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Strategic Value of Trademark Portfolio Based on Enterprise Performance in China

RAN Huaqing

Doctor of Management

Supervisors:
PhD Leandro Pereira, Assistant Professor,
ISCTE University Institute of Lisbon
PhD XIAO Yangao, Professor
University of Electronic Science and Technology of China

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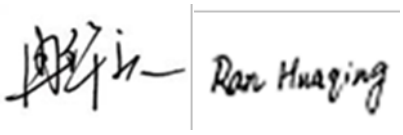
Signed:  Date: 2022.4.6

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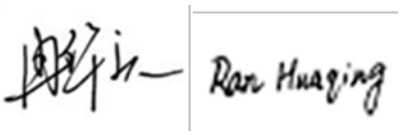
作者签名：  日期：2022.4.6

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Abstract

The continuous “blowout” of registered trademark applications by Chinese enterprises has attracted widespread attention from the theoretical and practical circles. Trademark registration strategy is the logical starting point of an enterprise’s trademark strategy. However, Chinese enterprises still do not know how to apply for trademark registration based on their own capabilities and resources to better extract the value of registered trademarks.

Based on the institutional theory and the competitive advantage theory, this research constructs the trademark portfolio matrix of “signs & goods” through theoretical deduction, which is used to describe the different registered trademark application strategies of enterprises, and constructs the trademark portfolio value model. Then, this research collected a total of 157,379 trademark data and financial data from 1,666 Chinese listed companies from 2007 to 2018, and empirically analyzed the relationship between different trademark portfolios and enterprise performance. The main conclusions are: the trademark portfolio application strategies related to enterprise resources and capabilities (value-based, defense-based, joint-based) are conducive to improving enterprise performance, while the trademark portfolio application strategy unrelated to enterprise resources and capabilities (cumulation-based) has an inverted U-shaped relationship with enterprise performance; different trademark portfolio application strategies are affected to different degrees by institutions, and the high-tech enterprise certification can strengthen or weaken the relationship between different trademark portfolios and enterprise performance.

The conclusions of the research not only have reference significance for enterprises to optimize their registered trademark application strategies, but also provide useful implication from the perspective of managerial economics for the improvement of corresponding trademark policies.

Keywords: Trademark Portfolio; Enterprise performance; Institution; Strategy; Value
JEL: M1; O32

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Resumo

O aumento continuado dos pedidos de marcas registadas por empresas chinesas atraiu a ampla atenção da comunidade académica e da indústria. A estratégia de registo de marca é o ponto da partida lógico da estratégia de marca duma empresa. As empresas chinesas ainda não sabem como usar o registo de marca para potenciar as suas próprias capacidades e recursos e extrair todo o potencial das marcas registadas. Com base na teoria institucional e na teoria da vantagem competitiva, esta investigação desenvolve uma matriz de portefólios de marcas de "logótipos e produtos" através da dedução teórica, que é utilizada para descrever as diferentes estratégias corporativas de registo de marcas, e constrói um modelo de valor de portefólios de marcas. Além disso, esta pesquisa coletou os dados de 157.379 marcas registadas e dados financeiros de 1666 empresas listadas nas bolsas chinesas de 2007 a 2018 para analisar as relações entre os diferentes portefólios de marcas e o seu desempenho empresarial. A principal conclusão da investigação é que a estratégia de registo de marcas relacionada aos recursos e capacidades empresariais (estratégia de valor, estratégia defensiva, estratégia conjunta) é oportuna para melhorar o desempenho empresarial, enquanto a estratégia de pedido de portefólios de marcas não relacionada aos recursos e capacidades empresariais (estratégia cumulativa) tem uma relação em U invertida com o desempenho empresarial; as diferentes estratégias de registo de portefólios de marcas são influenciadas pelo sistema institucional em diferentes graus, e a certificação de empresas de alta tecnologia pode fortalecer ou enfraquecer as relações entre os diferentes portefólios de marcas e o desempenho empresarial. As conclusões da investigação não só têm significado de referência para as empresas otimizarem as suas estratégias de aplicação de marcas registadas, mas também fornecem implicações úteis na perspetiva da economia empresarial.

Palavras-Chave: Portfólio de Marcas; Desempenho Empresarial; Instituição; Estratégia; Valor
JEL: M1; O32

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摘 要

中国企业注册商标申请的持续“井喷”，引起了理论界和实践界的广泛关注。商标注册战略是企业商标战略的逻辑起点，中国企业仍然不知道如何根据自身的能力和资源申请商标注册，以更好地提取注册商标的价值。

本研究基于制度理论和竞争优势理论，通过理论推演构建“标识&商品”的商标组合矩阵，用于描述企业不同的注册商标申请策略，并构建了商标组合价值模型。进而，本研究收集了 2007-2018 年 1666 家中国上市公司总计 157379 件商标数据及财务数据，实证分析不同商标组合与企业绩效的关系。本研究的主要结论是：与企业资源和能力相关的商标组合申请策略（价值型、防御型、联合型）有利于提高企业绩效，而与企业资源和能力无关的商标组合申请策略（累积型）与企业绩效呈倒 U 型关系；不同的商标组合申请策略受制度影响程度不同，高新技术企业认证可以加强或削弱不同商标组合与企业绩效之间的关系。

研究结论不仅对企业优化注册商标申请策略具有参考意义，而且从管理经济的角度为完善相应的商标政策提供有益的启示。

关键词：商标组合；企业绩效；制度；战略；价值

JEL: M1; O32

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As I come to the end of my doctoral studies, I am once again at a crossroads in my life, with the joy of rewards and uncertainty about the future. As I look back, the first thing that comes to mind is the help and support I received along the way.

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Chapter 1: Introduction

As defined by the World Intellectual Property Organization (WIPO), a trademark is a sign capable of distinguishing the goods or services of one enterprise from those of other enterprises (WIPO, 2004). Trademarks condense a large number of technologies and capitals invested by enterprises, constitute an important intangible asset of enterprises, and have also become an important way for enterprises to compete in the industrial market and obtain competitive advantage (Barnes, 2006; Crass, 2015). In 2008, the State Council of China issued the "Outline of the National Intellectual Property Strategy", clearly stipulating in Article 4 as follows: "Implementing the national intellectual property strategy to greatly promote China's capacity in creation, utilization, protection and administration of intellectual property." With the development of China's market economy and the intensification of competition, registered trademarks are appearing more and more frequently in economic life, and the market performance and economic benefits they bring are increasingly being valued by enterprises. An enterprise's trademark strategy is greatly affected by its own resources and capabilities, as well as external system factors (Feng, 2015; Guo, 2006), such as type of the enterprise (e.g. a high-tech enterprise or not), changes in trademark registration fees, and changes in registered trademark application review system (G. Hu & Chen, 2021; H. Yang, 2021; X. P. Yang & Li, 2021) . As a result, enterprise trademark strategies are complex and dynamic (Noureldin et al., 2020). In this case, how enterprises implement appropriate trademark strategies in accordance with their own resources and capabilities and external systems to maintain their dynamic competitive advantages is worthy of in-depth study. This chapter will first discuss the background of the topic selection, and on this basis, propose research problems, questions and research significance, and then introduce the research content and research methods, and finally give a detailed explanation of the research route and chapter structure.

1.1 Research background and problems

On June 5, 2008, the State Council issued the "Outline of the National Intellectual Property Strategy" (hereinafter referred to as the "Outline"), with the aim to implement the national intellectual property strategy and elevate the intellectual property work to the national strategic level. Since enterprises are the leading force in the construction of an innovative country and

the implementation of intellectual property strategy (Jia, 2020), one of the strategic goals of the Outline is to further enhance enterprises' capability to utilize the intellectual property system, and guide the enterprises to be market-oriented and formulate an intellectual property strategy suitable for their own resources and capabilities. On September 22, 2021, the Central Committee of the Chinese Communist Party and the State Council issued the "Outline for Building a Powerful Intellectual Property Country (2021-2035)", once again emphasizing that China should accelerate the construction of an innovative country and strengthen the creation, protection and utilization of enterprises' intellectual property rights. However, under the background of the national intellectual property strategy and China's intellectual property power strategy, China has been continuous "blowout" of registered trademark applications, ranking first in the world for 20 years. Scholars have questioned the values and rationality of Chinese enterprises to apply for registered trademarks. The legislature revised the Trademark Law in 2013 and 2019 to curb the "registered trademarks that are not intended for use". However, enterprises still do not know how to apply for registered trademarks based on their own resources and capabilities, which is more conducive to improving the competitiveness of enterprises. In this section, we will condense the research problem and questions on the basis of further sorting out the theoretical and practical background.

1.1.1 Research background

1.1.1.1 Theoretical background

The trademark system (including the trademark registration system) is foreign to China. In the 19th century, modern trademark systems were established in various European countries. France's *Trade Mark Registration Act of 1857* was the first law in the world to provide registration protection for trademarks. It was formulated in accordance with the general principle of the *Law of Tort Liability* in Article 1382 of the *French Civil Code*, which stipulates that the party which causes damage shall be liable for compensation. In 1874, Germany enacted a trademark law, and then Spain, Italy and other continental European countries successively enacted their own trademark laws. The trademark protection in most continental European countries has undergone an evolution from tort liability law to trademark registration law (M. D. Li, 2021; Saiz & Zofio, 2020). It is worth noting that the trademark registration laws formulated by civil law countries are quite different from the common law system in terms of obtaining trademark rights. For example, in the United Kingdom, "registration" is regarded as a kind of publicity of the use or to-be-use of a trademark rather than a way to obtain trademark property

rights (Y. Li, 2011), while in continental European countries, trademark registration is generally regarded as a way to obtain rights. In this regard, Japan, which has accepted the concept of the civil law system, also clearly stipulates that trademark registration is a way to obtain trademark property rights (Y. Du, 2014). In terms of trademark registration and protection, China has accepted the system from the European continent from the beginning, using trademark registration as a way to obtain trademark rights (Cheng, 2014).

From a legal perspective, the important function of a registered trademark is that the law grants the owner of the registered trademark exclusive rights (Grashuis, 2019). In other words, without the permission of the owner of the registered trademark, no other individual or organization may use or register the same or similar trademarks on the same or similar goods or services, to prevent trademark confusion (X. Xiao, 2020). If a trademark has a high reputation, i.e., a well-known trademark, its owner also has the right to prevent other individuals and organizations from registering or using such a trademark on different categories of goods or services (L. F. Wang & Zeng, 2021).

From the perspective of managerial economics, trademarks are one of the most important assets of an enterprise (Dimitrieska et al., 2018). As a concentrated expression of an enterprise's goods or service reputation, the relation between trademarks and enterprise value can be understood as a reflection of customers' goodwill towards the enterprise's goods or services. If enterprises can dig deep into the connotation of trademarks and enhance their influence, they can increase their trademark assets and enterprise value through accumulation and realize the "halo effect" of the trademark and enterprise value (Beckwith & Lehmann, 1975). Enterprises should use trademarks to enhance their competitiveness, but the prerequisite for better optimization and management of trademarks is to register trademarks. Registered trademarks are the foundation of enterprise brands. Based on the consideration of increasing the value of their trademarks and their added value, enterprises should register their trademarks in a timely manner (X. P. Yang & Li, 2021). It is worth noting that trademarks can bring information about innovative activities (Bei, 2019; Mendonça et al., 2004). However, although trademarks are very important in economic life, they have been relatively ignored in literature of managerial economics, and trademark data is not often used in economic analysis.

Although the literature of jurisprudence and managerial economics covers the research on the relation between enterprise trademark strategy and enterprise performance, the focuses are different. Jurisprudent are concerned with the effectiveness of the trademark system (Chronopoulos, 2011), while managerial economics scholars are more concerned with how to protect innovation and improve enterprise competitiveness and performance (Barroso et al.,

2019; da Silva Lopes & Duguid, 2010; Sandner, 2009). In recent years, the research on trademark strategy has gone from the macro level to the micro field. The research on enterprise trademark strategy has received extensive attention from the theoretical and practical circles. Existing documents have summarized the motives and impacts of enterprises' registered trademarks (Castaldi, 2018), and made preliminary explorations on the strategic factors and performance impacts of trademark strategy (Flikkema et al., 2019; Nasirov, 2020), laying a theoretical foundation for further promoting the development of trademark strategy theories. However, the current research on trademark strategy is mostly limited to western countries, and there is still a lack of more in-depth research on the interaction between different factors and the impact of the intrinsic capabilities and external systems. Therefore, based on the theoretical results of predecessors, this research further explores the strategic value of enterprise trademark and its relation with enterprise performance from the perspective of jurisprudence and managerial economics in the Chinese context.

1.1.1.2 Realistic background

(1) Current situation of the surge in trademark registrations in China

Since China joined the World Trade Organization in 2001, it has been continuous rapid growth of the number of registered trademark applications by Chinese enterprises in the period of economic transition, and now has the largest number of trademark applications by domestic residents in the world (World Intellectual Property Organization [WIPO], 2020). The number of trademark applications by domestic residents in China has ranked first in the world for 20 consecutive years, and its growth is accompanied by the growth of China's GDP (See Figure 1.1).

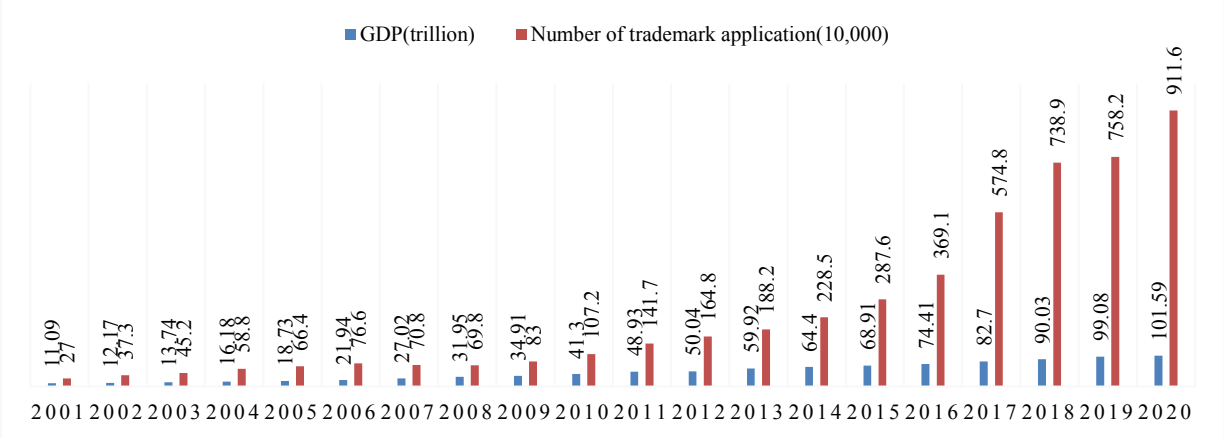

Figure 1.1 China's domestic trademark filing vs. GDP (2001-2020)

Source: Trademark Office of China National Intellectual Property Administration: Annual Development Report on China's Trademark Brand Strategy (2020)

(2) Debates in the intellectual property community

As the number of registered trademarks of enterprises in China continues to increase significantly, the discussion about the motivation of trademark registration and the value of registered trademarks has become a common topic in the intellectual property community. According to some scholars, the large number of registered trademark applications in China is due to the subsidy policies issued by the government rather than the necessity of enterprises to protect innovative achievements and enhance competitiveness (Nguyen, 2016), or is for the purpose of hoarding rather than protecting intangible assets (Cui, 2015). As the trademark's function of distinctiveness is mainly based on the use of trademarks(Landes & Posner, 2003; H. Yang, 2021), it is necessary to avoid the increase of cost, and even inefficient consequences such as trademark hoarding that may be brought by the trademark registration system(Bently et al., 2018). Trademark hoarding may not only cause hijacking of bona fide use of subsequent trademarks, but also serious interference with the normal market competition, leading to punishments by legislators and law enforcers (Cui, 2015; T. G. Liu, 2016).

(3) Trends in China's trademark laws and policies

Consistent with the above debates, to strengthen the protection of intellectual property rights, further optimize the business environment, address the outstanding problems arising from the practice of trademark registration and more effectively curb malicious trademark registration, the Standing Committee of the 13th National People's Congress decided on 23 April 2019 to amend the Trademark Law by adding in Article 4(1) that "malicious trademark registration applications that are not for the purpose of use shall be rejected". In order to implement the fourth revision of the Trademark Law and regulate the conduct of trademark applications for registration, the State Administration of Market Supervision and Administration formulated and issued in October 2019 *Certain Provisions on Regulating the Conduct of Trademark Applications for Registration*, refining the factors to be considered in determining whether a trademark is a "malicious trademark registration application not for the purpose of use". In order to adapt to the revision and improvement of the Trademark Law and to resolutely combat malicious trademark registration applications not for the purpose of use, the Trademark Office summarized the practical experience of examination and trial in the past two years since the promulgation and implementation of the new Trademark Law and revised the *Commercial Examination and Trial Guide* to clarify the criteria for examination and trial of "malicious trademark registration applications not for the purpose of use".

Meanwhile, Chinese trademark authorities have begun to take the initiative to curb the improper trademark applications by enterprises. Trademark opposition and review procedures play an important role in strengthening the source protection of intellectual property rights and

optimizing the business environment. In order to effectively combat malicious registration and standardize the order of trademark registration, China National Intellectual Property Administration (CNIPA, originally State Intellectual Property Office of China (SIPO)) completed an examination of 149,000 trademark opposition cases in 2020, an increase of 64.7% over the previous year, and completed 358,000 trademark review and adjudication cases, an increase of 7.8% over last year (State Intellectual Property Office, 2021).

Since trademark rights are legal rights, the value of trademarks is first established on a legal basis, so the trademark legal system has an important influence on the trademark registration behavior and trademark strategy of enterprises, that is, the orientation of trademark legislation and administrative supervision will encourage or inhibit the trademark registration of enterprises (Cohen, 1986; Krasnikov et al., 2009). The trademark registration strategies of enterprises not only reflect the market expansion needs, but are also guided and influenced by trademark law (Lemper, 2012). In other words, the scientific application of trademark laws and policies will not only affect the trademark behavior of enterprises, but also reflect the rationality of the trademark registration of enterprises (Cohen, 1991).

In short, although the number of registered trademark applications in China has continued to increase substantially, due to the short history of China's trademark system, relatively weak trademark protection, and special system and cultural factors, Chinese enterprises have not yet fully recognized the value of trademarks or understood how to implement trademark strategy. Their trademark applications are relatively blind, lacking a scientific and reasonable guideline (Nitu, 2014). Therefore, studying how enterprises can implement registered trademark application strategies based on their own capabilities and resources as well as external system factors has important practical significance for Chinese enterprises.

1.1.2 Research problem and questions

1.1.2.1 Research problems

In the context of the continuous "blowout" of registered trademark applications in China, Chinese enterprises are still troubled by registered trademarks. Enterprises have not clearly recognized the nature and function of trademarks or understood how to register trademarks can bring advantages to enterprises (Feng & Liu, 2019). Enterprises with strong capital, such as *Shenzhen Huawei Technologies Co.* and *Yibin Wuliangye Co.*, hold thousands of registered trademarks and can register core and non-core trademarks for all categories of goods and services (F. L. Zhang, 2021). However, many other Chinese enterprises, including listed

companies, can only selectively register trademarks with limited resources and capabilities (J. J. Zhang & Yu, 2019). Even if enterprises want to register more trademarks, in the context of the Chinese government's severe punishments on "abnormal registered trademark applications", they are also worried about legal penalties for improper trademark registration.

Therefore, here is the research problem: Companies in Chinese context still do not know how to apply for trademark registration based on their own capabilities and resources to better extract the value of registered trademarks.

1.1.2.2 Research questions

Regarding the problem of this research, this research decomposes it into four questions:

(1) What is the value of the trademark portfolios?

(2) What is the relation between different trademark portfolios and enterprise performance?

(3) In the context of China's unique system arrangements, how do external system factors affect the trademark application behavior?

(4) According to the empirical results of this research, what are the implications for enterprises' trademark application strategies and government regulations on trademark registration?

1.1.2.3 Research objectives

Based on the above research questions, the purpose of this research is to:

(1) Reveal the value of different trademark portfolios

This study attempts to create a trademark portfolio matrix, which is used to portray the different trademark registration application strategies of companies, and refine the value of the trademark portfolio according to the competitive advantage theory and the motivation of trademark registration behaviour of companies, based on the trademark registration application strategy represented by each trademark portfolio.

(2) Analyze the influence of different trademark portfolios on enterprise performance

This study not only attempts to construct a trademark portfolio matrix and a trademark portfolio value model from a theoretical point of view, but also selects sample companies and statistics on their trademark portfolios and financial data based on the public availability and credibility of the data, and analyses the impact of different trademark portfolios on enterprise performance through empirical analysis of the relation between the number of trademarks in different trademark portfolios and enterprise performance.

(3) Explore the degree of influence of China's relevant system on the relation between different trademark portfolios and enterprise performance

As a company's trademark registration application strategy is influenced not only by its own resources and capabilities, but also by the external institutional environment. Therefore, based on the analysis of the relation between different trademark portfolios and enterprise performance, this study further analyses the extent to which the relevant Chinese institutions influence the relation between trademark portfolios and enterprise performance, for example, the certification system for high-tech enterprises, so as to explore the impact of China's external institutions on the effectiveness of enterprises' trademark registration application strategies.

(4) Provide a reasonable boundary for the enterprise trademark registration strategy and provide a verifiable basis for the Chinese government to interfere with the enterprise trademark registration behavior

The purpose of this study differs from the existing literature on enterprise trademark strategy in that, on the one hand, unlike the existing literature on enterprise trademark strategy from a jurisprudence perspective, which only considers the impact of trademark legal policies on enterprise trademark registration behaviour and thus proposes institutional rationalisation; on the other hand, unlike the existing literature on enterprise trademark strategy from a managerial economics perspective, which only considers how enterprises apply for and maintain trademarks to achieve enterprise competitiveness, and thus proposes a path for realising enterprise trademark strategy. This study considers both the legal and economic attributes of trademarks, and both the intrinsic factors affecting trademark strategy and the institutional implications of trademark strategy in the same research and analysis, so as to give research results that can serve as a basis for guiding enterprises' trademark strategy and provide a rationalization path for institutional improvement.

1.2 Significance

1.2.1 Theoretical significance

Currently, the research on enterprise trademark strategy and enterprise performance is mainly conducted in western countries where the trademark system is relatively complete and the strategic management is prevalent. In the context of transition economy, China is quite different from these western countries in terms of the legal system and social culture, as well as the level of intellectual property development and the situation of industrial competition. In addition, existing theories of China are not fully applicable, as they study trademark protection strategies either from the perspective of jurisprudence or from the perspective of managerial economics,

and rarely combine jurisprudence with managerial economics. There is still insufficient research on the value of trademarks, and on how the institutional context affects enterprises' trademark application strategies and their performance. Finally, the existing dynamic research on enterprise trademark strategy is mostly based on the number of trademarks, and has not opened the trademark "black box" based on the structure of trademarks and registration categories, which needs to be expanded. Therefore, the theoretical significance of this research is as follows:

(1) On the basis of systematically sorting out the resource-based view, capability-based view and knowledge-based view of the competitive advantage theory, this research regards trademarks as an enterprise's unique resource and capability, and creates a trademark portfolio matrix. Moreover, this research also describes four registered trademark application strategies of enterprises through four trademark portfolios from the trademark portfolio matrix, expanding the previous theoretical research on enterprises' registered trademark application strategy.

(2) On the basis of existing institutional theory, combining the trademark registration system with China's unique system to arrange the "high-tech enterprise certification" system, this research explores the different impacts of changes in trademark registration laws and policies on the four trademark portfolios, and also gives a further understanding of the influence of different trademark portfolios on enterprise performance under China's unique system arrangements.

(3) This research creates a trademark portfolio database, which expands the data support for the empirical research on the value of trademark strategy.

1.2.2 Practical significance

Enterprise is the main body of the market economy and the actor who applies for, implements and exercises trademark rights. Enterprises' poor understanding of the selection and application of trademark strategies not only affects the enterprise performance, but also the realization of national intellectual property strategies. Aiming at the practical problems of Chinese enterprises, this research focuses on the strategic value of enterprise trademark application, i.e., the different relations between the four trademark portfolios and enterprise performance in the context of China. The practical significance of this research is mainly reflected in the following:

(1) Assisting enterprises to analyze the impact of their own resources, capabilities, and institutional environment on registered trademark application strategies and enterprise

performance, and guiding enterprises to select a registered trademark application strategy suitable for their own capabilities and resources.

(2) Helping enterprises select a legal and reasonable registered trademark application strategy according to China's registered trademark system and unique system arrangements (e.g., the "high-tech enterprise certification" system).

(3) Providing a reasonable boundary for the Chinese legislature to formulate regulations on restraining unfair registered trademark applications, and also providing a reasonable and reference basis for China's trademark authority to judge whether an enterprise's application for registered trademark registration is "unfair".

1.3 Research contents and methods

1.3.1 Research contents

This research uses a combination of theoretical and empirical analysis to analyze the impact of registered trademark application strategies of enterprises in the Chinese context on their performance. The research contents mainly include the following:

(1) Systematically sorting out the trademark system, trademark strategy and the relation between trademark strategy and enterprise performance

From the perspective of jurisprudence and managerial economics, based on the institutional theory and competitive advantage theory, this research systematically sorts out the trademark system, trademark strategy, and the relation between trademark strategy and enterprise performance, and seeks its theoretical contribution.

(2) Constructing a trademark portfolio matrix and a trademark portfolio value model

First, this research constructs a trademark portfolio matrix with two dimensions (i.e., "core & non-core" of "signs & goods") according to the structure and registration category of trademarks, and creatively depicts the behavior of enterprises' registered trademark application through trademark portfolios in the matrix. The matrix includes four trademark portfolios, including Portfolio I (core signs & core goods), Portfolio II (core signs & non-core goods), Portfolio III (non-core signs & core goods), and Portfolio IV (non-core signs & non-core goods).

Second, based on the trademark portfolio matrix and the value extraction methods of different trademark portfolios, a conceptual model of trademark portfolio value is constructed, and on this basis, four trademark portfolios are named accordingly:

Portfolio I (value-based portfolio), Portfolio II (defense-based portfolio), Portfolio III (joint-based portfolio), and Portfolio IV (cumulation-based portfolio).

(3) Creating a database of trademark portfolios

Through the four different trademark portfolios, this research describes enterprises' different registered trademark application strategies, and identifies and classifies the structure "signs & goods" of each trademark, thus creating a database of registered trademark portfolios of Chinese listed companies (2007-2018), which provides detailed data support for empirical research.

(4) Analyzing the relations between different trademark portfolios and enterprise performance

This research empirically analyzes the relations between different trademark portfolios and enterprise performance, so as to explore the value of different registered trademark application strategies and the reasonable path for enterprises to implement registered trademark application strategies.

(5) Further exploring the influence of external systems on different trademark portfolios and enterprise performance

Based on China's unique system arrangements (e.g. the "high-tech enterprise certification" system), this research further explores the influence on the relations between different trademark portfolios and enterprise performance, so as to help high-tech enterprises and other enterprises to implement effective registered trademark application strategies.

1.3.2 Research methods

In this research, we use the methods of theoretical deduction and regression analysis. Combining with the competitive advantage theory, institutional theory, and enterprise business practices in the context of Chinese systems, this research explores enterprises' trademark application strategies and their influence on enterprise performance, in order to give some suggestions for Chinese enterprises to improve their trademark protection and application capabilities, and thereby enhance their competitiveness. Based on theoretical analysis, this research further explores enterprises' trademark application strategies in the context of China's trademark system, and analyzes the impact of trademark application strategies on enterprise performance through empirical research.

1.3.2.1 Theoretical deduction

Based on the literature review, constructing a research framework through theoretical deduction

is the foundation of this research. Through summary and overview of previous research, we can refine relevant concepts and conclusions, structure and theorize practical problems, and finally determine the research problems and establish the theory and method for the research. In the course of this research, we refer to existing theories in the literature, including competitive advantage theory (resource-based view/capability-based view/knowledge-based view), institutional theory, and brand extension theory, innovation theory, and trademark protection theory (confusion/anti-dilution) through classification, comparison, induction and synthesis. These theories not only provide a theoretical basis for the analysis of this research, but also have important implications for the selection of the research methods.

1.3.2.2 Empirical analysis

Empirical research is a kind of scientific research using empirical evidence. It argues that experience is the logical starting point, logical expansion and logical end of scientific research, and that scientific theories should have empirical significance(Broye & Johannes, 2021; Hammergren, 2020). Management science has also attached great importance to the practicality of theory, so empirical research has become the basic method of management science research. This research also attaches great importance to the close integration of theoretical analysis and empirical research.

Multiple regression statistical analysis is the basic method of empirical research. It refers to a research method of understanding and revealing the relation, rules and trend between things through analysis of the quantitative relation such as scale, speed, scope and degree of the research object, so as to achieve correct interpretation and prediction of things (Albrecht, 1983). Based on theoretical deduction, this research constructs a theoretical model, makes reasonable assumptions, and uses the second-hand data of Chinese listed companies for statistical analysis.

Combined with second-hand panel data such as registered trademarks and enterprises' financial data, this research uses the panel regression (fixed effect model) to analyze the influencing factors of enterprises' registered trademark application strategies in China, as well as the relations between trademark portfolios and enterprise performance.

1.4 Research route and chapter structure

1.4.1 Research route

On the basis of the research content and research methods described above, the research route of this research is determined, and the logical relation between the research content and the

research methods used in each part of the research are more intuitively described through the research route.

On the basis of theoretical review and analysis of research problems, the research questions are refined to form the theoretical analysis framework of this research. On this basis, the trademark portfolio matrix and trademark portfolio value model are established accordingly.

This research uses empirical methods to study:

1) the dynamic impact of the evolution of China's trademark system on enterprises' registered trademark application strategies;

2) The relations between different trademark portfolios (registered trademark application strategies) and enterprise performance, and the impact of China's unique system arrangements (e.g. the "high-tech enterprise certification" system) on such relations;

3) summaries of research findings, conclusions and implications.

The research route is shown in Figure 1.2.

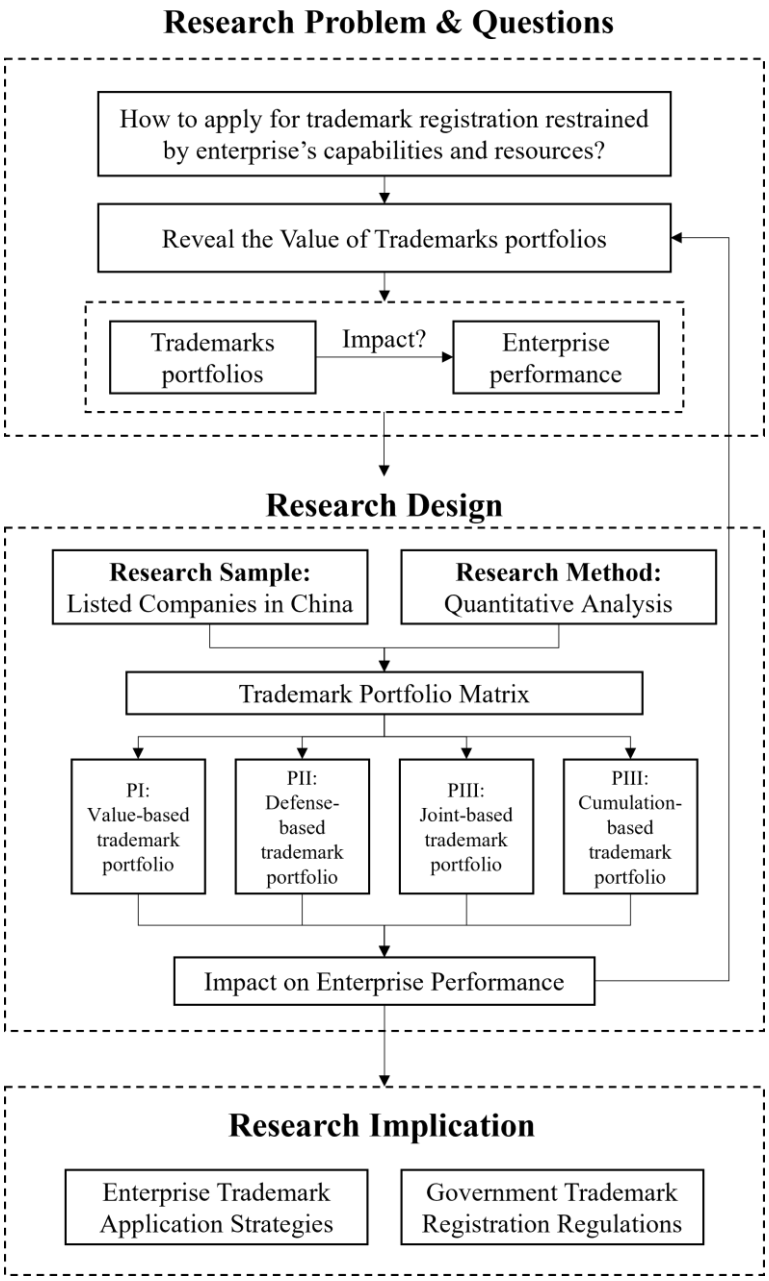

Figure 1.2 Research route

1.4.2 Chapter structure

With the Chinese system and trademark system as the background, this research first proposes the core research issue in Chapter 1: the strategic value of different registered trademark applications, i.e. the relations between different trademark portfolios (registered trademark application strategies) and enterprise performance.

