of scientific and reasonable judgment standards often results in the government not providing the optimal allocation of innovative resources and services for enterprises and sometimes will become a waste (Tang, Li, & Fan, 2017).

Each subject in the organization system is self-contained, competing with each other, the subject of innovation being restricted, and the sharing difficulty of innovation results, forming the "isolated island effect" and the difficulty of establishing synergies (Liu, Sun, & Ma, 2015). The research by Tian and Zhang (2013) shows that in state-owned enterprises in China, political connections not only lead to government favoritism, but also bring social burden. In turn, Yuan, Hou, and Cheng (2015) found that political association will affect enterprise innovation by reducing market competition and promoting excessive investment, and then result in weak technology innovation, resource dispersion and crowding-out effects. Therefore, innovation policies stem from market failures, while inclusive policies have little to correct the failures caused by innovation entities, innovation networks, and innovation systems. To promote the growth of corporate performance, we need to formulate selective policies to solve the failures.

In a transitional economic environment, policy support is still particularly important to organization-level R&D activities and outcomes. As to R&D activities and outcomes of high-tech firms, policy support acts as an important contingency factor in transforming innovation activities into innovation performance. Government agencies, as creators of innovation environments and innovation policies, exercise extensive control over organizations. Grounded in national innovation systems, European and American studies have proposed a "university-industry-government" triple spiral model. The EU has proposed a four-helix model of "government (public institution)-enterprise (industry)-university research-user (citizen)". Therefore, the government should focus on providing targeted policy support for the innovation activities in order to enhance organization-level searching, learning, and creation, and then ultimately improve innovation effectiveness.

In the process of economic transformation, the Chinese government has a major influence on the allocation of resources, i.e. funds and land (Tian et al., 2016). Specifically, the

government should improve the efficiency of policy support for corporate innovation activities from several aspects such as fiscal or special funds, tax incentives, technical information and technical support, and production equipment. At the same time, it should reduce the interference with the operation and management of the enterprise, create a good policy environment for enterprise innovation, and provide direct, clear and effective policy support. It also needs to promote the communication and cooperation between high-tech enterprises and competitors, industry associations, universities, research institutes and other departments, effectively integrate innovation resources, and thus promote sustainable development of enterprise innovation activities, thereby improving innovation performance.

6.2 Theoretical contributions and managerial implications

6.2.1 Theoretical Contributions

6.2.1.1 Entrepreneur's learning ability

The role of entrepreneur's learning ability in the growth of innovation performance has always been the focus of academic circles. Many scholars have explored the connotation and forms of entrepreneur's learning ability and probed into their impact on the performance of new product development or innovation performance. The consensus is that cross-functional cooperation can improve product innovation and innovation performance. From the perspective of information processing, Griffin and Hauser (1996) have pointed out that cross-functional cooperation can create and disseminate new information based on information sharing, while the successful innovation and performance improvements require integration and re-use of such information. After collecting market information and customer needs, entrepreneurs can integrate resources, and use knowledge integration to help them more accurately grasp market development trends and effectively organize market resources. This information is then integrated into targeted new product, new technology, and new service development processes and applied to the market, which can better meet customer needs and improve the innovation performance of enterprises.

According to knowledge theory, an enterprise can be regarded as an assembly of knowledge stocks. During innovation, firms need to continuously acquire, accumulate and integrate knowledge, and transform it into the innovation performance, so as to survive and gain sustainable development. Entrepreneur's learning ability is important to accumulate knowledge and improve innovation performance. The improvement of entrepreneur's learning

ability is realized in the process of continuous entrepreneur’s learning activities. Secondly, the development of entrepreneur’s learning ability is dynamically evolving, therefore an effective entrepreneur’s learning ability mechanism can shorten the learning process, reduce the degree of learning complexity as well as risks and uncertainties, and thus improve the efficiency of learning. In addition, the entrepreneur’s learning ability is conducive to the firm's clear learning goals and standardized learning behaviors, thereby improving absorptive capacity and innovation performance. Entrepreneurs' learning ability is also conducive to the continuous summarization and refinement of new methods and technologies. These newly acquired experiences and methods are advantageous to improving the efficiency of technical activities of enterprises, and ultimately improving innovation performance.

6.2.1.2 Absorptive capacity

For the resource-based view, absorptive capacity is regarded as an important resource. Innovation comes from the combination of various knowledge, so the diversified knowledge within the enterprise can promote innovation by absorbing and integrating knowledge fragments. Knowledge, is an objective and transferable commodity, it is not just a static resource, but a process of organizational learning including transferring, creating and applying.

In line with the resource-based view, absorptive capacity is a good way for knowledge integration, which hinders competitors’ imitation and creates new knowledge connections and applies them to the market. The importance of absorptive capacity at the one hand is on the influence of innovation and, at the other hand, it transfers benefits of entrepreneurs’ learning to innovation abilities of firms. Entrepreneur’s learning ability provides the conditions for innovation team members to create heterogeneous knowledge and an atmosphere for the organization to innovate. On this basis, enterprises can break through the original knowledge base for knowledge creation and technological innovation through absorption capabilities. Absorption, learning, and integration of resources help enterprises obtain the resources and capabilities needed during innovation and promote knowledge among personnel. In the process, firms continuously update their innovation resources. The new ideas and new products they generate will be an important source of inspiration for corporate innovation activities.

