THE COMPETITIVE ADVANTAGE MODEL OF CHINA'S "DOUBLE FIRST-CLASS" UNIVERSITY LIBRARIES FROM KNOWLEDGE-BASED DYNAMIC CAPABILITIES

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A dissertation submitted in partial fulfillment of the requirements for the degree of

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DECLARATION

I, Xue Jingjing (Student ID# 6319200003), hereby certify that the work embodied in this dissertation entitled "The Competitive Advantage Model of China's "Double First-Class" University Libraries from Knowledge-Based Dynamic Capabilities" is the result of original research and has not been submitted for a higher degree to any other university or institution.

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ABSTRACT

Title : The Competitive Advantage Model of China's "Double First Class" University Libraries from Knowledge-Based Dynamic Capabilities

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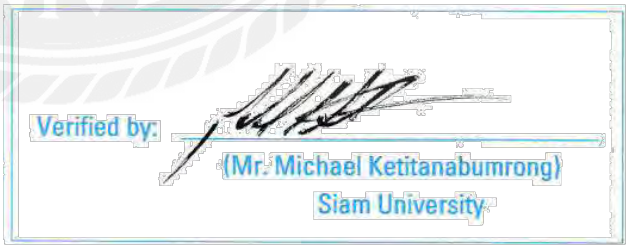
With a focus on improving national science and technology, universities and their libraries must actively form and maintain competitive advantages to support university teaching and research. The "Double First-Class" library is central to sharing knowledge resources, developing talented teams, and enhancing students' innovative abilities, which are essential for growth. The aims of this study are:(1) To investigate the factors of knowledge-based dynamic capabilities through service innovation that contribute to university libraries' competitive advantage; (2) To examine the effect of these capabilities and service innovation factors on the competitive advantage of university libraries; (3) To develop a competitive advantage model for university libraries based on knowledge-based dynamic capabilities through service innovation.

The effect of knowledge-based dynamic capabilities on China's "Double First-Class" university libraries' competitive advantage was explored, focusing on the mediating role of service innovation. A mixed-method research approach was employed, and 420 valid questionnaires were collected from these libraries, and data were analyzed using SPSS 26.0 and AMOS 23.0 for reliability and validity. Pearson correlation analysis was implemented, leading to the construction of a structural

equation model. In-depth interviews were conducted with nine key informants, including department directors and deputy directors, to gather insights on how these capabilities can enhance competitive advantages and support the quantitative data analysis.

The findings indicate that knowledge-based dynamic capabilities directly influence the competitive advantage of university libraries, with service innovation acting as a mediator in this relationship. The study's theoretical contribution lies in providing effective strategies to enhance the competitive advantage of Chinese university libraries and establishing a model based on knowledge-based dynamic capabilities. The study suggests that university library managers should prioritize these capabilities in service innovation and apply the competitive advantage model to real-world situations. Future research should also consider external factors such as government policies and external technologies affecting libraries.

Keywords: knowledge-based dynamic capabilities, service innovation, competitive advantage, "Double first-class" university library



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CHAPTER 1
INTRODUCTION

1.1 Background of the Study

In today's era of the knowledge-based economy, knowledge has become the most active and decisive factor of production, which can improve an organization's production capability and innovation habitation. Therefore, knowledge can help organizations create more value and maintain the continuity of competitive advantage in dynamic competition. In such a dynamic environment, the key to organizational success lies in the advanced concept of the knowledge economy, which emphasizes the importance of knowledge as a decisive business factor in enterprise competition. Furthermore, the dynamic capabilities theory holds that an organization's competitive advantage depends on the dynamic capabilities; that is, the dynamic capabilities enable the organization to continuously update the common organizational capability stock according to changes in the business environment.

For a long time, universities have been regarded as non-competitive organizations compared with enterprises (Guo, 2010). However, universities began to compete in resources, funding, employment, and other aspects with the further development of higher education. The competition between universities differs from the competition among enterprises, most of which are developmental competitions. The competition's goal is generally to obtain and create better conditions for self-development. The result of competition is generally a loss of advantage or a rise in competitive position (Warner & Palfreyman, 1996). Therefore, universities are the core bases of national scientific research and knowledge innovation (Veugelers & Cassiman, 2005; Wang, 2017).

To strengthen the construction of China's university system and create a group of Chinese elite universities and a group of disciplines with global influence, the Chinese government formulated the "Double First-Class University Plan" in 2015 and began implementing it in 2017. China's State Council issued the "Overall Plan for Coordinating and Promoting the Construction of World-Class Universities and First-

Class Disciplines" in 2015, which pointed out the main tasks of the “Double First-Class” construction of China's future universities (Tong et al., 2017; Zhang, 2017). The "Double First-Class Universities" selection dimensions include competitive selection, expert evaluation, government assessment, and dynamic screening (Deqiang, 2022).

The Chinese government noted that China will build 42 universities into world-class universities, and 95 universities will focus on building their superior disciplines into first-class ones (Education, 2015). The goal of China's "Double First-Class University Program" is to have these universities enter the ranks of world-class universities and world-class disciplines by 2050. See Table 1.1 and Figure 1.1.

Table 1.1 List of China's First Round of 42 “Double First-Class” Universities in 2017

Category	**S/N**	**Location**	**University Name**
Category A 36 Universities	1	Beijing	Peking University
	2		Renmin University of China
	3		Tsinghua University
	4		Beihang University
	5		Beijing Institute of Technology
	6		China Agricultural University
	7		Beijing Normal University
	8		Minzu University of China
	9	Tianjin	Nankai University
	10		Tianjin University
	11	Liaoning	Dalian University of Technology
	12	Jilin	Jilin University
	13	Heilongjiang	Harbin Institute of Technology
	14	Shanghai	Fudan University
	15		Tongji University
	16		Shanghai Jiaotong University
	17		East China Normal University
	18	Jiangsu	Nanjing University

	19		Southeast University
	20	Zhejiang	Zhejiang University
	21	Anhui	University of Science and Technology of China
	22	Fujian	Xiamen University
	23	Shandong	Shandong University
	24		Ocean University of China
	25	Hubei	Wuhan University
	26		Huazhong University of Science and Technology
	27	Hunan	Central South University
	28		National University of Defense Technology
	29	Guangdong	Sun Yat-sen University
	30		South China University of Science and Technology
	31	Sichuan	Sichuan University
	32		University of Electronic Science and Technology of China
	33	Chongqing	Chongqing University
	34	Shanxi	Xi'an Jiaotong University
	35		Northwestern Polytechnical University
	36	Gansu	Lanzhou University
Category B 6 Universities	1	Liaoning	Northeastern University
	2	Henan	Zhengzhou University
	3	Hunan	Hunan University
	4	Yunnan	Yunnan University
	5	Shanxi	Northwest Agriculture and Forestry University
	6	Xinjiang	Xinjiang University

(Source: https://cwauthors.com/article/double-first-class-list, 2015)

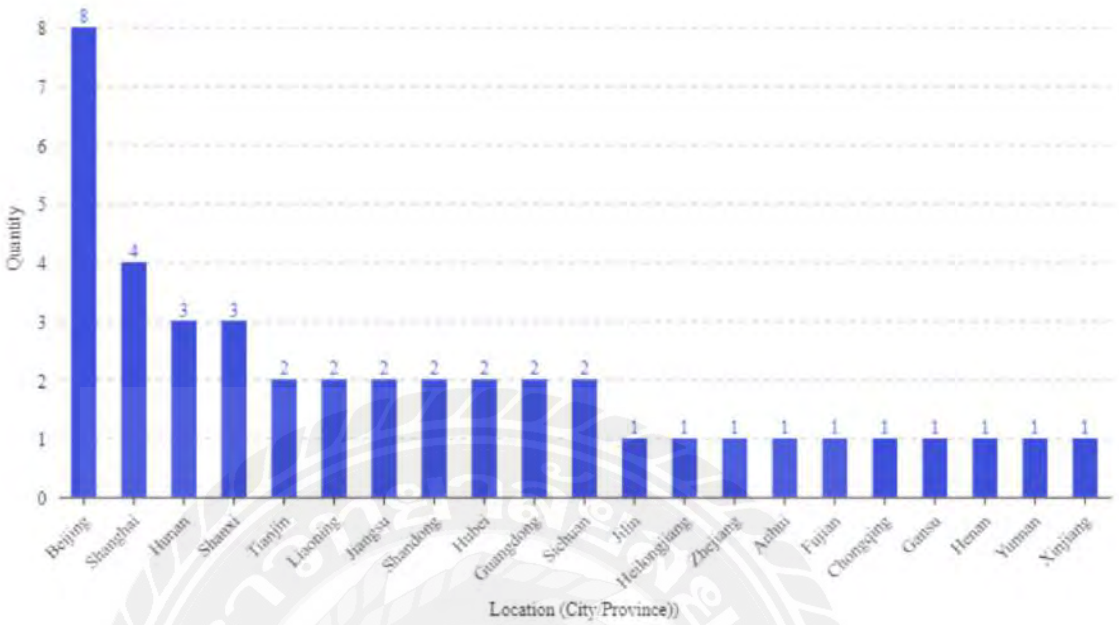


Figure 1.1 Provincial Distribution Statistics of China's "Double First-Class" Universities
(Source: https://cwauthors.com/article/double-first-class-list, 2015)

The content of the "Double First-Class" construction includes building a first-class university teaching staff, cultivating first-class innovative talents, improving the level of innovation ability in scientific research, inheriting the excellent traditional culture of innovation, and promoting the efficient and powerful transformation of research results (Education, 2015). However, these "Double First-Class" construction tasks are closely related to the competitive advantages of universities themselves.

University plays a vital role in developing national science and technology; its competitiveness is an essential indicator of a country's comprehensive strength (Deqiang, 2022). As an academic institution serving university teaching and scientific research, the library should actively build and stabilize its competitive advantage, especially the competitive advantage that affects the level of university scientific research (Lin et al., 2014). Therefore, China's universities must form a school-running philosophy with distinctive characteristics, improve knowledge innovation, and continuously enhance their competitive advantages in building world-class universities and high-level universities. Furthermore, Chinese universities can realize the strategic goal of going global as soon as possible. All in all, universities must

strengthen the competitive advantage of their university libraries to obtain a tremendous competitive advantage and sustainable development in the fiercely competitive environment.

Obtaining and enhancing the competitive advantage of university libraries is an eternal topic. University libraries have also ushered in a new starting point and orientation in the context of the development of the new era. "The Construction of First-Class Universities and First-Class Disciplines" is an inevitable choice and an essential measure for China to build a powerful country in higher education. In China, the "Double First-Class" construction, different from the "211" and "985" lifelong systems (See Figure 1.2), is dynamic in a five years cycle so that it will inject new development vitality into more universities (Yang et al., 2019). At the same time, as the cultural foundation and basic facilities for developing universities, the library has also faced new opportunities and challenges. The university library's self-positioning, development goal, and competitive advantage will directly affect whether the university can become a "Double First-Class" university or enter the "Double First-Class" discipline echelon. Therefore, higher requirements have been put forward for libraries supporting universities' academics under the "Double First-Class" construction.

Figure 1.2 The University Education Plan Implemented by The Ministry of Education (Source: https://www.china-admissions.com/blog/guide-to-chinese-universities-project-211-project-985-c9-league/, 2020)

University libraries are related to the long-term plan for developing university disciplines under the “Double First-Class” construction background. A first-class library is the foundation of university knowledge resource sharing, talent team construction, and students' innovation ability, which supports the construction and development of first-class universities. Therefore, Chinese university libraries must develop a competitive advantage model based on knowledge-based dynamic capabilities and service innovation to seek growth and comprehensively support universities' “Double First-Class” construction.

Moreover, university libraries are typical knowledge-intensive organizations, which form a knowledge value chain from knowledge acquisition, preservation, inheritance, sharing, and application to knowledge innovation. Knowledge is the core resource of university library operation, so the competitive advantage of a university library lies in knowledge management, embodied in knowledge management and innovation capabilities. Therefore, knowledge-based dynamic capabilities are an effective measure to enhance the competitive advantage of university libraries. It can be seen that maximizing the acquisition and utilization of knowledge is the key to improving the competitive advantage of university libraries.

The research on the application of dynamic capabilities in university libraries mainly includes the following:

We know from the literature that some scholars have explored using dynamic capabilities to strategically reposition academic libraries (Chan & Soong, 2010). Some scholars have used the concept of dynamic capabilities to study its usefulness in the academic library environment. Some scholars have further expanded the concept of knowledge-based dynamic capabilities and examined the relationship between essential data management capabilities and the innovative performance of academic librarians (Zotoo et al., 2021). Some scholars also believe that building a dynamic capability model for academic libraries can enhance the competitive advantage of libraries (D. Jadhav & D. Shenoy, 2022).

Apart from the above, no other published articles in the literature address the application of dynamic capabilities in university libraries. However, since Teece introduced the concept of dynamic capabilities in 1997 (Teece et al., 1997), the idea has been widely and successfully applied in case studies in other fields.

“Double First-Class” is the abbreviation of a world-class university and first-class discipline construction (Education, 2015). The goal is to promote a group of high-level Chinese universities and disciplines to enter the world's leading ranks and improve university personnel training, scientific research, and knowledge management innovation (Peters, 2019). The basic principle is based on disciplines: performance as a lever, reformation as a driving force, and first-class as the goal (Education, 2015). It is a higher education strategic development plan formulated by the Ministry of Education of China in 2015. All universities included in this strategic plan were called “Double First-Class” universities. The “Double First-Class” university strategic plan has made new arrangements for developing China's higher education (Peters & Besley, 2019). Moreover, this is a vital strategy put forward by China following the "211 Project" and "985 Project", and it is also an essential support for China to realize its grand goal of two hundred years. Therefore, this strategic plan aims to do an excellent job of constructing China's higher education, which is conducive to improving the core competitiveness of universities and the nation.

The “Double First-Class” university strategic plan will be divided into three steps:

Step 1: By 2020, some universities and some disciplines will enter the world-leading ranks, and several disciplines will enter the forefront of world-class disciplines;

Step 2: By 2030, more universities and disciplines will enter the world's top ranks, several universities will enter the world's top ranks, some disciplines will enter the world's top positions, and the overall strength of higher education will be significantly improved;

Step 3: By 2050, the number and strength of first-class universities and first-class disciplines will enter the forefront of the world and a country with higher education.

The “Double First-Class” university construction is a dynamic development system that injects new vitality into more universities. On the surface, the competition

among world-class universities is a competition of talents, disciplines, and scientific research achievements, but it is a competition of knowledge. Knowledge, as the foundation of the core competitiveness of universities, is the core resource of university operation and the core asset of value creation. Therefore, universities should effectively promote knowledge management and enhance their core competitiveness. In the “Double First-Class” university construction, university libraries should ensure that knowledge services are carried out in an orderly and meet the actual needs of universities and society. At the same time, as the cultural foundation for developing “Double First-Class” universities, the library has also ushered in new development opportunities.

First of all, the library should not only meet the needs of first-class universities and disciplines for first-class literature resources and knowledge management but also meet the needs of sustainable development of libraries under the condition of rapid development of information technology. Therefore, this requires library services to be more professional, accurate, and systematic, which also requires that the connotation development of university libraries must be rapidly improved. The connotative development centers on improving service quality and ability, enriching library collection documents, improving librarians' professional quality, expanding service content, discovering service methods, and promoting library knowledge management to be more distinctive, coordinated, and intelligent.

Secondly, the essence of a world-class university library is knowledge service, which serves the university's teaching, scientific research, and personnel training. Therefore, knowledge management is the foundation of the library and the foundation of the library's development. At the same time, the library is the leading position in university education and an essential participant in constructing the “Double First-Class” university. Furthermore, the development and construction of university libraries under the background of “Double First-Class” university construction are related to the long-term development plan of universities. The “Double First-Class” university library is the basis for sharing university scientific research resources, the construction of talent teams, and the creative ability of students. It supports the construction and development of first-class universities. Based on various resources

such as literature, information, and data, and aiming at disciplines, the operation process of collecting, refining, sorting, organizing, saving, and disseminating knowledge provides professional and personalized knowledge service.

Based on the “Double First-Class” university construction, university libraries' competitive advantage is providing support for the university's teaching and scientific research and helping the university's “Double First-Class” construction. To better understand the “Double First-Class” university library, this study screened and summarized the annual funding ranking of the “Double First-Class” university library in 2021 based on the statistics of the Ministry of Education of China (unit: Yuan), as shown in Figure 1.3. According to the statistical indicators of the China Ministry of Education Higher Education Library and Information Work Steering Committee, the annual expenditure of university libraries includes multiple expenses such as literature resource purchase fees, processing fees, equipment purchase fees, maintenance fees, and office expenses.

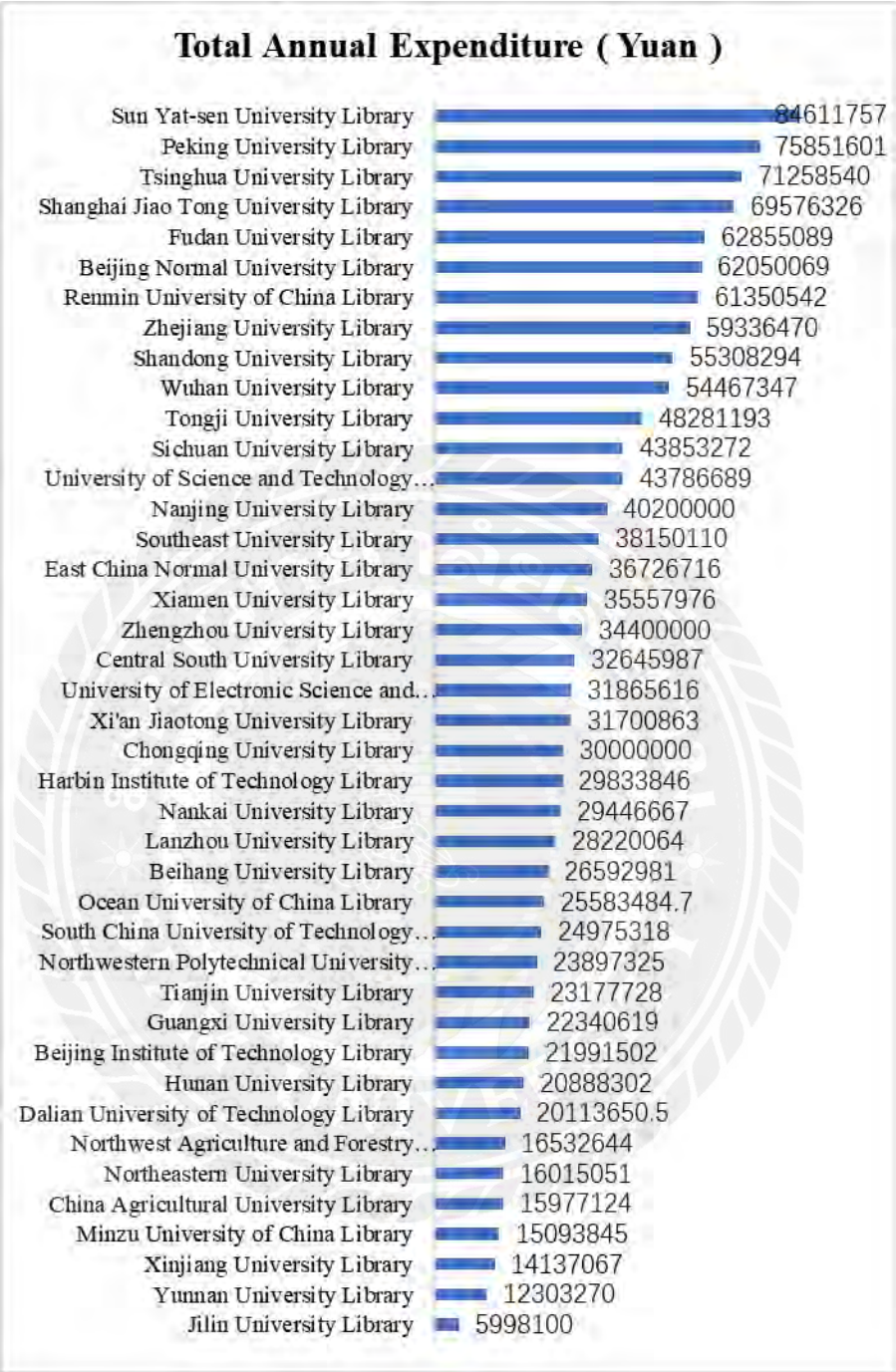


Figure 1.3 "Double First-Class" University Library Annual Expenditure Ranking （CNY）in 2021

(Source: Ministry of Education Higher Education Library and Information Work Committee,2021)

As shown in Figure 1.3, the total annual funding of China's "Double First-Class" university libraries is 140,16.4 million yuan (RMB) in 2021. However, the

yearly budget for each district or university library is different. Enhancing “Double First-Class” university libraries' competitive advantages is valuable in a knowledge-based dynamic environment.

According to relevant literature, knowledge-based dynamic capabilities have been applied in manufacturing, healthcare, and green energy industries. In particular, knowledge-based dynamic capabilities have nothing to do with university libraries. Therefore, this is the research gap in this study. However, the university library needs more dynamic knowledge, technology, and resources to gain competitive advantages (Li et al., 2019). Then, the university library must break the original fixed mode, effectively mobilize its enthusiasm for innovative reading services, and promote its competitive advantage in knowledge-based dynamic capabilities. In conclusion, according to the knowledge-based dynamic capabilities theory, university libraries should develop an appropriate management model to enhance their competitive advantages. These are urgent problems to solve in the university library management, as well as the needs of the university's development and realization of connotative development.