It then reviews the relevant theoretical literature in Chapter 2, and builds a trademark portfolio matrix and a trademark portfolio value model on this basis, and proposes hypotheses in Chapter 3.

Chapter 4 is about samples and data collection. Since the data collection in this research is carried out not only using existing trademark databases for statistics, but also through classification statistics on the basis of identifying the trademark portfolios I, II, III, IV, respectively, it is necessary to describe the samples and data collection in detail.

Chapter 5 studies the relations between different trademark portfolios (registered trademark application strategies) and enterprise performance through empirical analysis, and further explores the impact of special system arrangements (for example, the "high-tech enterprise certification" system) on such relations.

Chapter 6 presents the empirical analysis findings and discussions.

Chapter 7 gives the conclusions and implications of this research. The relation among the chapters is shown in Figure 1.3:

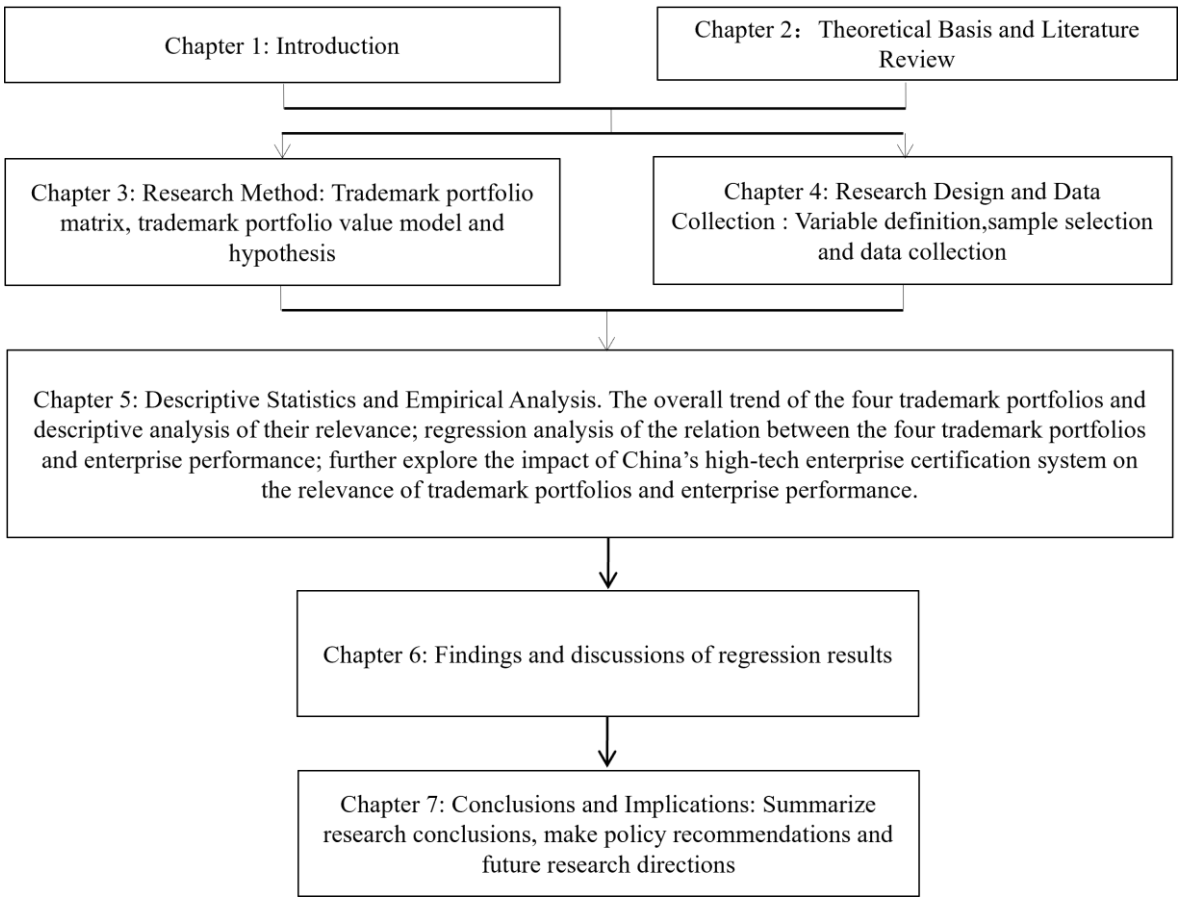

Figure 1.3 Chapter structure

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Chapter 2: Literature Review

2.1 Trademark system based on institutional theory

Since this research focuses on the strategic value of enterprise registered trademark application, it is necessary to sort out the trademark registration system from the perspective of institutional theory.

2.1.1 Institutional theory

Ideas related to institutional theory date back to the 19th century and were further developed in the 1970s by the new institutionalism in the study of economics and sociology (North et al., 2000). Institutional theory assumes that organizational behavior in economic society not only accepts the impact of economic efficiency under rational assumptions, but also emphasizes that institutions are the main factor affecting organizational behavior (Nelson & Nelson, 2002). Based on this, institutional theory can answer the motivations of organizational convergence and divergence from the perspective of social institutions (Peng et al., 2009). Institutions are constructed by the interaction between top-down design or bottom-up emergence in human social structure, mainly including three dimensions: regulation, norm, and cognition (Marquis & Raynard, 2015; W. R. Scott, 2013). The “rules of the game” formed under the institutional framework constrain the behavior of enterprises (homogeneous pressure, inertia), but also prompt enterprises to seek “institutional rents” and even conduct institutional entrepreneurship that changes the “rules of the game” (Ahuja & Yayavaram, 2011; Gray et al., 2015).

“Institutional perspective” is very useful for understanding the differences of organizational processes in different time and space. Meanwhile, it also provides a crucial concept and ideological basis for the theoretical comparison and analysis of organizations. The economic production organizations, commercial service organizations, and public organizations of all countries, including China, in the world have experienced a rapid modernization process. In this process, the organizations are increasingly affected by the cultural models and norms established by external governments and various groups, and also by their own unique traditions and past experience (W. R. Scott, 2013). Although the resources and capabilities of enterprises are important, it is worth noting that recent studies have emphasized the moderating effect of the characteristics of the specific background in which an enterprise

operates on the enterprise strategy (Hoskisson et al., 2000; Meyer et al., 2017). No matter research is organizational research, strategic management research, or dynamic capability research, it is inseparable from the research of institutional theory. Therefore, this research reviews the institutional theory.

(1) Representatives and main points of institutional theory

The related research on institutional theory can be traced back to the 19th century. In the 1970s, new institutionalism was further developed in the study of economics and sociology.

First of all, what is an institution? According to North and Weingast (1989), an institution is the constraints of artificial design that constitute political, economic, and social interactions, including informal restrictions (punishments, taboos, customs, traditions, and codes of conduct) and formal rules (constitution, laws, and property rights). Institutions are interactively constructed by two forces, i.e. top-down and bottom-up in the human social structure, which mainly include three dimensions: regulation, norms and cognition (Marquis & Raynard, 2015; W. R. Scott, 2013).

Second, what is the function of an institution? An institution provides an incentive structure for the economy and shapes the direction of economic change toward growth, stagnation, or recession (North & Weingast, 1989). While restricting enterprise behavior (homogeneous pressure, inertia), it also prompts enterprises to seek institutional rents and even make institutional innovations that change the institutional rules (Choi & Gray, 2008; Driffield et al., 2013). The economic functions of an institution include reducing transaction costs, creating conditions for cooperation, providing an incentive system for individual choice, and internalizing externalities (Frischmann, 2003).

Third, how about the legitimacy of institutional theory? According to the institutional theory, legitimacy is the criterion for judging the merits of an organization. It refers to the general perception of whether organizational actions conform to general expectations in a socialized system constructed by specific beliefs, norms, and values (Suchman, 1994). Legitimacy has an important impact on enterprise strategy. Loss of legitimacy will lead to loss of market, illegal operations, loss of access to resources, and supplier issues (Davison, 2012).

Fourth, how about the strategic management view of institutional theory? Peng et al. (2009) put forward the relation among institutions, organizations and strategic choices on the basis of summarizing relevant research results, constructing the institutional basic view of strategic management, and forming the strategic management paradigm of “institutional environment - enterprise strategy selection - enterprise performance”. The institutional perspective of strategic management regards institutional factors as the background factors for

enterprises' strategic choices. These choices are determined by the technical environment, such as industry conditions and specific resources, and are also a response to formal and informal institutional factors faced by senior managers. The institution-based view of strategic management focuses on the dynamic interaction between the system and the organization, and a strategic choice is the result of such a dynamic interaction. Peng et al. (2009) also developed an institution-based historical view of intellectual property, and identified three potential theoretical mechanisms that help explain the different strategies of intellectual property in China and the United States: path dependence, long-term process, and institution transition.

(2) Trademark value from the perspective of institutional theory

Trademark is an institutional factor for enterprises to seek competitive advantage through flexible innovation.

First of all, based on the needs of improving and protecting the competitiveness of enterprises, the trademark has been upgraded from the trademark of factual significance to that of legal system.

As mentioned above, a trademark is originally used to distinguish the same kind of goods produced or sold by different enterprises, and is an important means for enterprises to achieve differentiated competition (Porter, 1991). Before the 19th century, the users of trademarks established their own reputation for one or more kinds of commodities in their business. If other competitors used the same trademarks on the same or similar goods or services, they would inevitably cause confusion among consumers, so this should be prohibited (Y. Du, 2012; Yu, 2011). In this way, a trademark produces "exclusive" rights through its use, and it is not necessary to go through any procedures to confirm this exclusivity (Bently et al., 2018). However, with the development of commodity production and the expansion of market, more and more enterprises are engaged in economic and trade activities, and increasingly more attention is paid to the establishment and protection of goodwill of commodities and enterprises (C. S. Zheng, 1996). Moreover, reputation itself is a concept with greater flexibility. Most enterprises who wish to get engaged in long-term trade activities in the market consider that the exclusive rights naturally established by use alone are not reliable, and wish to establish their own exclusive rights through certain legal procedures. As a result, the trademark registration system comes into being (Cornish & Llewelyn, 2004). In 1857, France promulgated the Trademark Law and established the trademark registration system for the first time. Subsequently, the United Kingdom in 1862, the United States in 1870, and Germany in 1874 enacted their own written Trademark Law (C. S. Zheng, 2017). At the beginning of the 20th century, trademark, as an exclusive right, was recognized in the laws of most countries (Bently

et al., 2018). China promulgated the Trademark Law in 1982 and amended the law in 1993, 2001, 2013 and 2019 (G. L. Liu, 2020), respectively. Accordingly, the change of trademark from a symbol to an institutional factor protected by law is the appeal of enterprises in order to adapt to the development of market economy and to improve competitiveness.

Second, trademarks have increasingly become an important system arrangement for enterprises to implement and protect innovations.

Since the publication of *Schumpeter's Theory of Economic Development* (Schumpeter, 1934), there have been extensive discussions about the concept, type and model of innovation. Many scholars advocate a broad conceptualization of innovation, including "soft" aspects, such as organizational, brand and business model innovation (Elliott et al., 2015), while others argue that incorporating the "soft" aspects of innovation into Schumpeter's innovation concept is an over-expansion. In their views, focusing on technological progress and communication is the heart of innovation research (Drejer, 2004). In recent years, more and more research has divided innovation into technological innovation and non-technological innovation, especially marketing innovation (Millot, 2011), which are not mutually exclusive (Hertog, 2000). The trademark registration system improves the efficiency of right confirmation, reduces the possibility of conflict of rights, effectively guarantees the distinguishing function of trademarks, and meets the needs of the continuous development of commercial trade activities in terms of frequency and scope (F. Y. Zheng, 2020). As a result, more and more enterprises register trademarks to protect the premium from innovation (Greenhalgh & Rogers, 2012). Through trademark registration to protect their intellectual property rights, enterprises have established barriers to entry (Sandner & Block, 2011). Different from the way patent protects inventions and copyright protects works, the trademark registration system helps enterprises take advantage of trademark first applications, protect brands and extend other intellectual property protections in advance (D. A. Aaker, 2004; Castaldi, 2018), and signal enterprise strategies to the market to attract new customers and investors (Giarratana & Torrisi, 2010).

2.1.2 Trademark registration system

2.1.2.1 Trademark registration system and trademark exclusive rights

The establishment of trademark law is based on the trademark registration system from France's *Manufacture and Goods Mark Act* formulated in 1857. This act specifies requirements on use-based and examination based trademark registration, and is considered as

the world's first trademark law (Bently et al., 2018). The *Trade Marks Registration Act* (1857) is regarded as France's first domestic law to provide for the trademark registration system (Bently et al., 2018). The registered trademark system is conducive to determining the scope of the legal rights of trademark owners and finding out whether the marks they are using or intend to use conflict with any registered trademarks as soon as possible by consulting registered trademark information (Bently et al., 2018). The registered trademark system also gives trademark owners the right to file an infringement lawsuit based on their trademark registration certificate, thereby reducing the burden of the plaintiff to prove the distinctiveness of the trademark. With the establishment of the trademark registration system, the trademark protection system has been gradually improved (Schuster & Wroldsen, 2018).

The exclusive right to the use of a trademark is generated on the basis of the trademark registration system (Biddle et al., 2019). The content of trademark exclusive rights can be understood in a narrow sense and a broad sense. In a narrow sense, a trademark owner has the exclusive rights to use trademarks, and the focus is on the exclusive use of trademarks. In a broad sense, the owner of a registered trademark enjoys the exclusive right to use, prohibit, transfer, and license the registered trademark (W. R. Scott, 2013). This research is to analyze trademark exclusive rights from the broad perspective.

2.1.2.2 Fundamentals of trademark registration system

(1) Trademark registration system and trademark attribute

As defined by WIPO, "a trademark is any sign that individualizes the goods of a given enterprise and distinguishes them from the goods of its competitors". According to this definition, we can know that a trademark includes two inseparable aspects, and has unique attributes different from patents, copyrights and other intellectual property rights, that is, a trademark is a sign that can identify and distinguish the source of goods and services. Based on the identifiability and distinguishability of trademark, a trademark owner enjoys exclusive rights. The trademark registration acquisition system reflects the establishment of rights through enterprise trademark applications and government review and registration activities. However, the basic point of the registration acquisition system is the availability of rights other than the continuity of rights. Based on the dynamic characteristics of trademark attributes, the registration acquisition system, as a complete institutional structure, should also maintain the unique attributes of trademarks after acquisition of trademark rights (M. D. Li, 2021). In terms of the acquisition of rights, the premise is the distinctiveness of trademarks. The trademark registration system also emphasizes such distinctiveness in the trademark

application and review process. According to the provisions of Articles 8 and 9 of China's Trademark Law, only distinctive signs can be registered as trademarks. Therefore, from the perspective of obtaining trademark exclusive rights, there is no contradiction between the trademark registration system and the unique attributes of trademarks (T. P. Wang, 2020).

(2) Trademark registration system and trademark function

First, source identification function of trademarks — This function is not only the basic function of trademarks, but also reflects the value of trademarks (Sandner & Block, 2011). It is therefore required that the registration system of trademark rights should be consistent with the guaranteed trademark identification function (C. T. Liu, 2014). Article 9 of China's Trademark Law also stipulates, accordingly, that the trademark applied for registration should have distinctive features and be easy to identify.

Second, extension function of trademarks (i.e. function of quality and goodwill signal) — This function is an expanded function of trademarks in the commercial development other than a basic or inherent function of trademarks (Bently et al., 2018). When a trademark is registered successfully, the owner of the registered trademark has the right to prohibit others from using the same or similar trademark on the same and similar goods, so as to protect the trademark's function of quality and goodwill signal (Y. G. Xiao et al., 2021).

Third, derivative functions of trademarks (i.e. function of advertising and promotion and function of differentiated competition) — These functions are derived from different aspects based on the basic function of trademarks. The registration system also has a strengthening effect on these functions. For well-known trademarks, the registration acquisition system provides special protection. For example, according to Article 13 of China's Trademark Law, well-known trademarks that have been registered can provide cross-category protection for goods that are not the same or not similar to the registered goods (X. Zhang, 2018).

(3) Functions of trademark registration system

Scholars' research on the functions of trademark registration mainly summarized the following four basic functions.

1) First, to confirm the property status of commercial signs

Due to the reproducibility of the trademark itself and the immaterial nature of the goodwill it contains, the property status of the trademark cannot be presumed by right in the form of possession of the trademark, and registration becomes the only option (Bently et al., 2018). Under the trademark registration system, once a trademark has been registered it has the impetus of rights and the registrant in the register shall be deemed to be the owner of the trademark; no third party can either re-apply for registration of the trademark or use it without

permission in respect of the same or similar goods (Senftleben, 2013).

The trademark registration system not only presumes the subject matter of the rights, trademark registration also presumes the boundaries of the scope of the rights and the temporal boundaries of the protection (Dinlersoz et al., 2018). Under the current paradigm of national trademark rights regimes, the same trademark may be subject to separate rights depending on its use on different goods by different traders of the goods, and such rights are all limited in time. This particular arrangement of rights gives a special significance to the driving force of registration in the type of goods covered by the right and the duration of protection. The certificate of registration contains, in addition to the owner of the trademark, the range of types of goods to which the trademark applies and the time period of protection. By defining the range of goods, the "private sphere" of the trademark owner's property status is clarified, effectively solving the problem of defining the scope of trademark rights in a pure use acquisition system (Bently, 2008).

2) Second, to maintain the security of trademark property transactions

Since trademark rights have been treated as a property right, the value of trademark rights has further increased and the transfer and licensing of rights has become an important way of realizing their value, and the issue of the dynamic security of trademark property has become more and more prominent (Ni & Chen, 2016).

The trademark law gives the registration a "prima facie" role through a strict examination procedure and requires the renewal, change, transfer, licensing, cancellation and other significant matters of the registered trademark to be approved or recorded by the competent authority and published by it, thus making the function of ensuring the security of transactions based on the public notice of the registration prominent (Y. G. Xiao et al., 2021).

3) Third, to protect trademarks in advance

Due to the profit-making nature of capital, the spontaneous behavior of traders alone will not only fail to achieve the adjustment of interests and the observance of order, but will also create a more disorderly and chaotic state. At this point, the intervention of the law becomes necessary to maintain order. The trademark registration system has thus come to embody its proper institutional function (Y. M. Zhang, 2018).

By virtue of trademark registration, the state has abandoned its former laissez-faire approach to trademark administration and replaced it with supervision and regulation (Heath & Mace, 2020). In the public interest, the law, by establishing legal conditions for the registration of trademarks, has taken the initiative to draw some boundaries for the choice of trademark symbols, and even to include some "taboos", so that trademarks that are contrary to

public morals, that would lead to undue monopolies and that would have undesirable effects are excluded from the registration of trademarks; those that infringing on the prior rights of others, and the infringement of others' registered trademarks are also excluded from the scope of trademark registration. For example, Article 9 of China's Trademark Law provides that "a trademark applied for registration shall have distinctive features, be easily identifiable and shall not conflict with the prior legal rights acquired by others." Article 10 provides that signs of an undesirable nature, such as "discriminatory to the nation" or "harmful to socialist morality", shall not be used as trademarks, let alone allowed to be registered.

4) Forth, to reduce the cost of searching for trademark information

Regardless of whether the use-acquisition system or the registration-acquisition system is adopted, trademarks have the economic function of saving search costs (Landes & Posner, 2003). However, from the perspective of institutional functions, trademark registration has obvious institutional advantages in information acquisition compared to free use. As a public good, information is costly to produce and non-exclusive, private individuals are often reluctant or unable to invest, and this deficiency cannot be solved by the market itself, which can lead to market failures and greatly affect market efficiency (Sell & Wilson, 1991).

The same is true for trademark information. Under the simple use and acquisition system, due to the scattered and difficult collection of trademark information, as well as the geographical restrictions of trademark rights, there are many overlapping uses. The search cost-saving function of trademarks is actually not being better utilized. In the face of the weakness of market regulation, the active intervention of public power and appropriate intervention becomes a necessity. The way to intervention is to create a unified, authoritative and open platform for the search of trademark information through the creation of a system of "registration" to provide the public with an effective basis for information. A trademark registration system is similar to a property registration system, and the existence of a registration system greatly reduces the cost of transactions, especially the cost of obtaining the necessary information.

Accordingly, those four basic functions are related to the legitimate foundation for the construction of the trademark system. In short, they constitute the rationality and legitimacy of the trademark registration system (Yu, 2011).

2.1.3 Chinese context and trademark system

2.1.3.1 Chinese context

The concept of context is defined differently in different disciplines, but they all emphasize the interaction between an individual's cognitive decision-making and the social organization and environment, that is, an individual's cognition and behavior are affected by the collective environment of the social group. The Chinese context refers to the special environment formed by the interaction of individuals and groups under Chinese unique economic, political, and cultural background (Cai & Shan, 2013).

Specifically, China has the characteristics of both an emerging economy and a transition economy (Hoskisson et al., 2000). As an emerging economy, China has shown rapid development. It has made government policies that support the non-state economy, and initially possessed a relatively free market-oriented economic system. Meanwhile, China is experiencing a transition from a planned economy to a market economy, conforming to the characteristics of the transition economy. However, China still lacks competitive experience and awareness, and complete laws and regulations to regulate its market-oriented behavior (Hoskisson et al., 2000). Under the dual economic background, Chinese institutional environment has a certain degree of originality in terms of regulation, norms and cognition (Y. X. Li & Liu, 2021). From the system aspect, it shows imperfect property rights protection and fair competition protection; from the resource allocation aspect, it shows that the state-owned economy has considerable advantages in resources and information, while the non-state-owned economy has insufficient resources and capabilities; from the aspect of cognition, it shows that the market perception is relatively weak and there is a lack of the spirit of contract (Cai & Shan, 2013).

In short, Chinese enterprises are seeking competitive advantages in an environment that is jointly influenced by government policies and market-based competition (Cai & Shan, 2013).

2.1.3.2 Situation of China's trademark system

The trademark registration system is the core issue of the construction of China's trademark system. On the issue of trademark registration, although China's Trademark Law takes into account the use of pre-factors to a certain extent, it generally adheres to the principle of obtaining the trademark exclusive rights through registration (Feng & Liu, 2019).

(1) Development of China's trademark registration system

In 1982, the first Trademark Law of China established the "first-to-file" system and the

principle of obtaining trademark exclusive rights through registration (Article 18), protecting fairness on the basis of efficiency. The law stipulates that the Trademark Office shall order the related person to rectify or even cancel the registered trademark within a specified period of time if the use of the registered trademark has ceased for three consecutive years (Article 30), so it has become an important system for eliminating malicious registration and hoarding. The Trademark Law was amended for the first time in 1993, adding the provision for revocation of registered trademarks obtained "by deception or other improper means" (Article 27, Paragraph 1), and introducing into the principle of good faith, to optimize the market environment and regulate the trademark registration system. The second amendment to the Trademark Law in 2001 had more new provisions to ensure the fairness of trademark registration: The scope of trademark applicant was extended to cover natural persons (Article 4, Paragraph 1), in line with international conventions and practices; cross-category protection was provided for registered well-known trademarks, and the same category protection for unregistered ones (Article 13 and Article 14); it was forbidden for anyone to damage the prior rights of others or to have an act of malicious squatting that would affect the trademark to a certain extent (Article 31). The above-mentioned amendments to the Trademark Law make up for the unfairness brought about by the acquisition of trademark registrations and, in order to balance efficiency, impose the obligation of the Trademark Office to review applications for registration in a timely manner (Article 35). In 2013, the Trademark Law was revised for the third time, adding a good faith clause (Article 7) which has become a comprehensive clause to regulate trademark infringement and malicious squatting, and lowering the standard of malicious cybersquatting to "knowingly" cybersquatting (Article 15). In terms of efficiency, the change from "one trademark with one category" to "one trademark with multiple categories" (Article 22, Paragraph 2) provides greater convenience for trademark applicants to file multiple applications for the same trademark, the review cycle is stipulated within 9 months (Article 28), and restrictions on the subject of the objection and the reason for the objection (Article 33), to a certain extent, reduce malicious trademark objection applications. In order to effectively curb the malicious registration of trademarks and purify the business environment, a new clause "malicious applications for registered trademarks that are not intended for use shall be rejected" (Article 4) was included in the general provisions of the Trademark Law amended in 2019, , clearly prohibiting malicious registration of trademarks, and amending some of the relevant provisions of the sub-rules to increase the penalties for malicious trademark registrations (L. F. Wang & Zeng, 2021). Through these amendments, China's *Trademark Law* tried to establish a system based on the acquisition of trademark registration to curb malicious squatting and

hoarding, exactly reflecting China's pursuit of efficiency and fairness in the trademark registration system.

(2) Trademark registration process in China

According to the information available on the website of State Intellectual Property Office (2021), natural persons, legal entities or other organizations that need to obtain exclusive rights to trademarks for their goods or services in the course of their production and business activities shall apply to CNIPA for trademark registration. There are 45 categories of international classifications of goods and services for trademark registration, including 34 categories of goods and 11 categories of services.

Trademark registration is a kind of trademark legal procedure. If no opposition is filed or if the opposition is ruled not to be established, the trademark is registered and becomes effective and protected by law, and the trademark registrant enjoys the exclusive right to use the trademark. It takes about one to one and a half years for a trademark to be registered from application to approval. There is no statutory time limit for the approval or rejection of a trademark registration application. The Trademark Office validates and publishes the trademark and then issues a trademark registration certificate, and the trademark is hereby approved. The time period for the examination of a trademark may vary at any time depending on the efficiency of the examination within the Trademark Office. The validity period of a registered trademark is ten years from the date of approval of the registration. If a registered trademark expires and needs to continue to be used, it can be applied for renewal of the trademark registration.

In China, after an enterprise submits an application to register a trademark until it obtains a certificate of registration, it needs to go through examination, publication and special procedures.

1) Examination

Trademark examination is divided into formal examination and substantive examination.

Firstly, the formal examination of the trademark (3-4 months).The establishment of the application date is very important, because China's trademark registration using the first to apply principle, once the application date has become the legal basis for determining trademark rights, the application date for trademark registration to the trademark office received the application date shall prevail. The Trademark Office receives a trademark application and issues a notice of acceptance for applications that meet the formal requirements (National Intellectual Property Office,2021).

Secondly, the substantive examination of the trademark (12 months). The substantive

examination of a trademark is a series of activities conducted by the competent authority for trademark registration to check whether the application for trademark registration is in compliance with the provisions of the Trademark Law, such as information search, analysis and comparison, investigation and study and decision to grant preliminary examination or reject the application. During this period, please do not mark the registration mark (e.g. “registered trademark”, “&reg”) in use until the mark has been granted registration, but may mark “TM” (National Intellectual Property Office,2021).

2) Announcement

Trademark validation refers to the decision to allow the registration of a trademark that meets the relevant provisions of the Trademark Law after examination of the trademark registration application, and to be announced in the Trademark Gazette. If no objection is filed for three months from the date of publication of the Preliminary Validation Notice, the trademark shall be registered (National Intellectual Property Office,2021).

3) Special Procedures

The remedial procedures used in the event of contradiction, conflict or other reasons during the trademark registration process are not compulsory and include three main procedures: review of trademark refusal, review of trademark opposition and trademark dispute (National Intellectual Property Office,2021).

The above-mentioned compendium of Chinese trademark registration procedures helps to explain the criteria for selecting the trademarks of the companies in the sample for this study. That is, all registered trademarks were collected from those that applied for registration in the current year and were granted a trademark registration after the examination of the trademark registration application, as well as those that were still valid at the time of data collection for this study.

2.1.3.3 China’s special system arrangement — “high-tech enterprise certification”

High-tech enterprises are knowledge-intensive and technology-intensive enterprises, owners of cutting-edge technologies in the industry, and crackers of industry commonality and key technologies. At a time when economic competition among countries has gradually evolved into technological competition, high-tech enterprises, as one of the important players in the market, represent the highest level of innovation capabilities in a country as the pioneers in the high-tech field (L. F. Wang & Zeng, 2021). The Chinese government began to carry out “high-tech enterprise certification” in the 1990s and adopted preferential tax policies, such as 15% corporate income tax rate for qualified enterprises, to encourage enterprises’ technological

innovation (L. L. Xu et al., 2021). In particular, the "Administrative Measures for the Certification of High-Tech Enterprises" (hereinafter referred to as the "Administrative Measures") were revised in 2008 and 2016, respectively, expanding the scope of "high-tech enterprise certification" to the whole country, and increasing support for small and medium-sized enterprises (SMEs). Intensive efforts have encouraged a large number of enterprises to actively apply for the "high-tech enterprise certification". In 2020, there were 278,000 high-tech enterprises in China, with a total operating income of 51.3 trillion yuan (Gu, 2021). However, during the period of China's transition economy, the "high-tech enterprise certification", as a scarce resource that can bring tax incentives and other government supports to enterprises, will inevitably be sought after by enterprises. Scholars have gradually paid attention to the special system arrangement of "high-tech enterprise certification". Whether the special system arrangement will really promote the improvement of enterprises' innovation capabilities and enterprise performance is an important issue worthy of study in the process of differentiated marketization in China. From the perspective of the external environment of enterprises. S. D. Zhao (1999), through questionnaire surveys and field visits, pointed out that "high-tech enterprise certification" in Nanjing, Jiangsu Province is in a stage of gradual technological innovation based on technology introduction, assimilation and absorption. The driving force of enterprises' technological innovation mainly comes from market competition pressure and new market demand. The development of science and technology and the policy incentives also promote enterprises' technological innovation to a certain extent. Regarding the relation between "high-tech enterprise certification" and innovation performance, G. Sun et al. (2016) found that the private enterprises that have passed the "high-tech enterprise certification" significantly increased the innovation input compared to state-owned enterprises. L. L. Xu and Zheng (2016) took the listed high-tech enterprises from 2005 to 2014 as a research sample, and proposed that "high-tech enterprise certification" encourages enterprise innovation and directly affects financial performance. Accordingly, the "high-tech enterprise certification" system provides a good institutional background for studying enterprise innovation and performance growth in the Chinese context. For Chinese companies, if they want to maintain a sustainable competitive advantage, they must not only rely on internal resources, but also need to pay more attention to external institutional support (C. Y. Xu, 2011). Therefore, this research will further explore the influence of external institutional support on enterprise trademark strategy based on the relation between trademark portfolios and enterprise performance.

2.2 Trademark strategy based on competitive advantage theory

Acquiring and maintaining a sustainable competitive strategy is the fundamental issue of strategic management. Around this issue, competitive advantage theory has evolved into industry positioning theory, resource-based view (RBV)/capability-based view (CBV), and knowledge-based view. In the uncertain global competitive environment, intellectual property is increasingly becoming a core strategic resource for enterprises to maintain strategic flexibility and seek sustainable competitive advantages. As a result, intellectual property management and its relevance to the enterprises' competitive advantages are becoming hot issues in strategic management (X. Xiao, 2020). Relevant research conclusions in this regard have provided important references for this research.

2.2.1 Theory of competitive advantage

The theoretical background to the issue of competitive advantage is the revision of the assumption of a perfectly competitive market by neoclassical economics (Barca, 2017). The neoclassical theory of perfect competition market mainly revolves around the question of "how to allocate scarce resources effectively", which implies the existence of a perfectly competitive equilibrium with optimal resource allocation. Based on the assumption that market participants are rational economic actors and production factors are completely fluid, the market is regarded as a perfectly functioning machine rather than a social or historical system arrangement, which allocates resources spontaneously and frictionlessly. For the operation of the market price system, enterprises exist as intermediaries between the supply of resources and the demand for goods, rather than as decision makers. Therefore, under perfectly competitive conditions, it is easy to determine through the equilibrium between price and output when the supply and demand curves are given (Archibald, 1979). As enterprises produce homogeneous goods, and the number of enterprises is unlimited, no enterprise can affect the prices and profits of other enterprises. Therefore, enterprises act as the price receiver. In addition, they are completely free to enter and exit the market and do not need to care about competitive advantage, since the enterprise profit is the average profit, without any long-term economic profit and rent. Moreover, there is no need to study the rationale for the existence of an enterprise, and the determinants of the enterprise's boundaries, performance differences, management models, internal structures, decision-making processes, market positioning, resources and capabilities, and strategic actions (Y. G. Xiao et al., 2021). However, there are

indisputable differences in profits between enterprises in the same industry. In order to provide a proper explanation for this, we must break away from the assumption of perfectly competitive market.

Chamberlin (1949) introduced the concept and theoretical model of monopolistic competition and imperfect competition, proposed that most market prices are the results of competition and monopoly, and began to study the importance of differentiated goods, advertising and enterprises' behaviors. The development of monopolistic competition model involves the logical relation between industrial structure and price and profit. Accordingly, the sources of profit differences between enterprises and the mechanisms that shape them have become a common concern in economics and management. As a result, the concept of "strategy" came into being. It refers to a theory that analyzes the relation between an enterprise and its market environment and studies how enterprises can compete successfully (Porter, 1980).

Teece (1993) summarized several questions that focus on strategic management research:

(1) What are the sources of differences in profits and performance between different enterprises?

(2) How can the source of these differentiated profits be maintained in the context of competitive equalization?

(3) Can knowledge assets be strategically managed?

(4) How do the boundaries of an enterprise affect performance?

(5) How well does good strategic management affect enterprise performance?