6.2.2 Managerial Implications

6.2.2.1 Entrepreneurs should keep learning

Entrepreneur’s learning ability is the key factor to promote the improvement of innovation

performance and can be obtained through learning (e.g. learning by doing and theoretical learning). Therefore, entrepreneurs should make full use of various channels and resources, continuously absorb new information, ideas and knowledge, strengthen business capabilities, and then improve their own learning capabilities. Based on the empirical analysis of this thesis, the enlightenment is as follows:

Entrepreneurs should be good at learning from history, at analyzing history from the perspective of political economy, and at deriving the future from history. Learning from past experiences makes people wise and enables entrepreneurs to see the development of things, to understand and master the laws of change. Entrepreneurs should read the official history, because the official history can reflect the true face of the history and help understand its essence. When reading history, entrepreneurs in China must also use the thoughts of political economy to analyze them and make a general survey of the ancient and modern Chinese and foreign discoveries and summaries, to integrate and understand the causes and trends of development and change, so as to form their own viewpoints and unique perspectives on issues.

Entrepreneurs should be good at learning philosophy and think about life with the basic principles of philosophy. Life profoundly reflects the basic principles of philosophy everywhere. For example, existence is possible. When it comes to the evaluation of a thing, as long as the thing develops well, its rationality should be recognized. Therefore, as long as there is no ethical fading, no matter what entrepreneurs use to do the business, their approaches are reasonable. Considering "the survival of the fittest", the extinction of dinosaurs did not occur because they are not strong enough, but because they could not adapt to the changing environment. Ants could survive to this day and have not been eliminated, because of their small body, because they can adapt to the environment. Similarly, entrepreneurs must adapt themselves to their environment. This is also the principle of universal connection in the Marxist philosophy and the butterfly effect is an extreme example of the universal connection principle. There is also "the accidental and the inevitable". If a CPU (Central Processing Unit) is lost in today's factory, this is not an accident and is not inseparable from the management of the factory. It reminds entrepreneurs to strengthen management immediately. In life, thinking more about the issue from a philosophical perspective, the entrepreneur's thoughts will become more acute and profound.

In turn, learning literature can improve language expression and be more pervasive. Literature is not compulsory, but if entrepreneurs learn literature, they will be more powerful. A little more literary accomplishments will be of great help to entrepreneurs, and the

communication skills of entrepreneurs will be strengthened, because with the help of literary accomplishment, entrepreneurs can portray things more clearly. Even when encountering esoteric, awkward or abstract things, entrepreneurs can make them clearer with a vivid metaphor or story or fable. Therefore, literature will be of great help to entrepreneurs and enable them to make reports, speeches, or even educate subordinates in a poetic and artistic way: the words will be more colorful, and the listeners will be more attentive and more susceptibly touched. If entrepreneurs do not have literary education, they often find it difficult to express themselves precisely.

Focusing on the reality, entrepreneurs should learn knowledge management and integrate them together. Entrepreneurs should learn the business strategy of the company and learn each link of management: production operation management, financial management, human resource management, marketing, management psychology... but when learning the knowledge about management, they must pay attention to the prerequisites, and it is impracticable to copy the experience of others regardless of their actual situation. For example, when referring to the importance of leadership and comparing it to management, Jack Welch once said, "management is as simple as that." His words are not wrong. GE is a large company and requires a strong leadership, so GE's president certainly conducts management over the company as little as possible, trying to make management easier, because he should do more leadership and direction work. "Leadership creates movement, management creates order" but, if one takes Jack Welch's words as the truth, neither identifying what position he has held, nor analyzing the conditions for the establishment of this statement, when one opens a small company and strictly follows this assertion by paying little attention to management, the company may soon close down.

6.2.2.2. Entrepreneurs should continuously improve their innovation ability

Insufficient innovation capability has become a bottleneck restricting the improvement of human capital of entrepreneurs in China. First of all, poor learning ability of the entrepreneurs affects the formation of entrepreneurial human capital, which in turn affects the company's labor productivity, profitability, scientific and technological level and its position in international competition. From the current situation of Chinese enterprises, most of them have such circumstances as strategic convergence, struggling with the resources and manpower, lack of differentiation in products (services), and low-end value chains in international operations, which should draw great deal of attention from enterprises, governments and the whole society. Second, innovation ability can be cultivated, and should start from childhood. This is not only

a challenge to traditional school education, but also a challenge to national policies and social concepts. How to awaken the sense of innovation in the social community, and how to promote the formation of innovation ability with policy guarantee are all greater challenges to practice and theory. Finally, from the analysis of entrepreneurs, the lack of domestic entrepreneur's learning ability is also related to the traditional Chinese Confucian culture. Some of its backward concepts such as self-restraint, self-effacement and following-up are harmful to the ability to innovate. Entrepreneurs are social elites, and corporate innovation is indispensable. Of course, it is worth mentioning that innovation is also accompanied by risks.