1.2 Significance of the Study

The new management style is regarded as a catalyst for organizational self-renewal. Therefore, competitive advantage has gradually attracted people's attention. Many researchers in academic and business circles have invested in competitive advantage research and formed many significant research results. Competitive advantage has steadily developed into a substantial research branch in enterprise management.

With the deepening of the research on competitive advantage, researchers have gradually shifted their research perspective from macro to micro, focusing on the implementation by enterprises. However, due to the regional solid and environmental dependence on management science theories and methods, the existing mature theoretical models and methodologies in developed countries are uncomfortable in China's practice.

To cope with the rapidly changing dynamic environment, the university library needs a complete and knowledge-based dynamic capabilities system to maintain the university library's sustainable competitive advantage.

This study aims to achieve two purposes by studying the impact of knowledge-based dynamic capabilities on competitive advantage through service innovation.

Firstly, knowledge-based dynamic capabilities are indeed implemented in the organization management practice process. The specific method is to integrate dynamic capabilities with knowledge management and then closely integrate knowledge-based dynamic capabilities with organizational daily management activities.

Secondly, this study aims to match the knowledge-based dynamic capabilities to enhance competitive advantage. In the process of improving the knowledge management capabilities of the organization, it emphasizes the guiding role of the promotion of competitive advantage and the knowledge-based dynamic change of the environment. This study also hopes to expand the depth and breadth of the application of knowledge-based dynamic capabilities and provide practical references for Chinese university libraries to enhance their competitive advantages.

The university library needs a management model to enhance its sustainable competitive advantage in the dynamic development environment. Dynamic capabilities will change with the continuous changes of external and internal environments, reorganize university library cost elements, optimize resource allocation, and continuously promote university libraries to improve their competitive advantages. Therefore, knowledge-based dynamic capabilities can guide university libraries in solving this problem. In addition, the competitive advantage of university libraries comes from unique and difficult-to-imitate knowledge, so knowledge-based dynamic capabilities are the guarantee and basis for university libraries to enhance competitive advantages. To develop and grow, university libraries must strengthen their management capabilities to improve their competitive advantages. Along this research line, this study explores how university libraries can enhance their competitive advantages through knowledge-based dynamic capabilities, which have vital theoretical and practical significance.

From the perspective of organizational behavior, studying the competitive advantage of university libraries from the perspective of knowledge-based dynamic capabilities is an inevitable requirement to promote the management reform of university libraries. This study mainly reflected in the following aspects:

1. Theoretical significance

This research can explore the components of knowledge-based dynamic capabilities that affect the competitive advantage of China's “Double First-Class” university libraries as non-profit organizations.

2. Practical significance

The practical significance of this research is to point out the direction for developing China's “Double First-Class” university libraries and for other general university libraries to build towards “Double First-Class” libraries.

Through the investigation and analysis of the knowledge management situation of China's “Double First-Class” university libraries, this study summarizes the deficiencies in the current knowledge management. Then, it builds a knowledge management model of university libraries based on knowledge-based dynamic capabilities. Furthermore, it can enhance the competitive advantage of the library, thus making the work more efficient, significantly improving the work efficiency and enhancing the competitive advantage of the library. At the same time, it provides practical significance for improving the competitive advantage model for university libraries based on knowledge-based dynamic capabilities.

1.3 Research Questions

Based on the research background and research significance, this study will establish a competitive advantage model for university libraries from the perspective of knowledge-based dynamic capabilities. Through the literature review, there has been some progress in the research on the influencing factors of the competitive advantage model for university libraries from the perspective of knowledge-based dynamic capabilities. Therefore, based on the existing research results, the directors,

deputy directors, and department directors of China's "Double First-Class" university libraries will be selected as the research subjects, and the following three scientific questions will be raised:

1. What are the factors of knowledge-based dynamic capabilities and service innovation that affect the competitive advantage of China's “Double First-Class” university libraries?

2. How can a competitive advantage model be developed for China's “Double First-Class” university libraries from knowledge-based dynamic capabilities through service innovation?

3. What is the model for enhancing the competitive advantage of China's “Double First-Class” university libraries from knowledge-based dynamic capabilities through service innovation?

1.4 Research Objectives

Based on the theory of knowledge-based dynamic capabilities, this study takes China's "Double First-Class" university libraries as the research object to explore the relationship between knowledge-based dynamic capabilities and the competitive advantage of university libraries. Specifically, this study takes service innovation as a mediating variable, combines the nature and characteristics of China's "Double First-Class" university libraries, deeply analyzes the mediating effect of service innovation, and examines how knowledge-based dynamic capability factors affect China's "Double First-Class" university libraries to enhance their competitive advantages. It further reveals the role of knowledge-based dynamic capabilities in the competitive advantage of China's "Double First-Class" university libraries, forming a competitive advantage model for university libraries and providing a reference for developing other university libraries.

This study aims to develop a competitive advantage model of China's “Double First-Class” university libraries from knowledge-based dynamic capabilities and service innovation.

1. To investigate the factors of knowledge-based dynamic capabilities through service innovation on university libraries' competitive advantage.

2. To reveal the effect of knowledge-based dynamic capabilities factors through service innovation factors on university libraries' competitive advantage.
3. To develop a competitive advantage model for university libraries from knowledge-based dynamic capabilities through service innovation.

1.5 Scope of the Study

According to the research's needs, this study mainly focuses on increasing China's university libraries' competitive advantage from knowledge-based dynamic capabilities. Therefore, the research scope of this study is the following three aspects:

1. To create a conceptual framework, this study will collect secondary data from the website of the Steering Committee of the Higher Education Library and Information Work of the Ministry of Education of China, the homepage of each university library, and literature.
2. This study will be designed for “Double First-Class” university libraries in China. There were 42 double first-class university libraries (for more than five years) in 2022, which will involve collecting and analyzing quantitative data.
3. Regarding methodology, the study will use mixed methods. This qualitative study will select eight or more representative university library leaders and managers as critical informants for in-depth interviews.

1.6 Research Methods

The mixed research method is used in this study to explore how to develop the management model competitive advantages of university libraries from knowledge-based dynamic capabilities and to ensure the reliability and credibility of the research process and results. The following research methods are included:

1. Literature research: This study extracts valuable research questions from numerous literature and continues in-depth research through literature analysis along this line. Before the construction of the theoretical model, this study collects relevant

literature with the keywords "university library, knowledge management, dynamic capabilities, knowledge-based dynamic capabilities, and competitive advantage" on the various database platforms, such as EBSCO, PROQUEST, Elsevier Science, Emerald, CNKI, Baidu Academic. Then, this study carefully reads, screens, and organizes relevant literature, sorts out and summarizes the research context, existing deficiencies, and future frontier research directions related to the research topic, and finally constructs a theoretical research model and puts forward research hypotheses.

2. Questionnaire method: This study will adopt the questionnaire survey method to collect survey data from “Double First-Class” university libraries to test the proposed theoretical hypothesis; in addition, this study tested and analyzed the theoretical assumptions with the help of SPSS26.0 software and AMOS 23.0 for reliability, validity, person correlation analysis.

3. Interview: In-depth interviews are the most effective way to understand how “Double First-Class” library staff can enhance the competitive advantage of libraries. This study formulates the overall idea of interviews based on literature analysis and actual investigation analysis. The interviews in this study will follow the following principles: (1) The semi-open principle ensures that the interview objectives will not deviate significantly and can be adjusted according to the actual situation. (2) The principle of objectivity. When setting the problem, it should be based on objective facts, not on the will of the interviewee, and the setting of all problems should be based on factual cases.

1.7 Expected Results

Based on the needs of practice and theory, this dissertation takes the “Double First-Class” university libraries in China as the research object. It discusses the internal process of how university libraries enhance their competitive advantages through knowledge-based dynamic capabilities.

This dissertation explores enhancing university libraries' competitive advantages from knowledge-based dynamic capabilities based on the actual situation of China's “Double First-Class” university libraries.

Then, this study assumes positive relationships between knowledge-based dynamic capabilities and the competitive advantages of university libraries to guide how they can increase their competitive advantages through knowledge-based dynamic capabilities.

Finally, this dissertation provides leaders with a clear understanding of strategies to enhance the competitive advantage of university libraries through relevant research and practice.

1.8 Benefits of the Study

1. China's university libraries will know how knowledge dynamic capability factors affect competitive advantage.
2. China's university libraries will gain the key factors to enhance competitive advantage from knowledge-based dynamic capabilities.
3. China's university libraries will gain a competitive advantage from their knowledge-based dynamic capabilities.

1.9 Definition of Key Terms

Term	Definition
University Library	It is a resource center for learning, teaching, research, and activities related to the operation and management of the university (D. Jadhav & D. Shenoy, 2022).
Double First-Class	It is the abbreviation of First-class universities and disciplines worldwide. It refers to China's Ministry of Education issuing the first round of "Notice on Publishing the List of World-Class Universities and First-class Discipline Construction Universities and Construction Disciplines" on September 21, 2015 (Education, 2015).

Knowledge Management	The organization's activity is to create, share, use, and manage its knowledge to enhance its competitive advantage. (Clair, 2017).
Dynamic Capabilities	Firms implement new hard-to-imitate strategic routines for allocating resources to meet changing customer needs and competitor strategies as markets evolve (Danneels, 2008; Teece, 2007).
Knowledge-Based Dynamic Capabilities	An organization can acquire, create, and integrate knowledge resources to perceive, respond to, utilize, and initiate market change (Kaur, 2019).
Service Innovation	Continuously improves the reader's experience of using the library's feelings, including exploitative and exploratory Service Innovation.
Competitive Advantage	The concept is that a particular good can be produced more efficiently than others due to several factors, including productive skills, climate, and natural resource availability (Porter & Millar, 1985).

1.10 Dissertation Structure

This dissertation will be divided into five chapters.

The first chapter mainly includes the research background, research significance, research purpose, research questions, research scope, the introduction of methodology, expected results, benefits, and keyword definition.

Chapter 2 includes all critical literature on definitions, concepts, theories, and conceptual frameworks.

Chapter 3 includes research methods, design, questionnaire details, hypotheses, and in-depth interviews.

Chapter 4 includes descriptive analysis, structural equation models, and other statistics features and content analysis.

The last chapter is the research conclusion, and this paper's results are discussed.

CHAPTER 2
LITERATURE REVIEW

The details in this chapter will be separated into six parts as follows:

The literature review is a way to understand the development of this research field, and it is also the central premise to clarify the innovation and theoretical basis of this research. According to the research questions in Chapter 1, this chapter will focus on reviewing relevant literature, defining the concepts of related theories, and preparing for the following research step. In terms of literature review, this study analyzes the relevant literature on China's "Double First-Class" university library, knowledge-based dynamic capabilities theory, and competitive advantage through the literature metrology and summarizes the previous research.

2.1 Knowledge-Based Dynamic Capabilities

Two leading schools of thought study organizational competitive advantage, classical and contemporary. First, the classical school believes that the research on competitive advantage can be divided into three categories: the design school, the positioning school, and the resource-based perspective. Second, contemporary schools study competitive advantage from a dynamic capabilities perspective and a knowledge-based perspective.

This study aims to explore the research and application of knowledge-based dynamic capabilities in modern university libraries; however, due to today's social environment in VUCA (volatility, uncertainty, complexity, and ambiguity), there is a gap in developing a competitive advantage model for China's university libraries based on knowledge-based dynamic capabilities. In addition, there is little relevant literature about this study in China's academic research, so this study will have important significance for developing the knowledge economy in China and even the world. Liao et al. proposed "gaining a competitive advantage based on knowledge-based dynamic capabilities" to achieve and maintain the core competitiveness of university libraries (Liao et al., 2007). Due to organizations' complex, uncertain, and ever-changing environment, scholars have recognized the importance of knowledge to organizations (Sørensen & Stuart, 2000). Thus, competitive advantage is made possible through knowledge, not just resource access. The knowledge view holds that knowledge is the source of strategic advantage among all the organization's resources (Nieves & Haller, 2014). Knowledge has become the key to high performance, so organizations can build a competitive advantage through knowledge dynamics.

2.1.1 Knowledge Management

The theory and practice of knowledge management originated in the 1980s. In 1986, knowledge management was first proposed at the European Management Conference held by the United Nations International Labor Organization. In 1989, "MIT Sloan Management Review" published the first article related to knowledge management. Nonaka and Takeuchi published their famous article (Nonaka et al.,

2007), "The Knowledge-creation Company: How Japanese Companies Create the Dynamics of Innovation." In this book, knowledge can be divided into "Tacit Knowledge" and "Explicit Knowledge." Davenport proposed, "Knowledge management is the process of capturing, distributing, and effectively using knowledge.".

Knowledge management refers to creating, acquiring, and using knowledge to enhance organizational performance (Samuel & Odor, 2018). This definition emphasizes the critical role of knowledge management activities such as knowledge acquisition, creation, transfer, and application in the knowledge management process. Knowledge management promotes innovation in organizations and allows them to provide better products and services (Romero-Hidalgo et al., 2021). Thus, knowledge management is not a static storage of knowledge resources but a specific dynamic management process through certain methods or technologies.

With the rapid development of the knowledge economy, knowledge management plays an increasingly important role in economic growth and social development. Knowledge management is an organization's practice of identifying, creating, capturing, and distributing knowledge for reuse, identification, and learning across the organization (Conlé et al., 2020). Knowledge management programs are often associated with achieving specific organizational goals, such as improved performance, competitive advantage, or higher levels of innovation. Knowledge management aims to make the best use of the knowledge available to an organization and turn it into a strong competitive advantage (Torres, 2018). Relevant scholars have studied the role of knowledge management from different perspectives and have emphasized winning the competitive advantage of enterprises through knowledge management.

Firstly, the research is about the vital role of knowledge management in organizations. Grant, a scholar who proposed "the knowledge-based view," suggested that knowledge is an organization's most strategically valuable resource. Knowledge is an organization's most important strategic resource for creating and maintaining its competitive advantage (Armaghan & Renaud, 2017). Because knowledge can be disseminated, implemented, and developed in communication and interaction, they pointed out that effective knowledge management processes can stimulate individuals

and organizations to acquire knowledge in different ways in further research while being more critical and creative. To generate new knowledge and gain a competitive advantage (Aulawi et al., 2009). Paarup Nielsen's study found that internal knowledge management activities created the flow of internal knowledge storage in the enterprise, changed the state of knowledge resources, and prompted the enterprise to generate new dynamic capabilities (Nielsen & Anders, 2006). In addition, for new organizations, the internal knowledge management process helps the organization build more diverse knowledge, enabling the organization to perceive various ways to carry out innovative activities. At the same time, organizations can improve the accuracy and effectiveness of innovation decision-making by carrying out cross-functional knowledge exchanges (Clercq et al., 2013).

Secondly, scholars put forward different views on the research of the knowledge management process. Huber was the first to analyze the knowledge management process in 1991. He expanded the knowledge-based view and divided the knowledge management process into four processes: knowledge acquisition, knowledge sharing, knowledge integration, and organizational memory (Huber, 1991). Barker believed knowledge management mainly includes the internal processes of knowledge collection, creation, sharing, revision, and storage (Barker, 2015). Paarup Nielsen proposed that knowledge management activities cover all the necessary steps from knowledge creation to knowledge utilization, involving manipulation of knowledge and changes in the state of knowledge, for example, eight activities, including innovation, acquisition, capture, assembly, sharing, integration, use and develop knowledge. However, Zhu et al. pointed out that knowledge management is a process in which an organization acquires knowledge from the outside and integrates it with internal knowledge so that members can apply relevant knowledge and complete organizational targets at any time and place (Zhu et al., 2011).

However, the development of knowledge management theory does not exist in isolation. During the development period, organizational learning theory, organizational behavior theory, and evolutionary economics theory were continuously derived, and these theories are applied in knowledge management. Some scholars emphasize the absorption, digestion, and reuse of knowledge, which is how enterprises use knowledge to explain organizational behavior (Teigland & Wasko,

2009). Organizations should consider changes in employee behavior when new knowledge exists or the job responsibilities of managerial employees change. Therefore, this view has been widely recognized by existing research. Many studies have found that knowledge services positively impact dynamic organizational capabilities, innovation capabilities, performance, and competitive advantages (see Figure 2.1).

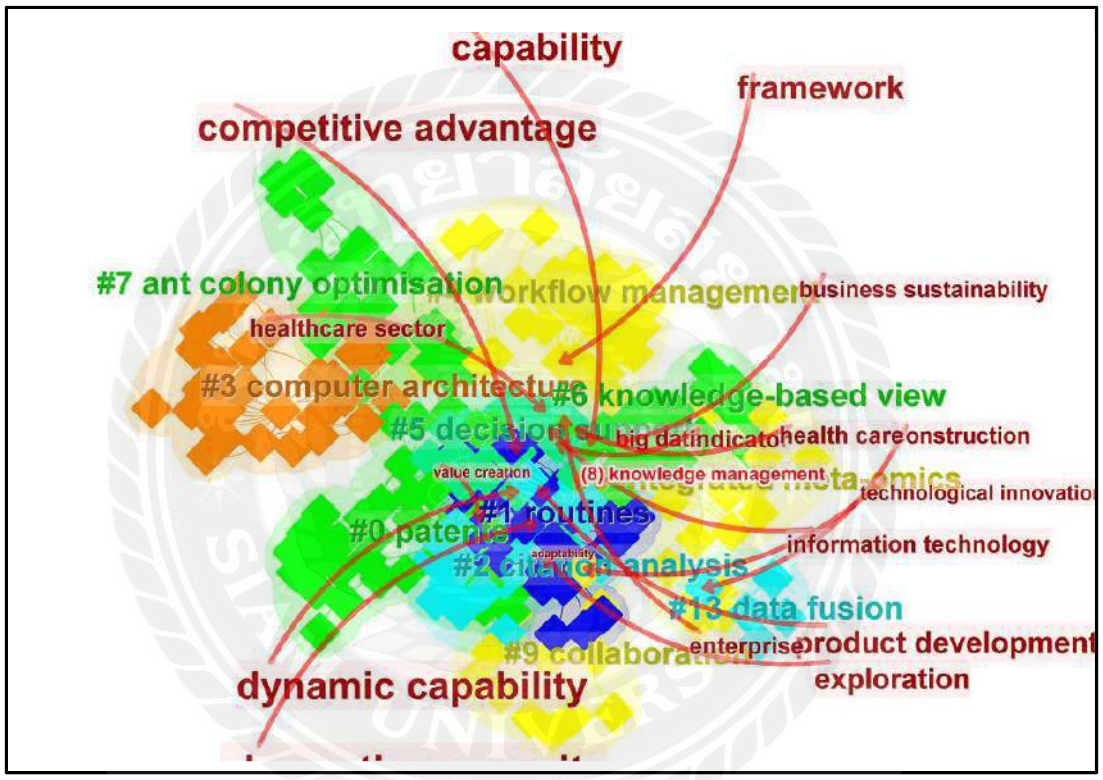


Figure 2.1 Related Research of K.M.

(Source: Based on the related literature in WOS, 2023)

Based on the above study on knowledge and knowledge management, it is found that knowledge is a kind of ability resource to some extent. Knowledge management can also be regarded as the management of this ability of knowledge, thus evolving the theory of knowledge-based view.

2.1.2 Dynamic Capabilities

1. Definition of Dynamic Capabilities (D.C.s)

As an open system, the university library needs to dynamically adjust its goals, knowledge structure, and capabilities according to environmental changes to maintain its competitive advantage. The university library must have core competence in a dynamic environment to sustain its competitive advantage in the professional field. Therefore, the university library must continuously create competitive advantages and develop the dynamic competitive ability to obtain sustainable competitive advantages.

Dynamic capabilities is an emerging and potentially comprehensive theory that explores new sources of competitive advantage in a dynamic environment. The concept of "dynamic capabilities" was first proposed in the article "Dynamic Capabilities and Strategic Management," published by Teece, Pisnao, and Shuen (Teece et al., 1997). Teece et al. defined dynamic capabilities as "the capability to integrate, build, and reset internal and external capabilities of a company to adapt to rapid environmental changes." The research results on dynamic capabilities are rich, but scholars have different research perspectives.

Firstly, scholars define dynamic capabilities from a conventional perspective. From this perspective, it is generally believed that dynamic capabilities are an enterprise's decision-making and implementation process to restructure, adopt, or abandon resources, adapt to the environment, and obtain resources again when the market changes. Therefore, corporate decision-makers reset and integrate corporate resources to get sustainable inertial competitive advantages (see Table 2.1).

Table 2.1 The Definition of Dynamic Capabilities

The Source	The Definition
Subba Narasimha (2001)	Enterprises use their knowledge resources to generate knowledge and adapt to the normal mode of environmental change (Narasimha, 2001).
Zollo and Winter (2002)	Organizations systematically generate, change, and revise their business procedures through the collective learning model, and dynamic capabilities are dynamic and systematic (Zollo & Winter, 2002).