These questions are all developed around the source of sustainable profit performance differentiation and its formation mechanism, and are also the paradigm of strategic management research. Porter (1991) and Rumelt (1982) both argued that the focus of strategic theories is the "sustainable" profit differentiation between enterprises other than short-term or temporary differentiation. In other words, the competitive advantage theory should explain both the source of enterprise differentiation and the sustainable mechanism of differentiation. An enterprise strategy is about how to maintain a competitive advantage in a competitive environment, that is, to find the source of an enterprise's competitive advantage, and to maintain the competitive advantage under the influence of competitive pressure, imitation or market equilibrium (Y. G. Xiao et al., 2021).

In summary, the source of sustainable competitive advantage and its formation mechanism have become a fundamental issue of strategic management. The competitive advantage theory of an enterprise includes the following four aspects:

(1) What is the competitive advantage and how to measure competitive advantage?

(2) What can bring competitive advantage to enterprises?

(3) What is the logical relation between the source factors and the competitive advantage?

(4) What are the requirements for an enterprise's sustainable competitive advantage?

Through research around these issues, there have formed industry positioning theory, resource/capability theory, and knowledge resource theory. This research will further seek the theoretical basis of enterprises' registered trademark applications strategy on the basis of the above-mentioned competitive strategy theory combing.

2.2.2 Industrial positioning theory and its theoretical contribution

(1) Proposal of structure-conduct-performance (S-C-P) paradigm

As mentioned above, since the actual market competition is imperfect market competition, the focus of industrial organization theory research has shifted from enterprise behavior under a perfectly competitive market structure to enterprise behavior and performance under multiple market structures (Mason & Lamont, 1982). In other words, the industrial organization theory began to understand and explore why there were performance differences between enterprises, rather than just explain how the effective allocation of resources was achieved. According to the industrial organization theory, the excess profits obtained by some enterprises are mainly attributed to different market structures. In other words, the entry and exit barriers in the industry, the restrictions on government protection and the relative monopoly caused by product differentiation determine the profit level of enterprises. On this basis, the S-C-P paradigm indicated by the industrial organization theory is proposed accordingly (Bain, 1959; Mason, 1939).

According to the S-C-P paradigm, the market structure affects the characteristics and intensity of inter-firm competition in the same industry and determines the behavior and performance of those enterprises. "Structure" refers to the concentration of buyers and sellers, the barriers to entry into potential markets, the degree of product differentiation, vertical integration, and even capital concentration, and advertising density. "Conduct" refers to the strategy followed by an enterprise, that is, the pattern of behavior adopted by the enterprise in order to adapt to or adjust to the market. "Performance" refers to the level of profitability, the link between price and cost, and efficiency (Ferguson & Ferguson, 1994). According to Bain (1959), there are two factors determining the market performance of an enterprise. One is the organization or structure of the industry, that is, the market structure restricts the behavior of an enterprise and its results, and a change in the structure leads to a corresponding change in performance. The other one is the market behavior of an enterprise (the policies, measures and

steps adopted by the enterprise to adapt to the market), which also affects the enterprise performance. In the final analysis, the enterprise performance is determined by the market structure outside the enterprise.

(2) Porter's theory of competitive advantage

Porter (1985) used the S-C-P paradigm to explain the differences between enterprises, and to analyze the source of competitive advantage and its formation mechanism. According to Porter, enterprise differentiation is the result of two dynamic factors. The first is the attractiveness of an enterprise determined by the long-term profitability of the enterprise and its influencing factors, which is the primary and fundamental factor that determines the profitability of an enterprise. Porter (1980) came up with the famous Diamond model of competition: In any industry, whether domestic or international, whether relating to goods or services, competition manifests itself as the result of five competitive forces: entry of new competitors, threat of substitutes, rivalry among the existing competitors, and bargaining power of buyers and suppliers. These five competitive forces determine the ability of enterprises in an industry to earn rates of return on investment in excess of the cost of capital. The second dynamic factor is the relative competitive position of enterprises in an industry, which determines whether the profitability of an enterprise is higher or lower than the industry average. An enterprise's basic competitive advantage is reflected in two areas: low cost and differentiation. This advantage stems from the ability of the enterprise to handle these five competitive forces more effectively than its competitors. For enterprises, cost leadership, differentiation and focus are the basic strategies to create above-average performance in the industry and gain competitive advantage. The profitability of an enterprise depends on which competitive strategy it chooses, and the choice of competitive strategy should be based on the following two considerations:

1) Choose attractive and highly profitable industries;
2) Determine the competitive position of its own advantage in the selected industry.

In order to further explore the source of competitive advantage and its formation mechanism, Porter (1985)introduced the core concept of the value chain, and regarded that the competitive advantage of an enterprise ultimately comes from the value created by the enterprise for customers under a specific industrial structure, and from a series of value-creating activities carried out by the enterprise in the design, production, marketing, delivery and auxiliary processes. These value-creating activities are the driving force of an enterprise's competitive advantage. Generally, the following factors constitute the fundamental source of an enterprise's competitive advantage: its scale, mutual connections,

ability to share value activities with other business units, location of value activities, timing of investment, degree of vertical integration of these activities, and institutional elements. The collection of value creation activities determines the relative cost position of an enterprise and lays the foundation for differentiation(Porter, 1980).

(3) Challenges of industry positioning theory

The industrial positioning theory, represented by Porter, describes how enterprises can position themselves in an industry, gain competitive advantage, profit in the fierce competitive environment, and then create a new field of enterprise strategy. This theory emphasizes the importance of enterprises' choices of industries, especially the influence of industrial structure, and emphasizes the decisive role of the external competitive environment of enterprises in strategy making. The basic assumption is that each enterprise has similar resources and capabilities, enterprise resources are flowing between enterprises, the external environment of an enterprise is relatively stable, the good life cycle is long, and enterprises can predict the external environment. Therefore, the key to seeking a competitive advantage is to choose attractive industries, and seek common strategies (S. D. Zhou & Guo, 2002).

However, first, since the 1990s, with the continuous rise of emerging technologies such as information technology, biotechnology and nanotechnology, the industrial boundary has become increasingly blurred. The uncertainty of technology, market and management makes it difficult to predict the competitive environment (Day & Schoemaker, 2000; J. R. Zhao, 2021). An enterprise's strategy should not only guide the competition within the existing industry, but also enhance the enterprise's ability to foresee the future industrial development. In this uncertain competitive environment, in order to obtain sustainable competitive advantage, enterprises must not only emphasize the importance of opportunities, but also consider whether they have corresponding resources and capacity support. Second, the industrial positioning theory puts too much emphasis on the importance of choices of attractive industries. According to the logic of industry positioning theory, in the same industry, the market structure and opportunities faced by all enterprises are objectively homogeneous. Under relatively sufficient market competition conditions, market opportunities cannot be monopolized by any enterprise for a long time. The profitability of all enterprises in the same industry should be basically the same. However, this is not the case. The most important source of excess profits is the particularity of enterprises other than the interrelation within the industry (Rumelt, 1982). Both economic factors and organizational factors have a significant impact on enterprise performance. These two factors are independent of each other, and the degree to which organizational factors explain enterprise

profitability is approximately twice that of economic factors (Hansen & Wernerfelt, 1989).

The deviation between theory and practice has prompted economics and management scholars to shift their research perspectives from the outside of enterprises to the inside of enterprises, and explore the source and realization mechanism of enterprises' "successful competition". Resource-based view (RBV) and capability-based view (CBV) are outstanding representatives of this exploration. RBV and CBV and their development also constitute one of the theoretical foundations for this research to analyze the enterprise trademark strategy.

2.2.3 Resource-based view/capability-based view and its theoretical contribution

(1) Representatives of the resource-based view and their main views

The theoretical origin of the resource-based view can be traced back to Penrose, the founder of "The Theory of the Growth of Firm". In this pioneering work, Penrose (1959) took the growth of enterprises as the object of analysis for the first time, and believed that this theory was a purely internal growth theory, emphasizing the role of management on the growth of enterprises. An enterprise is essentially a collection of resources within a specific management framework. The growth of an enterprise is the result of the effective coordination of its resources and management functions. The overall goal of an enterprise is to organize its "own" internal resources and other external resources obtained to produce and sell goods or provide services to obtain profits. The growth of an enterprise is not determined by the equilibrium forces of the market. Instead, it is driven by the uniqueness of the enterprise (Penrose, 1959). Later, Andrews (1971) began to analyze and evaluate the internal advantages and disadvantages of an enterprise as a prerequisite for strategy formulation in strategic research, and continued to explore the path of growth of enterprises. In 1984, Wernerfelt published a landmark paper "A Resource-Based Perspective" in the *Journal of Strategic Management*, marking the birth of the term "resource-based" and the emergence of resource-based view. After nearly two decades of development, the resource-based view has become an important competitive advantage theory.

The resource-based view holds that an enterprise is a collection of resource bundles, and its competitive advantage comes from the resources owned by the enterprise, especially heterogeneous resources. Although external market structure and opportunities have some influence on the competitive advantage of enterprises, they are not decisive factors. Wernerfelt (1995) examined the relation between resources and profitability and how enterprises manage resource positioning. In Wernerfelt's view, enterprise resources are tangible or intangible assets that can bring advantages or disadvantages to an enterprise,

including business name, know-how, technical employees, customer resources, machinery and equipment, and capital. Wernerfelt adopted the concept of "Barriers to Entry" to develop the concept of "Resource Position Barrier", which enabled differentiation and competitive advantage of enterprises by establishing a resource-product matrix to implement dynamic resource management, including exploitation of existing and new resources.

J. B. Barney (1986) proposed that the economic performance of enterprises was dependent on the choice of strategy and the cost of strategy implementation. In order to analyze the cost of strategy implementation, Barney introduced the concept of "Strategic Factor Market" and argued that when different enterprises had different expectations for the future value of strategic resources, the strategic factor market was not fully competitive. In this situation, an enterprise could obtain higher-than-average economic performance from the acquisition and control of strategic resources and the implementation of strategies. Compared with the analysis of competitive environment, the unique skills and abilities of enterprises are more explanatory for the enterprises to obtain higher-than-average economic performance. Since then, J. Barney (1991) and J. Barney et al. (2001) has conducted a series of studies focusing on the logical relation between resources and sustainable economic advantages.

1) Definition of resources and sustainable competitive advantage

According to Barney, an enterprise's resources, including all assets, capabilities, organizational processes, business attributes, information, and knowledge, are controlled by itself and help it develop and implement strategies to improve operational efficiency. These resources are divided into financial capital resources, physical capital resources, human capital resources, and organizational capital resources. If an enterprise has a sustainable competitive advantage, it means that the value creation strategy implemented by the enterprise cannot be implemented by other existing or potential competitors at the same time, nor can other competitors duplicate the benefits of the strategy. An enterprise's "sustainable" competitive advantage depends on the possibility of competitive replication, and will only continue to exist after other enterprises' efforts to duplicate this advantage have ceased.

2) Measures of competitive advantage

J. Barney et al. (2001) made use of Porter's definition of competitive advantage as a theory of how successfully an enterprise competes in strategy, which in turn is defined as a competitive advantage. Enterprises that gain competitive advantage have better performance than those that only get equal competition, so the performance of enterprises is the focus of strategic practice and research. In Barney's view, the competitive position of an enterprise includes three aspects: first, to gain a competitive advantage — the actions of an enterprise in

an industry or market add value, and few other companies take similar actions; second, to obtain competition equality — the actions of an enterprise in an industry or market have added value, but some other enterprises have taken similar actions; third, to gain a competitive disadvantage — the actions of an enterprise in an industry or market cannot create economic value. Accordingly, the performance of enterprises is divided into three types: normal economic performance — the economic value created by enterprises using resources is equal to the value expected by resource owners; below-normal economic performance — the economic value created by enterprises using resources is lower than the value expected by resource owners; above-normal economic performance — the economic value created by enterprises using resources is higher than the value expected by resource owners. This positive difference between expected value and actual value is called economic profit or economic rent.

(2) Relation between resources and sustainable competitive advantage

Due to the heterogeneity and immobility of resources (Wernerfelt, 1995), it is too abstract and vague to explain the source of competitive advantage. J. B. Barney et al. (2017) proposed the famous VRIO analysis framework, and argued that the sustainable competitive advantage of an enterprise cannot be obtained through open market "purchase". Instead, it lies in the value, rareness, imperfectly imitability, and organization of the resources controlled by the enterprise. In the VRIO framework, imitation appears in two ways: direct duplication and substitution, which increases the requirements of organizations (J. B. Barney et al., 2017). At the same time, the definition of "value" is whether the enterprise's resources or capabilities work to enable the enterprise to respond to environmental opportunities or threats; the definition of "rareness" is whether these resources are currently in the hands of a relative few enterprises, that is, how many competing enterprises have obtained specific valuable resources and capabilities; the definition of "imperfectly imitability" is whether there will be significant cost disadvantage to the enterprises without these resources in acquiring or developing these resources, compared with those that have these resources or capabilities; the definition of "organization" is whether an enterprise is organized around the competitive potential of making full use of its resources and capabilities.

According to Barney's theory, enterprises with resources that meet the above four standards have a sustainable competitive advantage. Imperfectly imitability plays a central role, while imitable resources are not the basis of sustained competitive advantage.

Rumelt (1984) introduced the "isolation mechanism" into the organizational environment. Ownership, learning and development costs, and causal ambiguity are three effective isolation

mechanisms, the essence of which comes from protected resources. For the isolation mechanism, one difficulty is how to protect knowledge-based assets. With regard to the isolation mechanism of knowledge-based resources, Rumelt (1987) argued that enterprises could implement actions regarding information compression (such as technical secrets, and tacit knowledge), identification of advantages and response, employee learning, reputation, and large customer groups. Miller and Shamsie (1996) further pointed out that most ownership-based resources were threatened by the degradation of environmental changes, while knowledge-based resources could be maintained under changing conditions.

In short, the resource-based view explains the source of an enterprise's sustainable competitive advantage from the perspective of resources, seeks the rationality of the growth of enterprise and sustainable competitive advantage from resources of enterprises, creates a new research field and forms a new branch of competitive advantage theory. In particular, this theory laid emphasis on the significance of the special resource of knowledge for the sustainable competitive advantage of enterprises, which has important significance for subsequent research.

(3) Representatives of capability-based view and their main views

In the 1990s, on the basis of the resources-based view, the theory of core competence of enterprises was established. The most representative one is the "Core Competence of the Corporation" published in *Harvard Business Review* by Prahalad and Hamel (1990). In the opinion of Prahalad and Hamel, enterprises not only produce goods, but also create and accumulate knowledge and skills, and embed them in the organization. Although the competition of enterprises is externally manifested as product competition, it is essentially the competition of the core competitiveness of enterprises. From the perspective of "end products"- "core products"- "core competences", the core competence theory opens an enterprise's "black box", guides the source of an enterprise's competitive advantage to the core competence of the enterprise, and promotes the development of competitive theory to a new stage. Accordingly, the theoretical research on competitive advantage of competence has gradually evolved different viewpoints, such as core competence and dynamic competence.

1) Core competence view (CCV)

Many scholars regard "core competence" and "core capability" as the same category. Prahalad and Hamel (1990) argued that the core competency is the root of competitive advantage and the collective learning within an enterprise, particularly when it comes to reconciling multiple production skills and integrating multiple streams of technologies. Unlike material assets, the core competency will not be worn out by exploitation, but enhanced by

application and sharing. Prahalad (1993)considered the core competency to be a combination of different capabilities within an enterprise. Barton (1998) argued the core competency consists of four elements: knowledge and skills, management systems, physical systems, and view of value, forming a unique system of knowledge that creates a competitive advantage. These points of view give different understandings of the core competence and the logical link with sustainable competitive advantage from different perspectives. Moreover, they all agreed that the essence of core competence is the combination of a series of knowledge and skills within an enterprise, featuring integration, scalability, customer value, uniqueness, and difficulty to duplicate.

Enterprise strategy is made in a high-risk and highly uncertain environment. In such a competitive environment, flexibility and dynamics are the most important attributes of enterprise strategy (D'aveni, 2010). Therefore, to achieve the competitive advantage of competence, efforts should be made to identify how to adapt the core competence of an enterprise to the dynamic and complex environment, so as to maintain the sustainability of competition. In this context, the concept of dynamic capability has been proposed and continuously developed.

2) Dynamic capability view (DCV)

According to Teece and Pisano (1994) and Helfat (1997), dynamic capability refers to the competitiveness or ability of enterprises to create new goods and processes to adapt to changes in the market environment. Teece (1993) argued that dynamic capability is the ability of enterprises to integrate, build and reconfigure internal and external competences to address rapidly changing environments, and is the source of sustainable competitive advantage. Although the academic circles have different definitions of dynamic capabilities, it can be concluded from these definitions that dynamic capabilities have the following characteristics: First, “dynamics” is the most basic feature of dynamic capability. Enterprises need to constantly update themselves in order to address rapidly changing environments and to gain and maintain a sustainable competitive advantage in adapting to environmental changes. Second, “knowledge” is the source of an enterprise’s continuous renewal and ability to maintain the “dynamics”. Knowledge is required for a quick perception of changes in the internal and external environments, the reorganization of resources, and for the performance of activities within an enterprise. Knowledge includes explicit and implicit knowledge, so the dynamic capability is a dynamically changing system of knowledge. Third, “learning” is an effective way to build an enterprise’s dynamic capabilities. The building of dynamic capabilities is essentially an institutional change. Through learning, enterprises can quickly

and efficiently promote organizational changes to respond to changes in the environment. Teece and Pisano (1994) proposed three key dimensions in their dynamic capability theoretical analysis framework: organizational and managerial processes, positions, and paths. First, the organizational and managerial processes refer to the routines of an enterprise in handling problems and the mode of management, specifically including three aspects: coordination and integration, reconstruction and transformation, and organizational learning. Second, positions refer to the endowment of an enterprise's current technology and intellectual property rights, customer base, and relation with suppliers. Third, paths refer to the attractiveness of strategic choices and future development opportunities that are conducive to an enterprise. Therefore, the theory of dynamic capabilities has begun to take the market as a key factor in the evolution of capabilities. In other words, in order to respond to market changes, enterprises must use Schumpeter's innovation theory to change the position of resources through innovation (Y. G. Xiao et al., 2021).

In terms of dynamic capabilities and sustainable competitive advantage, Teece (1993) pointed out that dynamic capabilities can enhance an enterprise's competitiveness and thus improve its performance, especially in a dynamic market environment. According to Teece (2007), in a changing environment, dynamic capabilities are a source of competitive advantage for some enterprises, allowing them to improve their management skills, so that they can identify and leverage development opportunities to address environmental changes. Taking ZTE in China as an example, Carmeli and Azeroual (2009) discussed the logical relation between knowledge transmission, dynamic capability and enterprise growth, and pointed out that dynamic capability is the motivation of enterprise growth, and knowledge dissemination indirectly affects enterprise growth through dynamic capability.

In terms of dynamic capability formation and evolution, Helfat and Raubitschek (2000) proposed a model about the coevolution of organizational knowledge, capabilities, and products, and argued that an enterprise's product development is supported by the enterprise's system of knowledge and systems of learning, while the product sequence development, in turn, enhances the enterprise's knowledge and learning capability. Eisenhardt and Martin (2000) regarded that learning and market mechanisms promote and influence the evolution of dynamic capabilities. The learning mechanism includes repetitive behaviors, trial and errors, and experience; the market mechanism is subdivided into moderately dynamic and rapidly changing markets.

With the continuous deepening of the theoretical research on resource-based view and capability-based view, we can see gradually prominent core position of knowledge in the

integration of enterprise resources, especially the value of obtaining and maintaining dynamic core capabilities of the enterprise. As a result, the knowledge-based view of the competitive advantage theory is ready to emerge.

2.2.4 Knowledge-based view and its relations with intellectual property

(1) Relations between knowledge and enterprise's competitive advantage

Knowledge refers to "the sum of cognition and experience that people has acquired in the practice of transforming the world" (Editorial Board of Contemporary Chinese Dictionary, 2021). Unlike private assets such as lands, labors and capitals, knowledge is a "public good", meaning that knowledge is theoretically unlimited, and one person's use will not exclude others from using knowledge (Maskus & Reichman, 2004). However, Teece (1993) pioneering research on the source of enterprise profits inspired scholars to continue to explore the technical knowledge of enterprises. Winter (2003) was the first to put forward the view that knowledge is a strategic asset, and believed that knowledge is closely related to enterprise capabilities, and gradually exists as a kind of private property related to enterprise profits. With the deepening of research on enterprise resources and capabilities, the academic community has realized that in order to dynamically respond to the changing environment, enterprises should not only be regarded as machines that effectively process information, but also as entities that create information and knowledge. Teece et al. (1997) argued that, with the acceleration of changes in technology, markets, products, competitors and rules, organizational structural changes are of strategic significance. An enterprise's competitive advantage comes from the creation, ownership, protection and use of knowledge assets that are difficult to imitate (including implicit and explicit knowledge). Accordingly, the enterprise's superior performance depends on the innovation, protection and utilization of intangible knowledge assets. Knowledge is increasingly regarded as a fundamental asset that determines the profitability of technology-intensive enterprises (Borg, 2001).

Globalization, time constraints, and technology integration have created a turbulent technology and market environment for enterprises (Gugler & Haxhimusa, 2019). In order to understand how enterprises gain and maintain competitive advantage in such an environment, knowledge management is generally regarded as the core activity of enterprises, and the focus of research is on the relation between knowledge management and performance (M. C. Huang & Chiu, 2020; Teece, 2000). Here, we can see an important direction of knowledge management, i.e. resource-based value acquisition ideas, focusing on how enterprises form their own managerial and organizational processes through the unique combination of

knowledge and tangible resources in order to gain a sustainable competitive advantage (Tarn, 2015; van Weele et al., 2020)

(2) Relations between knowledge and intellectual capital, intellectual assets and intellectual property

In the theoretical study of knowledge management, one of the main concerns of scholars is the relation between the concepts of knowledge, intellectual capital, intellectual assets and intellectual property. Thomas (1994) considered that intellectual capital is an enterprise's optimal value asset, which is the sum of related "soft" assets known to all members of the enterprise that can provide the enterprise with a competitive advantage in the market, including employees' knowledge and skills, customer loyalty, and the enterprise's cultural, institutional and collective knowledge and experience in the course of operation. Bontis (1998) and Barrena-Martínez et al. (2020) used the concept of intellectual capital to replace knowledge and intellectual assets, and linked intellectual capital to enterprise profits. They regarded that intellectual capital refers to the knowledge that can be transformed into profit, and then discussed the logical relation between intellectual capital, intellectual assets, and intellectual property.

For employees, the vast majority of intellectual capital is kept in their mind in the form of intangible knowledge. When employees leave the enterprise, they will take away the intellectual capital that is kept in their mind. Therefore, the primary task of intellectual capital managers is to identify, capture, prove and record intellectual capital, and to enable other members of the enterprise to have access to this intellectual capital, that is, to upgrade intellectual capital to intellectual assets.

Intellectual assets are identified and proven intellectual capital that can be shared and replicated in an organization, while intellectual properties are intellectual assets protected by laws. However, for intellectual assets that are to be upgraded to intellectual property rights, it is often required to go through a process of application, review, approval, registration, or signing of confidentiality agreements (Y. G. Xiao et al., 2021). Therefore, the relation between intellectual assets, intellectual capital, and intellectual property is: intellectual capital includes intellectual assets, and intellectual assets include intellectual properties. These three factors have an increasing relation in value, which determines how managers design management processes: Filter intellectual assets from intellectual capital, and then extract intellectual property from intellectual assets. Therefore, the goal of managers is to continuously explore and protect intellectual property.

In short, the development context of the competitive advantage theory is as shown in

Figure 2.1.

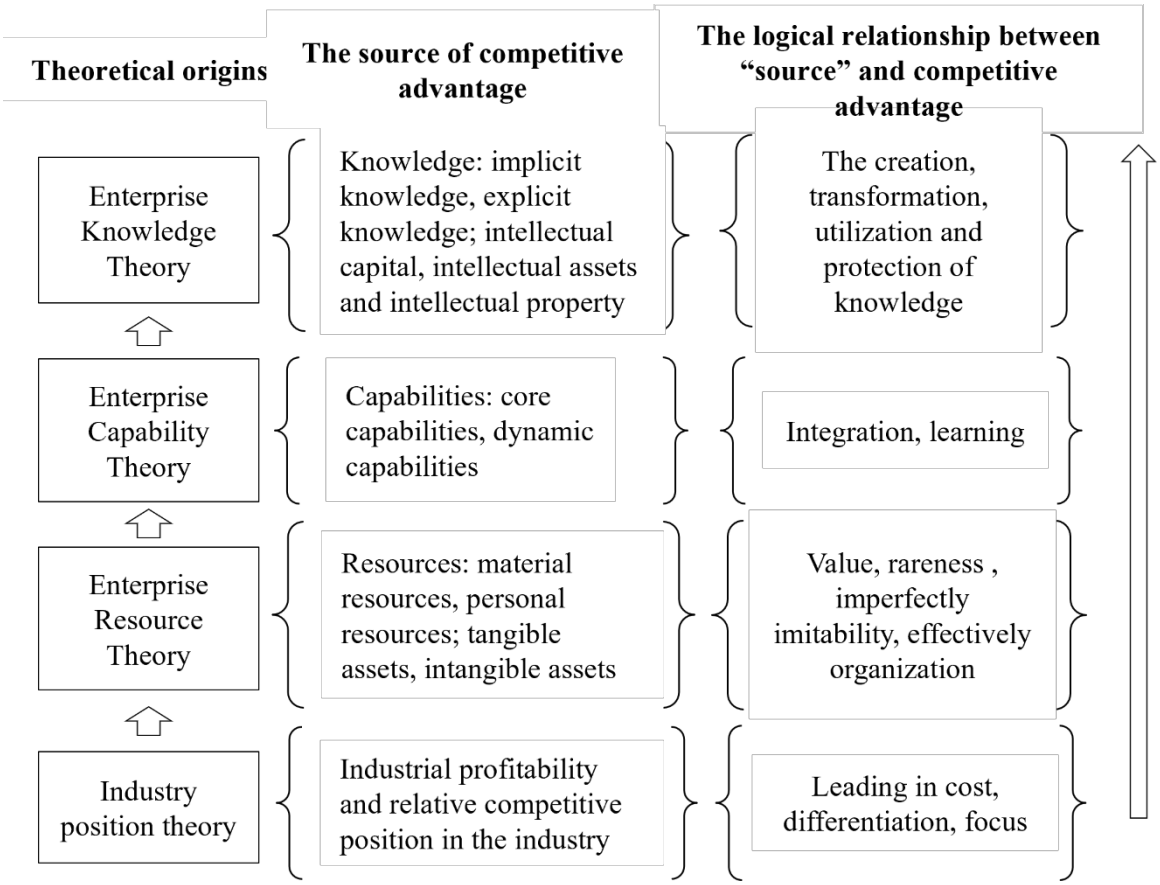

Figure 2.1 Development context of competitive advantage theory

(1) Intellectual property as an internal source of enterprises seeking and maintaining competitive advantages

At the beginning, the academic circle mainly regarded intellectual property as an institutional factor for enterprises to win the income of innovation, thereby gaining a competitive advantage in competition. At the same time, intellectual property has been regarded as a legal system from the beginning (Bently et al., 2018). However, the acquisition of knowledge is a process of gradual accumulation, and a process full of "creative", involving absorption and application of external knowledge of enterprises, and also application of existing knowledge inside and outside enterprises to create new knowledge (Nonaka et al., 1995). Based on this understanding and recognition, scholars gradually regard intellectual property as a strategic core resource for enterprises to participate in competition, and an internal "source" for enterprises to seek and maintain competitive advantage in a dynamic technology and market competition environment (Grimaldi et al., 2021; Peters et al., 2013). The value positioning of intellectual property in the competitive advantage of enterprises is derived from two factors: the difference in public policies that promote the innovation-driven development of intellectual property services by knowledge products (subject matter of intellectual property)

and tangible objects (subject matter of property rights), and the ability to cope with a dynamic and uncertain competitive environment (Y. G. Xiao et al., 2021). From the perspective of resources, intellectual property protected by law has flexible characteristics, and are therefore different from rigid tangible assets. In the dynamic competitive environment, in order to achieve goals more effectively, enterprises need to actively adapt to environment changes, and implement flexible strategies, including flexibility of resource, capability, organizational, production and cultural (G. L . Liu et al., 2020).

(2) Trademark value from the perspective of dynamic environment and resources

In the dynamic environment, the value of trademark is considered to be flexible compared with tangible assets.

1) Symbolic tool. The cost of trademark design is lower than that of new product development. At the same time, the exclusive rights of trademarks are obtained by registration application, so the cost required is much lower than that of new product manufacturing. Therefore, a large number of enterprises, regardless of their size or industry, are willing to use this symbolic tool to build their own competitiveness (Mendonça, 2014; Smith & Richey, 2013).

2) Dynamic utilization. As mentioned above, the distinctiveness of trademarks is dynamic, so enterprises can decide the scope and extent of trademark utilization according to their own competition needs (Lemper, 2012; Seip et al., 2018) .

3) Reduction of the negative consequences of uncertainty. Enterprises in the uncertain technology and market environment can, through trademark registration in the target market, improve their response ability. Once the uncertainty is reduced, enterprises can take advantage of their registered trademarks, curb competitors and gain competitive advantage (D. A. Aaker, 2004; Abrahamson, 1996; Giarratana & Torrisi, 2010; Heil & Robertson, 1991). Accordingly, the differences between rigidity and flexibility of resources determine that trademarks can better support enterprises to adapt to the dynamic technology and market competition environment than tangible assets, and make positive responses in the uncertain competitive environment, so that enterprises can gain competitive advantages in the uncertain environment (Y. G. Xiao et al., 2021).

Besides, as a flexible resource, trademarks also have the following characteristics:

1) Popularity. The distinctiveness of a trademark is reflected in the degree of customer awareness, that is, the higher the degree of consumer awareness of the trademark, the greater the value of the trademark (H. C. Zhang, 2017).

2) Quality image. It refers to consumers' overall perception or impression of the overall

quality of product and applicable trademarks and is based on experience, learning, or influence through consumers. As mentioned above, the identification function and quality assurance function of trademarks do not mean that consumers need to identify specific commodity producers or operators through trademarks. Instead, consumers' existing cognition and impression of trademarks form an overall impression of commodity producers or traders, including stable commodity quality assurance (Smith & Richey, 2013).

3) Trademark association. It refers to the information node associated with trademarks and goods in memory, which contains the brand meaning in the minds of consumers (Keller, 2014). The trademark association not only involves brand awareness, but also becomes an important basis for trademark laws and policies to stop confusion and anti-dilution behaviors and for anti-unfair competition laws and policies to stop commercial fraud (Bradford, 2008; Desai & Waller, 2010; Ertekin et al., 2018; Pullig et al., 2006).

4) Loyalty to trademark. It refers to a consumer's tendency to repeatedly select a trademark over a period of time. General Motors Company (GM) is proved to have been lower in quality than its competitors for nearly two decades, but even in such adversity, GM's products still account for a third of the U. S. auto market. This is largely due to consumer loyalty to GM's trademarks (Keller et al., 2011).

5) Proprietary property attached to trademarks. Like the patent and copyright systems, the owner of a registered trademark enjoys exclusive right over the trademark to prevent the trademark from being easily copied, imitated by others, or from being used in competing products and markets without permission. This is also an integral part of the value of trademark (Fu, 1996; H. X. Liu, 2009).

2.2.5 Trademark strategy of enterprise

Trademark strategy is a new subject appearing in the 1990s, which contains the essence of managerial economics. Developed countries began the practice of trademark strategy after the Second World War. Theorists first defined trademark strategy as "a basic strategy of modern enterprises", which is intended to increase the reputation through careful selection and cultivation of trademarks, so that trademarks can effectively convey enterprises' image and product quality, and enhance enterprises' competitiveness in the market, thus bringing great economic benefits to enterprises (Guo, 2006).

The United States started to formulate and implement trademark strategies from the institutional level in addition to the enterprise level. It promulgated its first Trademark Law in 1870 to stipulate the registration conditions, use and protection of trademarks. It is clearly

recognized that the trademark brand has become the carrier of enterprises' goods, service quality and image (Bently et al., 2018). In 2002, the U.S. Trademark and Patent Office issued the Outline of the Development Strategies for the 21st Century, stating the application of intellectual property rights to protect and promote the development of the U. S. economy (Bently et al., 2018). Enterprises have taken the protection of trademarks as a long-term daily task, and such an action has strong applicability and protection to trademarks (Herz & Mejer, 2019). The European Union promulgated the Trade Mark Regulation in 1994, which was the first trademark law in the EU countries. Meanwhile, a professional entity was set up to be responsible for adjusting market demand and national standards. Since then, EU countries have formed a unified European trademark protection mechanism through the formulation of trademark laws and regulations. Driven by those laws and policies, most large-scale enterprises have built international competitiveness and famous brands, such as Mercedes-Benz, BMW, and Siemens. China enacted its first Trademark Law in 1982, and made four amendments to the Trademark Law respectively in 1993, 2001, 2013 and 2019. In 2008, the State Council of China issued the "Outline of the National Intellectual Property Strategy", with the aim to implement the national intellectual property strategy, and elevate the intellectual property work to the national strategic level. On June 2, 2009, the State Administration for Industry and Commerce (now merged into the newly created State Administration for Market Regulation) issued the "Opinions on Implementing Trademark Strategy", greatly promoting the development of China's trademark business (Y. X. Yang, 2016).