From the perspective of enterprises and entrepreneurs, improving the ability to innovate can start from the following aspects:

a) Focus on cultivating innovative thinking: Innovative thinking refers to the way in which new connections are created by rethinking the connections among things and first one should break the barriers to thinking. In the long-term development process, the company has formed its own unique thinking inertia and thinking mode, which forms a relatively fixed mental model for the enterprise itself and the environment. This mental model is likely to become a hindrance factor for enterprises to achieve development and innovation. Therefore, to cultivate an innovative spirit, entrepreneurs must change their fixed mental models and cultivate out of the box thinking. Second, innovation has to become an important element of corporate culture since it is fundamental to maintain a sustainable competitive advantage in a complex and dynamic environment. Any capability or resources of the enterprises themselves do not have a unique competitive advantage. Only by making a new unique combination of these capabilities and resources can they prevent competitors from imitating. Therefore, entrepreneurs must strive to cultivate an innovative corporate culture, making innovation become a conscious way of thinking for employees. Third, the innovative thinking of entrepreneurs should be fostered. Entrepreneurial management thoughts and thinking methods play an important role in shaping corporate culture. Only by fully recognizing the importance of innovation in the development of enterprises and by setting an example of innovation and striving to create an innovative support system, entrepreneurs can truly put innovation into implementation.

b) Strive to cultivate a team of talented operation and management personnel: Talented personnel are the stamina of economic development and the source of economic growth. The competition among enterprises in the world today is, in the final analysis, a competition of talents. Having an excellent team of business operation and management personnel is an important resource for current economic competition. Driven by the revolution of new science

and technology in the world, the improvement of human life and the growth of national wealth have been increasingly dependent on the innovation and accumulation of knowledge. In order to make the enterprise bigger and stronger, we must strive to create a good atmosphere conducive to the development and growth of business management talents, and improve its ability of strategic decision-making, market competition, business management, coping with complex situations and promoting the corporate innovation. It is necessary to, around the production and operation center of the enterprise, build a team of talented personnel with professional structure, clear hierarchy and reasonable age structure that meets the needs of corporate strategic development, and forms a highly intensive talent advantage in the core business areas of the enterprise, thus universally enhancing the quality of corporate talented personnel. The ability and knowledge of talented personnel are coordinated and developed, and fully exerted. According to the different characteristics of various levels of talented personnel, it is expected to coordinate and promote open recruitment, competition for posts, and allocate the proportion of talented personnel through market-based means such as "hunting" in the talent market, establish a competitive mechanism for selecting and hiring talented personnel in an all-round manner, and gradually utilize the fundamental role of the talent market in the allocation of talent resources.

c) Improve the level of information and modernization of corporate management: World-class enterprises have a high level of information that assists them in establishing excellent management and operational. Dell's computer direct sales model and Wal-Mart's low-cost supply chain management are achieved through management innovation by virtue of the information platform, and information technology has made a qualitative change in the entire business model. Cisco's management information has completely become the basic support for its international operation. All employees are working online, and the company completes 90% of its sales business online. Formosa Plastics' information management can realize one-time input of data, and it can be used effectively many times in the world. The one-day global financial settlement each month has been realized more than 10 years ago. It can be said that the level of information has become an important indicator of whether enterprises can achieve world-class management. For Chinese enterprises, especially large enterprises, traditional management tools and methods can no longer meet the needs of current international operations and market competition. With the help of modern information technology, it is helpful to realize the modernization and refinement of corporate management. Key performance indicators such as market response capacity and speed, centralized management and control, service quality

level, user satisfaction and cost reduction have been significantly improved.

6.2.2.3 Entrepreneurs should highlight the importance of integration

In the context of increasingly fierce competition and a complex and changing external environment, companies must continuously learn and change in order to achieve sustainable development. In the process of enterprise innovation, effective integration of system resources is conducive to the integration of internal and external innovation resources to improve the innovation performance of enterprises. The research undertaken in this thesis has confirmed that there are many factors that affect the innovation performance of enterprises. It is particularly important to strengthen collaboration among enterprises in all aspects of the technological innovation process and try to maintain harmony.

The process of resource integration is that entrepreneurs identify and select, activate and organically integrate resources and capabilities from different sources, different structures, different levels and different content. It is a dynamic process where flexibility, value and systems come with new resources and new abilities. Entrepreneurs should actively cultivate the vision of resource capture, enhance the ability to develop resources, become familiar with the art of using resources, and use performance to create new miracles. The idea of system integration is that under the new situation of world economic integration, enterprises seek and attack ability and strategic capability to maximize profit margins. It is impossible for any entrepreneur to solve all the problems involved in innovation, nor is it possible to have all the resources for innovation. The key here is to learn to integrate the systems

6.3 Research limitations and future study

6.3.1 Research limitations

This thesis has conducted theoretical and empirical research based on scientific methods, but there are some limitations due to various reasons.

(1) The limitations caused by the particularity of the subject: The scarcity of entrepreneurs and of their available time; the difficulty of conducting in-depth interviews with a large number of entrepreneurs; the constraints of research funding; and the limited research channels, all have resulted in that the contents, depth and breadth of the research have certain limitations. Although through various channels we have worked to expand the number of respondent entrepreneurs, we still may suffer from sample bias. In addition, some of the surveys were

completed by the middle management of the enterprise and not exactly by the entrepreneur him or herself. Although they can describe the entrepreneur's intentions more objectively from their position, it is also possible that the viewpoints proposed from this subjective perspective misinterpret the entrepreneur's intentions, resulting in certain subjective response bias. Because we wanted, as much as possible, surveys to be filled in by the entrepreneurs themselves, we considered their time constraints and limited the length of the questionnaire, which may also limit the depth of the research to some extent.