Teece et al. (2007)	Organizations can acquire, maintain, and apply new knowledge to drive innovation by developing dynamic capabilities (Teece, 2007).
Wang and Ahmed (2007)； Helfat and Martin (2015)	With the change of environment, an enterprise reorganizes, updates, and creates its resources and capabilities, mainly reorganizing and optimizing its core capabilities (Wang & Ahmed, 2007).
Philip Cordes-Berszinn (2013)	An integrated descriptive model of dynamic capabilities and organizational structures allows for characterizing, classifying, and comparing (Cordes-Berszinn, 2013).
Vaneet Kaur (2019)	It covers three higher-order capabilities: adaptive, innovative, and absorptive (Kaur, 2019).
Armaghan lli A, Battistella C F, Nonino, et al. (2021)	The in-depth studies on the development process of platform enterprises to build a competitive advantage model from the perspective of dynamic capabilities theory (Annarelli et al., 2021).

(Source: Based on the literature review, 2023)

To sum up, the result is a new operating model that can sustain competitive advantages. Although the concept definition of dynamic capabilities is not unified yet, there is some consensus among them:

Dynamic capabilities are designed to enable enterprises to adapt to dynamic environments;

(1) The capability to reconstruct internal and external resources and capabilities ;
(2) It is a high-level capability to adjust and rebuild the basic capabilities of the enterprise;
(3) Rooted in the organization and management process, it involves the trans-formative transformation of the company's existing knowledge resources and management;
(4) It acts on the enterprise's process, begins with changes in the external environment;

In short, the dynamic capabilities embedded in the corporate routine are strategic organizational capabilities that match the internal resources and capabilities of the enterprise with the external environment. Dynamic capabilities can integrate,

construct, and reorganize the enterprise's internal and external resources so that the enterprise's existing operation capability form can change from a matching state with the environment to another state. At the same time, the dynamic capabilities theory can obtain countless temporary competitive advantages to achieve the sustainability of competitive advantage, adapt to the dynamic changing environment, and achieve long-term development.

2. Dimensions of Dynamic Capabilities

Dynamic capabilities are difficult to operate and test, and it is necessary to measure this variable reasonably, so it is essential to clarify the specific dimensions of dynamic capabilities. Although the academic community has not yet reached a consensus on this issue, most scholars believe that dynamic capabilities should emphasize the collection of different capacities based on knowledge and routine views. Many scholars also admit that the capability to integrate and reconfigure is an essential component of dynamic capabilities. Summarize the research on the dimension of dynamic capabilities through a literature review, as shown in Table 2.2.

According to the existing research literature, although scholars have not uniformly understood the dimension of dynamic capabilities, almost every division method includes the response to the external environment, such as the capability to identify opportunities and the capability to obtain resources. At the same time, due to the diversity and unpredictability of changes in the market environment in which enterprises operate, the capability to perceive danger and seize opportunities is crucial for enterprises. Therefore, the three dimensions of dynamic capabilities—sensing, seizing, and reconfiguration capabilities—are scholars' three most studied, profound, and mature aspects. This dimensional division of dynamic capabilities is widely recognized and respected by scholars.

In addition, the dynamic capabilities of these three dimensions not only occur in the specific production process of the enterprise but also exist at the organization's overall level, such as new product development, new knowledge creation, strategic alliances, and mergers and acquisitions. Resource identification, resource acquisition, and resource replacement all play essential roles in the production and operation of enterprises. Therefore, based on the research background and research questions, according to knowledge management theory and routine-based theory, this paper will

measure dynamic capabilities from three aspects: sensing capability, seizing capability, and reconfiguration capability, but still consider dynamic capabilities as a whole in the research variables to analyze.

Table 2.2 The Dimensions of Dynamic Capabilities

The Source	The Dimensions
Teece & Pisano（1994）	Adapt capability, integration capability, and reconfiguration capability (D. J. Teece & G. Pisano, 1994).
Eisenhardt & Martin（2000）	Resource integration, reset, acquisition, and release capability (Eisenhardt & F, 2000).
Caloghirou et al.（2004）	Learning capability, coordination capability, and change capability (Caloghirou et al., 2004).
Wang & Ahmed（2007）	Absorption capability, adaptation capability, and innovation capability (Wang & Ahmed, 2007).
Prieto et al.（2009）	Knowledge creation capability, integration, and reconfiguration (Prieto et al., 2009).
Zheng et al.（2011）	Knowledge acquisition, innovation, and integration capability (Zheng et al., 2011).
Pavlou & El Sawy（2011）	Sensing capability, learning capability, coordination capability, and integration capability (Pavlou & Sawy, 2011).
Makkonena et al.（2014）	Reconfiguration capability, sensing and capture capability, knowledge creation, and integration capability (Makkonen et al., 2014).
Wilhelm et al.（2015）	Sensing capability, learning capability, and reconfiguration capability (Wilhelm et al., 2015).
Helfat & Raubitsche（2018）	Innovation capability, environmental scanning, sensing capability, and integration capability (Helfat & Raubitschek, 2018).
Ilmudeen et al.（2021）	Sensing, coordination capability, learning and integration capability, and reconfiguration capabilities (Ilmudeen et al., 2021).

(Source: Based on the literature review, 2023)

3. Research on Dynamic Capabilities Variable

When Teece & Pisano proposed the concept of "dynamic capabilities" (D. J. Teece & G. Pisano, 1994), they did not discuss the influencing factors. Subsequently, scholars Eisenhardt & Martin suggested that internal cognition and external environmental changes are the two dominant factors affecting dynamic capabilities to study the reasons that affect dynamic capabilities (Eisenhardt & F, 2000), which made a groundbreaking contribution to the theory of dynamic capabilities. Internal cognition refers to the organizational learning mechanism, which means the willingness and capability of the organization to acquire external knowledge actively; the external environment changes refer to the dynamics of the environment. This paper summarizes the research on dynamic capabilities variables, as shown in Table 2.3.

Table 2.3 Related Research on Dynamic Capabilities Variables

The Source	**Independent Variables**	**Mediating Variables**	**Moderating Variables**	**Dependent Variables**
Romme et al.（2010) Empirical Research	Deep learning	None	Environmental Dynamics	Dynamic capabilities
Hautz et al.（2014） Empirical Research	Dynamic capabilities	None	None	Sustainable competitive advantage
Fainshmidt et al. (2016) Empirical Research	Higher-order dynamic capabilities	Low-order dynamic capabilities	None	Organizational performance
Bitencourt et al.(2020) Empirical Research	Knowledge management, alliances, and entrepreneurial orientation	Dynamic capabilities	Culture & Economy	Performance
Dong et al. (2014) Empirical Research	Resource integration process	Dynamic capabilities	None	Competitive advantage
Lu et al. (2018) Empirical Research	Knowledge management	dynamic capabilities	None	Organizational innovation

(Source: Based on the literature review, 2023)

In summary, it can be seen that the research on dynamic capability has formed many achievements. The research on its concept, influencing factors, and effects has attracted the attention of scholars, which has laid a solid foundation for further research on the theory. However, the current research on dynamic capabilities still has the following deficiencies. It needs to be deepened:

Firstly, although the essential characteristics of dynamic capabilities have gradually formed a consensus, its constituent dimensions have not yet developed a consensus conclusion, which will restrict the in-depth development of empirical research. It is not easy to create a consistent finding, and it will affect practical guidance.

Secondly, the academic community recognizes the perspective of learning to analyze dynamic capabilities. However, there is a lack of detailed research on learning, that is, how specific learning forms (such as knowledge sharing) affect dynamic capabilities.

Thirdly, dynamic capability is the ability of enterprises to cope with the opportunities and challenges brought by environmental changes.

Then, it will be affected by external factors playing a role. The existing research mainly focuses on the impact of external environmental changes on dynamic capabilities, and the effect of internal characteristics on dynamic capabilities is limited.

According to the analysis of the related literature, it is worth noting that the research on dynamic capabilities variables mainly includes the following three aspects. The independent variables mainly include knowledge resources, organizational learning, knowledge management, and dynamic capabilities. Secondly, there are many studies on dynamic capabilities as mediating variables. Thirdly, the dependent variables related to dynamic capabilities are mainly organizational performance and sustainable competitive advantage (see Figure 2.2).

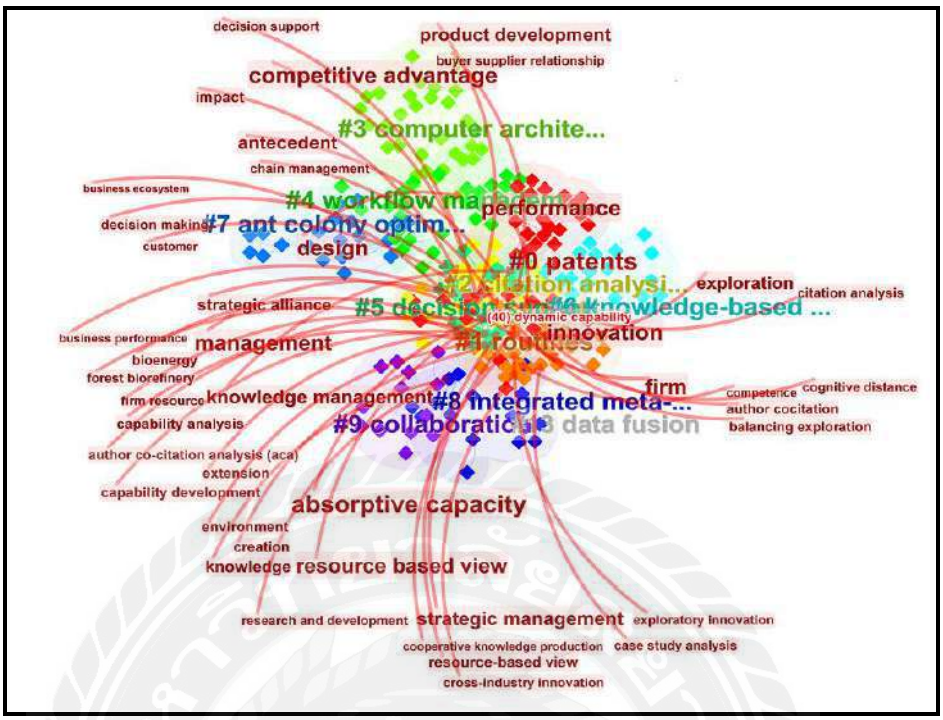


Figure 2.2 Related Research of D.C.

(Source: Based on the related literature review in WOS, 2023)

4. Application of Dynamic Capabilities Theory

The research on dynamic capabilities in strategic management was first carried out by Teece et al. (1994) in their working paper "The Dynamic Capabilities of the Firms: An Introduction." They introduced the view of "dynamic" into the study of enterprise capability and formally put forward the concept of dynamic capabilities. The author revised and perfected this article and published it in the "Journal of Strategic Management" in 1997. Due to the influence of the "Journal of Strategic Management," it is generally believed that the theory of dynamic capabilities was proposed in 1997. Subsequently, a series of related studies on dynamic capabilities were published.

The Web of Science database searches research articles and review types under "dynamic capabilities." The results show that from 1994 to 2022, more studies mentioned dynamic capabilities and 1837 related papers were retrieved. The research field of dynamic capabilities has formed a rich and complex research result pointing to different directions through literature reading and analysis. For example, some

studies focus on the existence of dynamic capabilities; Some studies attempt to reveal the development and maintenance of dynamic capabilities; Some researchers believe that dynamic capabilities are related to rapidly changing environments; Some researchers consider a more stable external environment; Some researchers use corporate performance as the relevant result of dynamic capabilities; Some researchers explore dynamic capabilities processes or organizational outcomes; Some researchers conceptualize dynamic capabilities as personal factors; Some studies regard dynamic capabilities as the commonality of enterprises.

Dynamic capabilities have a more significant positive impact on the innovation performance of research universities by adopting quantitative research methods to study the effect of dynamic capabilities on the innovation performance of American research universities (Bibi, 2023). Based on 204 China enterprise samples, Zhou et al. explored the differences in dynamic capabilities from three dimensions: perception, integration, and reconstruction capability (Zhou et al., 2022). They revealed the mechanism by which dynamic capabilities affect enterprise performance.

Research shows how school leaders in a South African public school perceive dynamic capabilities and knowledge management to cope with the rapid changes brought about by COVID-19 in a VUCA environment (Schalkwyk, 2021). Based on the survey and analysis of 68 construction companies, William Ricardo found that enterprises with dynamic capabilities can attract and retain employees through human resource management to gain a competitive advantage (Jimenez, 2019).

5. Criticism of Dynamic Capabilities Theory

It can be known that the existing research has not reached a consensus on the connotation of enterprises' dynamic capabilities. However, they have in common that enterprises' dynamic capabilities are the reallocation and integration of internal and external resources, which can generate new resources and capabilities, and the latest resources and capabilities can adapt to the rapid changes of the external environment and maintain enterprises' competitive advantages. Whether it is the process of perceiving, recognizing, and even screening internal and external resources or integrating internal and external resources to generate new resources, it is the behavioral process of personalized disposal of resources, which depends on the differences in the needs, cognition and creative capability of the enterprise. This

heterogeneous capability among enterprises is the source of enterprises' continuous competitiveness.

The previous research largely followed a dominant empirical logic of homogeneity but ignored the influence of the cognitive reasoning of heterogeneity (Wenzel et al., 2020), thus restricting the in-depth understanding of enterprises' dynamic capabilities. Dynamic capabilities should be applied to other theories to improve organizational performance (Jantunen et al., 2018).

From the above analysis, it can be seen that the learning perspective to analyze the formation mechanism of dynamic capabilities is the critical research perspective. Even if later scholars gradually incorporate elements such as orientation and practice into the research, it is not difficult to find that these elements affect the generation of dynamic capabilities or drive enterprises to shape them.

Therefore, the definition of dynamic capabilities must consider the scientific cognitive process of corporate behavior to profoundly and comprehensively understand the changes. This paper argues that dynamic capabilities are a unique routine process for enterprises to identify information such as market opportunities and threats, integrate existing internal and external resources, and adapt to changes in the external environment.

2.1.3 Knowledge-Based Dynamic Capabilities

Knowledge-based dynamic capabilities (KBDC) intersect the two management domains of knowledge management and dynamic capabilities. Based on sorting out and clarifying the concept of dynamic capabilities, this part will propose the concept of KBDC, define the variables of KBDC, and discuss the relationship between KBDC and competitive advantage.

The concepts of knowledge, knowledge management, and dynamic capabilities have been empirically studied in their respective fields, but KBDC is still in the initial stage of development. According to the existing literature, this paper summarizes the viewpoints of different research fields. It proposes an overall framework for KBDC, which integrates knowledge acquisition, application, sharing, and innovation into the dynamic process of seizing, combination, reorganization, and

integration. There is more to be explored about the various factors of knowledge-based dynamic capabilities and management, especially the interaction of competitive advantages.

1. Definition of Knowledge-Based Dynamic Capabilities (KBDC)

The study of knowledge-based dynamic capabilities originated from the dynamic capabilities theory proposed by Teece (Teece et al., 1997). He first defined dynamic capabilities as an organization's capability to reconfigure and integrate existing resources and capabilities to adapt to a dynamic environment (Teece et al., 1997). In the 1950s, knowledge and knowledge-creation practice were understood as the essential elements of organizational survival and used as an important variable to explain the differences in corporate performance (Faccin et al., 2019). As an organization's most essential and critical intangible resource, the view of integrating knowledge and dynamic capabilities is gradually being accepted by more and more scholars (Del Giudice & Maggioni, 2014).

Scholars began to describe knowledge-based dynamic capabilities as the capability of organizations to master knowledge in the process of knowledge practice. Scholars of different disciplines have extended their understandings to a greater extent. Anders tried to combine dynamic capabilities with specific and ubiquitous knowledge management activities to establish a link between dynamic capabilities and knowledge management in the organization and deepen the understanding of dynamic capabilities (Nielsen, 2006). KBDC could be referred to as the capability of enterprises to gain a competitive advantage by using knowledge process capabilities to construct high-order dynamic capabilities (Gonzalez & Melo, 2019; Kaur, 2019). The dynamic framework was described by perception, acquisition, and transformation that facilitates knowledge management.

Based on Vaneet Kaur (2019) and the definition of knowledge management and dynamic capabilities in the previous section of this paper, this study defines knowledge-based dynamic capabilities as " the capability of organizations to absorb, integrate, share, protect and innovate knowledge resources to perceive, adjust, apply and create Change. " This study argues that various types of knowledge may have positive significance for organizations to gain competitive advantage in a dynamic

environment. Therefore, this study discusses how to apply KBDC to increase the competitive advantage of university libraries.

2. Dimensions of KBDC

In recent years, KBDC's research has attracted the attention of many scholars. After analyzing relevant literature, we found that many scholars divide the dimensions of knowledge-based dynamic capabilities in various ways. See Table 2.4 for details.

Table 2.4 The Dimensions of KBDC

Dimensions / Source	Absorptive capability	Integration capability	Innovation capability	Storage capability	Protection capability	Sharing capability	Combination capability
Nielsen (2006)			1			1	1
Wang et al. (2007)	1		1	1	1	1	
Zheng et al. (2011)	1	1	1	1			1
Han & Li (2015)	1	1			1	1	
Gonzalez & Melo(2019)	1	1		1			1
Jiang et al. (2019)	1	1	1		1	1	
Vaneet Kaur (2019)	1	1			1		1
Zhang (2020)	1	1	1		1	1	
Sum	7	6	5	3	5	5	4

(Source: Based on the literature review, 2023)

After defining the concept, this paper will systematically discuss the elements of KBDC based on the research object of the “Double First-Class” university library. In fact, with the definition of knowledge-based dynamic capabilities as “the capability of organizations to integrate, share, protect and innovate knowledge resources to perceive, adjust, apply and create change.” its constituent elements are visible. That is,

knowledge absorptive, knowledge integration, knowledge sharing, knowledge protection, and knowledge innovation capability.

(1) Knowledge Absorptive Capability (KAC)

Some scholars believe that "absorptive capability" was first produced in Kedia's research on the flow and penetration of scientific and technological achievements between geographical regions (Kedia & Bhagat, 1988). However, it is generally recognized that Cohen and Levinthal (Cohen & Levinthal, 1989) first proposed the definition of " absorptive capability " and continuously improved it. Knowledge absorptive capability, presented by Cohen, refers to the capability of the subject to identify, digest, and eventually commercialize new knowledge. Later, many scholars modified the concept of knowledge-absorptive capability based on Cohen's research results.

First of all, based on the knowledge transformation perspective, scholars believe that knowledge absorptive capability is the ability of individuals to internalize acquired knowledge into another knowledge, and the transformed understanding can be used to solve a specific problem or bring new benefits. However, KAC is defined as an organization's capability to acquire, assimilate, transform, and utilize knowledge to improve performance (Khan et al., 2022).

In summary, this study believes that absorptive capability can be regarded as a specific type of knowledge-based dynamic capability, or absorptive capability is a subset of knowledge-based dynamic capabilities for external knowledge resources of the organization. The core part of absorptive capability is the acquisition of external knowledge, which is also the direct background and foundation of the knowledge acquisition capability in the dynamic capability based on the knowledge view. Absorptive capability, in a broad sense, also covers the transformation and utilization of knowledge, which discusses the integration of external and internal knowledge, and thus is also a specific form of knowledge integration capability in knowledge-based dynamic capabilities.

(2) Knowledge Integration Capability (KIC)

Henderson and Clark proposed the concept of knowledge integration for the first time in 1990 and believed that developing new products in enterprises requires component knowledge and architecture knowledge. Architecture knowledge

integrates and connects various components into a coherent overall knowledge system. The formation of architectural knowledge is a knowledge integration process (Henderson & Clark, 1990).

The key to an organization's competitive advantage lies in knowledge integration, not single knowledge. Organizations need to develop their knowledge integration capabilities to expand, integrate and apply the acquired knowledge to existing technologies or products (Wang et al., 2018). Through knowledge integration, organizations can transform internal and external local knowledge advantages into global ones and form a new knowledge system. Therefore, organizations must continuously mine and integrate new knowledge to maintain product market competitiveness. Knowledge integration is always vital in the organizational innovation system and is the basis of corporate knowledge innovation (Chen, 2014).

Specifically, the organization acquires, integrates, and develops knowledge through employee communication and information sharing and then forms new knowledge and technology with the help of tools. The main views of the scholars are shown in Table 2.5.

Table 2.5 The Main Points of KIC

The Source	The Main Points
Alavi et al. (2001)	Knowledge management activities are divided into four basic processes: (1) knowledge creation, (2) knowledge storage and retrieval, (3) knowledge transfer, and (4) knowledge integration and application (Alavi & Leidner, 2001).
Martini et al. (2017)	Knowledge integration is guided by the knowledge organization method, based on data integration and information integration, and supported by the knowledge organization system, organizing concepts and conceptual relationships in the resource knowledge structure and transforming actual knowledge into operable knowledge (Martini et al., 2017).
Gonzalez & Melo, (2019)	Knowledge acquisition capability, knowledge generation capability, knowledge storage capability, and knowledge combination capability (Gonzalez & Melo, 2019).
Vaneet Kaur (2019)	Knowledge acquisition capability; knowledge combination capability; knowledge protection capability (Kaur, 2019)

Zhang (2020)	Knowledge acquisition capability, Knowledge generation capability, Knowledge storage capability, and Knowledge combination capability (Zhang, 2020).

(Source: Based on the literature review, 2023)

The significance of knowledge integration for enterprises is reflected in the use and creation of market changes. After enterprises discover opportunities for market change through external or knowledge innovation, they can effectively utilize these opportunities by integrating knowledge of different attributes and even lead to market change.