Scholars generally considered that the implementation of trademark strategy can make full and effective use of the functions of trademarks to create more profits for enterprises and promote local economic development (Barroso et al., 2019). On the one hand, the implementation of trademark strategy is conducive to the establishment of a good image and reputation, thereby transforming the quality and performance advantages of goods into market advantages. On the other hand, the implementation of trademark strategy is also conducive to promoting the concentration of various production factors to brand-name goods and enterprises, thereby promoting local economic development (B. Lin & Xue, 2020; Porter, 1980).

Trademark strategies can be classified according to different standards. From the perspective of the implementation subject of trademark strategy, there are national trademark strategy, local trademark strategy, and enterprise trademark strategy (Jia, 2020; Lemper, 2012). From the distinction of trademark right application strategy, there are trademark design

strategy, trademark application strategy, trademark maintenance strategy, and trademark management strategy (Guo, 2006). The main task of this research is to build a trademark portfolio value system in the Chinese context to analyze enterprises' trademark application strategies.

In the knowledge economy, intellectual property assets including trademarks have been recognized as the main source of competitive advantage. Large, medium and small-sized enterprises are also increasing their patent applications and trademark registrations (Hanel, 2006). However, although enterprises have made great efforts to develop intellectual property and protect intellectual property from counterfeiters, they do not have the same ability to utilize intellectual property and obtain value therefrom (Agostini et al., 2017). In order to address this issue, in recent years, the research on intellectual property value has shifted from the traditional economic and legal perspective to a more strategic and managerial approach. There is a profound influence of intellectual property decision-making on enterprise business, which even exceeds the legal disputes of intellectual property (Agostini et al., 2017). Only blindly accumulating intellectual property assets cannot obtain any value distribution or any investment return from innovation. According, intellectual property management is an important practice for enterprises to benefit from intellectual property (Grimaldi et al., 2021). We will sort out the trademark strategy from the perspectives of brand, innovation and trademark protection.

(1) Brand perspective of trademark strategy

Despite their different definitions of brand, scholars have reached the following consensus on brands: First, a brand is a name, term, mark, symbol and design or their combinations enterprises use to distinguish their goods and services from those of their competitors (Keller et al., 2011; Zaichkowsky, 2010) . Second, a brand is a consumer-centric concept. The value of a brand is reflected in consumers' emotional perception of the brand, and in the brand' s ability to bring new value and benefits to consumers (Keller, 2014). Third, a brand has unique personality. It attaches and symbolizes a specific culture, which is easy for consumers to identify. It can bring specific attributes to consumers, and transmit certain interests and values to consumers through attributes and culture, so that consumers' personality can be recognized in the brand personality (J. L. Aaker, 1997; Smith & Richey, 2013). Furthermore, T. P. Wang (2015), a famous Chinese trademark law expert, analyzed the brand structure from external, middle and core levels. To be specific, the external level is the symbol system of a brand, including two parts: brand name and brand identity. The middle level is the carrier of a brand, including two aspects: goods/services and goods/service providers. The core level is the connotation of a

brand, including brand positioning, brand personality and brand culture (T. P. Wang, 2015).

According to the above meaning of brands, it is obvious that a brand is different from a trademark. A trademark is only a component of a brand. However, combined with the previous disclosure of the essence of a trademark, the structure of a brand and a trademark can further reveal the corresponding relation between them, as shown in Table 2.1.

Table 2.1 Comparison of brand structure and trademark structure

Brand structure		Vs.	Trademark structure
External level	Brand name and brand identity	Vs.	Signs: text, graphics, letters, numbers, three-dimensional signs, color combinations and sounds (with identifying and distinguishing characteristics)
Middle level	Goods/services and goods/service providers.	Vs.	Goods/services
Core level	Brand positioning, brand personality, and brand culture	Vs.	It can play some of the functions of trademark identification, information transmission, advertising, differentiated competition and symbol recognition.

(2) Innovation perspective of trademark strategy

As mentioned above, the essence of a trademark is a kind of private right granted by law. The trademark owner has the exclusive right to use the trademark for his authorized goods or services (Castaldi, 2018). In the 21st century, with the prominent role of innovation in market competition, enterprises gradually pay more attention to the innovation of new goods and new processes, and to the expansion of new markets. For example, the Manual (2005) regards that a trademark can support enterprises' marketing activities, and is also an indicator of non-technical innovation and service innovation. Similar to patents, trademarks can be regarded as a supplementary indicator of innovation for enterprises and industries (Mendonça et al., 2004). From this perspective, the interest in trademark research turns to how trademarks can become complementary assets for enterprises' innovation and help enterprises create profits (Bei, 2019). Relevant studies have shown that trademark registration and maintenance by enterprises can protect brands and build barriers to competition, and can also protect innovation, expand markets, and improve enterprises' profitability. Trademarks have become important complementary assets for enterprise innovation (Bei, 2019; Millot, 2011; Sandner & Block, 2011). Flikkema et al. (2019) studied the relation between trademarks and goods or service innovation through brand strategy path. In the conceptual model, they clearly pointed out that a brand strategy for innovation involved innovations in both brand name and brand scope. To protect those innovations, trademark application should start from trademark logo design and corresponding goods and service scope, so as to protect and realize innovation of goods or

services. Accordingly, the corresponding relation between the trademark structure and the innovation theory is shown in Figure 2.2.

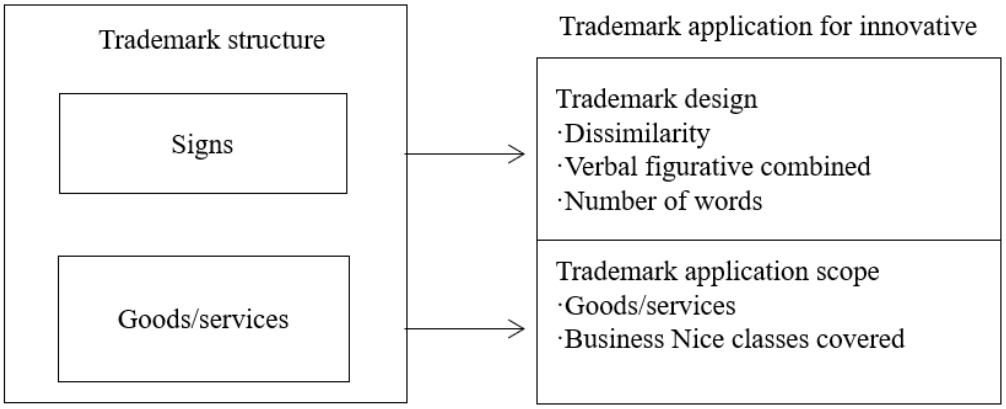

Figure 2.2 Corresponding relation between trademark structure and innovation theory

(3) Legal protection perspective of trademark strategy

1) Anti-confusion theory

The trademark protection originates from stopping unfair competition. In the early stage, the regulation of trademark infringement is to prohibit counterfeiting to prevent consumers from confusing the source of goods. The anti-confusion theory runs through the trademark legal system. Confusion usually refers to the misunderstanding of the source of goods, including the misunderstanding that there are the same commodity sources, or that the commodity producers and operators have specific economic relevance (Kopp & Suter, 2000). The basis of the anti-confusion theory is to protect the distinctive symbol essence of trademarks and the function of trademarks to identify the source of goods and services (Bently et al., 2018; Y. Du, 2012). Accordingly, in the traditional trademark legal system, misunderstanding of the source of goods is a constituent element of confusion (Desai & Waller, 2010). According to the provisions of China's Trademark Law, the anti-confusion theory requires that others should not register or use the same or similar trademarks on the same or similar goods, that is, the trademarks used by others should not be the same or similar to the signs in the trademark portfolios, nor should the related goods or signs be the same or similar to those in the trademark portfolios (G. H. Wang, 2016). In addition, the special protection of well-known trademarks in China's Trademark Law still adheres to the "principle of anti-confusion", that is, only if the trademark applied for registration is a well-known trademark, and its reproduction, imitation or translation by others is likely to cause confusion and mislead the public, the registration is not allowed and the use is prohibited (Kong, 2020).

2) Anti-dilution theory

American scholar Frank Schechter is the earliest proponent of the anti-dilution theory. According to Frank Schechter, the value of modern trademarks lies in creating purchasing power instead of in identifying the source of goods. This purchasing power comes from the psychology of the public. It not only depends on the value of the goods on which a trademark is used, but also on the uniqueness and unity of the trademark itself. The extent to which the law protects the uniqueness of a trademark depends on the extent to which the trademark owner makes the trademark unique from others through his own efforts or creativity (Schechter, 1927). The United States is the first country to make anti-dilution provisions. The *State Trademark Model Law* of the United States Trademark Association first defined the conditions for the application of "diluted" clauses. The 1992 version stipulates as follows: "The meaning of dilute here is the trademark instruction of the registrant and the weakened function of distinguishing goods or services, regardless of whether there is: (a) competition between the parties; and (b) the possibility of confusion, error or deception" (McCarthy, 2004).

Unlike the anti-confusion theory, which is based on "misunderstanding" or "possibility of confusion", the "anti-dilution" theory is based on "blurring or tarnishment" or "possibility of association", which is reflected in the trademark portfolios, and is to prevent others from registering or using the same sign in related or unrelated categories of goods or services (Ertekin et al., 2018).

The corresponding relation between the trademark structure and the anti-confusion theory and anti-dilution theory is shown in Figure 2.3.

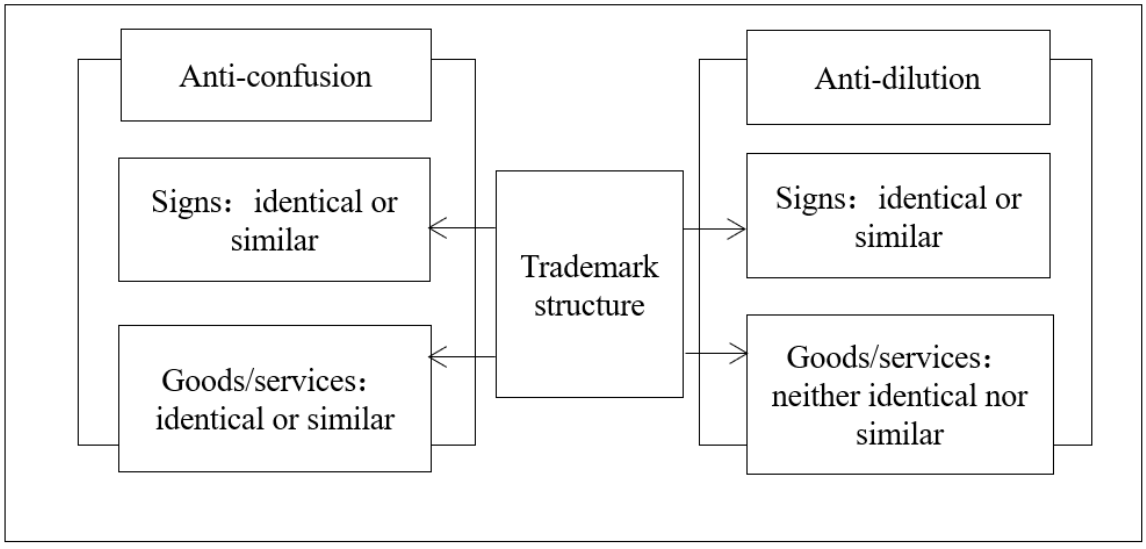

Figure 2.3 Corresponding relation between trademark structure and anti-confusion theory and anti-dilution theory

2.3 Trademark strategy and enterprise performance

2.3.1 Empirical research on relation between trademarks and enterprise performance

Related literature selects data from the trademark database to analyze the relation between the number of trademarks and the enterprise performance, and argues that there is a certain relation between trademark behavior and enterprise performance, but this relation is bounded by the boundary. For example, Krasnikov et al. (2009) discussed that trademarks with both brand identity and brand association could affect the financial performance of a company. The analysis of 22,060 registered trademarks of 108 enterprises indicates that brand-related trademarks generally have a positive impact on enterprises' cash flow, *Tobin's Q*, *ROA* and stock returns. Through analysis of the trademark data of 1,600 large UK enterprises from 1996 to 2000, da Silva Lopes and Duguid (2010) argued that the trademark registration of SMEs should not be too frequent, and for enterprises with the life span less than 5 years, the trademark registration had little impact on their performance. The impact of trademark behavior on enterprise assets and turnover could only be reflected after three years. The research conclusion shows that trademarks are the agent of innovation activities, but different enterprises should choose their appropriate trademark behavior; otherwise, they will fall into the trap of "creative destruction" of Schumpeter's theory. Sandner and Block (2011) selected 6,757 observations for 1,216 publicly traded enterprises, and concluded that trademarks contributed strongly to the enterprises' market value, and investors were more willing to invest in enterprises with more trademark portfolios. Trademarks are regarded as an effective tool to reflect the value of marketing investment. The category and quantity of trademark registrations can measure the degree of marketing or product strategy. Accordingly, in addition to accounting data, the use of trademark data will increase the dimension of the impact of enterprise diversification on enterprise performance. Melnyk et al. (2014) selected 2,911 trademarks in the SSI industry in the US, and argued that trademarks were important assets of enterprises, enabling enterprises to protect their own brand design features from global and local competition, and that the innovation and extension of enterprise trademarks were affected by the national and regional culture in which they were located. Flikkema et al. (2019) selected a sample of 1,015 Benelux and Community trademarks in 2009 for empirical analysis. Their analysis results show that the trademark application behaviors of different brand strategies have different impacts on enterprise performance.

2.3.2 Relations between the trademark and enterprise performance in China

The empirical research on the impact of Chinese trademarks on enterprise performance mainly focuses on two aspects: The first is to deduce the relation between the number of trademarks and the enterprise performance by taking individual enterprise trademark data as a sample. H. X. Liu and Zhang (2021) took China Hengan Group and Ordos Corporation as examples. The empirical analysis results show that the number of Chinese enterprise trademarks has a compound functional relation with enterprise performance. W. M. Sun (2017) randomly selected data from 7 listed companies in China from 2006 to 2014, and analyzed their dependence on the relation between the enterprises' operating income, net profit and trademark value. The research results show that the value of trademarks varies in different stages of enterprise development, and changes with the scale of enterprise development. The second is to study the value of well-known trademarks. H. X. Liu and Zhang (2021) analyzed the impact of marketing activities and R&D activities of listed companies with well-known trademarks in 2013. The results show that advertising expenditure is positively correlated with enterprise performance, and the number of marketing activities of non-state-owned listed companies is significantly higher than that of state-owned listed companies. On this basis, they also studied the relation between trademark protection and enterprise performance of listed companies with well-known trademarks from 2004 to 2014. The results show that the increase in the number of registered trademarks of the same kind as well-known trademark goods can significantly improve the enterprise performance (H. X. Liu & Zhang, 2021). Qin and Zhang (2018) selected listed companies with well-known trademarks from 2004 to 2015, and further analyzed the positive relation between advertising investment and financial performance and brand effect. J. Wang and Long (2020) once again proved that enterprises with well-known trademarks are significantly better than those without well-known trademarks in terms of operation and innovation performance.

In addition, Chinese scholars have also paid more attention to the enlightenment of empirical research on trademark value to the legal system. Earlier, Nan and Liu (2008) analyzed the perfection of the trademark system and the performance of the system implementation based on the annual number of applications and the number of registered trademarks in China from 1984 to 2003, and found that there was a positive relation between the trademark system and the performance of trademark innovation. H. X. Liu and Zhang (2021) compared the performance of enterprises with well-known trademarks, and argued that the government's policies on well-known trademark recognition were improper, resulting in a large number of

"defensive trademarks" and "idle trademarks" in enterprises, consequently affecting the effective management of enterprise trademark value, and aggravating the unfairness of trademark registration in economic activities and a serious waste of social resources. Therefore, the standardization and marketization of well-known trademark recognition should be strengthened, and enterprises should be guided to rely on technological innovation and scientific management to optimize and integrate trademark resources and strengthen cultivation of the advantages of brand effect, thus achieving high added value of goods.

2.4 Theoretical summary revision

Based on review of the theory related to this study, this part summarizes the existing literature regarding China's trademark system, trademark strategy, the relation between trademarks and enterprise performance, and China's special institutional arrangement, and puts forward the research direction of this study, as shown in Table 2.2.

Table 2.2 Summary of main points of the literature

Theme	Category	Author (Year)	Main view
Trademark system and Chinese context	Legal characteristics of trademarks	C. D. Scott (2013)	From the broad perspective, the owner of a registered trademark enjoys the exclusive right to use, prohibit, transfer, and license the registered trademark.
		Sandner and Block (2011); M. D. Li (2021); J. Wang (2020)	In terms of the acquisition of rights, the premise is the distinctiveness of trademarks, and the trademark registration system also emphasizes the distinctiveness of trademarks in the trademark application and review process.
	Legitimate foundation of the construction of the trademark system	Bently et al. (2018) Y. G. Xiao et al. (2021), Y. M. Zhang (2018), Landes and Posner (2003), Varian et al. (2004)	The basis of the trademark system is to distinguish the source of goods, maintain the security of trademark property transactions, protect trademarks in advance and reduce the cost of searching for trademark information.
	Chinese context	Cai and Shan (2013), Hoskisson et al. (2000)	Chinese context refers to the special environment formed by the interaction of individuals and groups under Chinese unique economic, political, and cultural background. It has the characteristics of both an emerging economy and a transition economy. However, it lacks complete laws and regulations to regulate their market-oriented behavior. Chinese enterprises are seeking competitive advantages in an environment that is jointly influenced by government policies and market-based competition.
	" high-tech enterprise certification " system	G. Sun et al. (2016), L. L. Xu and Zheng (2016),	The "high-tech enterprise certification" system provides a good institutional background for studying enterprise innovation and performance growth in the Chinese context. For Chinese

		C. Y. Xu (2011)	companies, paying more attention to external institutional support is important for sustainable competitive advantage.
Trademark strategy	Definition of trademark strategy	Barroso et al. (2019)	The implementation of trademark strategy can make full and effective use of the functions of trademarks to create more profits for enterprises and promote local economic development.
	Function of trademarks	T. P. Wang (2015)	Trademarks belong to the external level of the brand symbol system, which includes two parts: brand name and brand identity.
		Sandner and Block (2011), C. T. Liu (2014), Bently et al. (2018), Y. G. Xiao et al. (2021), X. Zhang (2018)	The basic function of trademarks is to identify the source, the expanded function is to signal quality and goodwill, and the derivative function is to advertise and promote differentiated competition.
		Mendonça et al. (2004), Bei (2019), Flikkema et al. (2019)	Trademarks can protect innovation, expand markets, and improve enterprise profitability, and become important complementary assets for enterprise innovation.
	Classification of trademark strategies	Lemper (2012), Jia (2020)	From the perspective of the implementation subject of trademark strategy, there are national trademark strategy, local trademark strategy and enterprise trademark strategy.
		Guo (2006)	From the distinction of trademark right application strategy, there are trademark design strategy, trademark application strategy, trademark maintenance strategy and trademark management strategy.
	Strategic role of trademarks	Barroso et al. (2019)	Trademark strategy can make full and effective use of the functions of trademarks to create more profits for enterprises and promote local economic development.
		Porter (1980), B. Lin and Xue (2020)	Transforming the quality and performance advantages of the goods into market advantages, promoting the concentration of various production factors to brand-name of products and enterprises, thereby promoting local economic development.
		Kopp and Suter (2000), Y. Du (2012), Bently et al. (2018), Kong (2020), Schechter (1927), McCarthy (2004), Ertekin et al. (2018)	From the perspective of legal protection, the significance of trademark strategy lies in anti-confusion and anti-dilution.
Trademarks and enterprise performance	Research on the Chinese market	H. X. Liu and Zhang (2021)	The trademark has a compound functional relation with enterprise performance.
		W. M. Sun (2017)	The value of trademarks varies in different stages of enterprise development, and changes with the scale of enterprise development.

	J. Wang and Long (2020)	Enterprises with well-known trademarks are significantly better than those without well-known trademarks in terms of operation and innovation performance.
A certain relation between trademark behavior and enterprise performance	Krasnikov et al. (2009)	Brand-related trademarks have a positive impact on enterprises' cash flow, Tobin's Q, ROA and stock returns.
	Sandner and Block (2011)	The use of trademark will increase the dimension of the impact of enterprise diversification on enterprise performance.
	Helmers and Rogers (2010)	Different enterprises should choose their appropriate trademark behavior; otherwise, they will fall into the trap of "creative destruction" of Schumpeter's theory.
Time considerations for trademarks to generate performance for businesses	Helmers and Rogers (2010)	Since the impact of trademarks on enterprise performance has a lag, generally 3-5 years, it is necessary to lag the trademark variables.

2.4.1 Shortcomings of existing research

Within the framework of traditional trademark strategy management, scholars have studied the trademark strategy of enterprises from different perspectives around the logical link of trademark strategy and its performance impact. However, due to the limitations on the understanding of trademark attributes and trademark registration system, there are still some shortcomings, which need to be studied in depth:

(1) Since the emergence of the trademark system in Western countries, most studies have focused on the improvement of Western trademark systems and market conditions (Bently et al., 2018). In the context of the Western market, judicial protection is relatively perfect, and the trademark protection system is also relatively complete and stable. Western economics and management scholars have studied the rationality and performance impact of enterprises' trademark application behavior from their respective perspectives. However, the conclusions of those studies are not applicable in the context of the emerging and transition economies. For example, in China, the trademark system has been initially established under international pressure, the reforms are constantly being made for the purpose of strong trademark protection, and enterprises are facing an unstable intellectual property system. Ma and Xie (2020) focused on the bilateral interaction between China and the United States during and after the trade war, and on how the interaction affected China's intellectual property protection policies. They pointed out that the trade war had stimulated the development of China's intellectual property protection system in a short period of time (including amendment to the Trademark Law in 2019 and amendment to the Patent Law and the

Copyright Law in 2020). Accordingly, the transformation of China's trademark registration system made enterprises face the risk of more intense competition in the domestic and international markets while bringing about new opportunities, and the motivation, behavior and performance of trademark applications showed a certain degree of complexity and particularity. However, there are still insufficient systematic empirical and theoretical research on the impact on trademark application strategy and the relation with enterprise performance in the context of the emerging and transition economies.

(2) Trademark application strategy is not only the result of inter-enterprise game, but also deeply influenced by the national intellectual property strategy and trademark system. Combining the internal elements of an enterprise's competitive advantage with the external system influence can better reveal the internal mechanism of the enterprise's trademark application strategy. However, existing research on trademark strategy is not sufficient for the research on the combination of enterprise internal and external environment. In practice, enterprises are bounded rational, competing and learning in dynamic interaction. From the views of knowledge and dynamic capability, it should further study how to form and dynamically evolve an enterprise's trademark application strategy under the continuous improvement of China's trademark system.

(3) Literature is mostly from the perspective of managerial economics, and just a little focus on analyzing the mechanism of enterprises' different trademark application strategies on performance from the perspective of jurisprudence and managerial economics in the same context. Besides, the empirical research on the relevance of trademarks and enterprise performance is mostly based on the analysis of the (total) number of trademarks in the trademark database, and just few studies have opened the trademark "black box" and proceeded from the function of trademarks and trademark registration system to further excavate trademark information in the trademark database.

2.4.2 Further research directions

In order to fill the above research gaps, this study combines relevant theories with the practice of enterprises in the context of China's trademark system, and explores the dynamic evolution of enterprises' trademark application strategy, the strategic influencing factors of enterprises' trademark application, and the impact of trademark application strategy on enterprise performance. This study is conducted from the following four aspects to fill existing research gaps.

(1) From a managerial economics perspective, past studies on the value of trademarks or

trademark strategies have mostly examined trademarks as mere signs or as a part of brands, and even though some of these studies have incorporated the legal attributes of trademarks, they have tended to do so in terms of the scope of exclusive rights that arise from trademark registration. In fact, the essential attribute that distinguishes a trademark from other symbols is the structure of the trademark, i.e. the distinctiveness of the trademark and the scope of the exclusive rights of the trademark are based on the basic structure of "signs & goods". Based on the structure of trademarks and registration categories, this study discloses the trademark "black box" and constructs the trademark portfolio matrix of "signs & goods". According to the different trademark portfolios that represent different trademark value extraction methods, the trademark portfolio value model is constructed, and the competitive advantage and institutional theory hypothesis are introduced to further analyze the research on trademark application strategy, and give implications to existing theory.

(2) How to improve enterprise performance through registered trademark application is the focus and difficulty of this study. This study argues that the value of trademark registration should follow the institutional logic, and also requires the coordination of trademarks and related resource/capabilities. In the past, empirical studies on the value of trademarks or trademark strategies have mostly been conducted by selecting data on all trademarks in a country or on trademarks in a particular industry or on companies of a certain size. The secondary data in this empirical study are from data of companies listed on the Shanghai and Shenzhen Stock Exchanges in China before 31 December 2007 (including consolidated subsidiaries), covering a period of 11 years and coinciding with the implementation of the National Intellectual Property Strategy Framework in China, which is rare in studies on the value of trademarks and trademark strategies. Through empirical analysis of second-hand data, this study explores the performance impact of Chinese enterprises' trademark application strategies, and analyzes the impact mechanism of trademark reserves and corresponding resource/capabilities and different systems on enterprise performance.

(3) This research will start from the literature review and dig deep into the trademark information in the trademark database, so as to provide data support for the empirical analysis of enterprise performance under different trademark portfolios. Based on the results of the empirical analysis, this study provides Chinese enterprises with trademark registration application strategies that are conducive to improving enterprise performance, and also provides enterprises with a legal and reasonable referenceable boundary for registered trademark applications under the existing institutional environment in China. Meanwhile, this study also provides a reference basis for Chinese trademark authorities and law enforcement

and judicial departments to determine whether an enterprise's trademark registration application behavior is a reasonable trademark registration application and whether it is a malicious trademark registration application with the aim of hoarding trademarks.

(4) Since the existing publicly available trademark database only publishes the basic information of registered trademarks of enterprises and does not open the trademark black box of "signs & goods", in order to achieve the objective of this empirical study, this study will creatively construct a trademark portfolio database, i.e., according to the trademark portfolio matrix (the "signs & goods" structure and the "core & non-core" dimension), four types of trademark portfolios ("core signs & core goods" "core signs & non-core goods" "non-core signs & core goods" "non-core signs & non-core goods") are selected respectively from the database. In the process, identification methods and paths for judging different trademark portfolios will be mapped out, leading to the construction of a trademark portfolio database, which will be another contribution of this study.

Chapter 3: Research Method

This chapter will describe the construction of trademark portfolio matrix according to the structure of trademarks and registration categories, and the construction of trademark portfolio value model by classifying the motivation of registered trademark application, so as to explore the links between different trademark portfolios and enterprise performance and its internal mechanism.

3.1 Trademark portfolio matrix

Enterprises submit registered trademark applications for the purpose of obtaining exclusive rights and also for certain business motives (Drivas et al., 2020; Sandner, 2009). In order to scientifically depict the value of trademarks in commercial competition, this study, according to the structure of trademarks and registration categories, opens the trademark "black box" (that is, a trademark consists of "signs & goods"), and constructs the trademark portfolio matrix. As defined by WIPO, "signs" consist of word(s), letter(s), number(s) or any combination thereof, as long as the signs are identifiable and distinguishable. "Goods" are as described in the Nice Classification (NCL). Established by the Nice Agreement (1957), NCL is an international classification of goods and services applied for trademark registration. There are 34 categories of goods and 11 categories of services, including more than 10,000 goods and services. In this study, the "goods" category in the trademark portfolio matrix includes the "service" category. Refer to Figure 3.1 for the trademark portfolio matrix.

Core Goods	III Joint-based trademark portfolio	I Value-based trademark portfolio
Non-core Goods	IV Cumulation-based trademark portfolio	II Defense-based trademark portfolio
	Non-core Signs	Core Signs

Figure 3.1 Trademark portfolio matrix based on signs & goods

Portfolio I: value-based trademark portfolio based on core signs and core goods. This portfolio includes the core and most distinguishing trademarks among the numerous registered trademarks owned by enterprises, as well as the trademarks that have been used by enterprises for a long time and have a large advertising investment (X. Zhang, 2018). Generally speaking,

the sign of a registered trademark is the same as an enterprise's name. When the enterprise promotes this registered trademark, it also promotes the enterprise name, helping increase the popularity of the enterprise itself and its core products. This study takes Zhuhai Gree Electric Appliances Co., Ltd. (hereinafter referred to as *GREE Co.*) as an example to interpret the connotation of four trademark portfolios. *GREE Co.* has grown from a small factory with an annual output value of less than 20 million yuan to a diversified global industrial group. In the past two decades, *GREE Co.* had completed the transformation into an international electric home appliance enterprise. "GREE" has become one of the most well-known electric home appliance brands in China.

GREE Co. first applied for the registration of the core trademark "GREE" on its core goods (including air conditioners, refrigeration equipment, electric fans, exhaust fans, and dehumidifiers) on April 12, 1994 (Registration No. 800547). This was the initial stage of *GREE Co.*'s brand version 1.0. After the trademark registration application, the slogan of brand version 1.0, i.e. "Turbo Cooling" - "Gree Creates Much Sales Chance", was put forward. As of February 28, 2022, Green Company had registered 6,694 trademarks. In terms of registration maintenance period and continuous investment in trademarks, the registered trademark "GREE" (Registration No. 800547) is the most distinctive trademark of *GREE Co.*. Accordingly, this study includes the registered trademark "GREE" (Registration No. 800547) into the value-based trademark portfolio.

Portfolio II: defense-based trademark portfolio based on core signs and non-core goods. This portfolio involves registration of core trademarks on non-core goods. The purpose of defensive trademark registration is mainly to prevent others from using its core signs on non-core goods, as this may impair and weaken the reputation and the significance of its core trademarks (W. Liu, 2020). For example, Green Company first registered the core trademark "GREE" in 1994 for its core goods (including air conditioners, refrigeration equipment, electric fans, exhaust fans, and dehumidifiers). However, since then, *GREE Co.* has encountered the situation that third parties, such as Yu Hing Machine Works Co., Ltd., and Personal, Pan Fucho, applied for registration of "GREE" trademark in the non-core goods category of *GREE Co.*. Every year, *GREE Co.* raises objections to the applications of different third parties for the registered trademark "GREE" on non-core goods (such as stationery, toys, and office supplies), incurring huge defense costs. Accordingly, this study classifies the trademark portfolio based on core signs and non-core goods into defense-based trademark portfolio.

Portfolio III: joint-based trademark portfolio based on non-core signs and core goods. From the legal point of view, the registration of such trademarks is conducive to expanding the

protection scope of core trademarks and avoiding consumer confusion due to the similarity between other signs and their core signs (W. Y. Gong, 2014). From the perspective of managerial economics, the joint-based trademark portfolio builds a protective belt around core trademarks to prevent similar identification. This is a commonly used trademark strategy of enterprises (Feng, 2015). For example, on September 15, 2021, *GREE Co.* applied for the registration of trademarks "Gree Phoenix", "Gree Galloping towards the Moon", "Gree Distant Mountains" and "Gree Legend" on its core products (including refrigeration equipment and machines, air conditioners, air conditioning equipment, air dryers, air purification devices, and machines). Accordingly, this study summarizes the trademark portfolio based on non-core signs and core goods.

Portfolio IV: cumulation-based trademark portfolio based on non-core signs and non-core goods. For example, Alibaba Group Holdings Co., Ltd. registered the trademark of "Big Dream and Small Home" on goods of Category 16, including paper, magazines (periodicals), and painting materials, in July 2017. This is a typical case of registration of non-core signs on non-core goods. When an enterprise applies for registration of trademarks in this trademark portfolio, from the perspective of brand management, it is considered that this is the implementation of the enterprise's multi-goods and multi-brand strategy (Suffia et al., 2018), while from the legal point of view, this may be the enterprise's hoarding of trademarks for improper interests (L. F. Wang & Shen, 2019; Zhu, 2018). For example, On November 24, 2021, *GREE Co.* applied for the registration of the trademark "Meng Yutong" on its non-core products (including ropes, nets, synthetic rubber, and plant seeds, which are of Class 17, 22, 29 and 31, respectively, according to the international classification). Meng Yutong is the private secretary of Dong Mingzhu, Chairman of *GREE Co.*, and is also a popular internet celebrity in China. *GREE Co.* applied for the registration of the non-core trademark "Meng Yutong" on its non-core products, possibly to hoard trademarks and prevent others squatting. Accordingly, this study summarizes the trademarks on non-core signs and non-core goods into the cumulation-based trademark portfolio.

3.2 Trademark portfolio value model

The above trademark portfolio matrix based on signs & goods is helpful to describe different registered trademark application strategies of enterprises in more detail. The registered trademark application strategy adopted by enterprises is determined by the motivation of their application behavior, i.e. the value that enterprises expect from trademarks (Feng, 2015).

There are three main motivations for enterprises to apply for registered trademarks: trademark protection, trademark marketing, and trademark transaction (Castaldi, 2018). Trademark protection means that enterprises can effectively protect brand interests and realize trademark value by trademark registration (C. D. Scott, 2013). In addition to the registration of core trademarks on core goods, trademark protection also has two special functions: anti-confusion and anti-dilution (Sandner & Block, 2011). Trademark marketing refers to that enterprises register trademarks and expand marketing efforts, thus building barriers to competition and continuously obtaining commercial benefits (Helmers & Rogers, 2010). In addition to strengthening the promotion of the core trademarks registered in core business, trademark marketing also has two functions: new brand and new business development (Simonson, 1994).