(2) Subjectivity of the constructs: Entrepreneur's learning and innovation performance are constructs with very wide and rich connotations. Moreover, the internal relationship between them is also very complex and it is a dynamic process that is constantly changing. Despite the fact that the indicators that measure entrepreneur's learning ability and innovation performance are based on previously tested scales, they still may be inevitably subjective.

(3) Limitations of the research design: Although the hypotheses are validated by empirical research, the main factors are used to explore the relationship between entrepreneur's learning ability and corporate innovation performance, and do not cover all the related factors, which has certain limitations by nature. Besides, there may be unawareness of interwinding of these factors which lead to a certain deviation in the relationship and degree of influence.

6.3.2 Future study

Despite of the fact that the empirical tests of this thesis have demonstrated the influence of entrepreneur's learning ability on innovation performance of enterprises, whether this influence varies with different contexts needs further study. In addition, this research could be enriched by conducting multiple case studies or further surveys in specific industries. Thus, future research could expand the scope of this thesis and also conduct comparative studies to gain further understandings of the inherent mechanism of entrepreneur's learning ability affecting innovation performance. This will not only further enlarge the conclusions of the thesis, but also reflect the dynamics of enterprise innovation performance under the influence of entrepreneur's learning abilities.

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Annex A: Scale

Dear Sir/Madam:

Thank you for helping us fill out this academic questionnaire. The main purpose of this questionnaire is to investigate the influence of entrepreneurs' learning ability on innovation performance. Your support will be the key factor for the research. Thank you very much for your cooperation.

Best Regards!

Part I: Basic information of individual

1. Gender

○ female ○ male

2. Age group

○ Younger than 35 years old ○ 36-45 years old ○ Older than 46 years old

3. Level of education

○Middle school or technical secondary school ○Junior college

○undergraduate ○Postgraduate and above

4. Approaches to get the current position

○Internal promotion ○External recruitment ○Own entrepreneurship ○Inheriting the undertaking of the ancestors

5. Satisfaction of the current income

○Very satisfied ○Relatively satisfied ○Generally satisfied ○Not very satisfied ○Very dissatisfied

6. Satisfaction of the current social status

○Very satisfied ○Relatively satisfied ○Generally satisfied ○Not very satisfied ○Very dissatisfied

Part II: Basic information of Enterprise

7. Enterprise registration type

○ State-owned or collectively owned enterprises ○ Joint-stock enterprises ○ Private

enterprises ○ Foreign investment ○ Partnership enterprise

8. Enterprise life cycle stage

○ Start-up stage ○ Growth stage ○ Mature stage ○ Degenerating stage

9. Enterprise scale

○Less than 50 employees ○51-200 employees ○201-500 employees ○501-1000 employees ○1001-5000 employees ○More than 5000 employees

10. The industry in which the enterprise operates

○Manufacturing ○Scientific research and general technical services ○Electronic information industry ○Social service industry and manufacturing industry ○Extractive industry ○Financial industry ○Architecture ○Real Estate ○Export trade ○Others

Part III: The effect of Entrepreneur Learning Ability on Innovation Performance

① Entrepreneurs learning ability. Please choose the number that represents the degree of your agreement or disagreement with the statements about entrepreneurs' learning ability. The relevant evaluation criteria are as follows: 1 = very disagree; 2 = disagree; 3 = uncertain; 4 = agree; 5 = very agree.

11. Willing to try new methods and new solutions

○1 ○2 ○3 ○4 ○5

12. The ability to summarize and absorb the experience and lessons of the enterprise itself and its competitors

○1 ○2 ○3 ○4 ○5

13. The ability to learn and think, able to find good strategies, develop business, resolve crisis

○1 ○2 ○3 ○4 ○5

14. Quickly update the knowledge structure, be able to sum up experience and apply what you have learned

○1 ○2 ○3 ○4 ○5

15. Good at innovation in business philosophy and management methods, product management and services, marketing and supply

○1 ○2 ○3 ○4 ○5

②Absorptive capacity. Please choose the number that represents the degree of your agreement or disagreement with the statements about absorptive capacity. The relevant evaluation criteria are as follows: 1 = very disagree; 2 = disagree; 3 = uncertain; 4 = agree; 5 = very agree.

16. Effectively search, identify and track knowledge in new technology areas

○1 ○2 ○3 ○4 ○5

17. Effectively acquire knowledge in new technology area needed internally or externally

○1 ○2 ○3 ○4 ○5

18. Effectively disseminate and share knowledge of new technology areas created or acquired within the company

○1 ○2 ○3 ○4 ○5

19. Effectively integrate and apply knowledge from new technology areas created or acquired to different scenarios

○1 ○2 ○3 ○4 ○5

③Market orientation. Please choose the number that represents the degree of your agreement or disagreement with the statements about market orientation. The relevant evaluation criteria are as follows: 1 = very disagree; 2 = disagree; 3 = uncertain; 4 = agree; 5 = very agree.