(3) Knowledge Sharing Capability (KSC)

Through a literature review, it was found that knowledge sharing can occur inside and outside the organization. Knowledge sharing is one of the main ways to add value to knowledge. Knowledge sharing between organizations refers to exchanging knowledge between an organization and another to maintain long-term partnerships and achieve a win-win situation (Ritala et al., 2015). This mainly occurs in industrial clusters or strategic alliances, but this paper focuses on knowledge sharing within the organization.

Knowledge sharing within an organization is an individual's behavior of solving problems and conceiving new ideas by sharing information and proprietary knowledge to help or cooperate with others (Wang & Noe, 2010). Knowledge sharing is a process in which knowledge owners impart knowledge to knowledge recipients and a process in which team members share knowledge with other classmates (Zhao et al., 2022).

From the summary of the existing research, knowledge sharing involves the individual's knowledge, experience, viewpoint, or understanding being absorbed, reorganized, and used by other individuals after transformation and dissemination, and the knowledge includes explicit and tacit knowledge. There are two forms of knowledge dissemination.

The first form is reflected in the two-way flow of knowledge, that is, the mutual transmission and exchange of knowledge, experience, skills, or opinions among members of the organization (Bradshaw et al., 2015). This kind of knowledge

exchange is based on random social interaction, which can form a knowledge-sharing culture in the organization. Based on Nonaka's point of view, Bradshaw divided knowledge sharing into four dimensions: knowledge combination, organizational internalization, organizational externalization, and knowledge socialization (Bradshaw et al., 2015).

The second form is reflected in the upward flow of knowledge, which emphasizes the sublimation and creation of knowledge. For example, Hau et al. believe that knowledge sharing is not limited to the same-level horizontal interaction between individuals (Hau et al., 2013).

Researchers ' exploration of the field of knowledge sharing started in the 1990s, and their enthusiasm for research rose rapidly at the beginning of this century and has received extensive attention from scholars in related fields. Many scholars have recognized the theoretical and practical significance of knowledge sharing in organizational knowledge management activities and have produced many research results and theoretical innovations. However, the existing research is relatively dispersed regarding research level, conceptual system, and mechanism of action. Many vital issues are ambiguous, and researchers must sort them out further to promote theoretical development in this field.

(4) Knowledge Protection Capability (KPC)

Knowledge management activities improve the efficiency of organizational operations, decision-making, and knowledge sharing, bringing many competitive advantages to organizations (Oyemomi et al., 2015). However, while organizations use the convenience and services brought by knowledge, more and more organizations must face the increasingly complex and severe knowledge security environment. Therefore, organizations must do their utmost to protect knowledge assets and prevent organizational knowledge from being illegally stolen or improperly used to increase competitive advantage.

This study believes that knowledge protection capability refers to the organization's ability to protect the legitimate rights and interests of its knowledge, limit the abuse of knowledge through legal channels, protect knowledge owners, standardize the use and exchange process of knowledge, and selectively transfer the organization's knowledge and create value in a regular and guaranteed situation. It

should be noted that knowledge protection does not conflict with knowledge sharing and knowledge transformation. It only ensures that knowledge is not abused and creates an effective knowledge environment to help organizations protect the integrity of their knowledge assets.

(5) Knowledge Innovation Capability (KIN)

Innovation is a process in which knowledge is acquired, shared, and absorbed to create new knowledge that reflects the methods and procedures of products and services (Byrd, 2012). In 1991, Debra M. Amidon first defined " knowledge innovation " as " the path of transforming new ideas into marketable products and services through creation, evolution, communication, and application to achieve business success, national economic revitalization, and social prosperity" (Rogers, 1993). Knowledge innovation is a dynamic process, which is the communication process of tacit and explicit knowledge at different levels in the enterprise (Nonaka & Takeuchi, 1995).

The so-called knowledge innovation is obtaining new knowledge in scientific research. Knowledge innovation mainly involves acquiring new knowledge through scientific research, including primary and applied research. The purpose is to pursue discoveries, create new theories and methods, and accumulate new knowledge (Quiggin & Grant, 2011).

In a broad sense, knowledge innovation refers to all activities and behaviors that can transform, update, and construct new knowledge to existing knowledge (Lee, 2010). Knowledge innovation is an activity that promotes the generation of new knowledge. Knowledge innovation includes scientific discovery, technological invention, knowledge integration and application, technological progress, and innovation in political, economic, and scientific education systems and mechanisms (Krings et al., 2016).

In a narrow sense, knowledge innovation refers to the process and behavior of obtaining new scientific knowledge through scientific research, including natural science knowledge, social science knowledge, and technical science knowledge (CoronaTrevino, 2012).

The definition of this knowledge innovation is similar to that of scientific research. This paper adopts a narrow definition of knowledge innovation, which refers

to obtaining new natural and technical science knowledge through scientific research, including primary and applied research.

3. Research on KBDC

Knowledge-based dynamic capability theory has been gradually applied to enterprises in the dynamic competitive environment. Scholars are conducting more and more research on dynamic capability theory, which has been analyzed from different perspectives.

From the perspective of knowledge management activities, Nielsen divides knowledge management activities into dynamic capabilities and believes that knowledge activities include eight aspects: knowledge creation, acquisition, sharing, and application. Organizational learning and knowledge are significant driving forces in developing dynamic capabilities (Tsoukas & Mylonopoulos, 2004). The dynamic capabilities can be better applied to operational operations (Cepeda & Vera, 2007).

One study synthesized existing research on dynamic capabilities, focusing on their applied knowledge resources, and proposed a knowledge-based typology of dynamic capabilities to guide future research and practice. The framework integrates three dimensions—internal versus external sourcing, exploration versus exploitation focus, and combination versus absorptive capacity—to form eight capabilities that comprehensively cover all existing frameworks and typologies identified in the literature (Denford, 2013). Knowledge-based dynamic capabilities are more likely to create competitive advantages for companies through empirical evidence from India's I.T. department. They suggested that organizations must establish a basic level and higher knowledge-based dynamic capabilities to pursue global competitiveness (Kaur & Mehta, 2016). Kaur used the knowledge-based dynamic capability framework to evaluate the organization of India's I.T. sector and examined the role of dynamic capabilities as a mediator between knowledge management process capability and competitive advantage realization (Kaur, 2019). Research confirms knowledge-based dynamic capabilities (KBDC) and their importance to firm performance (Sunali Bindra et al., 2020). The study proves that improving competitive advantage and performance through sustainable marketing starts with big data strategy and knowledge management. In addition, this study also found that social media improves sustainable marketing, competitive advantage, and performance (Horng et al., 2022).

In summary, many scholars have researched knowledge-based dynamic capabilities from the aspects of the path, dimension, variable, and use and have achieved empirical results. The focus of this article is how to enhance the competitive advantage of university libraries from knowledge-based dynamic capabilities.

2.2 Service Innovation

2.2.1 The Definition

In his book " Economic Development Theory, " the economist Schumpeter first proposed the term " innovation. " Innovation is to recombine production factors, which is to introduce the ' new combination ' of production factors and conditions that have not existed before into the existing combination system, and then produce a ' new combination, 'including five types of situations: the first type is to introduce new products, the second is to use new methods, the third is to expand new markets, the fourth is to obtain new sources of supply, and the fifth is to achieve. However, scholars have defined the connotation of service innovation from different perspectives. Sundbo and Jon (Sundbo & Jon, 1997) consider service innovation as a new and improved product and service from the standpoint of service products, using new technologies in services or applying new technologies to existing technologies. From the perspective of value and competitive advantage, Sundbo (Sundbo, 2008) proposed that service innovation refers to the application of new ideas and new technologies in the service process to improve and change the service process and service products, improving service quality and efficiency. In summary, service innovation is to realize the dynamic new demand for service objects, enhance service quality, and create new market value through the change of production factors and the change of the relationship between production factors.

The service innovation concept has a more extensive extension, mainly because the service of service innovation is not only the service industry itself, but other industries and sectors also need to serve innovation activities. Therefore, service innovation includes the following types:

(1) Innovation of products. Product innovation refers to the research, development, and introduction of new products for the market. Product innovation is an entirely new concept in the service industry, which involves relatively narrow contents, but the object of innovation is fixed.

(2) Innovation of technology. Innovation of technology refers to the continuous development of new technologies in the service process, leading to innovation.

(3) Innovation in form. Innovation in the form will not change the quantity, but the service standard change.

(4) Innovation of organizational form. Organizational innovation refers to changing service organization form and structure, increasing and decreasing organizational elements, and updating and introducing management methods and means.

2.2.2 The Service Innovation of University Library

2.2.2.1 The Definition of University Library's Service Innovation

Throughout the relevant research on the library's service innovation, we find that scholars mainly study library service innovation from the perspectives of technology and service platform innovation, resource organization form innovation, organizational culture innovation, and multiple innovation integration. The concept, content, and system of university library service innovation have been updated with the background of the times. Enhancing the competitive advantage of the library is a crucial part of its support for universities to carry out service innovation. The advanced service concept undoubtedly provides a prerequisite for innovative services. To innovate the concept of library service, librarians, as one of the critical factors of the library, must change their ideas. Only by recognizing the essential influence of services and providing readers with services that meet their individual needs with a proactive attitude can librarians achieve higher standards of service renewal and innovation and enhance the competitive advantage of libraries.

2.2.2.2 Incremental Service Innovation and Radical Service Innovation of University Library

Although some studies have defined service innovation as a whole, some scholars believe that the overall definition should be generalized, indicating that some core features are insufficient to identify service innovation in practice and lack operability. Therefore, methods further defined from a multi-dimensional perspective are more common in recent studies. For example, Shi and Perdue (Shin, 2022) defined service innovation in the tourism field as the combination of innovation related to technology, business model, knowledge, organization, and demand to improve existing services progressively or radically create new services. As this definition reflects, service innovation has two critical levels: incremental and radical.

Incremental innovation is to meet the needs of existing customer groups by improving existing products, services, and process flows; radical innovation is the introduction of new technologies, technologies, services, and production processes (Eisele et al., 2022; Yusof et al., 2023). Similarly, scholars have also proposed incremental and radical service innovations in university libraries (Jantz, 2013). In general, the progressive service innovation of university libraries refers to improving and revising existing services and supplementing or extending existing service lines. In contrast, the radical service innovation of university libraries includes new services or significant innovations in terms of readers and reading activities.

2.3 Competitive Advantage

2.3.1 Definition of Competitive Advantage

Competitive advantage originated from Chamberlin's "Theory of Monopolistic Competition," which defined a firm's performance as being better than its competitors. Hofer and Schendel also introduced the concept of competitive advantage into the research field of strategic management, arguing that competitive advantage comes from capabilities (Hatten et al., 1978).

In 1985, Porter and Millar defined competitive advantage as when the value created by the enterprise for its buyers exceeds the cost of creating value by the

enterprise, which comes from providing equal benefits at a lower price than the competitors or focusing on a specific field, that is, cost leadership advantage, differentiation advantage and focus advantage, so the competitive advantage is the strategic goal of enterprises (Porter & Millar, 1985).

However, no unified and precise definition of “competitive advantage” exists. Different people have different statements because of other research perspectives. Grant (R. M Grant, 1996) put forward the basic theory of enterprise knowledge: knowledge plays a significant role in the enterprise, so it is an essential strategic resource. In a broad sense, competitive advantage is defined as one or a group of resources or capabilities that enable enterprises to compete (Wiggins & Ruefli, 2002).

The dynamic competitive advantage based on knowledge can allow the company to conduct business more efficiently (Davcik & Sharma, 2016).

The concept of competitive advantage reflects the organization's pursuit of maintaining its competitive advantage and situation, but different theoretical backgrounds give different connotations to competitive advantage. To continue the competitive advantage, the organization must continuously improve its competitive position through reinvestment (Hafeez et al., 2002).

"Competitive advantage" emphasizes a superior state relative to competitors, enabling an organization to obtain more excellent value in the competition (Pietersen, 2011).

From the perspective of innovation, only innovation with heterogeneous value can bring sustainable competitive advantages, while innovation with homogeneous value will be rapidly disseminated and imitated (Forsman, 2013). This study defines competitive advantage as an organization surpassing its competitors and is in a leading position for a particular time.

The knowledge-based competitive advantage theory is based on resource and capability theory development, and many researchers pay more attention to it. Therefore, knowledge is a tool as well as a resource. Knowledge can bring productivity and creativity to the organization, and the organization relies on all kinds of knowledge to form resources to obtain competitive advantages (Li, 2020).

The organization can enhance its competitive advantage if a unique knowledge management system can be developed. Therefore, organizations must learn to manage

knowledge to perform well. At the same time, organizations should face the current situation and environment and learn to use scientific methods to organize existing knowledge. Organizations enhance their competitive advantages through management processes such as knowledge acquisition, integration, sharing, protection, and innovation.

2.3.2 Research on University Libraries' Competitive Advantage

From the review of existing studies, the research on competitive advantage mainly focuses on how the internal factors of an enterprise shape competitive advantage, including organizational learning, entrepreneurial orientation, entrepreneurial strategy, and entrepreneurial network. However, the core of dynamic capability is knowledge (D. Teece & G. Pisano, 1994), which provides the idea for this study.

Organizations must integrate individual expertise into products and services and establish the necessary coordination for this knowledge integration to achieve sustainable competitive advantage(A.F. Ragab & Arisha, 2013; R. M Grant, 1996).

At the same time, the organization should not only emphasize the development and utilization of knowledge within the organization but also promote knowledge sharing and transfer through the communication and interaction between the organization and external stakeholders to realize the creation of new knowledge and enhance its competitive advantage (Tian & Tian, 2021).

Knowledge can bring productivity and creativity to enterprises, and then enterprises rely on various knowledge to form resources to gain a competitive advantage (Jardon, 2017; Sitkovska & Dzirgun, 2018). If a unique knowledge management system can be created in the enterprise, then the enterprise will be more advantageous in forming a strong competitiveness. Therefore, the university library must learn dynamic knowledge management to enhance its competitive advantage (Omidkhah, 2016).

University libraries should give full play to the competitive advantages of their own material culture, spiritual culture, management culture, and service culture, effectively participate in the construction of a public cultural service system, and put

forward corresponding measures to construct the cultural competitiveness of university libraries (Guo & Wang, 2012).

Because the main task of the university is to impart professional knowledge to students systematically, the university library mainly serves teachers and students. Therefore, the core competitiveness of the university library refers to integrating various university knowledge resources (Lin, 2008).

Teachers and students are the objects, and scientific service means are carried out to meet the knowledge needs of teachers and students in scientific research and teaching activities and to provide them with unique knowledge services (Zhu & Cheng, 2002).

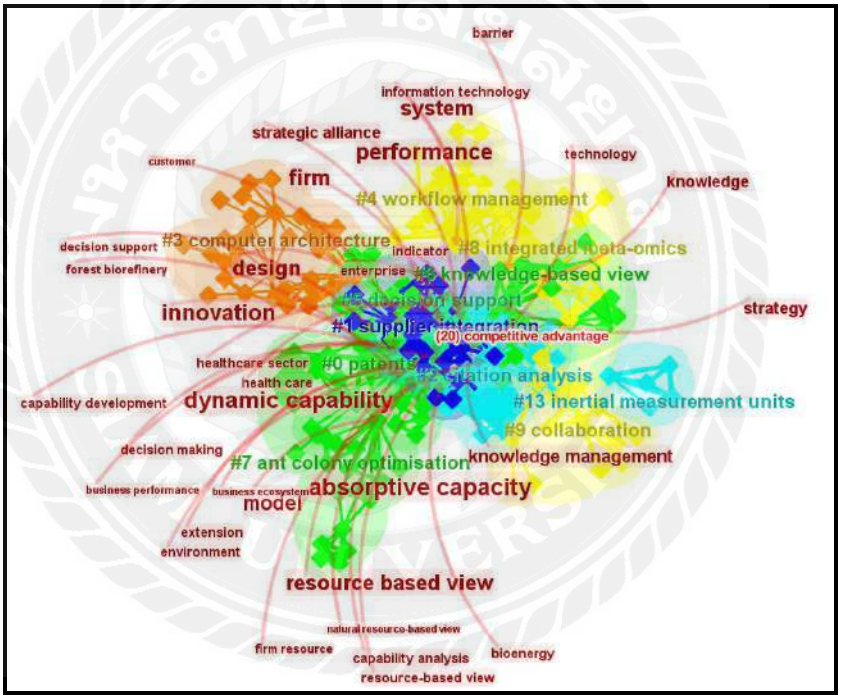


Figure 2.3 Related Research of Competitive Advantage

(Source: Based on the related literature, 2023)

According to the literature analysis (see Figure 2.3), competitive advantage is related to knowledge, knowledge-based view, knowledge management, and dynamic capability (Kaur, 2019). Another scholar thinks that the key for enterprises to obtain and maintain competitive advantage is knowledge and its management process (Nonaka, 1994). This point of view provides an idea for studying the relationship between knowledge-based dynamic capabilities and competitive advantage.

In other words, the academic and business circles have never stopped studying the competitive advantage of enterprises. The above views are reasonable for understanding competitive advantage according to their different starting points and perspectives.

2.4 The Relationship Between Knowledge-Based Dynamic Capabilities, Service Innovation, and Competitive Advantage

In the rapidly changing environment, the environment is uncertain, complex, and dynamic, and the development of science and technology leads to changes in technology and the market, all of which indicate that the competitive advantage of enterprises is practical at a certain point in a short period. The competitive advantage is not static, and it is always impossible to maintain the status quo. It will be impacted and strongly damaged by competitors and other factors, indicating that the competitive advantage needs to be continuously improved and strengthened.

According to relevant literature research, many scholars have explored and analyzed the impact of knowledge-based dynamic capabilities and competitive advantages and demonstrated this relationship through different research methods.

Firstly, the dynamic capabilities that lead to competitive advantage are knowledge-based processes characterized by specialization. Secondly, the organization is a weighted and focused structure composed of skilled participants, an incentive system, a robust organizational structure, and a unique culture. Thirdly, the organization's development needs managers' specific division of labor (Cillo et al., 2007).

User knowledge is the key to maintaining university libraries' sustainable competitive advantage. Cultivating users ' knowledge management ability can improve libraries' service innovation ability, improve user satisfaction and loyalty, realize user value innovation, and finally enable university libraries to gain a sustainable competitive advantage (Zhang, 2008). The flow of tacit knowledge within the library promoted business exchanges and development, improved the library staff's working ability, stimulated librarians' enthusiasm, and promoted the library to maintain a sustainable competitive advantage and form its core competitiveness

(Xiong & Tan, 2009). One of the research studies used a structured questionnaire to analyze the three dimensions of dynamic capabilities in fast-food restaurants. They concluded that dynamic capabilities affect the organization's competitive advantage (Chukwuemeka & Onuoha, 2018). Taking the Indian IT sector as an example, this paper integrates the knowledge-based view and the dynamic capability model. It proposes to use knowledge-based dynamic capabilities to gain organizational competitive advantage (Kaur, 2019). Using 30 top knowledge-based firms in Iran as case studies, this study analyzes the competitive advantages of knowledge-based firms using knowledge-based dynamic capabilities (A. A. Khaligh et al., 2020). The concept of knowledge-based dynamic capabilities (KBDC) and its significance for firm competitive advantage are investigated through meta-analysis (S. Bindra et al., 2020). This study proposed knowledge-based dynamic capabilities as a moderating variable to promote the effect of green product innovation on competitive advantage, studying 157 manufacturing companies in Malaysia.

Based on a multi-level meta-theoretical framework, Vaneet Kaur explains the impact of knowledge-based dynamic capabilities on competitive advantage from different aspects (Kaur, 2022).

The above studies show that:

1. There are few research results on the influence of knowledge-based dynamic capability and competitive advantage, and there is no literature on analyzing the competitive advantage of university libraries from the perspective of knowledge-based dynamic capability, which provides space for the study of this paper.

2. There are few empirical studies on knowledge-based dynamic capability and competitive advantage. Some pieces of literature only explore the measurement of a specific variable, such as dynamic capability. As for the research on competitive advantage, many studies equate competitive advantage with enterprise performance and use performance measurement indicators to measure competitive advantage.

3. Most cases of the companies mentioned above are studied, which provides a research basis and reference for the later case studies of this paper.

2.5 Conceptual Framework

2.5.1 The Conceptual Framework

Based on the existing research, this chapter defines the concept of related variables and divides the dimensions of each variable. Based on the definition of the concept, the conceptual framework of this theoretical research is constructed, which lays the foundation for the subsequent hypothesis and the following sample data analysis.

Based on the related research results, this study assumes that knowledge-based dynamic capabilities can enhance the competitive advantage of university libraries. Therefore, based on the research results of Kaur (2019), this study attempts to put forward the five dimensions of knowledge-based dynamic capabilities of university libraries as independent variables and competitive advantages as dependent variables.

Knowledge management theory indicates that enterprises transform knowledge into enterprise value and establish a sustainable competitive advantage through management processes such as acquiring, sharing, integrating, and utilizing organizational knowledge, an intangible asset. Knowledge is the core of capability. At the same time, the concept of dynamic capabilities has made an in-depth exploration of dynamic capabilities, emphasizing that knowledge is the basis for forming dynamic capabilities (Teece et al., 1997).