Combined with the motivations of enterprises' registered trademark applications, this study establishes the trademark portfolio value model, as shown in Figure 3.2. The model is described as follows:

(1) The value of the value-based trademark portfolio is to protect the exclusive use of an enterprise's core trademarks on its core goods, and extract the core market value of the core trademarks on core goods.

(2) The value of the defense-based trademark portfolio is to prevent an enterprise's core trademarks of the enterprise from being diluted, or expand the core trademarks to non- core goods, so as to directly extract the extended market value of the core trademarks.

(3) The value of the joint-based trademark portfolio is to prevent the core trademarks of enterprises from being confused, or develop new trademarks in core business, so as to realize the brand differentiation of different goods series in core business.

(4) The value of the cumulation-based trademark portfolio is the trademark hoarding of an enterprise for the purpose of transaction, and also shows the enterprise's implementation of the multi-product and multi-brand strategy unrelated to its core commodities and core business (Ries & Trout, 2001; Zhu, 2018).

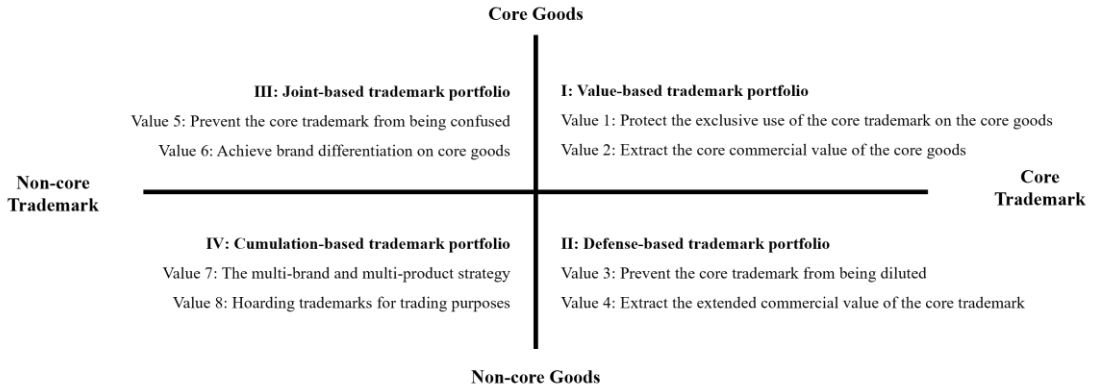

Figure 3.2 Value deconstruction of different trademark portfolios

3.3 Research framework

No matter whether an enterprise needs to apply for a trademark for the purpose of protecting trademarks, promoting sales, or expanding markets, the ultimate goal is to improve enterprise performance and competitive advantage. Relevant studies have shown that there is a relation between trademark registration and enterprise performance, and that trademarks can be used as complementary assets and measurement indicators for enterprises and even industrial innovation (Bei, 2019; Helmers & Rogers, 2010; Mendonça et al., 2004). However, the above research only consider the total number of trademark registrations or the number of individual trademark portfolios, without opening the “black box” of trademark structure, or systematically discussing the influence of different trademark portfolios on enterprise performance under the same situation. Therefore, relevant research conclusions are difficult to meticulously explain the motivation and behavior of enterprises’ complex registered trademark applications, so as to provide targeted optimization suggestions for enterprises’ trademark registration behaviors, and provide more valuable empirical evidence for the improvement of trademark policies.

Based on the above-mentioned trademark portfolio matrix and its value model, this study takes value-based, defense-based, joint-based and cumulation-based trademark portfolios as independent variables to characterize the value orientation of enterprises’ registered trademark applications and empirically analyze the following:

First, what is the relation between different trademark portfolios and enterprise performance?

Second, in the context of China’s unique system arrangements, how do external institutional factors affect the trademark application behavior?

Third, combined with the conclusions of empirical research, this study gives suggestions

on the optimizations of enterprises' registered trademark application strategies and implications on the application of trademark laws and policies in China.

The research framework is shown in Figure 3.3

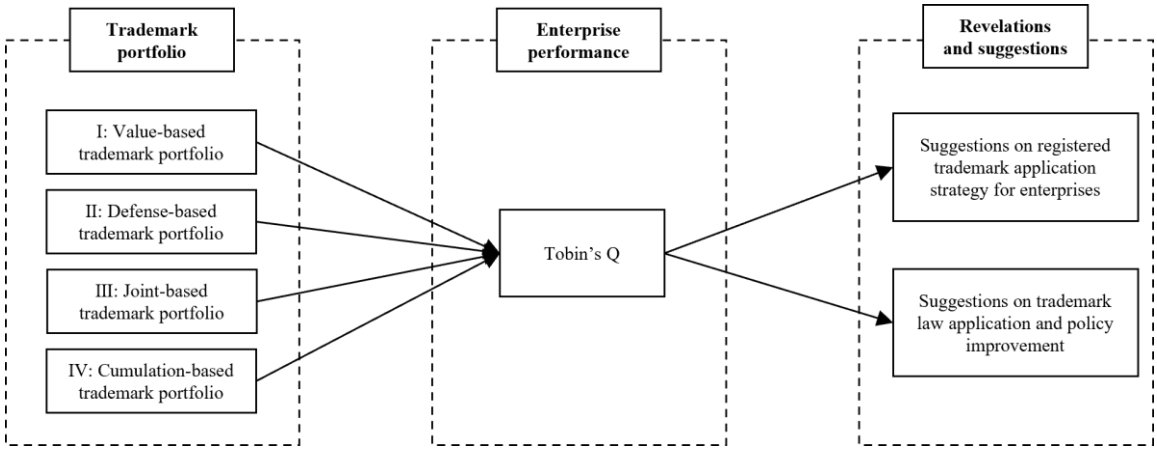

Figure 3.3 Research framework

3.4 Hypothesis

Some scholars have conducted empirical studies on trademark strategies based on the cumulative nature of trademark value, from the stock of trademarks (Bei, 2019; Greenhalgh & Rogers, 2012), while others have conducted empirical analyses based on the dynamic nature of trademark value, from the increment of trademarks (Qin & Zhang, 2018). This study considers that the value of trademarks is both cumulative and dynamic, and therefore conducts an empirical analysis from the stock of trademarks, and makes hypotheses accordingly.

(1) H1: the more stock of value-based trademark portfolio (PI), the higher is enterprise performance

The value of the value-based trademark portfolio is mainly to extract the core commercial value of core signs on core goods by protecting the exclusive use of an enterprise's trademarks on core goods. In other words, the value-based trademark portfolio is the main carrier of the brand value and social reputation accumulated by an enterprise, which can bring value-added goods and services to consumers, so that consumers are willing to obtain more satisfying goods with the same goods performance at a higher price (X. Zhang, 2018). Take Zhuhai Gree Electric Appliance Company Limited (hereinafter referred to as *GREE Co.*) as an example, *GREE Co.* registered the core trademark "GREE" on its core goods (including air conditioners, refrigeration equipment, electric fans, exhaust fans, and dehumidifiers) in 1994. According to the introduction on *GREE Co.*'s official website, *GREE Co.*'s brand strategies include brand

1.0 (Turbo Cooling) in 1994, brand 2.0 (Quality Takes Priority) in 1997, brand 3.0 (Leading in Science and Technology) in 2010, brand 4.0 (Undertake Responsibility) in 2013, and brand 5.0 (Serve the World) in 2015-2020. During the 16-year brand development, *GREE Co.* has continued to increase the registrations of core trademarks on core goods, and maintain the registrations of such trademarks. The validity of the registrations has provided a reliable legal guarantee for *GREE Co.* to realize the above-mentioned brand strategies.

1) From the resource-based and capability-based view, core trademarks on core goods are undoubtedly the most important trademark assets of an enterprise (Keller et al., 2011), and are also an important foothold for achieving differentiated competition and brand positioning (Grashuis, 2019). The increase in the number of value-based trademark portfolio means that for core goods, enterprises will not only register trademarks for core goods in the major categories listed in the Nice Classification, but also for core goods in the small categories below the major categories, in order to seek full exclusiveness for the value of the value-based trademark portfolio. Note: The Nice Classification *(NCL)*, established by the Nice Agreement (1957), is an international classification of goods and services for the registration of trademarks.

The incremental increase in the value-based trademark portfolio means that companies continue to expand the scope of protection of their core goods and core signs by filing applications for registered trademarks in terms of extracting the core goods and core signs. Core signs applicable to core goods are usually distinctive because they are marks that are already used by the company in its core business areas or are associated with the marks in which the company has invested the most in advertising and promotion (Qin & Zhang, 2018). In addition, increasing the number of value-based trademark portfolio also means, to some extent, that enterprises adopt a single trademark strategy. The point of this strategy is that the enterprise brand structure is simpler, easier to manage and less costly to promote, for example, *3M* and *Philips* use this strategy (F. Y. Zheng, 2020). Accordingly, the performance of such marks for a company does not need to be built up over a long period of time to become apparent, and can often be demonstrated in a short period of time.

2) From the perspective of institutional theory, China implements a trademark registration system and opposes unfair trademark registration (W. Liu, 2020). The number of value-based trademark portfolio is an important intangible asset of an enterprise. A rational enterprise registers trademarks to protect the value of the value-based trademark portfolio, and also to increase the reputation and the value of the trademarks (Bently et al., 2018; J. R. Zhao, 2021). Therefore, in the context of China's trademark system, the registration of such trademark portfolios will receive positive support from the system.

The incremental value-based trademark portfolio means that the trademarks applied for are highly distinctive and mostly already in use (Fhima & Denvir, 2015), and therefore the examination procedures for trademark registration are also simpler, often requiring no special procedures, and can be registered almost in the same year of application (Dong & He, 2020), thus this type of trademark portfolio can obtain exclusive trademark rights in a relatively short period of time and build a competitive barrier for enterprises for their core goods and core signs.

Therefore, H1: the more stock of value-based trademark portfolio (PI), the higher is enterprise performance

(2) H2: The more stock of defense-based trademark portfolio (PII), the higher is enterprise performance

The defense-based trademark portfolio represents an enterprise's registration of core signs on non-core goods. Here, we take Yibin Wuliangye Co., Ltd. (hereinafter referred to as *Wuliangye Co.*) as an example. *Wuliangye Co.* is one of the largest liquor production and sales enterprise in China. It had the sales revenue of more than 100 billion yuan in 2019, ranking among the "Top 500 Global Brand Values" and "Top 100 Chinese Brand Values". Its *Tobin's Q* has been showing a downward trend from 2008 to 2013, followed by a stable but non-increasing trademark layout. After 2013, as *Wuliangye Co.* increased the registrations of defense-based trademark portfolios, its performance became better, even reversing the previous decline.

1) From the resource-based and capability-based view, the defense-based trademark portfolio is conducive to achieving brand extension in a short period of time, greatly reducing the cost of new brand promotion, and the advertising costs. Therefore, this trademark portfolio has a positive impact on an enterprise performance (Keller et al., 2011; Krasnikov et al., 2009). Meanwhile, registering core trademarks on non-core goods is to a certain extent a "related diversification" strategy (Rumelt, 1982), and also an act of brand extension (Keller & Lehmann, 2006). Since such trademark registration is based on an enterprise's existing trademark resources and core brand capabilities (F. Y. Zheng, 2020), although the market for the extended category is different from the original goods, as long as there is a certain degree of market fit, such trademark registration can also prevent the brands from being diluted, thereby enhancing consumers and investors' attitudes, beliefs and goods perception quality of brand extensions, and enhancing the core value of the original brands (G. L. Luo et al., 2020; X. Zhang, 2018).

Increasing the defense-based trademark portfolio means that companies increase the range of goods to which the core sign applies, in effect realizing an extension of the company's core brand value (D. A. Aaker, 2004). In the short term, core brand value

extensions are associated with lower advertising costs, higher brand association and quicker realization of the trademark recognition function (C. Y. Xu, 2011), thus contributing to improved enterprise performance. Even some of the problems discussed in the ambiguity theory of brand extension, such as the possibility that the quality of the extended product may not be as satisfactory as expected, thus diluting the value of the extended brand, only become apparent after a certain period of time. For example, *Haier Group* is a successful example of implementing this trademark strategy, and its experience is worth learning from. *Haier*'s products have grown from a single refrigerator in 1984 to a product group with more than 15,100 specifications in 96 categories, including white, black and beige home appliances, and exported to more than 100 countries and regions around the world, all under the single "Haier" sign (brand), and the continued growth of this type of trademark portfolio has helped Haier has been of great benefit to Haier's continued brand value creation (X. X. Luo, 2016). Therefore, the increment of defense-based trademark portfolio is beneficial to the performance of the company.

2) From the perspective of institutional theory, the defense-based trademark portfolio may not be actually used, as the trademark law only opposes malicious registered trademark applications (G. L. Luo et al., 2020). Moreover, a trademark registered for defensive purposes, even if it has not been used for three consecutive years, can still be proven to be reasonable without being revoked (Shan et al., 2020). Therefore, from the perspective of the registered trademark application system, the defense-based trademark portfolio will not have an adverse legal impact on enterprises.

In recent years, malicious infringements of Chinese trademarks have occurred frequently and intensified, not only departing from the original intent and essence of the trademark law to protect the exclusive right to register trademarks, leading to the alienation of China's trademark right registration and acquisition system, but also seriously damaging the legitimate rights and interests of those who have been infringed (Cui, 2015).In the current context of the Chinese State Trademark Office allowing applicants to apply for registration of the same trademark in more than one class, applicants can indeed prevent others from grabbing their marks by registering in multiple classes, thus protecting their core trademarks at a lower cost (currently, the fee for filing a trademark registration in China is: RMB 300 per piece, which applies to a group of commodity groups for each mark, with 10 smaller categories to choose from for each group) (Y. H. Zhang, 2020). Enterprises can achieve protection of the accumulated goodwill of their core trademarks in a short period of time.

Therefore, H2: The more stock of defense-based trademark portfolio (PII), the higher is

enterprise performance

(3) H3: The more stock of joint-based trademark portfolio (PIII), the higher is enterprise performance

The joint-based trademark portfolio involves the registration of non-core signs on core goods.

1) From the resource-based and capability-based view, a brand is an important resource of an enterprise and one of the capabilities of an enterprise to continuously obtain a competitive advantage (Mercer, 2010). Enterprises must create multiple brands in the same category to form a brand portfolio, and to increase the market coverage of the enterprises' core business. Since different target markets of enterprises have different preferences for a certain brand, it is necessary for enterprises to adopt a brand portfolio approach. The brand portfolio strategy in the same category enables enterprises to pursue different prices, different distribution channels and different geographic regions, thereby increasing the enterprises' profitability (Keller, 2014; Xiong, 2017). Meanwhile, the increase in the number of joint-based trademark portfolio reflects at least to a certain extent an enterprise's innovation strategy for its core business, i.e. a "related diversification" strategy that makes full use of the enterprise's existing resources and capabilities (Rumelt, 1982). This will help enterprises maintain and expand their core business market share (Ferrucci et al., 2020) on the basis of making full use of existing superior resources (J. Barney, 1991) and capabilities (Teece et al., 1997), and also help them convey to investors the determination and actions of the enterprises to protect their core brands and innovations, expand their core business and improve market performance. These are all positive signals and have a positive impact on enterprises' market performance (Castaldi, 2018; Krasnikov et al., 2009).

Increasing the joint-based trademark portfolio implies that the company adopts a multi-brand strategy in terms of extracting its core goods and core business. The advantage of this strategy is that market segmentation is more precise and if one brand is at risk, the other brand is less affected, thus avoiding "falling down" in the core business (Fletcher, 1981). Meanwhile, the registration of such trademark portfolios can also prevent others from using the same brand name. For example, Alibaba Group has registered "Ali Dad" and "Ali Brother" in the core business; Miss You Health Food Co., Ltd. has registered the trademark "You Think Well", "I Miss You", "I Miss Him" in the core business, forming a trademark protection network with lower trademark registration costs (F. Y. Zheng, 2020).Through this type of trademark portfolio registration strategy, enterprises also send a signal to the market to increase the protection of core trademarks, which can also increase investors' investment confidence in a

short period of time (Seip et al., 2018). In addition, the increase in the number of joint-based trademark portfolio is also conducive to the rapid development of a wide range of businesses, and the use of joint trademarks for goods of different qualities and grades makes it easy for consumers to identify the quality level of goods (Guo, 2006).

2) From the perspective of institutional theory, the joint-based trademark portfolio expands the scope of enterprises' exclusive rights to registered trademarks, thus preventing others' trademarks from being similar to their core trademarks and being misidentified by consumers in the market (L. F. Wang & Shen, 2019). Even in trademark transactions, core trademarks need to be traded as a whole with joint trademarks similar to the core trademarks, as this is conducive to improving enterprises' capability to benefit from trademark licensing or transfer. In addition, entrepreneurs with a strong sense of vision understand that trademark rights are key to the success or failure of their business and know the need to use the trademark legal system to protect their own interests and those of the public. Once an enterprise's trademark has entered the ranks of the well-known trademarks, bringing to market an unused joint-based trademark portfolio will make the enterprise's reputation rise and satisfy the "nostalgic" trademark sentiment of many consumers (Guo, 2006).

The value and function of the joint-based trademark portfolio is manifested in the following: firstly, the use of identical or similar trademarks by different enterprises on the same or similar goods will inevitably cause confusion among consumers as to the source of the goods and shake the inherent identification and differentiation role of the trademark. However, if an enterprise takes the initiative to take a positive stance and increase the possession of a number of similar trademarks, so that the scope of protection of the core trademark can be extended, consumer confusion and the insinuation of unfair competitors can be avoided, so that the core trademark can be closely protected, and such protection does not need to be accumulated for a period of time to be formed, as long as this type of trademark portfolio is successfully registered, a protection network can be formed (Feng, 2015). Secondly, judging the "similarity" of a trademark has been a major challenge for administrative and judicial decisions on trademark infringement, but the increase in the number of joint-based trademark portfolios has solved this confusion by providing an accurate reference basis for determining the scope of trademark similarity and blocking the infringer's defense of "non-similarity". This is a cost saving for the enterprise to defend its rights with very little cost, and the benefits it brings to the enterprise will also be apparent once the enterprise applies for this type of trademark portfolio and obtains authorization (Guo, 2006).

Therefore, H3: The more stock of joint-based trademark portfolio (PIII), the higher is

enterprise performance

(4) H4: The more stock of cumulation-based trademark portfolio (PIV), the lower is enterprise performance

The cumulation-based trademark portfolio involves registration of non-core trademarks on non-core goods.

1) From the resource-based and capability-based view, on the one hand, enterprises that register and maintain accumulative trademarks for the purpose of hoarding trademarks will increase their application and maintenance costs, but will not generate any economic benefits for themselves (Landes & Posner, 2003). On the other hand, if companies do not register non-core trademarks on non-core business for the purpose of hoarding trademarks, this indicates that the companies may implement diversification strategies that are not related to their existing resources and capabilities (Rumelt, 1982). The launch of a new brand requires a lot of publicity and promotion costs. Generally speaking, only when a company has a weak core brand and encounters a serious brand crisis, it will implement a new brand strategy for its non-core business (Xiong, 2017). Meanwhile, the increase in the number of cumulation-based trademark portfolio also means that the enterprises will get engaged in new goods development. In this regard, it is a very difficult task to break away from existing resources and ability base, as in terms of goods design, manufacturing, sales, distribution and service, the enterprises need to re-establish an efficient organization to manage the new goods development (Castaldi et al., 2021; Keller, 2014). This will, in turn, send uncertain signals to investors, and may have a negative impact on enterprise performance (Roberts, 2019).

The increment of cumulation-based trademark portfolio means that, on the one hand, increasing the number of such trademarks is only for hoarding trademarks for sale, and the enterprise will not actually use the trademark, so it is difficult to realize the value of such trademarks in the short term. On the other hand, increasing the number of such trademarks is to realize the enterprise's diversified brand strategy, but since the brand strategy neither extracts the core trademark of the enterprise nor extracts the core business of the enterprise, it is very difficult to create a new brand, even if the enterprise has correctly chosen the category of the new brand, it still needs to solve a series of problems such as organization, communication, terminal and marketing in order to create value, so it is difficult to bring benefits to the enterprise in a short period of time (Y. Y. Sun & Liu, 2007).

2) From the perspective of institutional theory, applying for multiple trademarks without intention to use may result in rejection of the registered trademark applied by an enterprise, and a legal risk that the trademarks will be cancelled due to "non-use for three consecutive years

without proper reason" (L. L. Zhang, 2019). It may also endanger the economic function of trademarks and the normal operation of the trademark system (Castaldi et al., 2021). As a result, the enterprise will inevitably suffer from an increase in legal costs, impairment of its goodwill and reduction of its revenue (F. Y. Zheng, 2020). Here, we take Beijing Huiyuan Beverage and Food Group Co., Ltd. (hereinafter referred to as "Huiyuan Company") as an example. Huiyuan Company is one of the largest fruit processing and bottling companies in China, especially in the medium and high-concentration fruit juice market. "Packaged food and beverages" are its core goods, and "Huiyuan" is its core trademark. Huiyuan Company applied for the registration of the non-core trademark "he" on the goods of the 25th category (clothing, shoes and hats) under the non-core business category on April 9, 2004, and the registration was announced on December 21, 2007. However, as the registered trademark has not been used for three consecutive years, it was revoked by the Trademark Office of CNIPA on June 5, 2019. The revocation of the trademark not only shows that the hoarding of trademarks will certainly have a negative impact on enterprise performance, and will also increase an enterprise's legal costs of trademark review or administrative litigation.

The increase in the number of cumulation-based trademark portfolios will inevitably lead to the cost of trademark registration applications. Even in the trademark registration review stage, when other companies raise objections or trademark registration is successful, other companies declare invalid, thus bearing more administrative or litigation costs. Therefore, the increase in the number of such trademark portfolios will hardly bring benefits to enterprises, and may even have adverse legal and economic consequences.

Therefore, H4: The more stock of cumulation-based trademark portfolio (PIV), the lower is enterprise performance.

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Chapter 4: Research Design and Data Collection

4.1 Variable definition

4.1.1 Dependent variables

Variables that are often used to represent corporate performance in previous studies include: net profit rate of total assets, return on net assets, return on invested capital, *Tobin's Q*, net profit growth rate, and operating income growth rate (Krasnikov et al., 2009; M. N. Li et al., 2019; Y. Zheng & Huang, 2021). Among them, *Tobin's Q* is a relatively comprehensive evaluation indicator of a company's market value. The market value method is often used in combination with accounting data to evaluate the economic value of innovation returns and intangible assets. In the financial market, investors estimate the value of a company based on their expected return on assets (Montgomery & Wernerfelt, 1988), and market value can be regarded as a forward-looking measure of a company's performance (Hall et al., 2005). *Tobin's Q*, i.e. the ratio of market value to total assets, is used to measure market performance (Bolton et al., 2011; Hall et al., 2005). On the one hand, the sample companies involved in this study are listed companies, and their consolidated subsidiaries, and financial data reflecting their market performance can be collected through their annual reports. On the other hand, existing studies have shown that the financial market has attached great importance to enterprise trademark registration, and trademarks have been regarded as an effective tool that can at least partially reflects the value of marketing investment. Companies apply for their own trademarks to show to the financial market that they are eager to protect their marketing investments. Moreover, the stock market has also attached importance to enterprise trademark registration (Sandner & Block, 2011). Therefore, *Tobin's Q* is widely used in this study as the explained variable. It is calculated by dividing the financial market value of an enterprise by the replacement cost of its assets (X. Q. Du & Wang, 2007; Sandner & Block, 2011; Y. Y. Sun & Shao, 2021). In some cases, the approximate *Tobin's Q* (X. D. Li et al., 2007) is also used for robustness testing.

4.1.2 Independent variables

The key explanatory variable of this study is the registered trademark application behavior, characterized by the stock of four trademark portfolios.

PI (value-based trademark portfolio) refers to stock of the core trademarks on core goods owned by an enterprise as of December 31 of the current year. *PII* (defense-based trademark portfolio) refers to stock of the core trademarks on non-core goods owned by an enterprise as of December 31 of the current year. *PIII* (joint-based trademark portfolio) refers to stock of the non-core trademarks on core goods owned by an enterprise as of December 31 of the current year. *PIV* (cumulation-based trademark portfolio) refers to stock of the non-core trademarks on non-core goods owned by an enterprise as of December 31 of the current year.

4.1.3 Control variables

Control variables include the following:

(1) *Intangible*: the ratio of intangible assets to total assets (Chen, 2010; G. T. Lin & Tang, 2009);

(2) *LnAsset*: the natural logarithm of total assets at the end of the period (X. Hu et al., 2020; Jiang, 2015);

(3) *Leverage*: the asset liability ratio of an enterprise, which is defined as the total liabilities divided by total assets at the end of the period (Enqvist et al., 2014; G. H. Wang, 2016);

(4) *Gross profit margin*: the gross profit rate of an enterprise (Qiao, 2015);

(5) *HTE certification*: the "high-tech enterprise certification". As mentioned in the previous theoretical analysis, an enterprise strategy is affected by internal resources and capabilities, and also by external systems. Existing research has indicated that the "high-tech enterprise certification system", as a unique system arrangement in China, has already had a certain impact on enterprise innovation and performance (She et al., 2021). Therefore, *HTE certification* is selected in this study as one of the control variables;

(6) *Concentration*: the degree of concentration and decentralization of a company's allocation of resources, which is reflected in the different trends of specialization and diversification in the business model (Xie & Zhang, 2007). The diversified operation of enterprises can reduce both operating risks and large fluctuations in profit levels (Clement, 1988; W. Li et al., 2012). Therefore, *concentration* (i.e. proportion of an enterprise's core business) is selected in this study as one of the control variables.

According to the relevant variables selected in this research, the panel data measurement set is as follows:

$$\boldsymbol{Tobin's\ Q_{i,t+1} = \beta_0 + \beta_1 LnAsset_{i,t} + \beta_2 Leverage_{i,t} + \beta_3 Concentration_{i,t} +}$$

$$\boldsymbol{\beta_4 GPM_{i,t} + \beta_5 Intangible_{i,t} + \beta_6 HTEcertifecation^{i}_{i,t} + \beta_7 PI_{i,t} + \beta_8 PII_{i,t} + \beta_9 PIII_{i,t} + \beta_{10} PIV_{i,t} + \varepsilon_{i,t}} \quad (4.1)$$

Where, $Tobin's\ Q_{i,t+1}$ represents the performance of company i in year t+1, that is, the company's performance deferred for one year is taken as the dependent variable; $LnAsset_{i,t}$, $Leverage_{i,t}$, $Concentration_{i,t}$, $GPM_{i,t}$, $Intangible_{i,t}$ and $HTEcertifecation^{i}_{i,t}$ are all control variables; independent variables $PI_{i,t}$, $PII_{i,t}$, $PIII_{i,t}$, and $PIV_{i,t}$ respectively indicate the number of the four trademark portfolios (*PI, PII, PIII and PIV*) of company *i* in year *t*. Refer to Table 4.1 for the variable definition.

Table 4.1 Variable definition

Variables	Definition
Dependent variable	
Tobin's Q	An enterprise's market value/total assets of the year
Control variable	
Intangible	An enterprise's intangible assets/total assets
LnAsset	Natural logarithm of an enterprise's total assets at the end of the period
Leverage	Total liabilities/total assets of an enterprise at the end of the period
Gross Profit Margin (GPM)	An enterprise's gross margin
Concentration	Proportion of an enterprise's core business (%)
HTE certification	"high-tech enterprise certification"
Independent variable	
PI	Stock of the value-based trademark portfolio owned by an enterprise as of December 31 of the current year
PII	Stock of the defense-based trademark portfolio owned by an enterprise as of December 31 of the current year
PIII	Stock of the joint-based trademark portfolio owned by an enterprise as of December 31 of the current year
PIV	Stock of the cumulation-based trademark portfolio owned by an enterprise as of December 31 of the current year

The financial data of this study comes from annual reports disclosed by listed companies, collected by the CSMAR, RESSET and Wind databases of China. These databases are authoritative and have been widely used in the economic research of Chinese listed companies (Y. S. Du et al., 2016; H. Hu, 2019; Ke & Wu, 2014).

4.2 Enterprise sample selection

4.2.1 Sample selection of listed companies

On the one hand, the financial data of listed companies is relatively open and transparent, and easy to obtain. On the other hand, in order to empirically study the above theoretical assumptions, this study selects 1,666 listed companies with registered trademarks that had

been listed on the Shanghai and Shenzhen stock exchanges before December 31, 2007.

4.2.2 Selection of consolidated subsidiaries of listed companies

Considering the actual financial consolidation of listed companies and their holding subsidiaries, this study also covers the consolidated subsidiaries of the above listed companies in the sample range. In this study, 24,286 consolidated subsidiaries are selected in total based on the annual reports of listed companies, supplemented by cross-validation of company data from the Chinese enterprise database *Tianyancha*.

4.2.3 Excluded sample companies

This study is about the relation between trademark portfolios and enterprise performance, that is, the premise of the study is that the sample listed companies and their consolidated subsidiaries should hold registered trademarks. Therefore, this study excludes the sample listed companies that themselves or their consolidated subsidiaries don't have trademarks.

Refer to Table 4.2 for the data of the sample listed companies.

Table 4.2 Data of sample listed companies

Year	Number of Sample listed companies or their consolidated subsidiaries Holding Trademarks	Total number of the sample listed companies
2007	1315	1666
2008	1324	1666
2009	1360	1666
2010	1394	1666
2011	1423	1666
2012	1410	1666
2013	1454	1666
2014	1423	1666
2015	1429	1666
2016	1440	1666
2017	1493	1666
2018	1498	1666

4.3 Data collection

4.3.1 Starting and ending time of trademark data collection

In this study, data was collected from the listed companies and their consolidated subsidiaries during the period from December 31, 2007 to December 31, 2018, including trademark and performance data, as well as data about annual trademark increment during the 11 years. 2008

is taken as the starting year of trademark increment calculation, since China issued the *Outline of the National Intellectual Property Strategy* on May 6, 2008. The implementation of the Outline is a milestone for the development of such intellectual properties as trademarks in China (C. T. Liu, 2018).

The end year of data collection was 2018, because the data collection time of this study started in the first half of 2019. At present, the average review period of registered trademark applications in China is 9 months. Plus the waiting time for publication, a smooth registered trademark application can generally be completed within 12-15 months (Fang, 2013). Accordingly, the registered trademark applications in 2019, 2020 and 2021 were still in the stage of examination and their final registration was still uncertain by the time of this study.

4.3.2 Trademark search database

(1) In 2018, in accordance with the institutional reform plan issued by the State Council of China, the responsibilities of CNIPA, the trademark management responsibilities of the State Administration for Industry and Commerce, and the geographical indications of origin management responsibilities of the General Administration of Quality Supervision, Inspection and Quarantine were integrated, and CNIPA was reorganized (Y. G. Xiao et al., 2021). Since then, CNIPA has been subject to management by the State Administration for Market Supervision and Administration, and has also expanded its business areas from the original patents and integrated circuit layouts to trademarks and geographical indications. At present, trademark search is integrated into the Trademark Office of CNIPA (hereinafter referred to as "*China Trademark Network*").

(2) As *China Trademark Network* sets a limit on the amount of daily trademark searches on its website, while this study involves more than 150,000 trademark searches, this study is also supplemented by the database *Tianyancha* for trademark searches. As China's largest commercial information query platform, *Tianyancha* has collected information on nearly 300 million social entities (including enterprises, institutions, foundations, schools, law firms) in China, including listing information, and information about enterprise background, enterprise development, judicial risk, business risk, business status, and intellectual property, which involves more than 300 data dimensions. By virtue of its data openness, legitimacy, accuracy and easy accessibility, *Tianyancha* has been widely used by Chinese scholars as the core source of data collection. Scholars including Qian et al. (2021), H. B. Gong and He (2021) have used *Tianyancha* for empirical analysis in their publicly published papers, and these papers have been recognized by the academic community.

4.3.3 Trademark selection criteria

This research problem is about the value of a enterprise's trademark portfolio strategy, which presupposes that the enterprise has a registered trademark.

From a managerial economics perspective, for a registered trademark applied for by an enterprise to become an asset of the enterprise, it must be exclusive and stable, and therefore only trademarks for which the enterprise has successfully applied for registration and which are still valid at the time of collecting trademark data for this study can become an asset of the enterprise.

From a jurisprudent perspective, on the one hand, a registered trademark applied for by an enterprise may not always be successfully registered, for example, the application is rejected because the registered trademark applied for lacks distinctiveness and violates the prohibitions of the law; or the application is rejected because a third party raises an objection during the publicity phase of the examination of the trademark application, so the statistical application for registration of a trademark cannot only be searched for the trademark applied for registration in the current year, but also to examine whether the successfully obtained a registered trademark.On the other hand, even if a trademark applied for registration by an enterprise is successfully registered, it is revoked because the enterprise does not use it for three consecutive years or the registered trademark is improperly used; or it is eventually invalidated by the State Trademark Office or ruled invalid by the court because a third party files a review to declare the trademark invalid. In summary, once a trademark application is rejected, or revoked, or declared invalid, the enterprise no longer enjoys the exclusive right to the trademark, and the trademark loses its legal effect and does not have exclusivity.