20. Establishes competitive advantages by fully understanding and grasping the customer demands in innovation

○1 ○2 ○3 ○4 ○5

21. Gets to know customer demands through information collection in innovation

○1 ○2 ○3 ○4 ○5

22. Carry out response strategy quickly to the threatening acts of the competitors

○1 ○2 ○3 ○4 ○5

23. Provide the targeted customers with relevant services according to your own competitive advantages

○1 ○2 ○3 ○4 ○5

24. Coordinate internal and external resources for innovation activities based on market changes

○1 ○2 ○3 ○4 ○5

④Policy support. Please choose the number that represents the degree of your agreement or disagreement with the statements about policy support. The relevant evaluation criteria are as follows: 1 = very disagree; 2 = disagree; 3 = uncertain; 4 = agree; 5 = very agree.

25. The level of innovative technical service conditions in the company's region is good

○1 ○2 ○3 ○4 ○5

26. The local government has developed and implemented some policies and procedures that are beneficial to business operations

○1 ○2 ○3 ○4 ○5

27. The government often provides consulting, free training for startup companies

○1 ○2 ○3 ○4 ○5

28. The government directly provides financial support to promote the development of enterprise

○1 ○2 ○3 ○4 ○5

⑤Innovation performance. Please choose the number that represents the degree of your agreement or disagreement with the statements about innovation performance. The relevant evaluation criteria are as follows: 1 = very disagree; 2 = disagree; 3 = uncertain; 4 = agree; 5 = very agree.

29. Increase in the number of innovative projects

○1 ○2 ○3 ○4 ○5

30. High success rate of new product development

○1 ○2 ○3 ○4 ○5

31. High quality of new product

○1 ○2 ○3 ○4 ○5

32. Higher speed of new product development

○1 ○2 ○3 ○4 ○5

33. Greater number of Patent licensing

○1 ○2 ○3 ○4 ○5

Annex B: Grouping Total Points

		Number of times	percentage	Valid percentage	Accumulative percentage
Valid	<=89	77	27.7	27.7	27.7
	90-102	122	43.9	43.9	71.6
	103+	79	28.4	28.4	100.0
	sum	278	100.0	100.0	

Annex C: Independent-samples T Test

		Levene test with equal variance		t test with equal variance						
		F	Sig.	T	df	Sig.	Average difference	SE	95% CI	
									Lower bound	upper bound
IP1	Equal variances assumed	47.407	.000	-10.185	154	.000	-1.278	.126	-1.526	-1.030
	Equal variances not assumed			-10.091	99.202	.000	-1.278	.127	-1.530	-1.027
IP3	Equal variances assumed	35.394	.000	-8.853	154	.000	-1.005	.114	-1.230	-.781
	Equal variances not assumed			-8.781	108.507	.000	-1.005	.114	-1.232	-.778
IP5	Equal variances assumed	50.740	.000	-12.401	154	.000	-1.369	.110	-1.587	-1.151
	Equal variances not assumed			-12.302	109.061	.000	-1.369	.111	-1.589	-1.148
IP4	Equal variances assumed	18.674	.000	-9.826	154	.000	-1.203	.122	-1.444	-.961
	Equal variances not assumed			-9.774	128.972	.000	-1.203	.123	-1.446	-.959
IP2	Equal variances assumed	37.404	.000	-10.996	154	.000	-1.252	.114	-1.477	-1.027
	Equal variances not assumed			-10.914	113.269	.000	-1.252	.115	-1.479	-1.025
ELA2	Equal variances assumed	3.051	.083	-7.212	154	.000	-.921	.128	-1.174	-.669
	Equal variances not assumed			-7.193	146.390	.000	-.921	.128	-1.174	-.668
ELA1	Equal variances assumed	.112	.738	-5.391	154	.000	-.744	.138	-1.017	-.471
	Equal variances not assumed			-5.396	153.665	.000	-.744	.138	-1.016	-.472
ELA3	Equal variances assumed	12.410	.001	-9.805	154	.000	-1.139	.116	-1.368	-.909
	Equal variances not assumed			-9.758	132.868	.000	-1.139	.117	-1.370	-.908
ELA4	Equal variances assumed	17.710	.000	-10.030	154	.000	-1.045	.104	-1.251	-.839
	Equal variances not assumed			-9.978	130.530	.000	-1.045	.105	-1.252	-.838