As an intangible asset, knowledge resources are difficult to imitate and copy. The knowledge management process can help enterprises acquire and use the knowledge needed by the organization more efficiently and establish the core competence of dynamic capabilities to obtain relative advantages to meet customer needs and gain market recognition (Raudeliūnien & Kordab, 2019).

Specifically, This study divides the knowledge-based dynamic capabilities of university libraries into knowledge absorptive capability, knowledge integration capability, knowledge sharing capability, knowledge protection capability, and knowledge innovation capability. Competitive advantage is studied as a whole variable. To sum up, the conceptual framework of this study is shown in Figure 2.4.

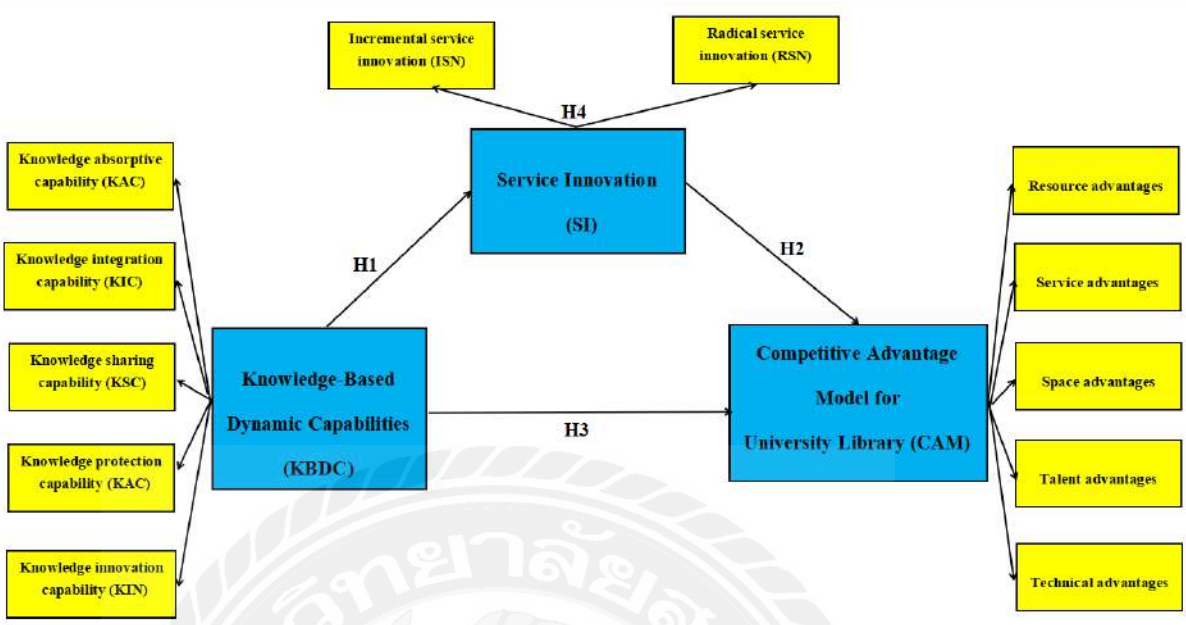


Figure 2.4 Conceptual Framework

2.5.2 Operational Definition

Knowledge-based dynamic capabilities are the independent variable of this study. This study will analyze knowledge-based dynamic capabilities (KBDC) from five perspectives: knowledge absorptive capability (KAC), knowledge integration capability (KIC), knowledge sharing capability (KSC), knowledge protection capability (KPC), and knowledge innovation capability (KIN).

(1) Knowledge absorptive capability (KAC)

From the perspective of organizational learning theory, knowledge acquisition can be divided into two processes: external and internal. Because simply acquiring knowledge from inside the enterprise will not increase the tacit knowledge owned by the enterprise (Tackney et al., 2006; Wang et al., 2017), the knowledge acquisition of this study referred to belongs to the external knowledge acquisition of the university library. In the process of knowledge acquisition, the university library introduces relevant knowledge from the external knowledge source of the library according to its own knowledge needs. The knowledge of both the library and the staff need to enter the library content through knowledge acquisition (Xizhong & Jin, 2009; Zanarone et al., 2016).

(2) Knowledge integration capability (KIC)

In the existing research, the library's knowledge integration ability scale is rarer than the knowledge absorptive and innovation capabilities scales. In this study, the scale is proposed based on synthesizing the views and ideas of many scholars. This index is mainly divided into the library's ability to integrate different knowledge. For example, Kogut & Zander believed that the main form of knowledge integration is the combination of external and internal learning knowledge. Therefore, this study will also set up related questions.

(3) Knowledge sharing capability (KSC)

Knowledge sharing is the core link of knowledge management in the library. The successful knowledge management activities of the library are inseparable from knowledge sharing (Gupta et al., 2000). Wang and Noe (2010) regarded knowledge sharing as an organizational activity providing decision-making information and critical technologies for organizations to solve problems, innovate ideas, and implement new strategies and production processes.

(4) Knowledge protection capability (KPC)

Knowledge protection capability is a knowledge management activity in that an organization protects the original and positive state of knowledge and prevents it from being transferred to other organizations without authorization. In the process of knowledge protection, university libraries should focus on the confidentiality of knowledge, including the protection of readers ' information, the protection of intellectual property rights, the rational use of databases, unnecessary knowledge leakage, and knowledge loss (loss of collections).

(5) knowledge innovation capability (KIN)

Knowledge innovation capability refers to the capability of the university library to adjust the development strategy innovation orientation and develop new services through innovative behavior and process (Mai et al., 2020; Yesil & Salih, 2014). The success of an organization depends on developing proprietary and internal innovation capabilities. On this basis, the organization can gain a competitive advantage. The essence of knowledge innovation capability is the ultimate goal of knowledge acquisition, knowledge integration, and knowledge protection capability.

(6) Service innovation(SI)

Based on the existing relevant literature, service innovation involves changes in various production factors and relationships, realizing the dynamic new demands of service recipients, improving service quality, and creating new market value.

(7) The Competitive Advantage Model for University Libraries (CAM)

The competitive advantage model for university libraries mainly involves factors such as resource advantages, service advantages, space advantages, talent advantages, and technological advantages.

2.6 Conclusion

Combining the concepts, dimensions, and related research results of knowledge-based dynamic capabilities and competitive advantages gives us a general understanding of the research progress of knowledge-based dynamic capabilities and competitive benefits. However, there are still some problems in the current research in this area :

Firstly, the research on the dimension and evaluation of knowledge-based dynamic capabilities must be strengthened. Much research shows that few scholars use " knowledge-based dynamic capabilities " precisely, and there is no empirical measurement of large samples.

Secondly, the research on knowledge-based dynamic capability is not systematic. It can be found that most previous research only focused on one or several dimensions of knowledge-based dynamic capability research, lacking completeness in reviewing previous research. In terms of research methods, many relevant studies adopt the case analysis method without in-depth statistical analysis of extensive sample data, and the results are not convincing.

Thirdly, the relationship between knowledge-based dynamic competence and competitive advantage needs further study. The research on the relationship between knowledge-based dynamic competence and competitive advantage shows that this part is mainly done through empirical research.

However, it is found that relevant studies did not control contingency factors such as the stage, industry, and scale of organizational development, which makes it

challenging to popularize these research results. Therefore, the author thinks that future research can strengthen the control from these aspects to improve its research significance and value.

CHAPTER 3
RESEARCH METHODOLOGY

Following the literature review in Chapter 2, this further chapter studies how to develop a competitive advantage model of China's " Double First-Class " university libraries based on knowledge-based dynamic capabilities. The main contents of this chapter include the following:

3.1 Research Design

This study adopts mixed research methods, mainly quantitative, supplemented by qualitative research methods, including questionnaire survey and in-depth interviews.

1. Questionnaire Survey

The questionnaire survey was adopted because most of the data from university libraries needed for this study can not be directly measured from public information data. The questionnaire design process of this study refers to research scholars such as

Churchill (Xizhong & Jin, 2009), which mainly includes the following steps. First, this study will combine the relevant literature to form the framework of the first draft.

Although there are few pieces of research on enhancing the competitive advantages of university libraries from the perspective of knowledge-based dynamic capabilities, many related research results in the enterprise aspect provide a valuable reference for this study. Combined with the actual situation of “Double First-Class” university libraries in China, this study adopts the mature scale of existing studies, designs measurement items, and forms the scale draft. Second, this study will consult the opinions of library academic experts. Based on the items, logic, wording, and other aspects of the first draft of the questionnaire, this study repeatedly consulted the revised opinions of five academic library experts and further modified and supplemented the questionnaire. Third, this study conducted a scale pre-test. The revised scale will be tested on a small scale from July to September 2023. Finally, this study obtained a formal scale. This study will conduct confirmatory factor analysis (CFA) and reliability analysis on all questionnaires and finally get the scale developed.

2. In-depth Interviews

In-depth interviews generally adopt a semi-structured interview method, which requires the researcher to design an interview outline as an interview outline and a basic framework according to the research theme before the interview (Ruslin et al., 2022). The leading role of in-depth interviews is to obtain cutting-edge materials in the research field through in-depth conversations with professionals and to summarize and extract the conclusions of the research issues and the direction of further research through the analysis and summary of the interview results of different researchers on the same topic.

3.2 Population and Sample Selection

This paper mainly studies how knowledge-based dynamic capabilities improve the competitive advantage of China's “Double First-Class” university libraries and whether there are other factors between them. This study is limited to “Double First-

Class” university libraries in China. According to China's official website of the Ministry of Education （ http://www.moe.gov.cn/ ） , there were 42 “Double First-Class” universities in China in 2017. However, the construction of “Double First-Class” is a dynamic process. On February 14, 2022, China's second round of “Double First-Class” universities reached 147, including 42 universities in the first round. In other words, these 42 universities have been on the “Double First-Class” construction list for more than five years. Therefore, the research object selected in this paper is 42 of China's “Double First-Class” university libraries.

For selecting a sample size for quantitative research, among the 42 libraries, the research plan is to obtain at least 10 questionnaires for each library. Through the 42 double first-class university library staff statistics, the total number of librarians in this study is 4829. After the total sample size is known, according to the sample size calculation formula

n = [C^2*s*(1-s] /a^2

Note: n represents the sample size, C represents the confidence level, s represents the proportion of a specific attribute in the population, and a represents the allowable error range. This study will select a confidence level of 95 %, the ratio of a particular point in the population is 50 %, and the allowable error range is 5 %, then the sample size is :

n = 356

The sample size is between 200 and 400, so the sample size of this study should be more than 400.

However, there are two requirements for selecting China’s “Double First-Class” university libraries as research objects: First, the research object should belong to the libraries to familiarize themselves with the library's relevant situation, which is very important. Second, respondents especially need to have a certain degree of awareness and familiarity with the knowledge-based dynamic capabilities of university libraries.

Regarding selecting key informants for qualitative research, this study will select 9 from 42 “Double First-Class” university libraries. These 9 interviewees should be the library director, deputy director, or department director.

3.3 Research Tool

1. Quantitative Study

The questionnaire will be distributed to the social media community in China, and the response rate will exceed 75 %. It takes about 3 to 4 minutes to complete the questionnaire. Data collection will be conducted from September to November 2023. This study will use identified research groups for data collection. The data is collected on questionnaire sites such as QuestionnaireStar. Then, the data is assigned a number, and the SPSS file is transmitted to the computer. Missing data will be processed by interpolation in AMOS version 23.0. Each interviewee will work alone but are studied as a group (Malhotra, 2010).

2. Qualitative Research

Qualitative research mainly uses an in-depth interview method. This study is based on the in-depth interview method, adopts semi-structured interview technology, and follows the scientific process to determine the content elements of the university library's competitive advantage. This method gives full play to the initiative and creativity of both parties in the interview, thus obtaining profound and systematic information and guaranteeing the objectivity and authenticity of the interview results to the greatest extent. Therefore, it is feasible to choose the in-depth interview method to determine the competitive advantage elements of university libraries. The specific process of in-depth interviews includes 9 key informants or more, conducting interviews, interview records, interview coding, interview data collation, and result analysis. The interviewees are directors and middle-level managers of “Double First-Class” university libraries.

3.4 Operationalization of Variables

3.4.1 Independent Variable

Based on considering the actual situation of “Double First-Class” university libraries in China, this study mainly draws on the projects proposed by Vaneet Kaur (2019) and Wei Zhang (2009) for the measurement of knowledge-based dynamic capabilities in the selection of measurement scales for specific dimensions. It revises the scale to obtain this paper's knowledge-based dynamic capabilities measurement scale (Nie, 2018). There are six items of the knowledge absorptive capability scale, five items of the knowledge integration capability scale, five items of the knowledge sharing capability scale, five items of the knowledge protection capability scale, and five items of the knowledge innovation capability scale, a total of 26 items, as shown in Table 3.1.

The Likert five-level scale was used to measure the knowledge-based dynamic capability of the organization. The score was from 1 to 5 points. The higher the score, the stronger the knowledge-based dynamic capability of the organization. The intensity was from completely disagreeing to agree.

Table 3.1 Measurement of Independent Variables

Variables	**Items**	**Source of Literature**
Knowledge Absorptive Capability	1. The library can get more technical knowledge from the outside. 2. The library can get more management knowledge from the outside. 3. The library can get more reading marketing knowledge from the outside.	Zahra & George (2002) Lichtenthaler (2009) Liao et al.

	4. The library can get more academic knowledge from the outside. 5. The library can get more knowledge from the outside. 6. The library has a solid ability to acquire and apply new knowledge.	(2017) Khan et al. (2022) And others.
Knowledge Integration Capability	7. The library can effectively integrate internally created and externally acquired knowledge. 8. The library can effectively integrate the knowledge of teams and individuals. 9. The library can effectively integrate different technologies or different professional knowledge. 10. The library can effectively integrate new knowledge and existing knowledge. 11. The library can effectively adjust the internal organizational structure or service workflow.	Chen (2014) Wang et al. (2018) Martini et al. (2017) Gonzalez & Melo (2019) And others.
Knowledge Sharing Capability	12. The library can optimize the knowledge-sharing service environment from five aspects: resource construction, data processing, text construction, service, and copyright. 13. The library can build an effective knowledge-sharing service network. 14. The library can strengthen the construction of the librarians' knowledge-sharing service team. 15. The library can effectively share existing	Ritala et al. (2015) Bradshaw et al. (2015) Tang & Long (2018) Zhao et al. (2022)

	literature or scientific research reports with readers. 16. The library can effectively provide innovative services for knowledge sharing.	
Knowledge Protection Capability	17. The library can effectively protect technical knowledge. 18. The library can effectively protect the professional collection of literature. 19. The library can effectively protect the copyright of reading promotion brand activities. 20. The library can effectively protect the personal information of readers. 21. The library can have enough space to preserve literature resources.	Oyemomi et al. (2015) Gonzalez & Melo (2019) And others.
Knowledge Innovation Capability	22. The library often tries new work ideas or ideas. 23. The library can create technical knowledge from its capabilities. 24. The library can create knowledge of reading promotion activities through its capability. 25. The library has a team of talented people who carry out knowledge innovation services. 26. The library can create a lot of management knowledge from the inside through its capability.	Byrd (2012) Krings et al. (2016) Corona Trevino (2012)

(Source: Based on the literature review, 2023)

3.4.2 Mediator Variable

Service innovation includes incremental service innovation and radical service innovation. Incremental service innovation refers to improving some service details, mining the reading needs of some readers, innovating some service styles, and so on in the university library. Radical service innovation refers to developing new service objects, proposing new service standards, or creating a new service concept in the university library. See Table 3.2 for details.

Table 3.2 Measurement of The Mediator Variables

Variables	**Items**	**Source of Literature**
Incremental Service Innovation	1. The library has partially improved the existing services. 2. The library can extend the existing services. 3. The library can innovate the form of reading activities. 4. The library can extend its opening hours. 5. The library can focus on meeting the service requirements of some readers.	(Mahavarpour et al., 2023) And others.
Radical Service Innovation	6. The library can develop off-campus reader services. 7. The library can develop a new service standard. 8. The library can effectively provide a new and effective service for teaching. 9. The library can effectively innovate unique	(Schiefer et al., 2024) And others.

	subject services. 10. The library can effectively obtain higher satisfaction from readers.	

(Source: Based on the literature review, 2023)

3.4.3 Dependent Variable

The competitive advantage model for university libraries is taken as the dependent variable of this study. The competitive advantage model for university libraries should be that compared with the same industry (Porter & Millar, 1999), they can quickly respond to changes in readers ' reading needs. They can also be higher than the average level of the same industry in other aspects, such as research and development and innovation of reading services. It can use external resources well to adjust its internal structure correctly and has better combat capability in a competitive environment (Guo & Wang, 2012). For example, it occupies an advantageous position in constructing campus culture, has substantial reader resources, and has better achievements and performance than the same industry in other aspects, such as reader satisfaction. See Table 3.3 for details.

Table 3.3 Measurement of The Dependent Variable

Variable	**Items**	**Source of Literature**
The Competitive Advantage	1. Compared with other university libraries, our library has higher innovation advantages. 2. Compared with other university libraries, our library has higher service quality. 3. Compared with other university libraries, the library	Porter & Millar (1985) Davcik &

Model for University Libraries	has done better regarding reading promotion and services. 4. Our library can better grasp readers' needs than other university libraries. 5. Our library staff is more motivated to work in our unit than other university libraries. 6. Compared with other university libraries, our library reflects readers' needs faster. 7. The university departments are more satisfied with the library's service than other university libraries. 8. Compared with other university libraries, the library's reading service brand has a more substantial influence.	Sharma (2016) Li (2020) Chen & Shan (2018) Tian & Tian (2021)

(Source: Based on the literature review, 2023)

3.5 Questionnaire Pretest

The original version of the questionnaire is in English. Since the respondents are from university libraries in China, the questionnaire is translated into Chinese. After consulting the suggestions of five library experts and professors in China, this study revised some questions.

3.5.1 Validity Testing

Validity is the scale's validity, which refers to the degree to which the measurement results reflect the content to be examined (Sürücü & Maslakci, 2020). The higher the degree, the higher the degree of agreement and the higher the validity. The lower the degree, the lower the contract and validity.

1. Content validity

Content validity is generally used to explain the validity of the questionnaire in words (Almanasreh et al., 2019; Sürücü & Maslakci, 2020). For example, the researcher explains the authority and validity of the questionnaire through references or authoritative sources. In addition, it is to fully illustrate the validity of the questionnaire through the pre-test and the correction of the items based on the results.

2. Logical Validity

The purpose of logical validity is to measure the rationality and validity of the questionnaire content design. The most common method is expert judgment (Yaghmaie, 2003).

This research invited five professors of library science (Professor Shi Dewan, Xue Hongzhen, Wang Fengcui, Liao Qiu, and Chen Lan) to evaluate the logical validity of each question according to the Item Objective Consistency Index (IOC).

3. Construct Validity

Construct validity analyzes the degree of agreement between the results obtained from the scale and the theory assumed when the scale was designed (Clark & Watson, 2016). The analysis process of construct validity includes the significance of construct validity, exploratory factor molecules, treatment of non-standard construct validity, and summary.

3.5.2 Reliability Testing

Reliability is an evaluation index of the measurement results—and reliability tests of internal consistency (Wrisley et al., 2004). Same reliability is an analytical method of equivalence reliability. The same survey group is asked to fill in two questionnaires with equivalent contents, and the correlation between the two data is analyzed. The greater the correlation is, the smaller the variation caused by the same composition.

The study uses the Cronbach α coefficient to detect the internal consistency of the dynamic ability scale, mainly using the experimental factor method to measure. When

analyzing the character of the scores in the scale, it is generally believed that Cronbach α is more significant than 0.8, which represents the best internal consistency of the survey scale. It is acceptable when the coefficient is between 0.7 and 0.8 and 0.6 and 0.7. It is barely adequate. If it is less than 0.6, the scale needs to be modified. The reliability analysis results of the formal questionnaire in this study are shown in Table 3.4.

Table 3.4 Reliability Analysis Results of Formal Questionnaire Scale and Variables

Scale/Variable	Number of Items	Cronbach's α
Knowledge absorptive capability (KAC)	6	0.908
Knowledge integration capability (KIC)	5	0.892
Knowledge sharing capability (KSC)	5	0.894
Knowledge protection capability (KPC)	5	0.879
Knowledge innovation capability (KIN)	5	0.892
Incremental service innovation (ISN)	5	0.918
Radical service innovation (RSI)	5	0.924
The Competitive Advantage Model for University Libraries(CAM)	8	0.929

3.6 The Hypotheses

According to the conceptual model in the literature review in Chapter 2, we can obtain the hypothesis of this study.

Hypothesis 1: Knowledge-based dynamic capabilities have a positive impact on service innovation.

Hypothesis 2: Service innovation has a positive impact on the competitive advantage model for university library.

Hypothesis 3: Knowledge-based dynamic capabilities have a positive impact on the competitive advantage model for university library.

Hypothesis 4: Knowledge-based dynamic capabilities have a positive impact on the competitive advantage model for university library through service innovation.

In summary, we can get the analysis model of this study. As is shown in the Figure 3.1.