Therefore, from the consideration of the legal and property attributes of trademarks, this study only counts trademarks that were applied for registration in the current year and are still validly registered.

4.3.4 Trademark data collection methods and searching procedures

(1) Database for trademark data collection and basis for goods classification

The trademark data of this study comes from China Trademark Network, supplemented by cross-comparison of trademark data available in Tianyancha to collect and classify registered trademarks. In order to ensure the accuracy of data, data collection is carried out in a two-person team with mutual verification.

In particular, when an enterprise applies for trademark registration, it must specify the

specific name of goods and services. The goods name must be specific, accurate, and standard where possible, in order to clearly specify the scope of protection of the trademark. CNIPA uses the "Similar Goods and Services Classification Table" in the "Nice Agreement Concerning the International Classification of Goods and Services for the Purposes of the Registration of Marks" (hereinafter referred to as "Nice Agreement") to regulate the names of goods and services. This table is also helpful for the classification of goods and services in this study. The international classification in the Nice Agreement covers more than 10,000 goods and services in a total of 45 categories, including 34 categories of goods (Category 1-34), and 11 categories of services (Category 35-45).

This research comprehensively collected the registered trademarks of the 24,286 enterprises (including 1,666 listed companies and 22,620 consolidated subsidiaries), as well as the categories of goods or services to which each trademark is applicable. This research then classified the trademark portfolios according to the trademark registration number (with one trademark sign corresponding to one class of goods or services).

(2) Steps and methods to identify the sign of a registered trademark

The first step is to determine a company's core sign through the logo on the homepage of the company's official website, If there is no logo on the company's official website or the logo is not prominently used, the company's core sign is determined from the logo recorded in Tianyancha.

The second step is to search for the same sign as the above-mentioned logo on China Trademark Network to verify the core sign of a registered trademark.

The third step is to include all signs other than the owner's core-signs in the scope of non-core signs of registered trademarks.

(3) Methods and steps to identify the goods of a company

The first step is to determine a company's core goods based on the related listed company's annual report. If the annual report does not record any core goods, a comprehensive judgment shall be made based on the "business scope" recorded in enterprise website, Tianyancha and the category of goods or services registered with the company's trademark.

The second step is to classify items other than the core goods of the company as non-core goods.

According to the above-mentioned trademark search and classification methods and steps, our statistics on the four trademark portfolios of the registered trademarks of the sample companies are shown in Table 4.3.

Table 4.3 Data of different trademark portfolios

Data of trademark stock (Unit: pieces)					
Year	PI	PII	PIII	PIV	Total
2007	4488	18143	11420	18927	52978
2008	4603	18590	11528	19648	54369
2009	4847	19198	12838	20690	57573
2010	4889	19404	12898	27933	65124
2011	5013	19854	13000	37845	75712
2012	5136	20117	13423	38604	77280
2013	5432	23931	14346	45262	88971
2014	5449	26461	14384	51830	98124
2015	5507	29488	14548	58529	108072
2016	7637	34852	15085	73802	131376
2017	7730	41406	15590	86666	151392
2018	8132	42814	16503	89930	157379

4.4 Trademark portfolio database construction - “Gree” as an example

4.4.1 Introduction

This research created a trademark portfolio matrix and constructed a trademark portfolio database based on this, namely, value-based trademark portfolio (core signs& core goods), defense-based trademark portfolio (core signs &non-core goods), joint-based trademark portfolio (non-core signs & core goods) and cumulation-based trademark portfolio (non-core signs & non-core goods), which provides important data support for this research.

Since the section 3 (4.3) of this chapter has explained the database resources and goods classification basis on which the trademark portfolio database is constructed, this section (4.4) focuses on Zhuhai Gree Electric Appliance Co., Ltd. as an example to introduce in detail the methods and steps for distinguishing between the core and non-core signs and the core and non-core goods to prove the verifiability and practicality of the construction of this trademark portfolio database.

4.4.2 The usual steps to search for a trademark

In general, we retrieve data on Gree’s registered trademarks through the trademark website of *China Trademark Network*, in the following steps.

Step 1: Enter the trademark query web interface of *China Trademark Network*.

Step 2: Enter the comprehensive search interface of China Trademark.com, and enter the name of the applicant (in Chinese): Zhuhai Gree Electric Appliance Co., Ltd. (hereinafter referred to as “ *GREE Co.*”) to search for registered trademarks.

Step 3: A total of 6,441 trademarks of *GREE Co*. were inquired through *China Trademark Website*. By searching the list, we can quickly browse *GREE Co*.'s registered trademark information, including the application/registration number, international classification, application date, and trademark name of each registered trademark.

Step 4: Select the trademarks in the list that are displayed during the period from December 31, 2007 to December 31, 2018, and click to open the details of the trademark registration.

Step 5: Open one of the trademark information web pages, and read the detailed information of *GREE Co*.'s trademark registration, including the specific sign of the registered trademark, specific product service category and trademark legal status (registered/ invalid).

Through the above steps, we can accurately find the sign of each registered trademark and the category of applicable goods or services, and prepare for the subsequent classification of trademark portfolios.

4.4.3 Methods and steps to identify the core and non-core signs of a registered trademark

We mainly judge whether the logo of the registered trademark of the sample company is the core logo based on the logo on the homepage of the official website of the sample company or the logo often used in the official text, taking *GREE Co.* as an example, the identification methods and steps are as follows.

The first step is to determine the core sign of a registered trademark of the company through the logo on the homepage of the company's official website. When we enter the official website of *GREE Co.* (website: https://gree.com/), we can clearly see the prominent logo GREE on the top left of the website. We use this logo GREE as the basis for judging the core sign of a registered trademark of *GREE Co*. All signs that are identical to the logo GREE or that are the same as a significant part of the logo GREE are classified as the core signs of a registered trademark of *GREE Co*.

The second step is to search for the same signs of a registered trademark as the logo GREE or that are the same as a significant part of the logo GREE on *China Trademark Network* to verify the core sign of a registered trademark of *GREE Co*.the company. GREE is the same as the distinctive part of GREE Co's official website logo GREE , and we will classify it as the sign of a registered trademark of *GREE Co.*

In the third step, all signs other than the core sign of a registered trademark of *GREE Co.*are

included in the scope of non-core trademarks. 品炫 is classified as a non-core sign of a registered trademark of *GREE Co.*, since it is different from the logo GREE and the distinctive part of the logo GREE of GREE Co .

4.4.4 Methods and steps for identifying core and non-core goods

The first step is to determine the core goods of the enterprise based on the records in the annual report of the listed company. If the main business and main goods of the sample companies are not recorded in the annual reports of listed companies, then we will search and identify which goods are the core goods of the companies according to the following paths in turn. (1) Based on the main business or main commodities of the sample company as clearly recorded in the database of *Tianyancha*; (2) Based on the main business or main goods of the sample company as published on the official website of the sample company; (3) Based on the chronological order of the commodity categories used by the sample company's registered trademarks as published on the *China Trademark Network* or the number of the same goods categories used by the registered trademarks.According to the Summary of *GREE Co*.'s 2018 Annual Report, *GREE Co*.'s core businesses include household air conditioners, HVAC, refrigerators, washing machines, water heaters, kitchen appliances, environmental appliances, communication products, smart buildings, smart homes, and other consumer areas. Since *GREE Co*.'s annual report has already announced the company's main business, we do not need to search the company's official website or the China Trademark website for the chronological order and number of registered trademark categories of goods used, i.e. we can directly determine *GREE Co*'s core goods based on the above-mentioned main business.

In the second step, all goods other than the company's core goods are classified as non-core goods.

4.4.5 Statistics for trademark portfolios

According to the above steps, taking the registered trademark of *GREE Co*. as an example, we classify the trademark portfolio as follows:

Portfolio I: core signs & core goods

The registered trademark (NO.6489564) sign GREE is the same as the significant part of the logo GREE on the official website of *GREE Co.*, and its category of registered goods / services is the installation and repair of air-conditioning equipment, which belongs to the core

goods / services scope of *GREE Co.* Accordingly, we classify this registered trademark (NO. 6489564) as the Portfolio I.

Portfolio II: core signs & non-core goods

GREE Co.'s sign of the registered trademark (NO.10431711) is GREE, which is the same as *GREE Co*'s official website Logo GREE and the registered goods/services are residence (hotel), day nursery, which is significantly different from *GREE Co*'s core businesses. Accordingly, we classify this registered trademark as Portfolio II.

Portfolio III: non-core signs & core products

The sign of registered trademark (NO. 37309144) of *GREE Co*. is 煥净, which is significantly different from the core sign GREE of trademarks and the registered goods/services are household air purifiers, electric heaters, which belong to the core businesses scope. Accordingly, we classify this registered trademark as Portfolio III.

PIV: non-core signs & non-core goods

The sign of registered trademark (NO. 24034600) is 荣著 RONG ZHU, which is significantly different from the core sign GREE of trademarks, and the registered goods/ services are radio wave, data stream transmission, which are also significantly different from the *GREE Co*.'s core products. Accordingly, we classify the registered trademark as Portfolio IV.

In this study, through the above signs and goods identification methods and steps, the data of *GREE Co*. trademark portfolio is detailed in Table 4.4.

Table 4.4 Data of different trademark portfolios of *GREE Co*.

Data of trademark stock (Unit: pieces)					
Year	PI	PII	PIII	PIV	Total
2007	131	98	343	34	606
2008	137	99	512	34	782
2009	137	99	512	34	782
2010	137	99	512	654	1402
2011	137	99	512	2090	2838
2012	137	99	512	2090	2838
2013	137	99	535	2092	2863
2014	137	99	627	2158	3021
2015	137	99	669	2205	3110
2016	137	99	742	2234	3212
2017	137	99	796	2299	3331
2018	137	99	796	2299	3331

4.5 Summary

Authoritative public databases such as the database of the Trademark Office of the State Intellectual Property Office of China and the database of "Tian yancha" provided the data basis for this study on the relation between trademark portfolio and enterprise performance. Based on this research question and theoretical framework, this study takes 1,666 companies listed on the Shanghai and Shenzhen stock exchanges in China prior to 31 December 2007 (including 22,620 subsidiaries of such listed companies in the consolidated table, totaling 24,286 companies) as the research sample, and collects a total of over 150,000 pieces of trademark data from 31 December 2007 to 31 December 2018.

This section uses secondary data, which has several advantages over primary data. Firstly, compared to primary data, secondary data sources are more open and transparent, with a larger volume of data and higher reliability; secondly, secondary data have less selectivity bias; thirdly, secondary data have fewer endogeneity problems and are highly replicable. In addition, this section uses panel data, which combines the characteristics of cross-sectional data and time series data, and can provide richer information for the study, and effectively control individual heterogeneity, increase the degree of freedom and reduce multicollinearity. After eliminating observations with missing values, the secondary unbalanced panel data used in this part of the empirical study was finally obtained.

Through the above-mentioned trademark search methods and steps, we have established a trademark portfolio database, and also provided a reference data collection method for the study of enterprise trademark value. This is a valuable innovation and contribution made by this research.

Chapter 5: Descriptive Statistics and Empirical Analysis

5.1 Descriptive statistics

5.1.1 Descriptive statistics

Table 5.1 gives the descriptive statistics for the different trademark portfolios of the listed companies. The average year of establishment of the sample companies is 1998.

Table 5.1 Descriptive statistics for different trademark portfolios

Year	Average stock of trademark portfolios of sample listed companies and their subsidiaries				Number of sample listed companies
	PI	PII	PIII	PIV	
2007	3.41	13.80	8.68	14.39	1315
2008	3.48	14.04	8.71	14.84	1324
2009	3.56	14.12	9.44	15.21	1360
2010	3.51	13.92	9.25	20.04	1394
2011	3.52	13.95	9.14	26.60	1423
2012	3.64	14.27	9.52	27.38	1410
2013	3.74	16.46	9.87	31.13	1454
2014	3.83	18.60	10.11	36.42	1423
2015	3.85	20.64	10.18	40.96	1429
2016	5.30	24.20	10.48	51.25	1440
2017	5.18	27.73	10.44	58.05	1493
2018	5.43	28.58	11.02	60.03	1498

Note: Sample listed companies refer to all the companies that had been listed on Shanghai and Shenzhen stock exchanges as of December 31, 2007, and the listed companies or their subsidiaries hold at least one trademark.

In order to eliminate the influence of extreme values, the continuous variables reflecting financial characteristics are winsorized at 1% level (cut out the top 1% and the bottom 1%) (Wilcox, 2011).

5.1.2 Further descriptive analysis

(1) Incremental changes in different trademark portfolios from 2008 to 2018

As shown in Figure 5.1, from 2008 to 2018, the four trademark portfolios show different increment trends at different time points. To be specific, PIV shows the most significant changes, falling sharply in 2011 and 2017, and increasing sharply in 2015. PI shows relatively small increment changes, and PIII shows the most stable increment.

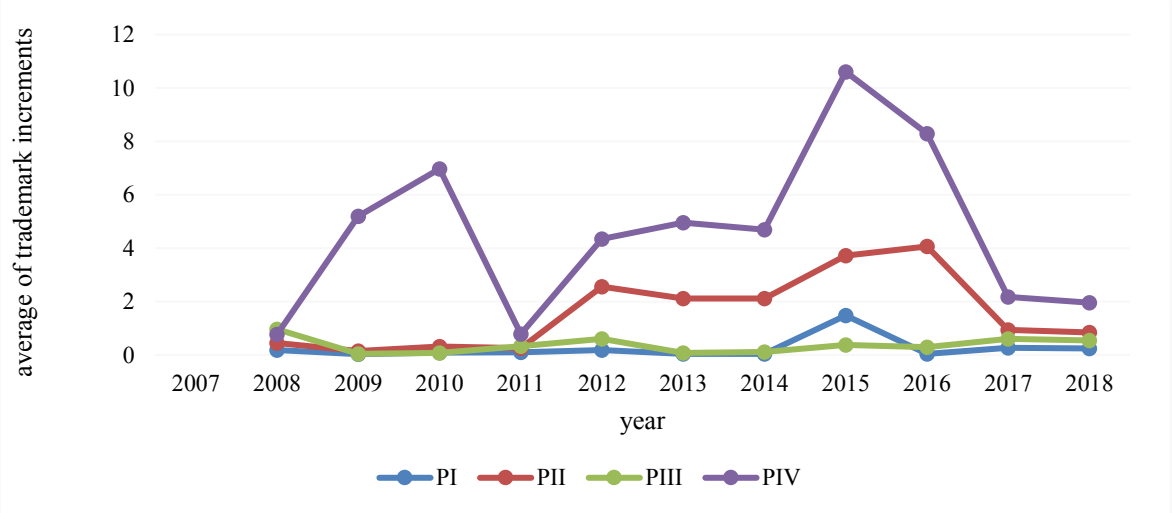

Figure 5.1 Incremental change trend of different trademark portfolios from 2008 to 2018

Note: The data in this figure relate only to incremental changes in trademark portfolio of the sample companies

(2) Description of policy impacts on incremental changes in trademark portfolios

The significant changes of PIV coincide with the time points of China's trademark laws and policies or relevant trademark registration review measures (as shown in Table 5.2). However, at the above time points, the changes of the other three trademark portfolios do not fully correspond to the relevant trademark laws and policies or measures. Therefore, although the trademark behavior of enterprises is affected by laws and policies as mentioned in the relevant literature (Cohen, 1991; Krasnikov et al., 2009), only PIV has the most sensitive response to trademark laws and policies and measures.

Table 5.2 Impact of Legal policies and measures on PIV increment from 2008 to 2018

Year	PIV increment	China's trademark legal policies and measures
2008	Start time for increment calculation of PIV	The "Outline of the National Intellectual Property Strategy" was implemented (T. G. Liu, 2016).
2009-2010	Significant increase in PIV	The National Trademark Office took measures to resolve the backlog of registered trademark applications (B. H. Zhou, 2011).
2011	Sharp drop in PIV, falling back to the level of 2008	The National Trademark Office's resolution of trademark review backlog came to an end (B. H. Zhou, 2011).
2012	Significant increase in PIV	In 2012, the National Trademark Office began to implement the strategy of strengthening trademarks (B. H. Zhou, 2011).
2014	Slight decrease in PIV	The Trademark Law (Third Revision) was implemented in 2014, conveying signals to curb trademark hoarding (C. T. Liu, 2018).
2015	Significant increase in PIV	According to the document of the National Development and Reform Commission and the Ministry of Finance ([2015] No. 2136), the trademark application fee was reduced from RMB 1,000 determined in 1995 to RMB 500 (L. F. Wang & Zeng, 2021).

2017	Sharp drop in PIV	In 2017, the National Trademark Office and the Trademark Review and Adjudication Board implemented the newly revised "Trademark Examination and Trial Standards", focusing on curbing trademark hoarding (L. L. Zhang, 2019).

(3) Distribution of trademark portfolio by industry

Figure 5.2 shows the distribution of trademark portfolio stock in each industry in 2007 and 2018, where PI, PII, PIII, and PIV on the horizontal axis of the coordinate represent the average value of trademark portfolio stock in each industry, respectively. The industry classification is based on the industry classification standards of the China Securities Regulatory Commission.

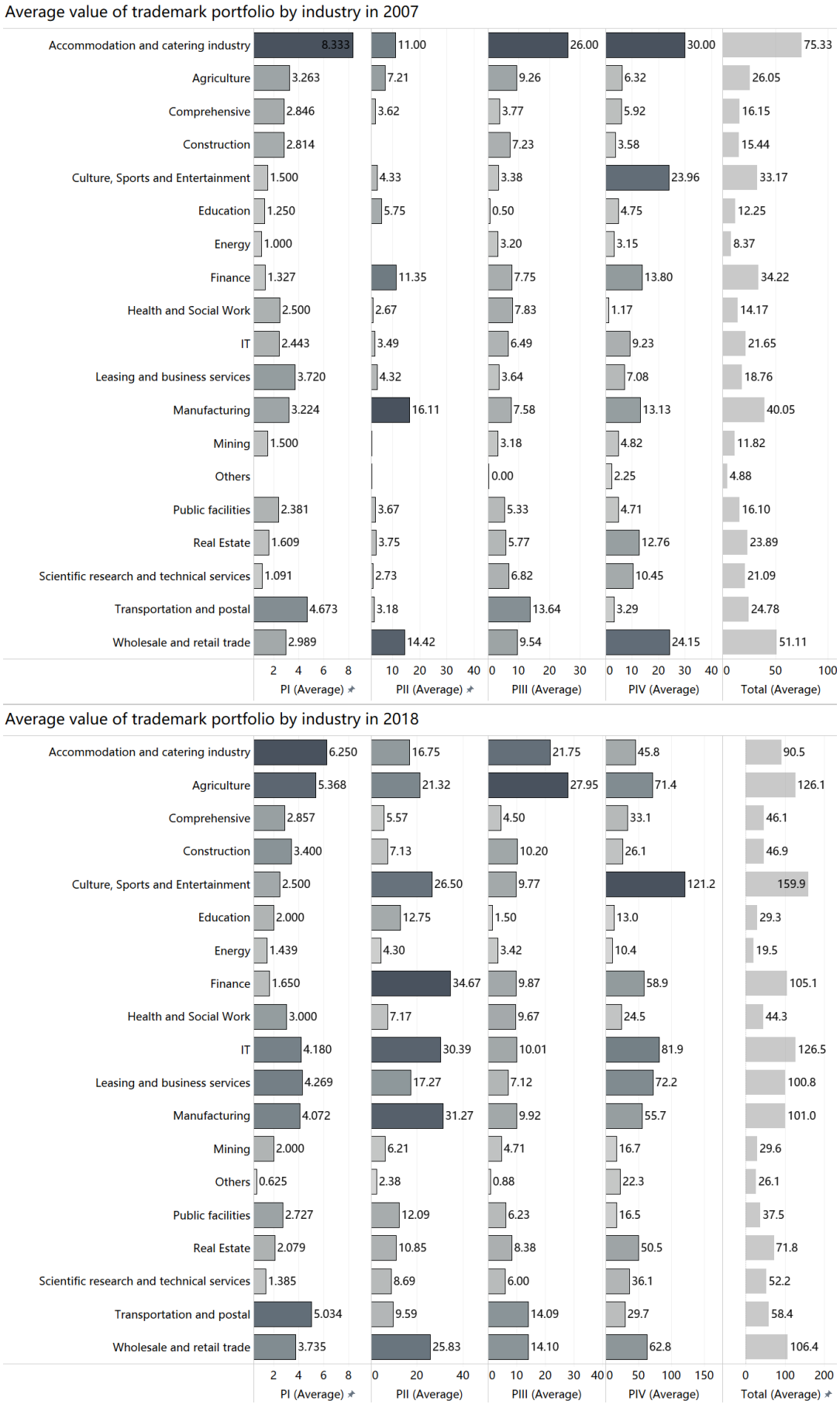

Figure 5.2 Trademark distribution map by industry (2007 and 2018)

Overall, in 11 years, the overall growth rate of trademarks is 260.8%. In 2007, the industry with the largest number of trademark portfolios was the accommodation and catering industry, however, by 2018, the growth of this industry was not very rapid (+212.2%), ranking eighth among all industries. Explain that in 2018, the trademark portfolio of other industries has greatly developed, especially the culture, sports and entertainment industry (+482.1%), information transmission, software, and information technology services (+584.3%), agriculture, forestry, livestock and fisheries (+484.1%), leasing and business services industry (+573.3%), the growth rate of these industries is much higher than the overall growth rate.

Among them, the growth trend of trademark portfolios in these industries is not consistent. For example, the culture, sports and entertainment industries are dominated by the growth of PII and PIV; the information transmission, software, and information technology services is dominated by the growth of PII and PIV (especially the growth rate of PII is extremely high); the growth of agriculture, forestry, livestock and fisheries is dominated by PIII and PIV.

It is also noteworthy that the scale of growth in PIV across all sectors is much higher than the growth in PI, PII and PIII, with an overall growth rate of 417%. In 2007, the extreme difference in PIV was 28.83, while in 2018, it was 110.8, a 384% increase. For example, the industry average for PIV in the culture, sport and recreation sector is 121.2, while in the energy sector is only 10.4.

Structurally, there is also some variation in the structure of the trademark portfolio between industries. In 2007, the culture, sports and entertainment industry had focused on a more pronounced placement on PIV, and by 2018, the placement on PII had been strengthened; the information transmission, software, and information technology services had a lesser placement on PII, PIII and PIV in 2007, and by 2018, the placement on PII and PIV had been significantly strengthened. Agriculture, forestry, livestock and fisheries, on the other hand, has strengthened its presence on PIII and PIV.

5.2 Empirical analysis

This study selects the trademark portfolio data of the sample listed companies and their subsidiaries from 2007 to 2018 as the fixed effect model for regression analysis. In the regression analysis, *Tobin's Q* is taken as the dependent variable and the stock of the different trademark portfolios as independent variables.

5.2.1 Correlation analysis

Table 5.3 is the matrix of the correlation between the variables in this study. The correlation coefficients between the variables in the table are all lower than 0.7, and the VIF values in the subsequent regression analysis are all lower than 10 (O'brien, 2007). In this way, collinearity in the regression can be ruled out.

Table 5.3 Correlation matrix

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Tobin's Q	1.000										
LnAsset	-0.402*	1.000									
Leverage	0.106*	-0.077*	1.000								
Concentration	-0.004	0.000	0.000	1.000							
GPM	0.172*	-0.111*	-0.028*	-0.017*	1.000						
Intangible	0.093*	-0.119*	0.017*	0.002	0.031*	1.000					
HTE certification	0.043*	0.019*	-0.024*	-0.001	0.036*	-0.015*	1.000				
PI	-0.017*	0.055*	-0.001	-0.001	-0.013	-0.005	-0.001	1.000			
PII	0.003	0.182*	-0.006	0.001	0.109*	-0.008	0.023*	0.144*	1.000		
PIII	-0.044*	0.177*	0.001	-0.001	0.032*	-0.012	-0.017*	0.223*	0.393*	1.000	
PIV	-0.019*	0.213*	-0.002	0.001	0.050*	-0.022*	0.018*	0.159*	0.664*	0.424*	1.000

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

5.2.2 Regression analysis results

Table 5.4 shows the regression analysis results of the annual stock of different trademark portfolios as independent variables.

Table 5.4 Regression analysis results of *Tobin's Q* (about the stock of trademark)

Variable	Dependent variable (*Tobin's Q*)	
	Model 1	Model 2
LnAsset	-0.253***	-0.275***
	(-7.77)	(-8.00)
Leverage	0.169***	0.165***
	(3.19)	(3.1)
Concentration	0.0001	0.0001
	(0.16)	(0.17)
GPM	0.087	0.087
	(0.41)	(0.42)
Intangible	0.01**	0.01**
	(2.42)	(2.44)
HTE certification	0.506***	0.493***
	(8.66)	(8.46)
PI		0.0001***
		(4.08)
PII		0.002*
		(1.78)
PIII		0.005**
		(2.15)
PIV		0.0001
		(1.04)

Intercept	7.456*** (10.39)	6.906*** (9.58)
R-square	0.10	0.12
Obs	14786	14786

Note: *, **, and *** respectively represent significant differences at 10%, 5%, and 1% levels.

Models 1 and 2 represent the regression results when the independent variable is the annual stock of trademarks. The specific model is as follows:

$$\textbf{Model 1: } Tobin's\ Q_{i,t+1} = \beta_0 + \beta_1 LnAsset_{i,t} + \beta_2 Leverage_{i,t} + \beta_3 Concentration_{i,t} + \beta_4 GPM_{i,t} + \beta_5 Intangible_{i,t} + \beta_6 HTEcertifecation_{i,t}^{i} + \varepsilon_{i,t} \quad (5.1)$$

$$\textbf{Model 2: } Tobin's\ Q_{i,t+1} = \beta_0 + \beta_1 LnAsset_{i,t} + \beta_2 Leverage_{i,t} + \beta_3 Concentration_{i,t} + \beta_4 GPM_{i,t} + \beta_5 Intangible_{i,t} + \beta_6 HTEcertifecation_{i,t}^{i} + \beta_7 PI_{i,t} + \beta_8 PII_{i,t} + \beta_9 PIII_{i,t} + \beta_{10} PIV_{i,t} + \varepsilon_{i,t} \quad (5.2)$$

Model 1 is the control variable group consisting of *LnAsset, Leverage, Concentration, GPM, Intangible, and HTE certification*, with the R-square of 0.10. According to the control variable group, the total assets of enterprises have a significant negative impact on *Tobin's Q* of 1% (t = -6.6), while the asset liability ratio and the proportion of intangible assets have a significant positive impact on *Tobin's Q* of 1% (t = 3.32 and 2.68, respectively). In model 2, the independent variables *PI, PII, PIII, and PIV* are added, and the R-square is 0.12. According to the results of regression analysis, the stock of *PI, PII* and *PIII* has a significant positive impact on *Tobin's Q* of enterprises, indicating that the more *PI*, *PII* and *PIII* trademarks, the higher *Tobin's Q* of enterprises. The significant level of *PI* is 1% (t =3.05), and that of *PII* and *PIII* is 5% (t = 2.09 and 2.18, respectively). *PIV* has no significant impact on *Tobin's Q*. R-square in the table represents the degree of fit of the model. The higher the value is, the higher the degree of fit between the model and the data is (Israeli, 2007; King, 1990). After independent variables are added, R-square is improved compared with model 1, showing that the addition of independent variables improves the fit degree of the model. Obs is the number of samples in the regression (Jaffe et al., 2013).

From the above results, more *PI*, *PII* and *PIII* have a favorable impact on enterprise performance. However, the stock of *PIV* trademarks owned by enterprises has no significant impact on market performance. Such regression results are largely consistent with the hypothesis of this study.

Since *PIV* did not show significance and was not consistent with the hypothesis, a U-shaped regression test was conducted in this research for the *PIV* to explore the existence of alternative models. The model for this U-shaped effect was set as follows.

$$\textbf{Model 3: } approximate\ Tobin's\ Q_{i,t+1} = \beta_0 + \beta_1 LnAsset_{i,t} + \beta_2 Leverage_{i,t} + \beta_3 Concentration_{i,t} + \beta_4 GPM_{i,t} + \beta_5 Intangible_{i,t} + \beta_6 HTEcertifecation^{i}_{i,t} + \beta_7 PI_{i,t} + \beta_8 PII_{i,t} + \beta_9 PIII_{i,t} + \beta_{10} PIV_{i,t} + \beta_{11} PIV^2_{i,t} + \varepsilon_{i,t} \quad (5.3)$$

The regression results of the model are shown in Table 5.5:

Table 5.5 U-shaped effect regression test of *PIV*

Variable	Dependent variable (*Tobin's Q*)	
	Model 1	Model 3
LnAsset	-0.253***	-0.322***
	(-7.77)	(-8.61)
Leverage	0.169***	0.160***
	(3.19)	(3.05)
Concentration	0.0001	-0.0001
	(0.16)	(-0.01)
GPM	0.087	0.073
	(0.41)	(0.35)
Intangible	0.010**	0.010**
	(2.42)	(2.43)
HTE certification	0.506***	0.461***
	(8.66)	(7.87)
PI		0.0001***
		(4.67)
PII		0.0002
		(-0.16)
PIII		0.008***
		(2.85)
PIV		0.007***
		(5.1)
PIV^2		-0.0001***
		(-3.19)
Intercept	7.456***	8.760***
	(10.39)	(10.86)
R-square	0.10	0.18
Obs	14786	14786

Note: *, **, and *** respectively represent significant differences at 10%, 5%, and 1% levels.

The results in Table 5.5 show that the primary term of *PIV* is positively significant at the 1% level (t = 5.1) and the secondary term is negatively significant at the 1% level (t = -3.19), showing a significant inverted U-shaped effect. This implies that at first, *PIV* can have a positive impact on enterprise performance when it increases, while after a certain level, an increase in *PIV* can instead have a negative impact on enterprise performance. By taking the partial derivative of *PIV* for model 3, the value of the turning point $\frac{-\beta_{10}}{2\beta_{11}}$ can be found to be about 298.14.

5.2.3 Robustness check

In order to ensure the robustness of the research results, the following tests are performed, and

all the test results are presented in Table 5.6. Model 4 and Model 5 are as follows:

$$\textbf{Model 4}: approximate\ Tobin's\ Q_{i,t+1} = \beta_0 + \beta_1 LnAsset_{i,t} + \beta_2 Leverage_{i,t} + \beta_3 Concentration_{i,t} + \beta_4 GPM_{i,t} + \beta_5 Intangible_{i,t} + \beta_6 HTEcertifecation^{i}_{i,t} + \beta_7 PI_{i,t} + \beta_8 PII_{i,t} + \beta_9 PIII_{i,t} + \beta_{10} PIV_{i,t} + \varepsilon_{i,t} \quad (5.4)$$

$$\textbf{Model 5}: Tobin's\ Q_{i,t+1} = \beta_0 + \beta_1 LnAsset_{i,t} + \beta_2 Leverage_{i,t} + \beta_3 Concentration_{i,t} + \beta_4 GPM_{i,t} + \beta_5 Intangible_{i,t} + \beta_6 HTEcertifecation^{i}_{i,t} + \beta_7 PI(annual\ increment)_{i,t} + \beta_8 PII(annual\ increment)_{i,t} + \beta_9 PIII(annual\ increment)_{i,t} + \beta_{10} PIV(annual\ increment)_{i,t} + \varepsilon_{i,t} \quad (5.5)$$

The regression results of the model are shown in Table 5.6:

Table 5.6 Robustness test (with *approximate Tobin's Q* as dependent variable)

Stock regression results		Incremental regression results	
Variable	Model 4	Variable	Model 5
LnAsset	-0.275*** (-8.00)	*LnAsset*	-0.310*** (-8.6)
Leverage	0.165*** (3.1)	*Leverage*	0.187*** (3.97)
Concentration	0.0001 (0.17)	*Concentration*	-0.0001 (-0.11)
GPM	0.087 (0.42)	*GPM*	-0.03 (-0.15)
HTE certification	0.010** (2.44)	*HTE certification*	0.010** (2.20)
Intangible	0.493*** (8.46)	*Intangible*	0.482*** (8.06)
PI	0.0001*** (4.08)	*PI (annual increment)*	0.0002*** (4.38)
PII	0.002* (1.78)	*PII (annual increment)*	0.004*** (3.00)
PIII	0.005** (2.15)	*PIII (annual increment)*	0.007* (1.75)
PIV	0.0001 (1.04)	*PIV (annual increment)*	-0.001* (1.68)
Intercept	7.85*** (10.49)	Intercept	8.759*** (11.00)
R-square	0.13	R-square	0.15
Obs	13989	Obs	13989

Note: *, **, and *** respectively represent significant differences at 10%, 5%, and 1% levels.

In this study, *approximate Tobin's Q* [(value of tradable shares + value of non-tradable shares + book value of liabilities)/total assets] is taken as the replacement dependent variable and the increment of the independent variable as the replacement independent variable for the robustness test (Li et al., 2007). The regression results show that the influence of the number of each trademark portfolio on enterprise performance is basically consistent with the above results.