ELA5	Equal variances assumed	.582	.447	-8.154	154	.000	-1.025	.126	-1.274	-.777
	Equal variances not assumed			-8.145	151.891	.000	-1.025	.126	-1.274	-.777
AC3	Equal variances assumed	19.538	.000	-8.537	154	.000	-1.007	.118	-1.240	-.774
	Equal variances not assumed			-8.489	126.850	.000	-1.007	.119	-1.242	-.772
AC1	Equal variances assumed	25.493	.000	-9.808	154	.000	-1.098	.112	-1.319	-.877
	Equal variances not assumed			-9.752	126.673	.000	-1.098	.113	-1.321	-.875
AC2	Equal variances assumed	28.040	.000	-10.642	154	.000	-1.149	.108	-1.362	-.936
	Equal variances not assumed			-10.574	121.135	.000	-1.149	.109	-1.364	-.934
AC4	Equal variances assumed	24.675	.000	-11.120	154	.000	-1.397	.126	-1.645	-1.149
	Equal variances not assumed			-11.036	112.194	.000	-1.397	.127	-1.648	-1.146
MO5	Equal variances assumed	36.249	.000	-10.149	154	.000	-1.083	.107	-1.293	-.872
	Equal variances not assumed			-10.076	115.572	.000	-1.083	.107	-1.295	-.870
MO2	Equal variances assumed	9.561	.002	-7.098	154	.000	-.946	.133	-1.209	-.682
	Equal variances not assumed			-7.073	140.957	.000	-.946	.134	-1.210	-.681
MO3	Equal variances assumed	44.486	.000	-11.075	154	.000	-1.343	.121	-1.583	-1.104
	Equal variances not assumed			-10.988	109.607	.000	-1.343	.122	-1.586	-1.101
MO1	Equal variances assumed	44.493	.000	-10.722	154	.000	-1.174	.109	-1.390	-.957
	Equal variances not assumed			-10.629	104.369	.000	-1.174	.110	-1.393	-.955
MO4	Equal variances assumed	64.447	.000	-10.489	154	.000	-1.094	.104	-1.299	-.888
	Equal variances not assumed			-10.384	93.660	.000	-1.094	.105	-1.303	-.884
PS4	Equal variances assumed	118.842	.000	-13.894	154	.000	-2.055	.148	-2.347	-1.762
	Equal variances not assumed			-13.740	86.818	.000	-2.055	.150	-2.352	-1.757
PS2	Equal variances assumed	66.888	.000	-13.595	154	.000	-1.847	.136	-2.116	-1.579
	Equal variances not assumed			-13.445	87.141	.000	-1.847	.137	-2.120	-1.574
PS3	Equal variances assumed	44.814	.000	-14.870	154	.000	-1.953	.131	-2.212	-1.694
	Equal variances not assumed			-14.737	101.950	.000	-1.953	.133	-2.216	-1.690
PS1	Equal variances assumed	40.888	.000	-13.162	154	.000	-1.849	.141	-2.127	-1.572
	Equal variances not assumed			-13.046	102.379	.000	-1.849	.142	-2.131	-1.568