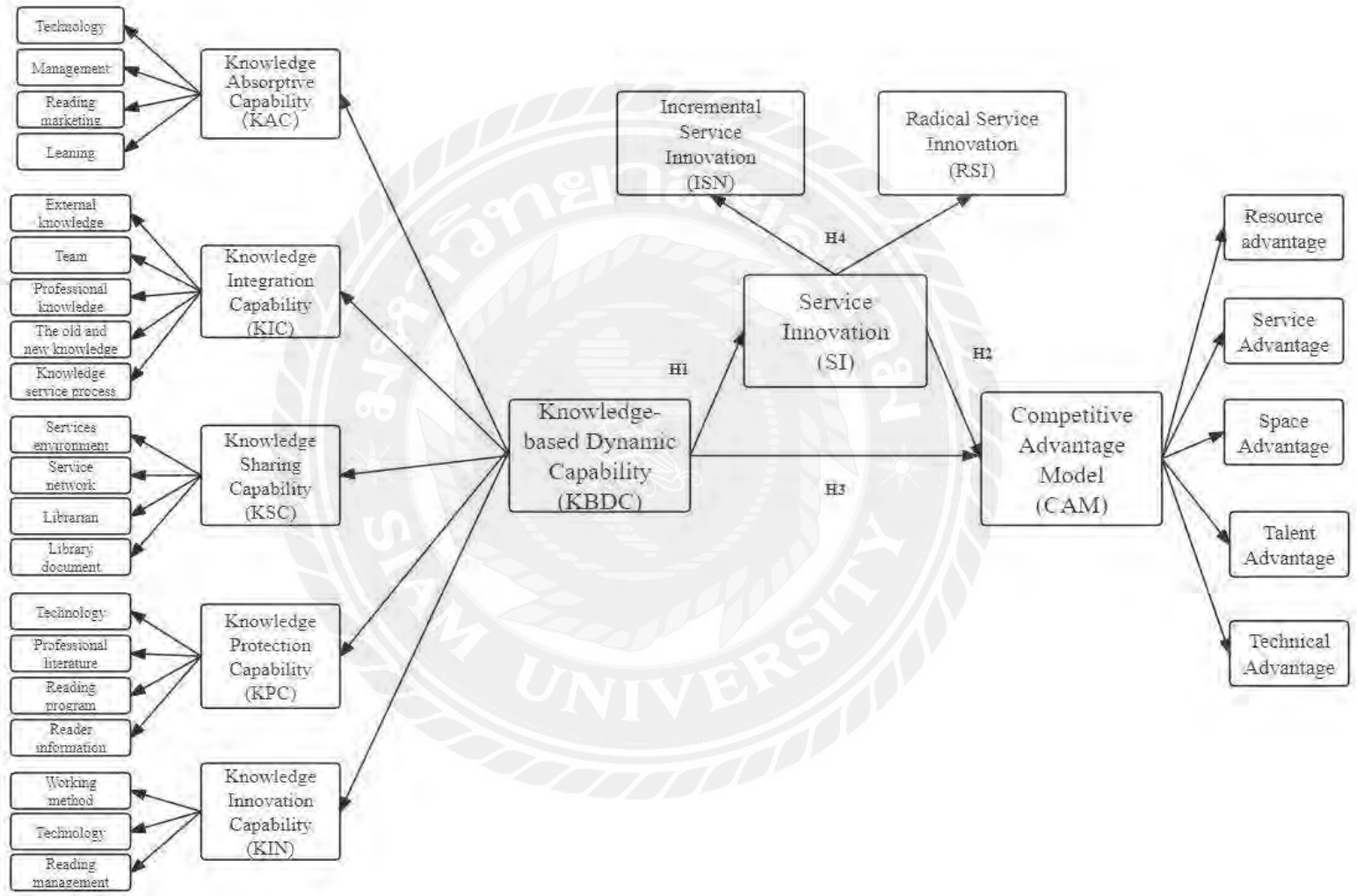


Figure 3.1 An Analytical Model

3.7 Analysis of Statistical Methods

The structural equation model (SEM) is a statistical data analysis tool that is formed by using multiple regression analysis, path analysis, and confirmatory factor analysis (CFA) (Ramayah & Lee, 2012). It was developed based on a statistical theory proposed by Karl Joreskog and DagSorbom in the 1970s.

Confirmatory Factor Analysis (CFA) is always used to test whether the known specific structure works as expected. This study will analyze the construct validity of the variables involved in the knowledge-based dynamic capability scale. A separate measurement model in structural equation model analysis is a confirmatory factor analysis model with covariance between each pair of latent variables. The evaluation of the measurement equation is the process of confirmatory factor analysis required to develop this scale.

This study will use AMOS (Analysis of Moment Structures) 23.0 as an analysis software for confirmatory factor analysis in developing knowledge-based dynamic capability scales and other statistical analyses involving structural equation modeling.

3.8 The Draft Model of University Libraries' Competitive Advantage

The essence of qualitative research is a process of inducing general conclusions from specific situations. The final results must go through a series of understanding and analysis, explained in the text, summarize findings, and support research. Qualitative research includes in-depth interviews, focus groups, case study research, record keeping, and others. Among them, focus groups and in-depth interviews have many similarities. However, the difference is that the topics suitable for focus group interviews are generally mass products, new consumption demand development, and consumer experience of partner groups. Topics ideal for in-depth interviews are research on competitive information and personalized product demand. Therefore, this study adopted the in-depth interview method.

From the 42 research objects, select 9 or more interview objects. The specific interview process is as follows:

1. The researcher contacts the director or middle manager of the library and sends an outline of interview questions to the key informant by making an appointment.

2. On the interview day, researchers conduct interviews by phone or online voice conference software, such as QQ, WeChat, DingTalk, or Tencent Meeting.

3. The researchers interviewed 9 key informants and asked relevant facts, opinions, and suggestions according to the prepared questions.

4. According to the analysis of relevant literature and interview content, this research intends to obtain a draft model of the competitive advantage of university libraries to support this research.

However, the university library is an essential part of the university and necessary support for discipline construction and personnel training. According to relevant literature, the competitive advantage model for university libraries can be analyzed from the following aspects:

Resource advantages: The university library has abundant literature and information resources, including paper books, electronic books, periodicals, databases, patents, and multimedia, which can meet readers' needs of different disciplines and levels. University libraries have also expanded the channels and scope of resource acquisition and improved resource utilization and efficiency through inter-library cooperation, resource sharing, and digital construction.

Service advantages: University libraries provide a variety of service items, including literature services, consulting services, reading promotion, scientific research support, teaching support, and learning support, which can meet the information needs of readers at different stages and in various scenarios. The university library has also improved the service quality and level through self-service, mobile service, intelligent service, and other methods.

Space advantages: The university library has a comfortable reading environment, a multi-functional learning space, advanced equipment, and facilities. It can provide

readers with convenient borrowing, printing, electronic reading, and other functions, and it can also give the readers places for independent learning, cooperative learning, and innovative learning. The university library also optimizes the space layout and functions through planning, design, and management.

Talent advantages: The university library has a talented team with high professional quality, strong business ability, and good service awareness, who can provide readers with professional guidance, consultation, training, and other services. University libraries have also enhanced the competitiveness and innovation of talents through talent introduction, training, and incentives.

Technical advantages: The technical advantages of university libraries mainly include Internet of Things technology, big data technology, and artificial intelligence technology. The Internet of Things technology can connect physical objects such as equipment, books, and users in the library to realize intelligent perception, identification, positioning, tracking, management, and control. IT technology can improve the resource management efficiency of libraries, reduce labor costs, and enhance users' borrowing experience and sense of security. Big data technology can help libraries build a multi-dimensional knowledge resource system, form an intelligent knowledge map, and support users in deep learning and innovation. Artificial intelligence technology can help libraries provide innovative consulting, reading recommendations, and knowledge question-and-answer services to improve user satisfaction and loyalty.

To sum up, a five-dimensional framework and knowledge-based dynamic capabilities can represent the competitive advantage model for university libraries. These five dimensions are interrelated and support each other, and together constitute the core competitiveness of the university library. As is shown in the Figure 3.2.

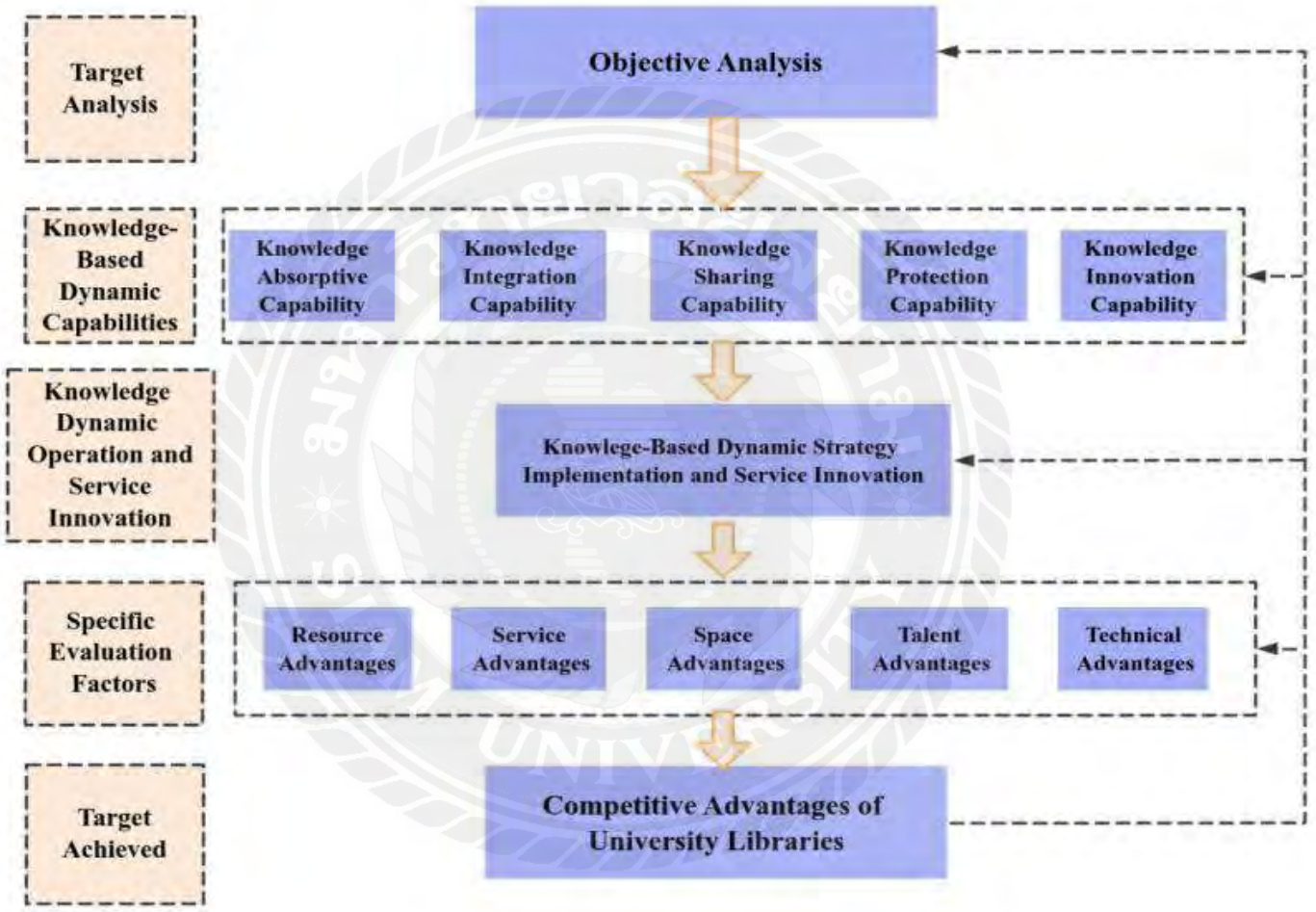


Figure 3.2 The Draft Model of University Libraries' Competitive Advantage Based on Knowledge-Based Dynamic Capabilities

CHAPTER 4
RESEARCH RESULT

This chapter mainly includes three parts:

4.1 Quantitative Analysis

4.1.1 Descriptive Statistical Analysis

4.1.2 Percentage Distribution of Factors

4.1.3 Reliability, Validity, and Confirmatory Factor Analysis

4.1.4 Correlation Analysis

4.1.5 Structural Equation Model Fitting And Hypothesis Testing

4.2 Qualitative Analysis

4.2.1 In-Depth Interviews

4.2.2 Content Analysis

4.3 The Competitive Advantage Model for University Libraries

This chapter will study knowledge-based dynamic capability and service innovation factors and construct a competitive advantage model for China's “Double First-Class” university libraries. Therefore, this chapter mainly includes three parts. The first part is to study the impact of knowledge-based dynamic capability factors and service innovation factors on the competitive advantages of China's “Double First-Class” university libraries. The process used quantitative research through the collection of questionnaires and structural equation models. Then, a qualitative study was conducted, mainly conducting in-depth interviews with library managers of China's “Double First-Class” universities and using content analysis methods to analyze the interview content. Finally, this chapter will combine qualitative and quantitative research to build a model that enhances the competitive advantage of China's “Double First-Class” university libraries.

The quantitative research in this study is based on data, so the accuracy of the data is a prerequisite for this study in the research model relationship. To obtain data and ensure its authenticity and validity, this study has precise requirements for selecting survey samples: managers of China's "Double First-Class" university libraries, such as directors and department managers. Therefore, this excludes the general staff of the library, which also ensures the validity and value of the questionnaire and improves the quality of the data.

This online survey uses the Questionnaire Star professional survey website (https://www.wjx.cn/) to release the "Competitive Advantage Model of China's "Double First-Class" University Libraries Based on Knowledge Dynamic Capabilities." 439 questionnaires were distributed in this survey, and 420 valid questionnaires were recovered, with the questionnaire validity rate being 95.67%.

4.1 Quantitative Analysis

4.1.1 Descriptive Statistical Analysis

Demographic analysis of the survey sample group shows that the number of males in the sample of this study is 60, accounting for 14.29%, and the number of females is 360, accounting for 85.71%. It can be seen that there are far more female managers in university libraries than male managers. Regarding age distribution, the number of people aged 36-45 is the largest, with 186 people, accounting for 44.29%, followed by the number of people aged 46-55, with 138 people, accounting for 32.86%. Finally, the number of people aged 56 and above, there are 96 people, accounting for 22.86%. In terms of management level, the number of lower managers is the largest, with 272 people, accounting for 64.76%, followed by middle managers, with 104 people, accounting for 24.76%, and the number of senior managers is the smallest, with 44 people, accounting for 10.48%. Regarding academic qualifications, the most significant number of graduate students is 366, accounting for 87.14%, and the number of Ph.D. is 57, accounting for 12.86%. In terms of working hours, the number of people with 5 to 10 years is the largest

at 254, accounting for 60.48%, followed by the number of people with 3 to 5 years at 82 people, accounting for 19.52%, and the number of people with less than one year is the lowest at 10, accounting for 2.38%. The number of employees with 30-50 people is the largest at 180, accounting for 42.86%, followed by the number of people with 50-70 employees at 150, accounting for 35.71%. The number of people with more than 100 is the smallest at 50, accounting for 11.90%. In terms of expenditures, 10-20 million yuan accounted for the highest proportion, accounting for 40.95%, followed by 70-100 million yuan, accounting for 17.62%, and Over 100 million yuan accounted for 14.76%.

Table 4.1 Basic Information of Questionnaire Respondents

Variable	**Options**	**Frequency n=420**	**Percent%**
GENDER	Female	360	85.71
	Male	60	14.29
AGE	36-45	186	44.29
	46-55	138	32.86
	Over 56	96	22.86
POSITION	Senior manager	44	10.48
	Middle manager	104	24.76
	Lower manager	272	64.76
EDUCATION	Master Degree	366	87.14
	Ph. D. or Post Doc.	54	12.86
WORKING YEARS	Less than 1 year	10	2.38
	1-3 years	28	6.67
	3-5 years	82	19.52
	5-10 years	254	60.48
	Over 10 years	46	10.95
NUMBER OF EMPLOYEES	30-50	180	42.86
	50-70	150	35.71
	70-100	40	9.52
	Over 100	50	11.90
ANNUAL EXPENDITURE IN 2022	1000-2000	172	40.95
	2000-5000	42	10.00
	5000-7000	70	16.67
	7000-10000	74	17.62
	Over 10000	62	14.76

In short, the practical sample data obtained in this study meets the research requirements from the respondents' essential information statistics perspective.

4.1.2 Percentage Distribution of Factors

1) Knowledge-Based Dynamic Capabilities

The five dimensions of knowledge-based dynamic capabilities are knowledge absorptive capability (KAC), knowledge integration capability (KIC), knowledge sharing capability (KSC), knowledge protection capability (KPC), and knowledge innovation capability (KIN), totaling 26 questions.

According to Table 4.2, there are six questions on knowledge absorptive capability (KAC); 57.6% (29%Agree + 28.6% Strongly agree) of the respondents agree that the library can get more technical knowledge from the outside. 56.1% of the respondents agree that the library can get more management knowledge from the outside. 62.4% of the respondents agree that the library receives more reading marketing knowledge from the outside. 59.5% of the respondents agree that the library can get more academic knowledge from the outside. 58.6% of the respondents agree that the library can get more knowledge from the outside. 60.5% of the respondents agree that the library can acquire and apply new knowledge. In short, it means the library is good at knowledge absorptive.

According to Table 4.2, there are five questions on knowledge integration capability (KIC). 58.6% of the respondents agree that the library can effectively integrate internally created and externally acquired knowledge. 62% of the respondents agree that the library can effectively integrate the knowledge of teams and individuals. 58.6% of the respondents agree that the library can effectively integrate different technologies or professional expertise. 60% of the respondents agree that the library can effectively integrate new and existing knowledge. 59.5% of the respondents agree that the library can effectively adjust the internal organizational structure or service workflow.

According to Table 4.2, there are five questions on knowledge sharing capability (KSC). 60.4% of the respondents agree that the library can optimize the knowledge-

sharing service environment from five aspects: resource construction, data processing, text construction, service, and copyright. 60% of the respondents agree that the library can build an effective knowledge-sharing service network. 59.5% of the respondents agree that the library can strengthen the construction of the librarians' team of knowledge-sharing service. 59.5% of the respondents agree that the library can effectively share existing literature or scientific research reports with readers. 58.6% of the respondents agree that the library can effectively carry out innovative knowledge-sharing services.

According to Table 4.2, there are five questions on knowledge protection capability (KPC). 64.7% of the respondents agree that the library can effectively protect technical knowledge. 63.8% of the respondents agree that the library can effectively protect the professional collection of literature. 61.9% of the respondents agree that the library can effectively protect the copyright of reading promotion brand activities. 62.4% of respondents agree that the library can protect readers' personal information effectively. 67.6% of the respondents agree that the library can have enough space to preserve literature resources.

According to Table 4.2, there are five questions on knowledge innovation capability (KIN). 64.3% of the respondents agree that the library can often try new work ideas or ideas. 62.9% of the respondents agree that the library can create technical knowledge from the inside by its capability. 65.7% of the respondents agree that the library can generate an understanding of reading promotion activities from the inside by its capability. 64.3% of the respondents agree that the library has a team of talented people to carry out knowledge innovation services. 61.4% of the respondents agree that the library can create a lot of management knowledge from the inside through its capability.

Table 4.2 Percentage Distribution of Knowledge-Based Dynamic Capabilities

Statement	Strongly Disagree	Disagree	Neutrality	Agree	Strongly agree
KAC1	10.5	12.9	19	29	28.6
KAC2	6.7	15.2	21.9	27.1	29
KAC3	5.7	15.7	16.2	30.5	31.9
KAC4	13.8	9	17.6	30	29.5
KAC5	8.6	13.3	19.5	27.6	31
KAC6	6.7	18.1	14.8	32.9	27.6
KIC1	11	8.6	21.9	31	27.6
KIC2	8.6	12.9	16.7	31	31
KIC3	6.2	15.7	19.5	31	27.6
KIC4	14.3	11	14.8	30	30
KIC5	12.4	12.9	15.2	30.5	29
KSC1	9.5	13.3	16.7	29	31.4
KSC2	8.6	12.9	18.6	32.4	27.6
KSC3	9.5	12.9	18.1	31.4	28.1
KSC4	11.4	13.3	15.7	21.9	37.6
KSC5	10.5	11.9	19	31	27.6
KPC1	9.5	6.2	19.5	35.2	29.5
KPC2	6.2	12.9	17.1	33.3	30.5
KPC3	12.4	9	16.7	31.9	30
KPC4	7.6	10	20	36.2	26.2
KPC5	5.2	13.3	13.8	39	28.6
KIN1	8.6	11.4	15.7	32.4	31.9
KIN2	11	11	15.2	26.2	36.7
KIN3	7.1	12.4	14.8	36.7	29
KIN4	10	9.5	16.2	32.9	31.4
KIN5	11.4	12.9	14.3	29.5	31.9

2) Service Innovation

The two dimensions of service innovation are incremental service innovation (ISN) and radical service innovation (RSI), totaling 10 questions.

According to Table 4.3, there are five questions on incremental service innovation (ISN). 60.9% of the respondents agree that the library can improve the existing services. 60.4% of the respondents agree that the library can extend the existing services. 59.5% of the respondents agree that the library can innovate reading activities. 57.7% of the

respondents agree that the library can expand its opening hours. 59% of the respondents agree that the library can focus on meeting the service requirements of some readers.