5.3 Further test

It can be seen from the above regression analysis that, as a special system arrangement of China, “high-tech enterprise certification” has a significant and stable positive impact on enterprise performance. Relevant research conclusions indicate that the “high-tech enterprise certification” has external relevance to enterprise innovation (H. X. Liu & Zhang, 2021; G. Sun et al., 2016; L. L. Xu et al., 2021; S. D. Zhao, 1999). Will “high-tech enterprise certification” have an impact on the relation between trademark portfolios and enterprise performance? To answer this question, this research attempts to conduct a more in-depth analysis of the institutional factor - “high-tech enterprise certification”.

5.3.1 “High-tech enterprise certification” system background

In April 2008, the National Bureau of Science and Technology, the Bureau of Finance and the State Administration of Taxation jointly issued the “Administrative Measures for the Certification of High-tech Enterprises”. According to the Administrative Measures, the certification conditions for a high-tech enterprise are briefly summarized as follows: (1) The core goods shall have independent intellectual property rights; (2) The core goods and technologies shall belong to the eight high-tech fields supported by the State; (3) The proportion of scientific and technical personnel must account for more than 10% of the total number of employees; (4) The proportion of R&D expenses to sales revenue in the past three years must be 3%, 4%, 5% or more, depending on the sales revenue in the past year; (5) The income of high-tech products in the past year must account for more than 60% of the total income of the enterprise; (6) The evaluation score of the enterprise's innovation ability must be above 70; (7) There shall be no major safety or quality accidents or serious environmental violations within one year before the application for certification. If an enterprise is certified as a high-tech enterprise, it can enjoy preferential measures such as tax reduction and exemption and local incentives, and therefore enjoy a lowered threshold for financing loans and government subsidies (She et al., 2021).

The “high-tech enterprise certification” is intended to select high-quality enterprises and enterprises with development potential from a large number of applicants, and give them a policy preference to establish a competitive advantage within a relatively short period of time. However, China’s “high-tech enterprise certification” has no specific requirements for enterprises’ registered trademark applications and trademark strategies. As a result, thousands

of enterprises submit applications for "high-tech enterprise certification" every year. However, companies applying for certification and certified companies do not need to register trademarks and implement trademark strategies to meet the certification conditions set by the government. Under the external effect of the "high-tech enterprise certification" system, how companies will apply for trademark registration and implement trademark strategies? We will further explore this issue.

5.3.2 Further regression analysis

Table 5.7 presents the statistics of the number of high-tech enterprises in the sample. During 11 years (2008-2018), the number of sample enterprises recognized as high-tech enterprises increased from 6 to 508, accounting for nearly 30% of the total sample.

Table 5.7 Statistics on the number of high-tech enterprises in the sample

Year	Number of enterprises passing "high-tech enterprise certification"
2008	6
2009	55
2010	120
2011	133
2012	182
2013	234
2014	239
2015	304
2016	353
2017	403
2018	508

Note: The document *The Measures for the Administration of High-tech Enterprise Recognition* was promulgated in 2008

Based on the above analysis, this study takes the *HTE certification* as a moderating variable for analysis. The fixed-effect model expression is as follows, and the schematic diagram of the moderating effect model is shown in table 5.2.

$$\textbf{Model 6: } \boldsymbol{Tobin's\ Q_{i,t+1} = \beta_0 + \beta_1 LnAsset_{i,t} + \beta_2 Leverage_{i,t} + \beta_3 Concentration_{i,t} + \beta_4 GPM_{i,t} + \beta_5 Intangible_{i,t} + \beta_6 HTE\ certification_{i,t} + \beta_7 PI_{i,t} + \beta_8 PII_{i,t} + \beta_9 PIII_{i,t} + \beta_{10} PIV_{i,t} + \beta_{11} HTE\ certification_{i,t} * PI_{i,t} + \beta_{12} HTE\ certification_{i,t} * PII_{i,t} + \beta_{13} HTE\ certification_{i,t} * PIII_{i,t} + \beta_{14} HTE\ certification_{i,t} * PIV_{i,t} + \varepsilon_{i,t}} \quad (5.6)$$

Where, $Tobin'Q_{i,t+1}$ represents the performance of company i in year t+1; $LnAsset_{i,t}$, $Leverage_{i,t}$, $Concentration_{i,t}$, $GPM_{i,t}$, $Intangible_{i,t}$ are control variables; independent variables. $PI_{i,t}$, $PII_{i,t}$, $PIII_{i,t}$, $PIV_{i,t}$ respectively indicate the number of PI, PII, PIII, and PIV of company i in year t; $HTE\ certification_{i,t}* PI_{i,t}$, $HTE\ certification_{i,t}* PII_{i,t}$, $HTE\ certification_{i,t}* PIII_{i,t}$, *HTE*

$certification_{i,t}$* $PIV_{i,t}$ are the interaction terms formed by the independent variables *PI*, *PIII*, *PIII*, *PIV* and the moderating variable *HTE certification*,$\boldsymbol{\varepsilon_{i,t}}$ is the error term. The moderating effect model is shown as figure 5.3.

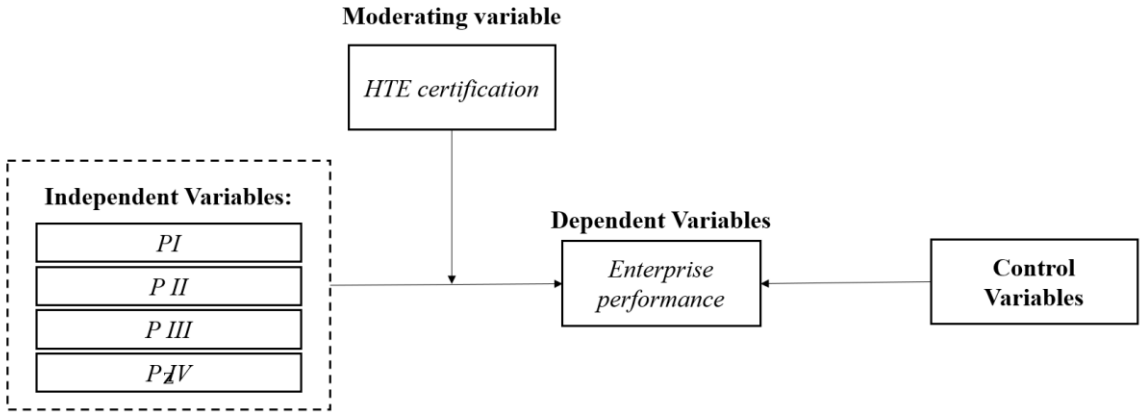

Figure 5.3 Schematic diagram of moderating effect model

Table 5.8 shows the regression results of Model 5 after addition of the control variable *HTE certification*. The model indicates whether official certification of an enterprise as a high-tech enterprise has a positive impact on enterprise performance at the 1% level (t=8.46). Model 6 introduces the interaction items between *HTE certification* and each trademark portfolio to test the moderating effect of *HTE certification* on the trademark portfolios and enterprise performance (with *HTE certification* acting as a moderating variable and a dummy variable).

Table 5.8 Regression analysis on moderating effect of *HTE certification* on variables

Variables	Dependent variable (*Tobin's Q*)	
	Model 5	Model 6
LnAsset	-0.275***	-0.278***
	(-8)	(-8.05)
Leverage	0.165***	0.165***
	(3.1)	(3.09)
Concentration	0.0001	0.0001
	(0.17)	(0.21)
GPM	0.087	0.099
	(0.42)	(0.47)
Intangible	0.01**	0.01**
	(2.44)	(2.41)
HTE certification	0.493***	0.566***
	(8.46)	(8.99)
PI	0.0001***	0.0001***
	(4.08)	(3.87)
PII	0.002*	0.002**
	(1.78)	(2.17)
PIII	0.005**	0.006**

	(2.15)	(2.12)
PIV	0.0001	0.0001
	(1.04)	(1.14)
HTE certification PI*		0.011*
		(1.68)
HTE certification PII*		-0.003***
		(-2.72)
HTE certification PIII*		-0.005***
		(-3.33)
HTE certification PIV*		0.0009
		(-0.42)
Intercept	7.85***	6.906***
	(10.49)	(9.58)
R-square	0.13	0.14
Obs	14786	14786

Note: *, **, and *** respectively represent significant differences at 10%, 5%, and 1% levels.

(1) The moderating effect on *HTE certification*PI* is significant at the 10% level (t=1.68), that is, when a sample enterprise is certificated as a high-tech enterprise, the positive impact of *PI* on enterprise performance is enhanced. (2) The moderating effect on *HTE certification*PII* is negatively significant at the 1% level (t=-2.72), that is, when a sample enterprise is certificated as a high-tech enterprise, the positive impact of *PII* on company performance is weakened. It also means that for non-high-tech enterprises, the positive impact of *PII* on enterprise performance is more significant. (3) The moderating effect on *HTE certification*PIII* is negatively significant at the 1% level (t=-3.33), that is, when a sample enterprise is certified as a high-tech enterprise, the positive impact of *PIII* on enterprise performance is weakened. It also means that for non-high-tech enterprises, the positive impact of *PIII* on enterprise performance is more significant. (4) The moderating effect on *HTE certification*PIV* is not significant. Since the number of *PIV* has an insignificant impact on enterprise performance, the moderating effect is not significant too, indicating that the number of *PIV* has no relation to enterprise performance, no matter whether the sample enterprises are high-tech enterprises or not.

According to the regression results in Table 5.8, certification of an enterprise as a high-tech enterprise has a significant moderating effect on the relation between different trademark portfolios and enterprise performance. For high-tech enterprises, the positive effect of *HTE certification* on *PI* is stronger than that of non-high-tech enterprises, while the positive effect of *HTE certification* on *PII* and *PIII* is weaker than that of non-high-tech enterprises.

Here are the core reasons for the above-mentioned moderating effects:

In terms of the internal resources and capabilities of high-tech enterprises, Chinese high-tech enterprises at least meet the following three important indicators: First, they possess

the ownership of the intellectual property rights that play a core supporting role in the technology of their core goods through independent research and development and other methods. Second, the technologies that play a core supporting role in the core goods fall within the scope of the "High-Tech Fields Supported by the State". Third, their income from high-tech goods in the past year accounted for no less than 60% of their total income in the same period. The above indicators determine that the internal resources and capabilities of high-tech enterprises are very focused, that is, 1) the goods produced are high-tech goods in the high-tech fields supported by the state; 2) the investment of the enterprises is dominated by R&D investment (X. D. Li et al., 2007), and the intellectual property rights obtained are mainly related to technological innovation such as patents and copyrights (B. Lin & Xue, 2020). Through analysis of the external influence of the system, we can know that the main policy tools used by the government to support high-tech enterprises include direct government subsidies for R&D and tax incentives (L. L. Xu & Zheng, 2016), while the intervention of the Chinese government is significantly correlated with the efficiency of enterprises' capital allocation (G. Sun et al., 2016). Accordingly, Chinese enterprises can form strong barriers to competition once they pass "high-tech enterprise certification" (H. Y. Huang et al., 2021). In addition, the number of trademark registrations and the categories of registered commodities are not the indicators for "high-tech enterprise certification". Therefore, for high-tech enterprises, the barriers to competition mainly include technical barriers and institutional barriers.

In short, (1) the goods of high-tech enterprises are not easy to be imitated, and it is more necessary to strengthen and protect the barriers to market competition formed by technical advantages through core trademarks. (2) Since the goods produced by high-tech enterprises are focused, in order to get the government support, high-tech enterprises need to protect the core trademarks of focused goods (core goods). Therefore, registering core trademarks on core goods *(PI)* will bring better performance to high-tech enterprises than registering core trademarks on non-core goods *(PII*) or registering non-core trademarks on core goods *(PIII)*.

Regarding how to improve the performance of enterprises that have not passed "high-tech enterprise certification", as such enterprises have not received government support and funding, they do not need to focus on R&D investment in goods in the high-tech fields supported by the state or on intellectual property rights such as patents and copyrights in order to meet the requirements for "high-tech enterprise certification". Meanwhile, they have more choices to implement competitive advantage strategies based on their own capabilities and resources and the external competitive environment (Teece, 2014). Goods produced by

non-high-tech enterprises are generally not technically high-tech products and are easy to be imitated. Therefore, defense-based trademark portfolios (*PII*) and joint-based trademark portfolios (*PIII*) can prevent others from imitating and copying their trademarks with less registration costs, and play a role in protecting the barriers to competition in core trademarks (M. J. Sun & Wei, 2012). Therefore, the registration of trademarks in the defense-based trademark portfolios (*PII*) and the joint-based trademark portfolios (*PIII*) by non-high-tech enterprises has more positive impact on enterprise performance.

Similarly, a regression analysis of the moderating effect of high-tech enterprises on the inverted U-shaped effect of *PIV* was conducted in this research, and the model was set as follows in Table 5.9:

$$\textbf{Model 7: } \boldsymbol{Tobin's\ Q_{i,t+1} = \beta_0 + \beta_1 LnAsset_{i,t} + \beta_2 Leverage_{i,t} + \beta_3 Concentration_{i,t} + \beta_4 GPM_{i,t} + \beta_5 Intangible_{i,t} + \beta_6 HTE\ certification_{i,t} + \beta_7 PI_{i,t} + \beta_8 PII_{i,t} + \beta_9 PIII_{i,t} + \beta_{10} PIV_{i,t} + \beta_{11} PIV_{i,t}^2 + \beta_{12} HTE\ certification * PIV_{i,t} + \beta_{13} HTE\ certification * PIV_{i,t}^2 + \varepsilon_{i,t}} \quad (5.7)$$

Table 5.9 Regression analysis on moderating effect of *HTE certification* on U-shape

Variables	Dependent variable (*Tobin's Q*)	
	Model 3	Model 7
LnAsset	-0.322***	-0.330***
	(-8.61)	(-8.8)
Leverage	0.160***	0.160***
	(3.05)	(3.05)
Concentration	0.0001	0.0001
	(-0.01)	(-0.16)
GPM	0.073	0.075
	(0.35)	(0.36)
Intangible	0.01**	0.01**
	(2.43)	(2.46)
HTE certification	0.461***	0.65***
	(7.87)	(9.41)
PI	0.0001***	0.0001***
	(4.67)	(4.69)
PII	0.0002	0.0001
	(-0.16)	(0.15)
PIII	0.008***	0.008***
	(2.85)	(3.43)
PIV	0.007***	0.009***
	(5.10)	(5.83)
PIV ^{2}	-0.0001***	-0.00001***
	(-3.19)	(-3.2)
HTE certification PIV*		-0.008***
		(-4.47)
HTE certification PIV* ^{2}		0.0001**
		(2.40)
Intercept	8.760***	8.891***

	(10.86)	(11.01)
R-square	0.18	0.17
Obs	14786	14786

Note: *, **, and *** respectively represent significant differences at 10%, 5%, and 1% levels.

The moderating variable can affect the U-shaped relationship in two ways: one is to shift the U-shaped curve turning point left or right; or it can make the U-shaped curve flat or steep. From the regression results in Table 5.9, it can be seen that *HTE certification* PIV* ^{2} is significant at the 5% level (t = 2.4) in model 6, contrary to the coefficient of the quadratic term of *PIV* in model 3. This means that *HTE certification* weakens the inverted U-shaped effect of *PIV* on enterprise performance and makes the inverted U-shaped curve flatter.

On the other hand, by deriving equation 5.6, the turning point can be derived as $\boldsymbol{X} = \frac{-\beta_{10}-\beta_{12}*\boldsymbol{HTE\ certification}}{2\beta_{11}+2\beta_{13}*\boldsymbol{HTE\ certification}}$. Since *HTE certification* is a dummy variable, there are only two cases, 0 and 1. Therefore, it can be calculated that when the enterprise is not a high-tech enterprise, which means *HTE certification* equals to 0, the turning point is 307.99. When the enterprise is a high-tech enterprise, i.e., *HTE certification*, the turning point is at -230.62. This turning point shift is very important and means that the turning point of the inverted U-shaped effect is located to the left of the y-axis when the enterprise is a high-tech enterprise. This means that when the PIV of a high-tech enterprise grows, the enterprise's performance decreases instead.

5.4 Summary

This chapter presents a descriptive and empirical analysis based on the stocks of each of the four trademark portfolios (value-based, defense-based, joint-based and cumulation-based) of the sample enterprises from 31 December 2007 to 31 December 2018.

(1) This chapter provides a descriptive analysis. Firstly, this chapter describes the changes in the annual stock of the four types of trademark portfolios from 31 December 2007 to 31 December 2018, in conjunction with the changes in China's trademark legal policies during the period, and demonstrates from a macro perspective that the annual stock of the four types of trademark portfolios has changed to varying degrees with the changes in trademark legal policies, among which the cumulation-based trademark portfolio is the most sensitive to trademark legal policies, i.e. the trademark legal policy has the most significant effect in regulating the cumulation-based trademark portfolio. Secondly, the averages of the four trademark portfolio stocks of the industries to which the sample companies belonged (in 2007 and 2018 respectively) were counted and presented, from which it can be seen that in 2007 the accommodation and catering industry ranked first in value-based trademark portfolio,

joint-based trademark portfolio, cumulation-based trademark portfolio and total number of trademarks, while the manufacturing industry ranked first in defense-based trademark portfolio. By 2018, the accommodation and catering sector ranked first in the value-based trademark portfolio only, the finance sector ranked first in the defense-based trademark portfolio, the agriculture, forestry, livestock and fishing sector ranked first in the joint-based trademark portfolio, and the culture, sports and entertainment sector ranked first in the cumulation-based trademark portfolio, with the culture, sports and entertainment sector ranking first in the total number of trademarks.Of particular note, the top three in terms of total trademark stock as at 31 December 2018 were culture, sports and entertainment; agriculture, forestry, animal husbandry and fishery; and information transmission, software, and information technology services. This coincides with China's 11th, 12th and 13th Five-Year Plans implemented during this period, which have continued to focus on strengthening the cultural industry, rural construction and promoting industrial informatization strategies (S. D. Li, 2017). This indicates, on the one hand, that there is a relationship between the implementation of trademark strategies by enterprises and the policies of the industries to which they belong, and, on the other hand, that the state implements economic and industrial development policies in which the trademark strategy of enterprises is also an important grip (Wei et al., 2010) .

(2) The regressions in this chapter analyses the relation between the annual stock of the four trademark portfolios and enterprise performance. The results of the regression analysis are also largely consistent with the hypotheses of this study. That is, the stock of trademark portfolios related to the enterprise's resources and capabilities (value-based, defense-based and joint-based) are positively correlated with enterprise performance (consistent with the hypothesis). However, the stock of cumulation-based trademark portfolio not related with the enterprise's resources and capabilities is inconsistent with the hypothesis (which assumes a negative relation). After further testing the U-shaped effect on cumulation-based trademark portfolios in this study, it was found that the cumulation-based trademark portfolio stock showed a significant inverted U-shape in relation to performance, and the turning point was at 289 units. This suggests that there is a positive effect on enterprises when they register a small stock of cumulation-based trademarks (turning point: 289). However, when the stock of registered cumulation-based trademarks exceeds a certain threshold, the higher the stock of cumulation-based trademarks, the more negative it is to the performance of the enterprise.

(3) This chapter also introduces the moderating variable of *HTE certification* to further regress the impact of the "high-tech enterprise certification" system on the relation between

the stock of the four trademark portfolios and enterprise performance. The results of the regression analysis show that the positive relation between the value-based trademark portfolio and enterprise performance is strengthened for companies certified as high-tech enterprises; however, the positive relation between their defense-based and joint-based trademark portfolios on enterprise performance is weakening. Meanwhile, the U-shaped relationship between the impact of *HTE certification* on the cumulation-based trademark portfolio and enterprise performance shows that if an enterprise is certified as a high-tech enterprise, its cumulation-based trademark portfolio is only negatively related to its performance, i.e. the more cumulation-based trademark portfolio a high-tech enterprise has, the worse its performance.

Chapter 6: Findings and Discussions

6.1 Findings

(1) From the perspective of the incremental change trend of different trademark portfolios from 2008 to 2018, the effects of trademark registration laws, policies and measures on trademark portfolios are significantly different. To be specific, the cumulation-based trademark portfolio (PIV) is the most sensitive to trademark registration laws, policies and measures, PIV drops significantly with the tightening of trademark registration laws, policies and measures, and increases sharply with the relaxation of relevant laws, policies and measures. The change trend of the value-based trademark portfolio (PI) and the defense-based trademark portfolio (PII) is not consistent with the tightening or relaxation of trademark registration laws, policies and measures. The joint-based trademark portfolio (PIII) responds steadily to relevant laws, policies and measures. It should be noted that the above four trademark portfolios showed a significant upward trend when China reduced registered trademark application fees in 2015, indicating that the cost of trademark registration is an important external factor affecting the number of registered trademark applications of Chinese enterprises.

(2) The distribution of the trademark portfolio stock by industry shows an overall growth rate of 260.8% over the 12-year period. In 2007, the industry with the largest trademark portfolio was accommodation and catering, however, by 2018, there was a tremendous growth in other industries, particularly culture, sports and entertainment (up 482.1%), IT (up 584.3%), Agriculture (484.1%), and Rental and Business Services (up 573.3%), which grew at a much higher rate than the overall growth rate. These sectors were also the focus of national economic planning during the period. Furthermore, the growth paths of these industry trademark portfolios are not consistent. For example, the culture, sport and entertainment sector is dominated by growth in PII and PIV; the IT sector is dominated by growth in PII and PIV (especially PII has a very high growth rate); and agriculture is dominated by growth in PIII and PIV. It is also noteworthy that the scale of growth in PIV across all sectors is much higher than the growth in PI, PII and PIII, with an overall growth rate of 417%. In 2007, the extreme difference in PIV was 28.83, while by the end of the year, it was 110.8, a 3.84-fold increase.

For example, the industry average for PIV in the culture, sport and recreation sector is 121.2, while in the energy sector the PIV is only 10.4.

(3) Through the empirical analysis, we obtain the hypothesis test results, as shown in Table 6.1.

Table 6.1 Regression results of research hypotheses and further test

Hypothesis	Content	Conclusion	Explanation
H1*(PI)*	The more stock of value-based trademark portfolio (*PI*), the higher is enterprise performance	Support	The more the core trademarks on core goods owned by an enterprise, the better the enterprise performance.
H2*(PII)*	The more stock of defense-based trademark portfolio (*PII*), the higher is enterprise performance	Support	The more the core trademarks on non-core goods owned by an enterprise, the better the enterprise performance.
H3*(PIII)*	The more stock of defense-based trademark portfolio (*PII*), the higher is enterprise performance	Support	The more the non-core trademarks on core goods owned by an enterprise, the better the enterprise performance.
H4*(PIV)*	The more stock of cumulation-based trademark portfolio (*PIV*), the lower is enterprise performance	Not support	The stock of non-core trademarks on non-core goods by an enterprise is not related to enterprise performance. However, the cumulation-based trademark portfolio stock shows a significant inverted U-shape in relation to performance, and the turning point is at 289 units.

Description of the moderating variable ***HTE certification*** for further testing

Moderating variable * independent variable	Moderating effects	Explanation
HTE certification PI*	Significant positive moderating effect	The positive impact of *PI* on enterprise performance is stronger in high-tech enterprises compared to non-high-tech enterprises
HTE certification PII*	Significant negative moderating effect	The positive impact of *PII* on enterprise performance is weaker in high-tech enterprises compared to non-high-tech enterprises
HTE certification PIII*	Significant negative moderating effect	The positive impact of *PIII* on enterprise performance is weaker in high-tech enterprises compared to non-high-tech enterprises
HTE certification PIV*	/	/

According to the results of the above empirical research hypothesis testing, the following

theoretical model (shown in figure 6.1) is obtained, which more intuitively explains the correlations between the variables involved in this chapter

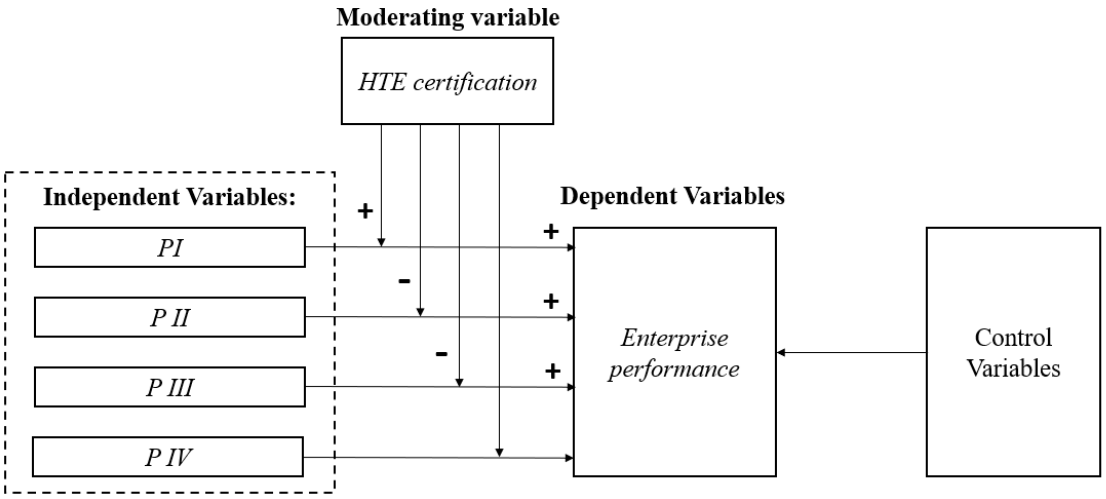

Figure 6.1 Validation results of the theoretical model in this chapter

6.2 Discussions

The research results of the previous chapter and this chapter further verify and expand the influencing factors of the strategic behavior of enterprises' trademark application in the context of China's system arrangement, revealing the different effects of different trademark application strategies on enterprise performance. Most of the current empirical research analyzes the trademark application strategy of enterprises from a single perspective and a single level, such as the total number of trademark registrations, commodity categories, and trademark registration period of enterprises of different scales or industries. This, to a certain extent, limits the understanding of the internal factors and the role of the external system in the trademark registration strategy of enterprises. In this study, descriptive statistics and regression analyses of sample data were conducted separately to explore the value of an enterprise's trademark portfolio strategy in terms of different dimensions of macro-legal policy, industry, relation between an enterprise's trademark portfolio and enterprise performance, and special regime as a moderating variable ("high-tech enterprise certification").

6.2.1 Discussion on the results of descriptive statistics

(1) The incremental change trend of different trademark portfolios from 2008 to 2018 reveals that the four trademark portfolios (value-based, defense-based, joint-based and

cumulation-based) reflect varying degrees of sensitivity to trademark legal policies. Among them, the cumulation-based trademark portfolio, which is dominated by the brand diversification strategy of not extracting core signs and core goods and the purpose of trademark hoarding, is the most sensitive to trademark legal policies. The degree of responsiveness of the four trademark portfolios to trademark legal policy is as follows: cumulation-based trademark portfolio > defense-based trademark portfolio > value-based trademark portfolio > joint-based trademark portfolio.

(2) From the trend of changes in the average values of the four trademark portfolios and total stock of the industries to which the sample enterprises belong (2007 and 2018 respectively), it can be found that the four trademark portfolios of the industries combined with the average value of the total stock are influenced by the national industrial policies respectively. Among them, the growth rate of the average value of trademarks basically coincides with the key construction industries of the National 11th Five-Year Plan, 12th Five-Year Plan and 13th Five-Year Plan. For example, as of 31 December 2018, the average value of trademark stock was in the top three industries: culture, sports and entertainment; agriculture, forestry, animal husbandry and fishery; and information transmission, software and information technology services, which is coincided with the key construction industries of China's national economic development plan during this period: cultural industry, new rural industry and manufacturing information technology industry. This indicates that the trademark strategy of enterprises is related to the policy of the industry to which they belong, and this also reflects, to a certain extent, that the trademark registration strategy has become an important grasp of national economic development or industry competitiveness enhancement. Interestingly, the culture, sport and entertainment industry is not significant in terms of the average value-based, defense-based and joint-based trademark portfolios, but only in terms of the average cumulation-based trademark portfolio, which is much higher than the other industries, resulting in the first position in terms of the average stock of total trademarks.

In summary, the descriptive analysis of the sample data shows that the different trademark registration application strategies of enterprises are influenced to varying degrees by the institution, including trademark legal policies and industrial policies. Among them, the trademark portfolios related to enterprises' resources and capabilities (value-based, defense-based and joint-based) are less responsive to policy stimulation, indicating that enterprises are more rational in adopting these three types of trademark registration application strategies by considering not only institutional factors but also their own competitive elements. However, cumulation-based trademark portfolios, which are less linked

to a company's own resources and capabilities, are more influenced by external regimes and are most responsive to policy stimuli, most notably in the culture, sports and entertainment sector.

6.2.2 Discussion on empirical analysis

Based on the trademark portfolio matrix and the trademark value model, this chapter empirically analyzes the different effects of different trademark portfolios on enterprise performance, and further introduces the test results of the moderating variable "high-tech enterprise certification". In this chapter, the hypothesis test results based on the second-hand data of Chinese listed companies can be drawn:

(1) Similar to the common view that the value-based trademark portfolio is the core trademark and core goods marketing method of a company, the analysis of the panel data from 2007 to 2018 indicates that the stock of value-based trademark portfolios has a positive impact on enterprise performance. According to the relatively stable growth in the increment of value-based trademark portfolio from 2007 to 2018, under the guidance of China's trademark legal system and policies, the application behavior of Chinese listed companies for the value-based trademark portfolio is very rational.

For example, *Tsingtao Brewery Co., Ltd*. (hereafter referred to as *Tsingtao Brewery*), had the largest increase in its value-based trademark portfolio between 2007 and 2018, which was greater than the company's average trademark growth. In particular, in 2011, the stock of value-based trademark portfolios of *Tsingtao Beer* increased steeply from 1 in 2010 to 27, mainly due to 1) the *Opinions on Several Issues Concerning the Hearing of Administrative Cases on the Confirmation of Trademark Authorization* issued by the Supreme People's Court in 2010, which abolished the opposition review procedure at the examination stage of trademark applications, i.e. simplified the procedure for the confirmation of trademark authorization. 2) In 2010, *Tsingtao Brewery* acquired *Taiyuan Jiahe Brewery*, which will undergo equipment renovation and process upgrading of its Taiyuan plant, increasing its production capacity to 400,000 tonnes, which is already ranked No. 1 in the beer industry in China. In contrast, *Tsingtao Brewery* added a value-based trademark portfolio based on internal competitive factors and external institutional considerations, which had a positive impact on corporate performance.

(2) Similar to the common view that the defense-based trademark portfolio can prevent core trademarks from being diluted and extract core trademarks to extend their commercial value, the analysis of the panel data from 2007 to 2018 indicates that the stock of

defense-based trademark portfolio shows a relatively stable growth trend and has a significant positive effect on enterprise performance. However, since the implementation of the trademark strategy by the Trademark Office in 2012 and the lowering of the application fee by the Trademark Office in 2015, the increment of defense-based trademark portfolio has showed a significant growth trend. Therefore, under the guidance of Chinese trademark laws and policies, the application behavior of Chinese listed companies for defense-based trademark portfolio tends to be rational.

China Railway Materials Co. (formerly known as *Tianjin FAW Xiali Automobile Co*., *Ltd.*), hereinafter referred to as *FAW Xiali*, during the period from 2007 to 2018, the increase in its defense-based trademark portfolio exceeded the average increase in its total trademark portfolio. The main reasons for this are: 1) In 2008, China implemented the *National Intellectual Property Strategy*, of which brand strategy is an important part, and as a State-controlled enterprise, it urgently needs to protect its core brand by registering defensive trademarks in response to the needs of the national policy.2) On January 21, 2007, at the "2006 CCTV Car of the Year Award Ceremony", *FAW Xiali*'s self-developed *Xiali* sedan was awarded the crown in the "2006 CCTV China Car of the Year 1.3L-1.4L" category. On March 28, 2007. *FAW Xiali* signed an export contract for 5,000 units of Xiali cars with VITA of Russia. Therefore, *FAW Xiali* registered core trademarks on non-core goods in accordance with the demand of national policies and the need to enhance the competitiveness of enterprise products in a timely manner, which is conducive to building a competitive barrier for core trademarks and preventing others from taking advantage of it, thus benefiting enterprise performance.

(3) Similar to the common view that the joint-based trademark portfolio can prevent the confusion of core trademarks and extract the extended commercial value of core goods, the analysis of the panel data from 2007 to 2018 indicates that the stock of the joint-based trademark portfolio has a significant positive impact on enterprise performance. Combined with the stable growth trend of the increment of joint-based trademark portfolio from 2007 to 2018, the trademark application behavior of Chinese listed companies for joint-based trademark portfolio is very rational and is hardly affected by changes in China's trademark laws and policies.

Shanghai Haixin Group Co.(hereinafter referred to as *Haixin Group*), during the period from 2007 to 2018, its joint-based trademark portfolio increased significantly, especially in 2013, the number of its joint-based trademark portfolio increased from 2 in 2012 to 22. The reasons for this are mainly: 1) in 2013, the third amendment to China's *Trademark Law* was

passed and implemented, which emphasises that "the application for registration and use of a trademark shall be in accordance with the principle of honesty and credit" and that multiple classes of goods can be applied for the registration of the same trademark, thus encouraging honest enterprises to protect their legitimate rights and interests by registering trademarks, and also bringing convenience and cost savings to enterprises in applying for registered trademarks.2) On 26 July 2012, *Haixin Biotechnology*, a subsidiary of *Haixin Group*, obtained the "Antigen-sensitised human dendritic cells" project from the *State Food and Drug Administration* and was approved to conduct Phase III clinical trials, which has promising prospects for the product to be put on the market. There is an urgent need to advance the trademark registration strategy to protect the brand value of its core business. Therefore, *Hisense Group*'s registration of non-core trademarks on core goods, i.e. increasing the joint-based trademark portfolio, is conducive to improving enterprise performance.