Annex D: Anti-image Correlation Matrix

	IP1	IP3	IP5	IP4	IP2	ELA2	ELA1	ELA3	ELA4	ELA5	AC3	AC1	AC2	AC4	MO5	MO2	MO3	MO1	MO4	PS4	PS2	PS3	PS1
IP1	0.439	-0.158	0.007	-0.025	-0.027	0.009	0.010	-0.013	0.007	-0.042	-0.036	-0.019	0.016	-0.030	0.019	-0.084	-0.014	0.011	0.036	-0.015	0.021	0.008	-0.022
IP3	-0.158	0.322	-0.090	-0.012	-0.017	-0.022	-0.023	0.058	-0.059	0.035	0.011	-0.023	-0.021	0.053	-0.010	0.009	0.020	-0.034	-0.003	-0.008	-0.015	0.012	0.007
IP5	0.007	-0.090	0.238	-0.013	-0.078	0.006	-0.013	-0.075	-0.029	-0.009	0.010	0.003	-0.009	-0.018	-0.002	-0.003	-0.007	-0.004	0.004	-0.027	0.032	-0.011	0.005
IP4	-0.025	-0.012	-0.013	0.345	-0.143	-0.039	0.000	-0.014	0.033	0.019	0.004	0.002	-0.025	0.002	-0.020	-0.008	-0.018	0.025	0.025	-0.004	0.008	-0.015	0.013
IP2	-0.027	-0.017	-0.078	-0.143	0.222	-0.019	0.017	-0.040	-0.011	0.025	-0.048	0.014	0.032	0.001	0.038	-0.011	0.029	-0.022	-0.032	0.009	-0.013	0.000	-0.009
ELA2	0.009	-0.022	0.006	-0.039	-0.019	0.311	-0.133	-0.037	-0.056	-0.080	-0.029	0.014	0.003	0.023	0.029	-0.013	0.012	-0.047	0.023	-0.005	0.018	0.005	-0.007
ELA1	0.010	-0.023	-0.013	0.000	0.017	-0.133	0.389	-0.039	-0.048	-0.062	0.040	-0.004	-0.034	-0.001	-0.022	0.040	-0.013	0.046	-0.016	0.027	-0.032	-0.001	0.023
ELA3	-0.013	0.058	-0.075	-0.014	-0.040	-0.037	-0.039	0.300	-0.072	-0.101	0.069	-0.008	-0.019	0.000	-0.048	0.004	-0.024	0.023	0.021	-0.003	-0.008	0.009	0.002
ELA4	0.007	-0.059	-0.029	0.033	-0.011	-0.056	-0.048	-0.072	0.355	-0.055	-0.006	0.011	-0.026	0.016	0.003	-0.005	0.004	0.007	-0.018	0.006	-0.019	0.012	-0.013
ELA5	-0.042	0.035	-0.009	0.019	0.025	-0.080	-0.062	-0.101	-0.055	0.447	-0.043	-0.014	0.024	-0.011	0.020	0.037	0.034	-0.033	-0.018	-0.002	0.011	-0.021	0.003
AC3	-0.036	0.011	0.010	0.004	-0.048	-0.029	0.040	0.069	-0.006	-0.043	0.286	-0.116	-0.103	0.032	-0.021	-0.048	-0.032	0.014	0.066	-0.023	0.009	-0.017	0.038
AC1	-0.019	-0.023	0.003	0.002	0.014	0.014	-0.004	-0.008	0.011	-0.014	-0.116	0.283	-0.103	-0.011	0.001	0.009	-0.011	0.037	-0.044	0.010	-0.041	0.032	-0.019
AC2	0.016	-0.021	-0.009	-0.025	0.032	0.003	-0.034	-0.019	-0.026	0.024	-0.103	-0.103	0.239	-0.128	-0.005	0.048	0.022	-0.020	-0.035	0.029	0.015	-0.026	0.007
AC4	-0.030	0.053	-0.018	0.002	0.001	0.023	-0.001	0.000	0.016	-0.011	0.032	-0.011	-0.128	0.471	-0.074	0.021	-0.018	0.004	-0.022	-0.052	0.003	0.047	-0.057
MO5	0.019	-0.010	-0.002	-0.020	0.038	0.029	-0.022	-0.048	0.003	0.020	-0.021	0.001	-0.005	-0.074	0.420	-0.038	-0.058	-0.056	-0.076	0.033	-0.024	-0.020	-0.004
MO2	-0.084	0.009	-0.003	-0.008	-0.011	-0.013	0.040	0.004	-0.005	0.037	-0.048	0.009	0.048	0.021	-0.038	0.449	-0.089	-0.036	-0.109	0.061	0.036	-0.041	-0.014
MO3	-0.014	0.020	-0.007	-0.018	0.029	0.012	-0.013	-0.024	0.004	0.034	-0.032	-0.011	0.022	-0.018	-0.058	-0.089	0.284	-0.136	-0.031	-0.054	0.029	-0.030	0.031
MO1	0.011	-0.034	-0.004	0.025	-0.022	-0.047	0.046	0.023	0.007	-0.033	0.014	0.037	-0.020	0.004	-0.056	-0.036	-0.136	0.310	-0.082	0.009	-0.026	0.009	-0.003
MO4	0.036	-0.003	0.004	0.025	-0.032	0.023	-0.016	0.021	-0.018	-0.018	0.066	-0.044	-0.035	-0.022	-0.076	-0.109	-0.031	-0.082	0.384	0.005	-0.046	0.022	-0.003
PS4	-0.015	-0.008	-0.027	-0.004	0.009	-0.005	0.027	-0.003	0.006	-0.002	-0.023	0.010	0.029	-0.052	0.033	0.061	-0.054	0.009	0.005	0.194	-0.060	-0.060	-0.024
PS2	0.021	-0.015	0.032	0.008	-0.013	0.018	-0.032	-0.008	-0.019	0.011	0.009	-0.041	0.015	0.003	-0.024	0.036	0.029	-0.026	-0.046	-0.060	0.181	-0.038	-0.056
PS3	0.008	0.012	-0.011	-0.015	0.000	0.005	-0.001	0.009	0.012	-0.021	-0.017	0.032	-0.026	0.047	-0.020	-0.041	-0.030	0.009	0.022	-0.060	-0.038	0.150	-0.074
PS1	-0.022	0.007	0.005	0.013	-0.009	-0.007	0.023	0.002	-0.013	0.003	0.038	-0.019	0.007	-0.057	-0.004	-0.014	0.031	-0.003	-0.003	-0.024	-0.056	-0.074	0.174