According to Table 4.3, there are five questions on radical service innovation (RSI). 55.8% of the respondents agree that the library can develop off-campus reader services. 51.9% of the respondents agree that the library can create a new service standard. 53.3% of the respondents agree that the library can effectively provide a new and effective service for teaching. 56.2% of the respondents agree that the library can effectively innovate unique subject services. 54.7% of the respondents agree that the library can effectively obtain higher satisfaction from readers.

Table 4.3 Percentage Distribution of Service Innovation

Statement	Strongly Disagree	Disagree	Neutrality	Agree	Strongly agree
ISN1	19.5	9.5	10	31.9	29
ISN2	12.9	13.3	13.3	31.4	29
ISN3	10.5	12.4	17.6	31.9	27.6
ISN4	15.2	9.5	17.6	32.9	24.8
ISN5	13.3	11.9	15.7	29.5	29.5
RSI1	19	11.4	13.8	24.8	31
RSI2	17.6	12.4	18.1	23.3	28.6
RSI3	13.8	11.4	21.4	23.8	29.5
RSI4	17.1	12.4	14.3	26.2	30
RSI5	15.2	12.4	17.6	27.1	27.6

3) Competitive Advantage Model for University Library

According to Table 4.4, there are 8 questions on the competitive advantage model for university libraries. 59.1% of the respondents think their library has higher innovation advantages than others. 56.7% of the respondents believe that their library has higher service quality. 55.7% of the respondents think their library has done better in promoting reading and reading services. 55.2% of the respondents believe that their library can better grasp readers' needs than other university libraries. 61.5% of the respondents think their library staff is more motivated to work in the unit. 55.2% of the respondents believe their library reflects readers' needs faster. 60.9% of the respondents think their university

departments are more satisfied with the library's service. 51.9% of the respondents believe the library's reading service brand has a more substantial influence.

Table 4.4 Percentage Distribution of Competitive Advantage

Statement	Strongly Disagree	Disagree	Neutrality	Agree	Strongly agree
CAM1	10.5	13.8	16.7	28.6	30.5
CAM2	12.4	13.8	17.1	32.9	23.8
CAM3	11	12.9	20.5	25.7	30
CAM4	11	11.4	22.4	23.3	31.9
CAM5	8.6	12.9	17.1	32.9	28.6
CAM6	14.8	11.9	18.1	25.7	29.5
CAM7	11	12.4	15.7	31.4	29.5
CAM8	10	13.8	24.3	24.8	27.1

4.1.3 Reliability, Validity, and Confirmatory Factor Analysis

This study used SPSS 26.0 and AMOS 23.0 to conduct reliability testing, validity testing, and confirmatory factor analysis on 420 valid questionnaires. The first step is to test the reliability and validity of the questionnaire data. The second step is to perform structural equation modeling when the reliability and validity tests are qualified.

4.1.3.1 Reliability Analysis

The variables in this study were collected using questionnaire data, so the reliability of the collected data needs to be tested. SPSS 26.0 software was used to conduct a reliability analysis on each variable, and then Cronbach's alpha was used in the reliability analysis to describe the overall reliability of the questionnaire. The total number of questions in the questionnaire variables is 44, and the overall Cronbach’s Alpha is 0.957. The reliability is high, and the requirements are met, as shown in Table 4.5.

The item objective consistency (IOC) index was used in the item evaluation stage and is a prerequisite for screening the quality of the items. Researchers can use IOC to test the questionnaire's reliability and validity and evaluate the data's validity. While

measuring each item, experts were asked to determine the content validity score: if the item has a measurement attribute, the score = 1. If the item does not have a measurement attribute, the score = -1. Suppose the item is uncertain whether it measures the expected attribute; the score = 0. This study modified the items with a score lower than 0.5. On the other hand, the items with a score higher than or equal to 0.5 were retained. In this process, the questionnaire was checked by five library science experts from China, all full professors of library science, and all questions were measured (see Appendix C).

Table 4.5 Reliability Test

Cronbach's Alpha	N of items
0.957	44

1) Knowledge-Based Dynamic Capabilities

Cronbach's Alpha and Item-Total Correlation (CITC) tests were conducted on the collected data. The conditions for satisfying internal consistency and reliability are that Cronbach's Alpha is above 0.7, and the CITC needs to be above 0.5. The analysis results show that the CITC values of the five dimensions of knowledge-based dynamic capabilities are all above 0.5, as shown in Table 4.6. Knowledge absorptive capability (KAC), knowledge integration capability (KIC), knowledge sharing capability (KSC), knowledge protection capability (KPC), and knowledge innovation capability (KIN), the Cronbach Alpha values of the above five dimensions are 0.908, 0.892, 0.894, 0.879 and 0.892. The reliability values of each dimension are above 0.7. Therefore, it can be seen that the reliability of each dimension is reasonable.

Table 4.6 Knowledge-Based Dynamic Capabilities Scale Reliability Analysis

Dimension	Item	Corrected Item Total Correlation (CITC)	Cronbach's Alpha
KAC	KAP1	0.714	0.908
	KAP2	0.710	
	KAP3	0.778	

	KAP4	0.765	
	KAP5	0.723	
	KAP6	0.787	
KIC	KIC1	0.714	0.892
	KIC2	0.751	
	KIC3	0.710	
	KIC4	0.796	
	KIC5	0.715	
KSC	KSC1	0.758	0.894
	KSC2	0.687	
	KSC3	0.708	
	KSC4	0.767	
	KSC5	0.780	
KPC	KPC1	0.689	0.879
	KPC2	0.718	
	KPC3	0.702	
	KPC4	0.710	
	KPC5	0.739	
KIN	KIN1	0.753	0.892
	KIN2	0.756	
	KIN3	0.741	
	KIN4	0.694	
	KIN5	0.740	

2) Service Innovation

Table 4.7 shows the analysis of the collected data on service innovation. According to the study results, the CITC values of the two dimensions of service innovation are higher than 0.5. The Cronbach's Alpha of the two dimensions of incremental service innovation (ISN) and radical service innovation (RSI) are 0.918 and 0.924, more significant than 0.7.

Table 4.7 Service Innovation Scale Reliability Analysis

Dimension	Item	Corrected Item Total Correlation (CITC)	Cronbach's Alpha
ISN	ISN1	0.812	0.918
	ISN2	0.778	
	ISN3	0.790	
	ISN4	0.772	
	ISN5	0.793	

RSI	RSI1	0.827	0.924
	RSI2	0.819	
	RSI3	0.771	
	RSI4	0.809	
	RSI5	0.784	

3) Competitive Advantage Model for University Library

Table 4.8 shows the analysis of the collected data on the competitive advantage model for the university library. According to the study results, the CITC competitive advantage values are higher than 0.5. The Cronbach's Alpha of this dimension is 0.929, more significant than 0.7.

Table 4.8 Competitive Advantage Scale Reliability Analysis

Dimension	Item	Corrected Item Total Correlation (CITC)	Cronbach's Alpha
CAM	CAM1	0.776	0.929
	CAM2	0.767	
	CAM3	0.727	
	CAM4	0.733	
	CAM5	0.728	
	CAM6	0.770	
	CAM7	0.780	
	CAM8	0.762	

4.1.3.2 Validity Analysis

When measuring the overall validity of the measurement variables, it was found that the overall KMO value was 0.924, the chi-square value was 13977.406, the degree of freedom was 946, and the significance level was below 0.05. As is shown in the Figure 4.9.

Table 4.9 KMO and Bartlett's Test

	KMO	0.924
Bartlett's test	Approximate chi-square value	13977.406
	Degree of freedom value	946
	Significance	.000

1) Knowledge-Based Dynamic Capabilities

Convergent validity means the results are highly correlated using different measurement methods for the same characteristics. First, this study established a measurement model through AMOS 23.0 software, confirmatory factor analysis for testing. The judgment indicators have three aspects: (1) The Standard Load Factor value meets the requirements; (2) The standardized factor loading of all question items is more significant than 0.5; (3) The combined reliability (CR) of the construct is more significant than 0.7, and the average variance extracted (AVE) is more significant than 0.5. If all three above are satisfied, the scale has convergent validity.

Table 4.10 shows the validity of knowledge-based dynamic capabilities. According to the analysis results, Knowledge absorptive capability (KAC), knowledge integration capability (KIC), knowledge sharing capability (KSC), knowledge protection capability (KPC), and knowledge innovation capability (KIN), the average variance extracted (AVE) of the above the five dimensions are 0.625, 0.627, 0.630, 0.594 and 0.625, all greater than 0.5. Meanwhile, the combined reliability (CR) of the five dimensions above are 0.909, 0.894, 0.895, 0.880, and 0.893, all greater than 0.7. The KMO coefficients of different dimensions are all above 0.7.

Table 4.10 Knowledge-Based Dynamic Capabilities Scale Validity Analysis

Dimension	Item	Standard Load Factor	AVE	CR	KMO
KAP	KAP1	0.762	0.625	0.909	0.910
	KAP2	0.739			
	KAP3	0.828			
	KAP4	0.809			
	KAP5	0.763			
	KAP6	0.838			
KIC	KIC1	0.768	0.627	0.894	0.888
	KIC2	0.805			
	KIC3	0.775			
	KIC4	0.840			
	KIC5	0.770			
KSC	KSC1	0.819	0.630	0.895	0.874
	KSC2	0.730			

	KSC3	0.760			
	KSC4	0.818			
	KSC5	0.835			
KPC	KPC1	0.737	0.594	0.880	0.872
	KPC2	0.772			
	KPC3	0.779			
	KPC4	0.771			
	KPC5	0.794			
KIN	KIN1	0.810	0.625	0.893	0.884
	KIN2	0.818			
	KIN 3	0.800			
	KIN 4	0.735			
	KIN 5	0.788			

2) Service Innovation

Table 4.11 shows the validity of service innovation. According to the results of the analysis, the AVE of the two dimensions of incremental service innovation (ISN) and radical service innovation (RSI) are 0.692 and 0.710, both greater than 0.5. Meanwhile, the combined reliability (CR) of the two dimensions above are 0.918 and 0.924, more significant than 0.7. The KMO coefficients of different dimensions are all above 0.7.

Table 4.11 Service Innovation Scale Validity Analysis

Dimension	Item	Standard Load Factor	AVE	CR	KMO
ISN	ISN1	0.852	0.692	0.918	0.894
	ISN2	0.814			
	ISN3	0.839			
	ISN4	0.813			
	ISN5	0.840			
RSI	RSI1	0.872	0.710	0.924	0.896
	RSI2	0.855			
	RSI3	0.804			
	RSI4	0.852			

3) Competitive Advantage Model of University Library

Table 4.12 shows the validity of the competitive advantage model for the university library. According to the analysis results, the competitive advantage's AVE is

0.621, which is more significant than 0.5. Meanwhile, this dimension's combined reliability (CR) is 0.929, more significant than 0.7. The KMO coefficients of different dimensions are all above 0.7.

Table 4.12 Competitive Advantage Model of University Library Scale Validity Analysis

Dimension	Item	Standard Load Factor	AVE	CR	KMO
CAM	CAM1	0.807	0.621	0.929	0.939
	CAM2	0.811			
	CAM3	0.764			
	CAM4	0.762			
	CAM5	0.752			
	CAM6	0.803			
	CAM7	0.810			
	CAM8	0.791			

4.1.3.3 Confirmatory Factor Analysis

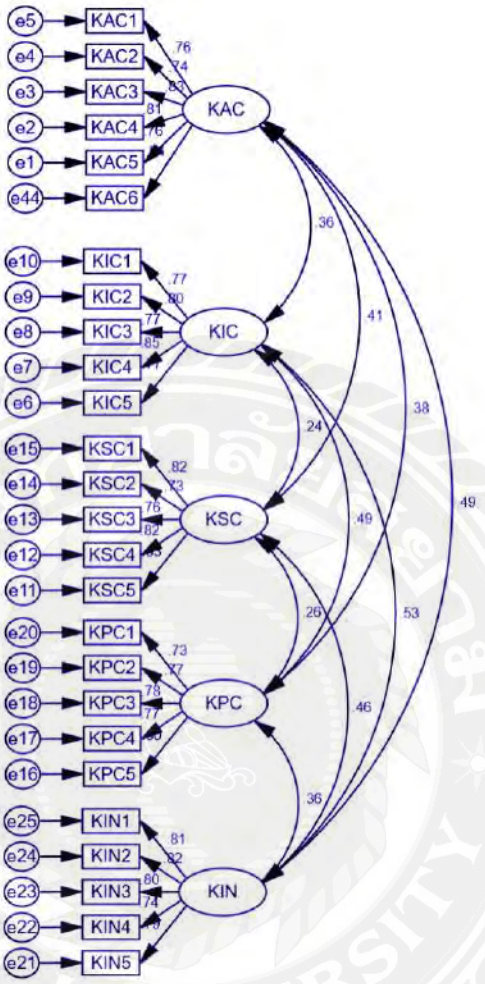
1) Confirmatory factor analysis of independent variables

This study conducted confirmatory factor analysis on the independent variable dimension scale. Table 4.13 is the model fitness judgment of the knowledge-based dynamic capabilities dimension scale.

According to Table 4.13, after analyzing the fitting indicators of the variables, it can be seen that the Chi-square/DF value of the initial model in this study is 2.487, the value of the remaining adaptation indicators GFI (Goodness of Fit Index) is 0.889, the value of AGFI (Adjusted Goodness of Fit Index) is 0.865, the value of RMSEA (Root Mean Square Error of Approximation) is 0.060. The value of IFI is 0.936, the value of TLI is 0.928, the value of CFI (Comparative Fit Index) is 0.936, the value of NFI (Normed Fit Index) is 0.898, the value of PNFI is 0.798, and the PGFI is 0.732. Therefore, the fitting coefficient of the path relationship model is good.

Table 4.13 Indicator Fitting Results of Knowledge-Based Dynamic Capabilities Measurement Model

Inspection Index	Evaluation Standard	Test Result	Model Fit
Model Fit Indices			
Chi-Square/df	1-3 is excellent, <5 is acceptable	2.487	Excellent
GFI	≥0.9 is excellent, ≥0.8 is acceptable	0.889	Acceptable
AGFI	≥0.9 is excellent, ≥0.8 is acceptable	0.865	Acceptable
RMSEA	≤0.05 is excellent，≤0.08 is acceptable	0.060	Acceptable
Value-Added Adaptation Statistics			
IFI	≥0.9 is excellent，≥0.8 is acceptable	0.936	Excellent
TLI	≥0.9 is excellent，≥0.8 is acceptable	0.928	Excellent
CFI	≥0.9 is excellent，≥0.8 is acceptable	0.936	Excellent
Parsimonious Fit Statistics			
PNFI	＞0.5	0.798	Excellent
PGFI	＞0.5	0.732	Excellent



Chi-square=718.781, DF=289,Chi-square/DF=2.487, GFI=0.889, IFI=0.936, AGFl=0.865, NFI=0.898, CFI=0.936, RMSEA=0.060

Figure 4.1 Confirmatory Factor Analysis Model of Knowledge-Based Dynamic Capabilities

The confirmatory factor analysis model of knowledge-based dynamic capabilities constructed using AMOS 23.0 is shown in Figure 4.1.

According to the fitting indicators in Table 4.12, it can be found that the values of each fitting parameter of the knowledge-based dynamic capabilities scale all meet the judgment standard, which shows that the structure among the factors of the dynamic capabilities variables is clear, and the model has good discriminant validity.

Standardized Regression Weights measure the significance of path coefficients. The path coefficient indicates the direct impact of one variable on another variable. The standardized regression weight is the standardized path coefficient, and its value should be significantly different from zero.

Regression coefficients are path coefficients with arrows in SEM. Model evaluation must first examine whether the parameters estimated in the model results are statistically significant. Conducting a statistical significance test on the path or load coefficients is necessary. This is similar to the parameter significance test in regression analysis.

AMOS 23.0 provides a simple and convenient CR (Critical Ratio) method. The CR value is a Z statistic, which is composed of the ratio of the parameter estimate and its standard deviation (as shown in the fourth column of Table 4.13). The statistical test of CR is accompanied by probability p. The user can perform a statistical significance test of the path coefficient/load coefficient, which is significant.

Table 4.14 shows the regression weights of knowledge-based dynamic capabilities. The path coefficient between knowledge absorptive and knowledge absorptive capability is 0.837. The regression weight estimate has a standard error (S.E.) of around 0.060. The regression weight estimate is 17.938 (C.R.) standard errors above zero. All path coefficients are between knowledge-based dynamic capabilities and the dimensions, and all the regression weights are positive numbers, indicating a positive influence between knowledge-based dynamic capabilities and the dimensions.

Table 4.14 Confirmatory Factor Analysis Results of Knowledge-Based Dynamic Capabilities

			Estimate	S.E.	C.R.
KAC6	<---	KAC	.837	.060	17.938
KAC5	<---	KAC	.763		
KAC4	<---	KAC	.809	.065	17.249
KAC3	<---	KAC	.829	.059	17.751
KAC2	<---	KAC	.740	.060	15.564
KAC1	<---	KAC	.761	.063	16.070

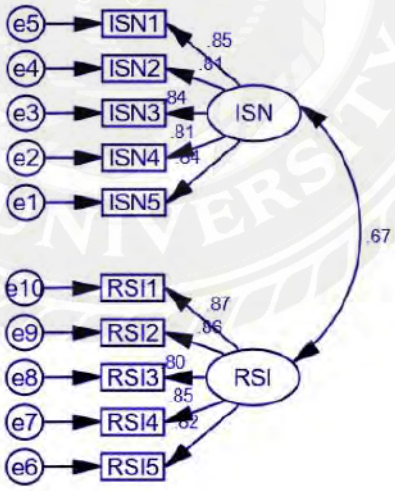
KIC5	<---	KIC	.771		
KIC4	<---	KIC	.845	.062	18.082
KIC3	<---	KIC	.769	.055	16.233
KIC2	<---	KIC	.804	.057	17.106
KIC1	<---	KIC	.766	.058	16.164
KSC5	<---	KSC	.834		
KSC4	<---	KSC	.821	.055	19.429
KSC3	<---	KSC	.760	.052	17.452
KSC2	<---	KSC	.730	.051	16.535
KSC1	<---	KSC	.818	.051	19.330
KPC5	<---	KPC	.800		
KPC4	<---	KPC	.771	.059	16.598
KPC3	<---	KPC	.779	.066	16.800
KPC2	<---	KPC	.769	.060	16.567
KPC1	<---	KPC	.732	.062	15.617
KIN5	<---	KIN	.787		
KIN4	<---	KIN	.735	.056	15.742
KIN3	<---	KIN	.800	.052	17.436
KIN2	<---	KIN	.816	.058	17.867
KIN1	<---	KIN	.811	.054	17.736

2) Mediating Variable Confirmatory Factor Analysis

After analyzing the fitting indicators of the mediating variables, it can be seen that the Chi-Square/df value of the initial model of this study is 2.518, the value of the remaining adaptation indicators GFI is 0.961, the value of AGFI is 0.937, the value of RMSEA is 0.060. The value of IFI is 0.984, the value of TLI is 0.979, the value of CFI is 0.984, the value of PNFI is 0.736, and the PGFI is 0.594. The fitting coefficient of the path relationship model is good. Table 4.15 is the model fitness judgment of the service innovation dimension scale. The confirmatory factor analysis model of service innovation constructed using AMOS 23.0 is shown in Figure 4.2. Table 4.16 shows the regression weights of service innovation.

Table 4. 15 Indicator Fitting Results of Service Innovation Measurement Model

Inspection Index	Evaluation Standard	Test Result	Model Fit
Model Fit Indices			
Chi-Square/df	1-3 is excellent, <5 is acceptable	2.518	Excellent
GFI	≥0.9 is excellent, ≥0.8 is acceptable	0.961	Excellent
AGFI	≥0.9 is excellent, ≥0.8 is acceptable	0.937	Excellent
RMSEA	≤0.05 is excellent，≤0.08 is acceptable	0.060	Acceptable
Value-Added Adaptation Statistics			
IFI	≥0.9 is excellent，≥0.8 is acceptable	0.984	Excellent
TLI	≥0.9 is excellent，≥0.8 is acceptable	0.979	Excellent
CFI	≥0.9 is excellent，≥0.8 is acceptable	0.984	Excellent
Parsimonious Fit Statistics			
PNFI	＞0.5	0.736	Excellent
PGFI	＞0.5	0.594	Excellent



Chi-square=85.628, DF=34, Chi-square /DF=2.518, GFI= 0.961, IFI= 0.984, AGFl=0.937, NFI=0.973, CFl=0.984, RMSEA=0 .060

Figure 4.2 Confirmatory Factor Analysis Model of Service Innovation

Table 4.16 shows the Indicator fitting results of the service innovation measurement model. The path coefficient between incremental service innovation and the exiting service is 0.813. The regression weight estimate has a standard error (S.E.) of around 0.048. The regression weight estimate is 19.941 (C.R.) standard errors above zero. All path coefficients are between service innovation and the dimensions, and all the regression weights are positive numbers, indicating a positive influence between service innovation and the dimensions.