(4) Firstly, the regression result of the relation between the stock of cumulation-based trademark portfolio and enterprise performance shows that an increase in cumulation-based trademark portfolio stock has no relation with enterprise performance. Secondly, the cumulation-based trademark portfolio stock is significantly inverted U-shaped (turning point: 289 pieces) with enterprise performance. This indicates that when the stock of cumulation-based trademark portfolio is small, it has a positive impact on the enterprise performance; however, when the stock of cumulation-based trademark portfolio exceeds the turning point, the more cumulation-based trademark portfolio stocks an enterprise has, the more negative it is to the enterprise's performance. When the stock exceeds the turning point the negative impact of the enterprise is mainly because applications for registration of this type of trademark portfolio are mostly influenced by external regimes, i.e. legal policy influence or industry policy influence. Against the background of China's legislation, enforcement and judicial authorities' ongoing efforts to curb trademark hoarding, enterprises that register trademarks solely for the purpose of hoarding are likely to suffer negative legal consequences for their businesses, leaving the cost of registration applications and the cost of maintaining the trademarks uncompensated, and thus having a negative impact on their businesses.

LeTV Information Technology (Beijing) Co. (hereinafter referred to as *Leshi*), whose cumulation-based trademark portfolio grew much faster than the average growth in the total number of trademarks during the period 2007-2018. In particular, the cumulation-based trademark portfolio increased from 202 in 2015 to 774 in 2016 and to 802 in 2017. As the *Provisions on Several Issues Concerning the Trial of Administrative Cases of Trademark*

Authorization and Confirmation, adopted by the Supreme People's Court on 11 January 2017, further emphasizes the attitude of encouraging honest trademark registration applications and curbing trademark registration applications for the purpose of hoarding. Therefore, the increase of non-core trademarks on non-core goods, i.e. the increase of cumulation-based trademark portfolio by *Leshi*, is more mainly for internal reasons of the enterprise. In 2017, *LeShi* received a notice from controlling shareholder Jia Yueting, Jia Yueting directly held shares of *LeShi* were all frozen; the 2018 annual report disclosed that the company was in a situation of insolvency. The above-mentioned public information shows that when *LeShi* is in a difficult position in terms of its own capacity and resources, it either "jumped the gun" and wanted to obtain more registered trademarks by spending relatively less on trademark registration application fees and selling them for a profit; either this is because the cultural and entertainment industry, to which *Leshi* belongs, has seen a significant increase in its cumulation-based trademark portfolio during this period, and based on the "crowd" mentality, it has also increased the number of cumulation-based trademark portfolio, thereby seeking to reap industry dividends. Apparently, because of the irrational nature of *Leshi*'s increasing the number of cumulation-based trademark portfolio, the increase in the number of cumulation-based trademark portfolio did not have a positive impact on enterprise performance.

(5) Through the regression analysis on the moderating effect of "high-tech enterprise certification" on variables as shown in Table 5.8, we can know that high-tech enterprise certification has a positive moderating effect on the positive effect of value-based trademark portfolio on enterprise performance, while it has a negative moderating effect on the positive effect of defense-based trademark portfolio and joint-based trademark portfolio on enterprise performance. It is thus clear that, affected by the certification conditions and government funding of China's high-tech enterprises, the more the value-based trademark portfolios registered by high-tech enterprises in China, the more positive effect they will have on enterprise performance. Meanwhile, the more the defense-based trademark portfolios and joint-based trademark portfolios registered by Chinese non-high-tech enterprises, the more positive effect they will have on enterprise performance. Meanwhile, according to the influence of the moderating variable "high-tech enterprise certification" in Table 5.9 on the inverted U-shaped effect of the cumulation-based portfolio on enterprise performance, it can be seen that if a high-tech enterprise applies for registration of a cumulation-based trademark, it will have a negative impact on enterprise performance.

Therefore, in the era of knowledge economy, trademarks are regarded as an important

competitive strategic element by enterprises because of their exclusive rights granted by law. However, due to the complexity and uncertainty of trademark rights, there is no consistent conclusion on whether trademarks positively affect enterprise performance (Bei, 2019; Castaldi et al., 2021; Mendonça et al., 2004). In scholars' research on the relation between trademarks and enterprise performance, positive, negative, U-shaped, and insignificant relations all appear (Flikkema et al., 2019; Helmers & Rogers, 2010; LauraÃ & Kaivo-oja, 2017; Seip et al., 2018). Inconsistent conclusions require scholars to further study the impact of trademarks on enterprise performance and its impact mechanism.Through descriptive and regression analyses, this study reveals the value of different trademark portfolio strategies of companies in terms of both external systems and internal resources and capabilities, respectively.

First, if enterprises apply for the registration of trademarks in the value-based, defense-based, and joint-based trademark portfolios, respectively, based on their own resources and capabilities, this is conducive to improving enterprise performance.

Second, if an enterprise applies for trademark registration based on a diversified brand strategy or purely for the purpose of hoarding trademarks, there will be no favorable impact on the enterprise. Especially in the context of China's continuing policy to curb the practice of filing trademark registrations not for the purpose of use, when the stock of cumulation-based trademark portfolio owned by enterprises exceeds the turning point (the turning point for this regression analysis is: 289), the more it negatively affects enterprise performance.

Finally, the enterprises that have passed "high-tech enterprise certification" have obtained external barriers to competition, and registering trademarks in the value-based trademark portfolio is conducive to enterprise performance; enterprises that have not passed "high-tech enterprise certification" have not obtained favorable factors outside the market, so they need to apply for more trademarks in the defense-based and joint-based trademark portfolios that match their own resources and capabilities to help improve enterprise performance. In addition, it is worth noting that for enterprises that have obtained "high-tech enterprise certification", registering non-core trademarks on non-core goods, i.e. having a cumulation-based trademark portfolio, will have a negative impact on the performance of the enterprise. This, combined with the fact that having a defense-based and joint-based trademark portfolio will reduce the positive impact of the above two types of trademark portfolios on the performance of a high-tech enterprise, suggests that a focused trademark application strategy, i.e. concentrating on the registration of value-based trademark portfolios, will help to improve the performance of high-tech enterprises.

6.2.3 Discussion on inadequate testing

Although chapter 5 effectively extends the existing research on trademark strategy and the path to realizing trademark value through empirical analysis, there are still some shortcomings:

(1) The sample in this chapter contains listed companies. On the one hand, the scale is large and the conclusions obtained are not necessarily applicable to start-up companies and small-scale enterprises. Therefore, in order to increase the generalizability of the conclusions, further research extensions are needed in the future.

(2) The empirical study in this chapter focuses on the enterprise level, while the realization of trademark strategy and trademark value is related to the reputation of the trademark itself (Bently et al., 2018), and thus cannot fully reveal the inner micro-mechanism of the path of realizing the value of the enterprise's trademark registration application strategy.

(3) China's unique institutional arrangements are only related to the "high-tech enterprise certification" system, and cannot be extended to other unique institutional arrangements, and the indicators of marketability include the proprietary and legitimacy dimensions of judicial trials.

Chapter 7: Conclusions and Implications

Through the theoretical deduction, conceptual model creation, trademark portfolio database establishment, descriptive analysis and empirical analysis in the first six chapters, this research provides a deeper and clearer understanding of the value of a enterprise's trademark portfolio strategy in the context of the Chinese institution. On this basis, this chapter will first summarize and refine the main conclusions and innovations of the research, and then summarize the theoretical contribution and practical implication of this research, and finally point out the limitations and shortcomings of the current research and propose possible future research directions.

7.1 Conclusions

In the era of knowledge economy, intellectual property has become the key for enterprises to surviving and developing, improving performance, and to obtaining sustainable competitive advantages. Under the new situation of China's development during the transition period, the implementation of trademark brand strategy is an inevitable choice for the implementation of innovation-driven development strategy. It is also an urgent requirement to promote the transition from "Made in China" to "Created in China", and to build a brand-powered country, and an important measure to lead the upgrading of the supply and demand structure. In the context of the continuous "blowout" of registered trademark applications in China, this research focuses on Chinese companies that are still troubled by registered trademarks. That is, if enterprises imitate the full-category trademark registration of *Shenzhen Huawei Technologies Co*. and *Yibin Wuliangye Co.*, they have to bear high trademark registration and maintenance cost. If an enterprise does not register full-category trademarks, others may counterfeit its trademarks or seize market opportunities through preemptive trademark registration. This study combines the Chinese institutional situation and enterprise practice, constructs the research framework based on institutional theory and competitive advantage theory, and studies the trademark registration application strategy of enterprises, that is, the relation between different trademark portfolios and enterprise performance. In this regard, this research provides a reference path for enterprise trademark registration strategies, and also provide implication for legislators and law enforcement officers to review the rationality of China's trademark registration legal system.

Firstly, taking the context of China's trademark system as the research background, from the perspective of institutional theory, the basic logic of the enterprise's trademark registration application behavior affected by the trademark system is proposed, and then from the perspective of the trademark registration application stipulated in the Chinese Trademark Law, the trademark portfolio matrix of "signs & goods" is constructed. Next, this research conducts a descriptive analysis of the incremental change trend of different trademark portfolios from 2008 to 2018, combined with the changes in China's trademark system and policies in the past 11 years, and observes the impact of changes in China's trademark system and policies on the total stock of different trademark portfolios. In addition, we also describe the average value of the trademark portfolio of the industry to which the enterprise belongs (2007,year 2018, respectively), thus finding significant differences in the stock of the trademark portfolio and the total number of trademarks in different industries during this 12-year period. In the subsequent regression analysis, China's "high-tech enterprise certification" system is used as a moderating variable to further verify the impact of the Chinese institution on the relation between different trademark portfolios and enterprise performance. To a certain extent, the results of this research enrich the theory of the trademark system, expand the understanding of the macro evolution of the strategy of enterprise trademark registration application, and deepen the understanding of the impact of the institutional situation on the strategy of enterprise trademarks.

Secondly, from the perspective of competitive advantage theory, this research sorts out the views of "resource-based", "capability-based" and "knowledge-based" as the basic logic for analyzing enterprise trademark strategy. Then, according to the trademark portfolio matrix of "signs & goods", combined with the different motivations of enterprises' trademark registration applications, a trademark portfolio value model is constructed. Among them, the value of the value-based trademark portfolio (core signs & core goods) is to protect the exclusive use of an enterprise's core trademark on its goods, and to extract the core commercial value of the core trademark; the value of the defense-based trademark portfolio (core signs & non-core goods) is to prevent the core trademark from being diluted or to obtain the extended commercial value of the core trademark; the value of the joint-based trademark portfolio (non-core signs & core goods) is to prevent the core trademark from being confused or to achieve brand differentiation in core business; the value of the cumulation-based trademark portfolio (non-core signs & non-core goods) is not only manifested in a variety of goods and multi-brand strategies but may also be the hoarding of trademarks for the purpose of transaction. The study then collected trademark data and financial data of listed companies in China (including consolidated subsidiaries) from 31 December 2007 to 31 December 2018, and regressed them to analyses

the relation between different trademark portfolios and enterprise performance, so as to empirically analyses the impact on enterprise performance of different trademark registration application strategies adopted by enterprises according to their own resources and capabilities and external systems.

Thirdly, as the data used for the trademark portfolio in this research is not simply the information on the enterprise trademark registration data published in the public trademark database (the sign of the trademark, the registration category of the trademark, the time of trademark registration, the applicant of trademark registration, the legal status of the trademark registration).Rather, it is necessary to identify and match the trademark portfolios corresponding to each trademark based on the sign and registration category of each trademark published in the trademark database, combined with the scope of the core business of the sample companies as published on their official websites or annual reports. therefore, this study creatively constructs a trademark portfolio database, i.e. a database of four trademark portfolios of Chinese listed companies (including consolidated subsidiaries) from December 31, 2007 to December 31, 2018, which lays the foundation for this empirical study.

Based on the above research perspective and research path, the conclusions of this research are as follows.

(1) Based on the incremental change trend of different trademark portfolios from 2008 to 2018, this research finds that the different trademark portfolios of enterprises are related to the changes in the legal system of registered trademarks in China. To be specific, the annul stock of cumulation-based trademark portfolios is the most strongly affected by China's registered trademark applications and examination measures, as each sharp rise or decline coincides with the time point of the changes in China's trademark registration examination measures. The other three trademark portfolios that reflect the stimulus of China's trademark registration policy, from strong to weak, are defense-based trademark portfolios, value-based trademark portfolios, and joint-based trademark portfolios. But what is interesting is that after the Trademark Office decided to reduce the registered trademark application fee in 2015, the four trademark portfolios showed a significant upward trend that year. This shows that there is a certain relation between the annul stock of applications for trademark registration of enterprises and trademark registration fees. The cumulation-based trademark portfolio is the most affected by the stimulus of trademark registration policies. Based on the foregoing empirical analysis conclusions, when the annul stock of cumulation-based trademark portfolio has no significant impact on enterprise performance, it is further explained that the number of cumulation-based trademark portfolio that enterprises apply for registration is mostly driven by external policy

rather than internal driving forces.

(2) From the changes in trademark portfolio data from an industry perspective, an overall growth rate of 260.8% over the 12-year period. In 2007, the industry with the largest trademark portfolio was accommodation and catering, however, by 2018, there was a tremendous growth in other industries, particularly culture, sports and entertainment (+482.1%), IT (+584.3%), Agriculture (+484.1%), and Rental and Business Services (+573.3%), which grew at a much higher rate than the overall growth rate. These sectors were also the focus of national economic planning during the period. Furthermore, the growth paths of these industry trademark portfolios are not consistent. For example, the culture, sport and entertainment sector is dominated by growth in PII and PIV; the IT sector is dominated by growth in PII and PIV (especially PII has a very high growth rate); and agriculture is dominated by growth in PIII and PIV. It is also noteworthy that the scale of growth in PIV across all sectors is much higher than the growth in PI, PII and PIII, with an overall growth rate of 417%. In 2007, the extreme difference in PIV was 28.83, while by the end of 2018, it was 110.8, a 384% increase. For example, the industry average for PIV in the culture, sport and recreation sector is 121.2, while in the energy sector the PIV is only 10.4. The distribution of the above-mentioned trademark portfolio in the industry reflects, to a certain extent, that the trademark portfolio strategy adopted by enterprises is related to the national industrial policy and the competitive strategy of industry. In addition, the trademark registration strategy of enterprises can also be an important “grasp” for the implementation of national industrial policies.

(3) The empirical analysis of the relation between trademark portfolios and enterprise performance shows that, from the perspective of enterprises’ internal resources and capabilities, the stock of value-based, defense-based, and joint-based trademark portfolios have a significant positive impact on enterprise performance, while the stock of cumulation-based trademark portfolio has no significant impact on enterprise performance, and when the stock of cumulation-based trademarks owned by enterprises exceeds the turning point (the tuning point is: 289), the greater the number of such trademark portfolios held by an enterprise, the more negatively impacted its performance. From the perspective of the external factors of the system affecting the trademark portfolios and enterprise performance, through the introduction of the moderating variable *high-tech enterprise certification*, this research further reveals that for enterprises that have passed “high-tech enterprise certification”, increasing the stock of value-based trademark portfolio has a better positive impact on enterprise performance than increasing the stock of defense-based and joint-based trademark portfolios. However, for enterprises that have not passed the “high-tech enterprise certification”, increasing the stock of

defense-based and joint-based trademark portfolios has a better positive impact on enterprise performance than enterprises that have passed the “high-tech enterprise certification”. In addition, the negative moderating effect on the inverted U-shaped relationship between cumulation-based trademark portfolio and enterprise performance also indicates that the more the stock of cumulation-based trademark portfolio owned by high-tech enterprises, the more negative it is for enterprise performance.

(3) Theoretical contribution of this study

As elaborated above, this study is based on institutional theory and competitive advantage theory, from the perspective of jurisprudence and management economics, combined with the problems of this study, and from the perspective of trademark system, trademark strategy, trademark strategy and enterprise performance, respectively, the views of the main literature are sorted out. Based on this, this study points out the shortcomings of the existing literature, including the rare empirical research on China’s trademark strategy from the perspective of jurisprudence and management economics in the same literature. Through the creation of trademark portfolio matrix, construction of trademark portfolio value model, research assumptions and regression analysis, the contribution of this study to related theories is summarized in Table 7.1.

Table 7.1 Main contributions to theory

Theme	Category	Author (Year)	Main View	Main Contributions
Trademark strategy	Classification of trademark strategies	Lemper (2012), Jia (2020)	From the perspective of the implementation subject of trademark strategy, there are national trademark strategy, local trademark strategy and enterprise trademark strategy.	By introducing the concept of “ trademark portfolio” from the perspective of jurisprudence and management economics, this study subdivides enterprise trademark strategies into value-based trademark portfolio strategies, defense-based trademark portfolio strategies that focus on extracting core trademark values, joint-based trademark portfolio strategies that focus on extracting core goods values, and cumulation-based trademark portfolio strategies that focus on
		Guo (2006)	From the distinction of trademark right application strategy, there are trademark design strategy, trademark application strategy, trademark maintenance strategy and trademark management strategy.	

			trademark hoarding or diversified brand strategies.
The strategic role of trademark registration	Barroso et al. (2019)	Trademark strategy can make full and effective use of the functions of trademarks to create more profits for enterprises and promote local economic development.	By constructing a trademark portfolio value model, this study further modularizes the strategic role of trademark registration application of enterprises according to the trademark functions and trademark value extraction methods represented by different trademark portfolios. From a legal perspective, the value-based trademark portfolio represents the protection of core trademarks on core goods; the defense-based trademark portfolio represents the prevention of trademark dilution; the joint-based trademark portfolio represents the prevention of trademark confusion; and the cumulation-based trademark portfolio represents the hoarding of trademarks. From a managerial economics perspective, value-based trademark portfolios represent the extraction of core trademark value from core goods; defense-based trademark portfolios represent the extraction of core trademark value; joint-based trademark portfolios represent the extraction of core goods value;
	Porter (1980), B. Lin and Xue (2020)	Transforming the quality and performance advantages of the goods into market advantages, promoting the concentration of various production factors to brand-name of products and enterprises, thereby promoting local economic development.	
	Kopp and Suter (2000), Y. Du (2012), Bently et al. (2018), Kong (2020), Schechter (1927), McCarthy (2004), Ertekin et al. (2018)	From the perspective of legal protection, the significance of trademark strategy lies in anti-confusion and anti-dilution.	

				and cumulation-based trademark portfolio represent multi-brand and multi-product strategies.
Trademarks and enterprise performance	Research on the Chinese market	H. X. Liu and F. L. Zhang (2021)	The trademark has a compound functional relation with enterprise performance.	1.In terms of the macro impact of trademark legal policies, the cumulation-based trademark portfolio is most sensitive to the macro legal policies of trademarks. And the number of trademark registration applications in different industries is also influenced by national industrial policies. 2.The “high-tech enterprise certification” system affects the relations of different trademark portfolios and enterprise performance.
		W. M. Sun (2017)	The value of trademarks varies in different stages of enterprise development, and changes with the scale of enterprise development.	
		J. Wang and Long (2020)	Enterprises with well-known trademarks are significantly better than those without well-known trademarks in terms of operation and innovation performance.	
	A certain relationship between trademark behavior and enterprise performance	Krasnikov et al. (2009)	Brand-related trademarks have a positive impact on an enterprise’s cash flow, Tobin’s Q, ROA and stock returns.	1.In general, trademark registration application strategies that are related to a firm's own resources and capabilities (specifically core trademarks and core goods in this study) have a positive impact on firm performance; while trademark registration application strategies that are not related to an enterprise’s own
		Sandner and Block (2011)	The use of trademark will increase the dimension of the impact of enterprise diversification on enterprise performance.	

	da Silva Lopes and Duguid (2010)	Different enterprises should choose their appropriate trademark behavior; otherwise, they will fall into the trap of "creative destruction" of Schumpeter's theory.	resources and capabilities are not related to enterprise performance. 2.The trademark strategy of high-tech enterprises differs from that of non-high-tech enterprises in that it should be more focused, i.e. applying for a value-based trademark portfolio is more conducive to improved performance.
Time considerations for trademarks to generate performance for businesses	Helmers and Rogers (2010)	Since the impact of trademarks on enterprise performance has a lag, generally 3-5 years, it is necessary to lag the trademark variables.	Through the analysis of the relation between trademark stock and performance for 12 years, this study found that the stock of trademarks (annual stock) has a different impact on enterprise performance (the following year's financial data).

7.2 Innovations

(1) As mentioned above, this study describes the different trademark registration application behaviors of enterprises by creating a trademark portfolio matrix, and creates a trademark portfolio value model based on the different trademark registration application motivations and strategies represented by these four different trademark portfolios. All the efforts are conducive to promoting the theoretical development of trademarks, an important component of intellectual property rights. Based on this, this research presents empirical analysis of the influence of different trademark portfolios on enterprise performance. This is a new and beneficial attempt of this research on the research path of trademark value, and also an important innovation of this research.

(2) Construction of trademark portfolio database is another innovation and contribution of this research. The trademark data involved in this study is not simply the number of registered trademarks, but whether the signs of the trademark is core or non-core; the categories of goods applicable to the trademark are core and non-core, which are formed after manual identification, verification and matching. Therefore, this study not only contributed to the trademark portfolio

database, but also contributed to the construction method and path of the trademark portfolio database, which provided a new research data basis for scholars to explore enterprise trademark strategy from second-hand data.

7.3 Implications

7.3.1 Implication on the optimization of enterprise trademark registration strategy

Generally speaking, the fundamental purpose of trademark registration applications is to improve business performance, i.e. to increase the competitive advantage of the enterprise. Firstly, an enterprise needs to decide how to register its trademark application based on its own resources and capabilities. Therefore, a trademark application strategy based on an enterprise's own resources and capabilities will either extract the core trademark signs or the core goods categories, and a trademark application that is not related to its own resources and capabilities will not bring positive performance, i.e. will not improve the competitiveness of the company. Secondly, an enterprise's trademark application strategy is influenced not only by the trademark laws and policies directly related to trademark registration applications, but also by other systems, such as the "high-tech enterprise certification" system. Since different institutional arrangements can create barriers to competition, i.e., enterprises that comply with special institutional arrangements will enjoy the dividends of the system, thus creating non-competitive barriers, enterprises need to pay attention to the impact of special institutional arrangements on the relevance of the trademark portfolio to enterprise performance, i.e., the impact of special institutional arrangements on enterprise trademark strategy. The specific revelations are as follows.

(1) Revelation 1: Enterprises should be cautious and rational when registering non-core trademarks on non-core goods. There are two reasons: First, registration of trademarks in the cumulation-based trademark portfolio is difficult to have a positive impact on enterprise performance, and when the stock of this type of trademark portfolio exceeds the turning point, it will have a negative impact on enterprise performance. Second, it is easy to incur deterrent measures taken by the government and judicial organs in the public interest. As a result, enterprises may bear unnecessary sunk costs of trademark application.

(2) Revelation 2: From the perspective of internal resources and capabilities, enterprises can appropriately increase the number of value-based, defense-based, and joint-based trademark portfolios. On the one hand, enterprises can protect their exclusive rights to core

trademarks (core brands) by registering their core trademarks on their core goods .On the other hand, by extracting the value of core trademarks or the value of core goods, enterprises have achieved extension in brand and category, expanded the scope of protection of core trademarks, formed barriers to differentiated competition, and increased the cost and legal risks of counterfeiting, plagiarizing and imitating core trademarks by other enterprises.

(3) Revelation 3: From the perspective of the external factors of the system, firstly, the enterprises that have passed the "high-tech enterprise certification" should focus more on registering their core trademarks on core goods to protect technological innovation and form barriers to competition, particular care should be taken to apply for cumulation-based trademark portfolio that are not related to their resources and capabilities.While those that have not passed the "high-tech enterprise certification" should focus more on registering core trademarks on non-core goods for the purpose of preventing trademark dilution, or on registering non-core trademarks on core goods for the purpose of preventing trademark confusion, thereby forming barriers to differentiated competition and enhancing their competitiveness. Secondly, because an enterprise's trademark strategy is also affected by the national trademark laws and policies and the competition structure of the industry it belongs to, enterprises can also make use of favorable external systems to increase the positive impact of the trademark registration application strategy on enterprise performance.

7.3.2 Implications on trademark law application and policy improvement

Accompanying the trademark registration application system is the phenomenon of trademark grabbing and hoarding. The main reason is that under the registered trademark application system, the first-to-file principle is generally applied at the same time, i.e. when different enterprises apply for the use of the same or similar signs for the same or similar goods, the exclusive right to use the trademark is acquired by the earlier applicant. The principle was originally designed to encourage those trademarks that have been in use in commerce for a long time to apply for registration as soon as possible in order to prevent losing the opportunity for legal protection. However, there is no doubt that under a simple registration application system, the law only protects marks registered first, which provides institutional space for some opportunists to register their trademarks in bad faith.

The phenomenon of bad-faith registration and hoarding of trademarks exists in all countries that have adopted a system of registration applications and is also prominent in China, as evidenced by the number of revocations of registered trademarks mentioned in Chapter 1 of this study. And the fourth amendment to China's Trademark Law (2019) places special emphasis

on deterring and punishing bad faith trademark registrations that are not for the purpose of use.

This study gives recommendations based on the tradition of Chinese trademark law, taking into account the realistic trademark practice of enterprises. Meanwhile, while confronting the shortcomings of the trademark registration application system itself, drawing on foreign experience and combining the results of this empirical study, the results of this research provide a referenceable basis for Chinese trademark authorities and courts to deal with the boundary of legal judgments on trademark registration and use, and whether a trademark registration application is in bad faith. The specific revelations are described below.

(1) Revelation 1: Trial implementation of the "Declaration System for the Use of Trademark Registration" can improve registered trademark application procedures. According to the conclusions of this study, the number of the value-based, defense-based, and joint-based trademark portfolios is positively related with enterprise performance, and enterprises engaged in marketing activities will use value-based trademark portfolios, that is, the enterprises not only register core trademarks on core goods, but also use these core trademarks. Accordingly, once a trademark in the value-based trademark portfolio is successfully registered, it will not be cancelled by the Trademark Office due to "non-use" for three consecutive years, nor will it be rejected by the Trademark Office for malicious applications for registered trademarks that are not intended for use. Therefore, the value-based trademark portfolio is protected by the trademark legal system from the perspective of protecting the legitimate rights and interests of enterprises, and from the perspective of protecting the order of fair competition in the market.

However, most of the enterprises applying for registration of trademarks in the defense-based or joint-based trademark portfolio are not for the purpose of using the trademarks or will not use the trademarks after registration. In addition, the number of the above-mentioned two trademark portfolios has a positive impact on enterprise performance, and to a certain extent serves the purpose of protecting core trademarks. Therefore, the Trademark Office of CNIPA can learn from trademark applicants in Japan, the United Kingdom, the United States and other countries (F. Y. Zheng, 2020), and initiate trial implementation of the "Declaration System for the Use of Trademark Registration" to make applicants' registered trademark application motives explicit, and to provide preliminary evidence for the national trademark authority to judge "malicious applications for registered trademarks that are not intended for use". Specifically, such "declaration" can be clarified in the *Regulations for the Implementation of the Trademark Law*. In addition, the column of Declaration of Use of Trademark Registration has been added to the "Application for Trademark Registration" to

enhance the operability of applying the above-mentioned provisions of the Trademark Law.

(2) Revelation 2: It is necessary to resolutely curb the hoarding of trademarks and prevent the abuse and waste of public resources (Cui, 2015). The main goal of the revision of China's Trademark Law in 2019 is to address the increasingly serious problem of malicious hoarding of trademarks for profit. As the stock of cumulation-based trademark portfolio owned by enterprises is in a significant inverted U-shaped effect (inflection point: 289), the State Trademark Administration should not curb the registration of non-core trademarks on non-core goods in a "one-size-fits-all" manner (rejecting the application), but should also treat the application of cumulation-based trademark portfolio separately, taking into account the integrity of the enterprise and the purpose of the enterprise's application for registered trademarks, so as to avoid wrongly interfering with the normal multi-brand and multi-product strategy of the enterprise.

7.4 Shortcomings and prospects

7.4.1 Shortcomings

This research has certain theoretical and practical significance, and expands existing research on trademark value and strategy. However, due to the complexity and particularity of trademark strategy itself, this research is still in the exploratory stage. Coupled with the limitations of the academic level, this research still have some shortcomings, and need to be further improved and expanded.

(1) Limitations of the theoretical model

In the research part of trademark application strategy, in order to improve the conciseness and effectiveness of the theoretical model, this research considers four ways for enterprises to rationally extract trademark value and presents modular analysis of the main motivations for registered trademark applications. Therefore, the theoretical model has its own limitations, and cannot fully reflect all the important influencing factors and details in reality. For this reason, the universality of the theory needs to be improved (Tan, 2008).

(2) Limitations of empirical sample selection

This study selects Chinese listed companies on the Shanghai and Shenzhen stock exchanges as the samples for empirical research. Although this study provides a detailed and scientific elaboration of the research questions and research methodology, the selection of the research sample does not significantly affect the analysis and conclusions of this study.

However, in general, the sample of this study is limited to listed companies that have been listed in China for more than 10 years, thus the study sample suffers from a certain degree of selectivity bias and the generalisability of the study findings is insufficient.

For example, SMEs may rely more on the "imitation" development logic (Wei et al., 2011; Xiang et al., 2012), and the reputation effects and cooperation opportunities brought by trademark defense and brand extension may be of little significance to them (Su, 2021). Therefore, the conclusions of this research are not necessarily applicable to SMEs, and this research needs to be expanded and refined in the future.

(3) Limitations of the study data

Based on the availability and convenience of the data, the empirical evidence in this study uses secondary data of listed companies in China, i.e. both the registered trademark data and financial data of listed companies are secondary data. The limitation of the data allows this research question to focus only on the publicly available level of companies.

For example, for the trademark portfolio data collection, we can only infer the core & non-core signs and core & non-core goods of the sample companies from the data published on their official websites, annual reports, *China Trademark website* and *Tian yancha*, and then categorise them into four trademark portfolio categories. But perhaps the non-core signs or non-core goods that we have identified in the above way are core signs or core goods to the decision makers and management of the company. Therefore, this study cannot systematically reveal the mechanism of the impact of a company's trademark registration application strategy and trademark value at a more micro level.

(4) Limitations of internal resources and capabilities versus external institutional factors

The mechanism of the "resources and capabilities" and "institution" logic to the enterprise trademark strategy needs to be further explored. This research discusses the influence of the "resources and capabilities" and "system" on the dynamic evolution of enterprises' trademark application strategies, as well as corresponding influencing factors, and the mechanism of trademark value acquisition in the context of the Chinese system.

In this study, only limited variables are used, including the dependent variable *Tobin's Q*, and the moderating variable "high-tech enterprise certification". Whether it is possible to select more indicators to describe enterprise performance or to select more Chinese special system influencing factors to study the impact of different industries and different types of enterprise trademark portfolios on enterprise performance? This remains to be further studied.

7.4.2 Future research prospects

In view of the limitations of this research, further expansion can be made in the following three aspects in the future:

(1) Enrich the theoretical foundation and improve the universality of theoretical models. The theoretical model is a simplified model of the real situation. However, in order to improve the credibility of theoretical simulation results, the theoretical model must fit the reality to the maximum. Future research will consider more subject types and strategic choices, and further verify the impact of enterprise heterogeneity and external systems on trademark application strategies, as well as a variety of mixed innovations (technical innovation and market innovation) and brand strategies (brand positioning and brand extension) under the dynamic evolution of enterprises' trademark application strategy, so as to enhance the validity and persuasiveness of the conclusion.

(2) Expand the samples and data of this research. In order to dig deeper into the decision-making mechanism of enterprises' trademark application strategies, the research samples and data can be expanded from the following three aspects.

First, further collect data on startups and SMEs to verify the general applicability of the theory of this research, and propose a new theoretical framework based on the characteristics of SMEs and startups, and expand this research (Veugelers & Schneider, 2018).

Second, further collect data from different industries, and study the dynamic evolution of enterprises' trademark application strategies, corresponding influencing factors and the mechanism of trademark value acquisition under different industrial policy environments.

Third, with case analysis and interview methods, take root in enterprises, obtain marketing and market innovation data, and study the mechanism of marketing and innovation heterogeneity on the dynamic evolution, influencing factors and performance effects of enterprises' trademark application strategies.

(3) Based on the empirical approach adopted in this study, the data collected are "secondary data", therefore, future research can be based on the findings of this study, through interviews and case studies, so as to more accurately construct trademark portfolio data, and more microscopically understand the motives of enterprise trademark registration application, and then more accurately analyse the relationship between enterprise trademark registration application strategy and enterprise performance.

(4) Further distinguish the influencing mechanism of "capacity and resources" and "institution" logic on the dynamic evolution of enterprises' trademark application strategies,

corresponding influencing factors, and value acquisition, and choose better proxy variables to study the difference in the degree of influence of the two variables on different enterprises, and the interactive influence between the two variables, to more comprehensively, in-depth and meticulously reveal the influencing mechanism of the “institution” logic on the enterprise trademark strategy in the context of the Chinese system.

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