	IP1	IP3	IP5	IP4	IP2	ELA2	ELA1	ELA3	ELA4	ELA5	AC3	AC1	AC2	AC4	MO5	MO2	MO3	MO1	MO4	PS4	PS2	PS3	PS1
IP1	.913[a]	-0.421	0.022	-0.064	-0.086	0.024	0.024	-0.035	0.016	-0.094	-0.101	-0.055	0.050	-0.067	0.043	-0.190	-0.041	0.029	0.087	-0.051	0.073	0.031	-0.080
IP3	-0.421	.895[a]	-0.324	-0.035	-0.065	-0.071	-0.064	0.186	-0.175	0.091	0.036	-0.075	-0.076	0.135	-0.027	0.024	0.066	-0.106	-0.008	-0.031	-0.063	0.056	0.029
IP5	0.022	-0.324	.923[a]	-0.047	-0.341	0.023	-0.042	-0.279	-0.099	-0.028	0.039	0.010	-0.037	-0.053	-0.006	-0.009	-0.027	-0.015	0.013	-0.124	0.152	-0.056	0.026
IP4	-0.064	-0.035	-0.047	.906[a]	-0.515	-0.118	0.001	-0.042	0.093	0.049	0.014	0.007	-0.088	0.004	-0.054	-0.021	-0.058	0.075	0.068	-0.014	0.033	-0.064	0.055
IP2	-0.086	-0.065	-0.341	-0.515	.879[a]	-0.074	0.057	-0.154	-0.041	0.080	-0.190	0.055	0.138	0.005	0.124	-0.036	0.116	-0.084	-0.108	0.045	-0.063	-0.001	-0.045
ELA2	0.024	-0.071	0.023	-0.118	-0.074	.914[a]	-0.381	-0.121	-0.170	-0.215	-0.098	0.049	0.011	0.060	0.079	-0.034	0.041	-0.150	0.066	-0.022	0.077	0.021	-0.032
ELA1	0.024	-0.064	-0.042	0.001	0.057	-0.381	.894[a]	-0.114	-0.130	-0.149	0.119	-0.011	-0.113	-0.002	-0.054	0.097	-0.038	0.132	-0.042	0.098	-0.121	-0.003	0.087
ELA3	-0.035	0.186	-0.279	-0.042	-0.154	-0.121	-0.114	.898[a]	-0.220	-0.276	0.237	-0.027	-0.070	0.001	-0.134	0.011	-0.082	0.075	0.061	-0.012	-0.033	0.044	0.010
ELA4	0.016	-0.175	-0.099	0.093	-0.041	-0.170	-0.130	-0.220	.951[a]	-0.139	-0.019	0.034	-0.089	0.040	0.007	-0.013	0.013	0.020	-0.049	0.025	-0.073	0.050	-0.053
ELA5	-0.094	0.091	-0.028	0.049	0.080	-0.215	-0.149	-0.276	-0.139	.912[a]	-0.122	-0.038	0.072	-0.024	0.047	0.084	0.096	-0.090	-0.043	-0.005	0.038	-0.080	0.010
AC3	-0.101	0.036	0.039	0.014	-0.190	-0.098	0.119	0.237	-0.019	-0.122	.800[a]	-0.409	-0.395	0.086	-0.061	-0.133	-0.112	0.047	0.200	-0.096	0.038	-0.081	0.169
AC1	-0.055	-0.075	0.010	0.007	0.055	0.049	-0.011	-0.027	0.034	-0.038	-0.409	.851[a]	-0.395	-0.030	0.003	0.025	-0.038	0.126	-0.133	0.045	-0.183	0.153	-0.085
AC2	0.050	-0.076	-0.037	-0.088	0.138	0.011	-0.113	-0.070	-0.089	0.072	-0.395	-0.395	.824[a]	-0.381	-0.015	0.146	0.083	-0.074	-0.117	0.134	0.073	-0.137	0.035
AC4	-0.067	0.135	-0.053	0.004	0.005	0.060	-0.002	0.001	0.040	-0.024	0.086	-0.030	-0.381	.874[a]	-0.167	0.046	-0.048	0.010	-0.052	-0.171	0.011	0.177	-0.201
MO5	0.043	-0.027	-0.006	-0.054	0.124	0.079	-0.054	-0.134	0.007	0.047	-0.061	0.003	-0.015	-0.167	.935[a]	-0.088	-0.169	-0.156	-0.188	0.115	-0.087	-0.080	-0.016
MO2	-0.190	0.024	-0.009	-0.021	-0.036	-0.034	0.097	0.011	-0.013	0.084	-0.133	0.025	0.146	0.046	-0.088	.849[a]	-0.250	-0.098	-0.261	0.206	0.125	-0.159	-0.050
MO3	-0.041	0.066	-0.027	-0.058	0.116	0.041	-0.038	-0.082	0.013	0.096	-0.112	-0.038	0.083	-0.048	-0.169	-0.250	.869[a]	-0.457	-0.093	-0.231	0.128	-0.144	0.141
MO1	0.029	-0.106	-0.015	0.075	-0.084	-0.150	0.132	0.075	0.020	-0.090	0.047	0.126	-0.074	0.010	-0.156	-0.098	-0.457	.886[a]	-0.238	0.036	-0.109	0.043	-0.015
MO4	0.087	-0.008	0.013	0.068	-0.108	0.066	-0.042	0.061	-0.049	-0.043	0.200	-0.133	-0.117	-0.052	-0.188	-0.261	-0.093	-0.238	.902[a]	0.020	-0.176	0.091	-0.013
PS4	-0.051	-0.031	-0.124	-0.014	0.045	-0.022	0.098	-0.012	0.025	-0.005	-0.096	0.045	0.134	-0.171	0.115	0.206	-0.231	0.036	0.020	.887[a]	-0.321	-0.352	-0.129
PS2	0.073	-0.063	0.152	0.033	-0.063	0.077	-0.121	-0.033	-0.073	0.038	0.038	-0.183	0.073	0.011	-0.087	0.125	0.128	-0.109	-0.176	-0.321	.889[a]	-0.233	-0.314
PS3	0.031	0.056	-0.056	-0.064	-0.001	0.021	-0.003	0.044	0.050	-0.080	-0.081	0.153	-0.137	0.177	-0.080	-0.159	-0.144	0.043	0.091	-0.352	-0.233	.873[a]	-0.460
PS1	-0.080	0.029	0.026	0.055	-0.045	-0.032	0.087	0.010	-0.053	0.010	0.169	-0.085	0.035	-0.201	-0.016	-0.050	0.141	-0.015	-0.013	-0.129	-0.314	-0.460	.883[a]