Table 4.16 Confirmatory Factor Analysis Results of Service Innovation

			Estimate	S.E.	C.R.
ISN5	<---	ISN	.839		
ISN4	<---	ISN	.813	.048	19.941
ISN3	<---	ISN	.839	.045	20.920
ISN2	<---	ISN	.814	.048	19.982
ISN1	<---	ISN	.854	.051	21.533
RSI5	<---	RSI	.820		
RSI4	<---	RSI	.851	.052	20.811
RSI3	<---	RSI	.805	.050	19.170
RSI2	<---	RSI	.860	.051	21.140
RSI1	<---	RSI	.873	.053	21.626

3) Dependent Variable Confirmatory Factor Analysis

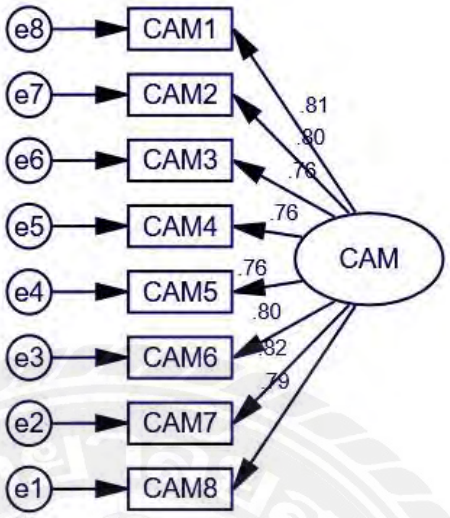
After analyzing the fitting index of the dependent variable, it can be seen that the CHI-SQUARE/DF value of the initial model in this study is 3.249, the value of the remaining fitness index GFI is 0.964, the value of AGFI is 0.936, the value of RMSEA is 0.073. The value of IFI is 0.980, the value of TLI is 0.971, the value of CFI is 0.979, the value of PNFI is 0.693, and the PGFI is 0.536. The fitting coefficient of the path relationship model is good, according to Table 4.17. Table 4.17 shows the indicator-fitting results of the competitive advantage measurement model. All the model fit results are excellent, so the model is very suitable.

Table 4.17 Indicator Fitting Results of Competitive Advantage Measurement Model

Inspection Index	Evaluation Standard	Test Result	Model Fit
Model Fit Indices			
Chi-Square/df	1-3 is excellent, <5 is acceptable	3.249	Acceptable
GFI	≥0.9 is excellent, ≥0.8 is acceptable	0.964	Excellent
AGFI	≥0.9 is excellent, ≥0.8 is acceptable	0.936	Excellent
RMSEA	≤0.05 is excellent，≤0.08 is acceptable	0.073	Acceptable
Value-Added Adaptation Statistics			
IFI	≥0.9 is excellent，≥0.8 is acceptable	0.980	Excellent
TLI	≥0.9 is excellent，≥0.8 is acceptable	0.971	Excellent
CFI	≥0.9 is excellent，≥0.8 is acceptable	0.979	Excellent
Parsimonious Fit Statistics			
PNFI	＞0.5	0.693	Excellent
PGFI	＞0.5	0.536	Excellent

The confirmatory factor analysis model of competitive advantage constructed using AMOS 23.0 is shown in Figure 4.3. Table 4.18 shows the regression weights of competitive advantage.

Table 4.18 shows indicator fitting results of the competitive advantage measurement model. The path coefficient between competitive advantage and the dimensions is 0.812. The regression weight estimate has a standard error (S.E.) of around 0.057. The regression weight estimate is 18.534 (C.R.) standard errors above zero. All path coefficients are between competitive advantage and the dimensions, and all the regression weights are positive numbers, indicating a positive influence between competitive advantage and the dimensions.



Chi-square=64.981, DF=20, Chi-square /DF=3.249, GFI=0.964, IFI= 0.980, AGFI=0.936, NFI=0.971, CFI= 0.979, RMSEA=0.073 .

Figure 4.3 Confirmatory Factor Analysis Model of Competitive Advantage

Table 4.18 Confirmatory Factor Analysis Results of Competitive Advantage

			Estimate	S.E.	C.R.
CAM8	<---	CAM	.793		
CAM7	<---	CAM	.816	.056	18.632
CAM6	<---	CAM	.801	.060	18.194
CAM5	<---	CAM	.757	.055	16.924
CAM4	<---	CAM	.764	.058	17.122
CAM3	<---	CAM	.758	.058	16.928
CAM2	<---	CAM	.800	.057	18.149
CAM1	<---	CAM	.812	.057	18.534

4.1.4 Correlation Analysis

This study uses Pearson correlation analysis of SPSS 26.0 to conduct correlation analysis on the dimensions of each variable. The correlation coefficient describes the relationship and direction of correlation between two variables. However, the correlation coefficient cannot accurately indicate the degree of correlation between two variables. Its value is between -1 and 1:

-1< r < 0 indicates that the two variables are negatively correlated.

r=0 means the two variables are not related.

0 < r < 1 indicates that the two variables are positively correlated.

This study determined the discriminant validity of the survey data by comparing the Pearson correlation coefficient with the square root of AVE. In the correlation analysis of variables in Table 4.19, the correlation analysis between knowledge absorptive capability (KAC), knowledge integration capability (KIC), knowledge sharing capability (KSC), knowledge protection capability (KPC), and knowledge innovation capability (KIN), incremental service innovation (ISN), radical service innovation (RSI), and the competitive advantage model for university library (CAM) is carried out. The results show that the correlation coefficients of all variables are distributed between 0.233-0.626. This indicates that there is a positive correlation between variables.

Table 4.19 Results of Pearson's Correlation Analysis for Each Dimension

	KAC	KIC	KSC	KPC	KIN	ISN	RSI	CAM
KAC	1							
KIC	0.335**	1						
KSC	0.370**	0.233**	1					
KPC	0.341**	0.444**	0.235**	1				
KIN	0.437**	0.478**	0.418**	0.324**	1			
ISN	0.262**	0.510**	0.185**	0.402**	0.376**	1		
RSI	0.337**	0.446**	0.385**	0.415**	0.383**	0.616**	1	
CAM	0.469**	0.519**	0.445**	0.448**	0.513**	0.517**	0.626**	1

* p<0.05 ** p<0.01

4.1.5 Structural Equation Model Fitting And Hypothesis Testing

This study focuses on verifying the impact of knowledge-based dynamic capabilities on the competitive advantage of academic libraries through the mediating

effect of service innovation. Therefore, this study conducted a model-fitting analysis using AMOS 23.0 and explained the relationship between variables through structural equation modeling.

After analyzing the fitting indicators of the independent variables (see Table 4.20), it can be seen that the Chi-Square/df value of the initial model in this study is 2.671, the value of the remaining adaptation indicators GFI is 0.849, the value of AGFI is 0.824, the value of RMSEA is 0.063. The value of IFI is 0.911, the value of TLI is 0.902, the value of CFI is 0.910, the value of PNFI is 0.789, and the PGFI is 0.730. Therefore, the fitting coefficient of the path relationship model is good.

Table 4.20 Results of Model Fitness Judgment of The Independent Variables

Inspection Index	Evaluation standard	Test Result	Model Fit
Model Fit Indices			
Chi-Square/df	1-3 is excellent, <5 is acceptable	2.671	Excellent
GFI	≥0.9 is excellent, ≥0.8 is acceptable	0.849	Acceptable
AGFI	≥0.9 is excellent, ≥0.8 is acceptable	0.824	Acceptable
RMSEA	≤0.05 is excellent，≤0.08 is acceptable	0.063	Excellent
Value-Added Adaptation Statistics			
IFI	≥0.9 is excellent，≥0.8 is acceptable	0.911	Excellent
TLI	≥0.9 is excellent，≥0.8 is acceptable	0.902	Excellent
CFI	≥0.9 is excellent，≥0.8 is acceptable	0.910	Excellent
Parsimonious Fit Statistics			
PNFI	＞0.5	0.789	Excellent
PGFI	＞0.5	0.730	Excellent

Table 4.21 Path Coefficient Analysis of Independent Variables

			Non-standardized Estimate	S.E.	C.R.	Standardized Estimate
Competitive Advantages Model for University Library	<--	Knowledge absorptive capability	.186	.054	3.420	.169
Competitive Advantages Model for University Library	<--	Knowledge integration capability	.268	.056	4.796	.262
Competitive Advantages Model for University Library	<--	Knowledge sharing capability	.229	.048	4.790	.230
Competitive Advantages Model for University Library	<--	Knowledge protection capability	.205	.057	3.577	.177
Competitive Advantages Model for University Library	<--	Knowledge innovation capability	.174	.057	3.046	.172

According to the structural equation modeling output of AMOS 23.0 (see Table 4.21 and Figure 4.4) path analysis model, knowledge absorptive capability's impact coefficient on university libraries' competitive advantage is 0.169 (S.E.=0.054, C.R.=3.420). Therefore, knowledge absorptive capability has a significant positive impact on the competitive advantage model for university library.

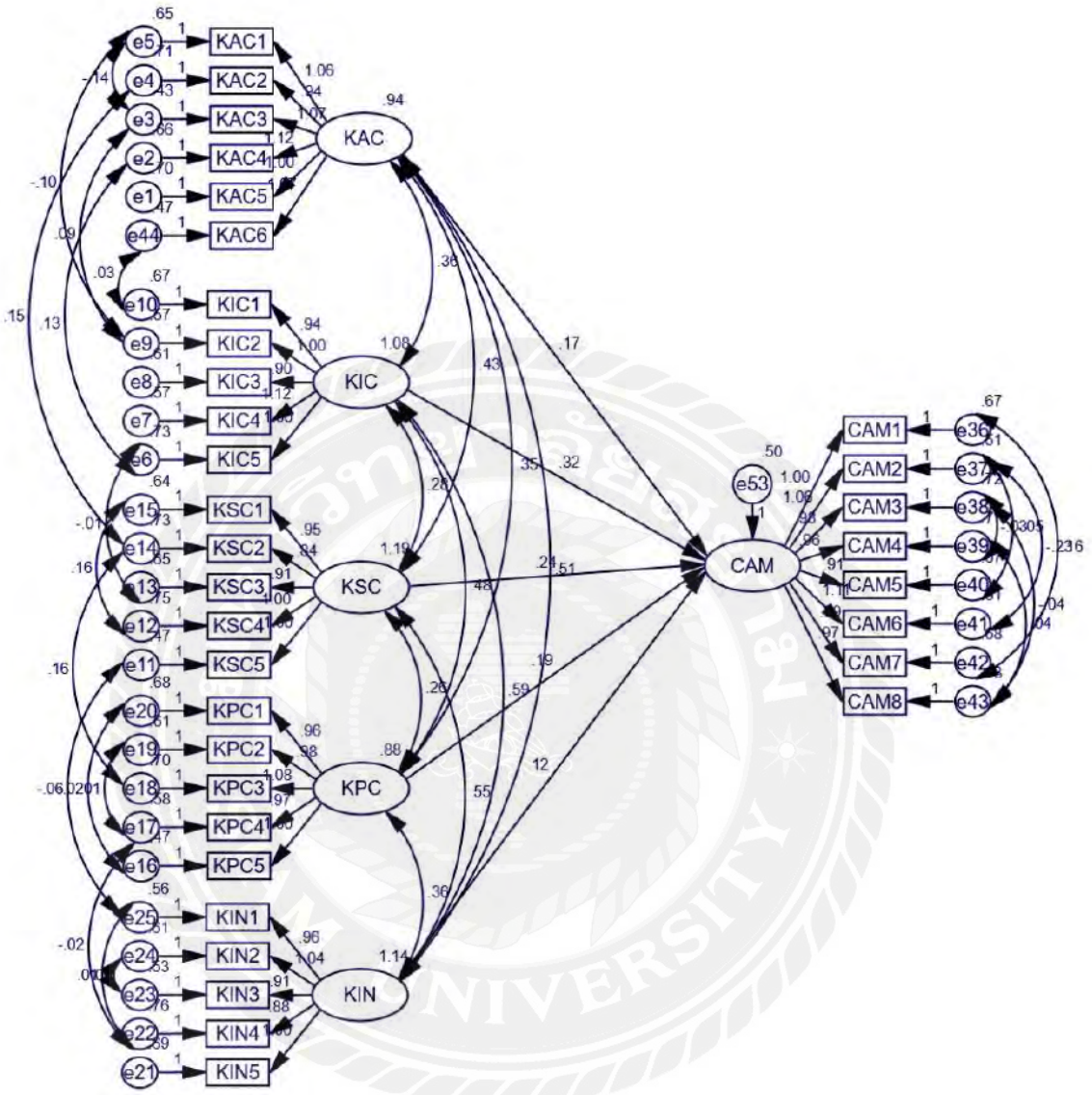
The impact coefficient of knowledge integration capability on the competitive advantage model for the university library is 0.262 (S.E.=0.056, C.R.=4.796). Therefore,

knowledge integration capability has a significant positive impact on the competitive advantage model for university libraries.

The impact coefficient of knowledge sharing capability on the competitive advantage model for the university library is 0.230 (S.E.=0.048, C.R.=4.790). Therefore, knowledge sharing capability has a significant positive impact on the competitive advantage model for university libraries.

The impact coefficient of knowledge protection capability on the competitive advantage model for the university library is 0.177 (S.E.=0.057, C.R.=3.577). Therefore, knowledge protection capability has a significant positive impact on the competitive advantage model for university libraries.

The impact coefficient of knowledge innovation capability on the competitive advantage model for the university library is 0.172 (S.E.=0.057, C.R.=3.046). Therefore, knowledge innovation capability has a significant positive impact on the competitive advantage model for university libraries.



Chi-square=1218.287, DF=491, Chi-square/DF=2.481, GFI=0.864, IFI=0.924, AGFI=0.835, NFI= 0.865, CFI=0.924, P=.000, RMSEA=0.059

Figure 4.4 Path Coefficient Analysis Model of The Impact of Knowledge-Based Dynamic Capabilities on The Competitive Advantage of University Library

After analyzing the fitting indicators of the mediating variables (see Table 4.22), it can be seen that the Chi-Square/df value of the initial model in this study is 2.714, the value of the remaining fitness indicators GFI is 0.807, the value of AGFI is 0.786, the value of RMSEA is 0.064. The value of IFI is 0.888, the value of TLI is 0.881, the value

of CFI is 0.887, the value of PNFI is 0.786, and the PGFI is 0.727. Therefore, the fitting coefficient of the path relationship model of the mediating variable is good.

Table 4.22 Results of Model Fitness Judgment of The Mediating Variables

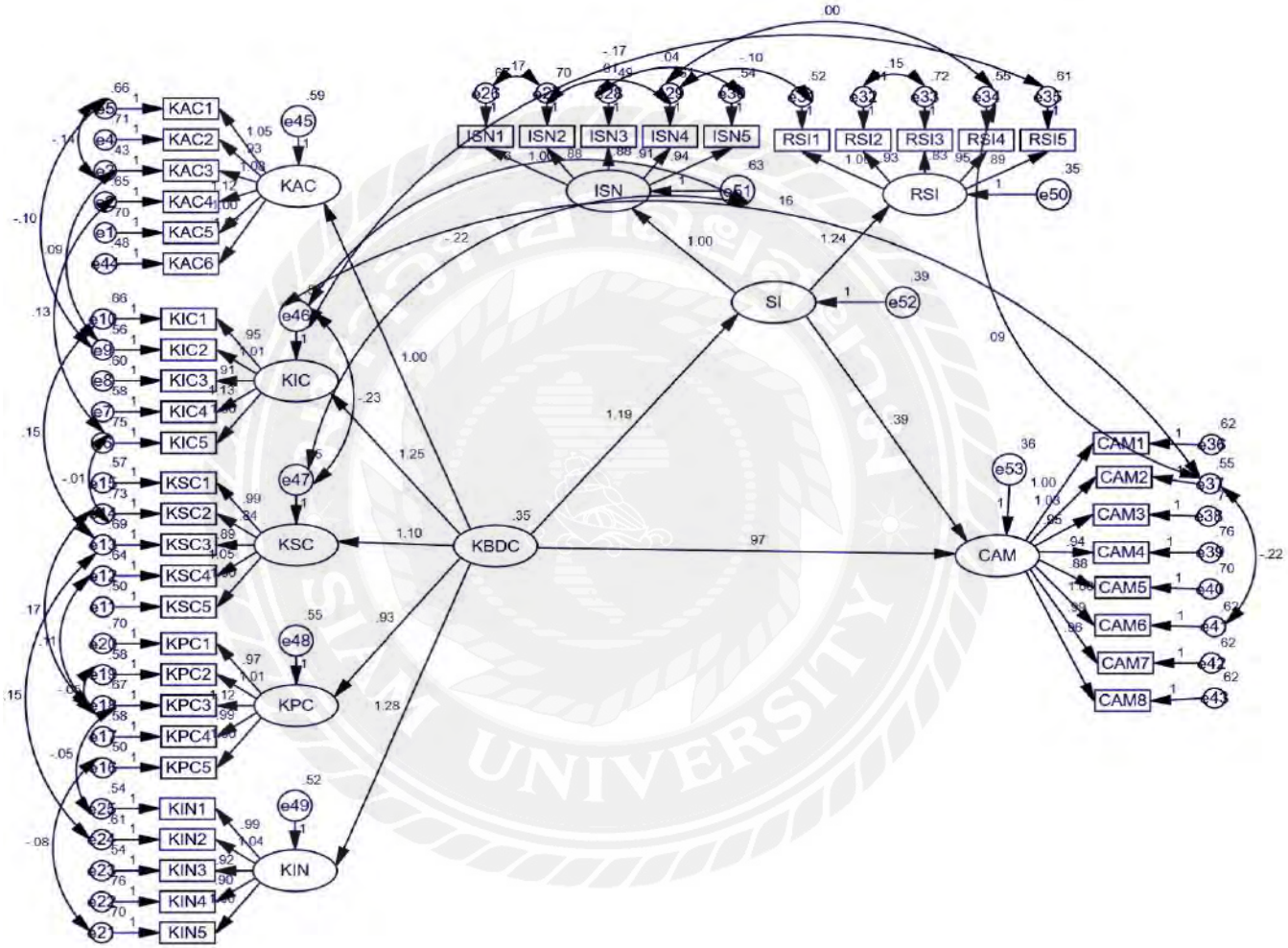
Inspection Index	Evaluation standard	Test Result	Model Fit
Model Fit Indices			
Chi-Square/df	1-3 is excellent, <5 is acceptable	2.714	Excellent
GFI	≥0.9 is excellent, ≥0.8 is acceptable	0.807	Acceptable
AGFI	≥0.9 is excellent, ≥0.8 is acceptable	0.786	General
RMSEA	≤0.05 is excellent，≤0.08 is acceptable	0.064	Acceptable
Value-Added Adaptation Statistics			
IFI	≥0.9 is excellent，≥0.8 is acceptable	0.888	Acceptable
TLI	≥0.9 is excellent，≥0.8 is acceptable	0.881	Acceptable
CFI	≥0.9 is excellent，≥0.8 is acceptable	0.887	Acceptable
Parsimonious Fit Statistics			
PNFI	＞0.5	0.786	Excellent
PGFI	＞0.5	0.727	Excellent

In the analysis of the mediating effect of service innovation on the competitive advantage model for university libraries based on knowledge-based dynamic capabilities (see Table 4.23 and Figure 4.5), the influence coefficient of knowledge-based dynamic capabilities on the competitive advantage of academic libraries is 0.579 (S.E.=0.178, C.R.=5.793). Therefore, knowledge-based dynamic capabilities positively impact the competitive advantages model for university libraries.

The impact coefficient of service innovation on the competitive advantage model for university libraries is 0.309 (S.E.=0.095, C.R.=3.613). Therefore, service innovation positively impacts the competitive advantage model for university libraries.

Table 4.23 Path Coefficient Analysis of Variables

			Non-standardized Estimate	S.E.	C.R.	Standardized Estimate
Service innovation	<--	Knowledge-based dynamic capabilities	1.237	.150	8.255	.771
Knowledge absorptive capability	<--	Knowledge-based dynamic capabilities	1.000			.614
Knowledge integration capability	<--	Knowledge-based dynamic capabilities	1.207	.137	8.778	.693
Knowledge sharing capability	<--	Knowledge-based dynamic capabilities	.983	.125	7.839	.548
Knowledge protection capability	<--	Knowledge-based dynamic capabilities	.937	.114	8.215	.609
Knowledge innovation capability	<--	Knowledge-based dynamic capabilities	1.262	.141	8.955	.714
Incremental service innovation	<--	Service innovation	1.000			.762
Radical service innovation	<--	Service innovation	1.195	.097	12.375	.883
Competitive Advantages Model for University Library	<--	Service innovation	.344	.095	3.613	.309
Competitive Advantages Model for University Library	<--	Knowledge-based dynamic capabilities	1.034	.178	5.793	.579



Chi-square=2111.978, DF=867, Chi-square/DF=2.436, GFI=0.828, IFI=0.909, AGFI=0.804, TLI=0.900, CFI=0.908, P=0.059,*p>0.05.

Figure 4.5 The Modified Structural Equation Model

Hypothesis 1: Knowledge-based dynamic capabilities have a positive impact on service innovation (**Accepted Hypothesis)**.

This hypothesis explains the relationship between knowledge-based dynamic capabilities and service innovation. As is shown in Table 4.23, the *Non-standardized Estimate value* between knowledge-based dynamic capabilities and service innovation is 0.344 (S.E.=0.150, C.R.=8.255), and the *Standardized Estimate value* is 0.771. Therefore, knowledge-based dynamic capabilities have a positive impact on service innovation.

Hypothesis 2: Service innovation has a positive impact on the competitive advantage model for university library (**Accepted Hypothesis)**.

This hypothesis explains the relationship between service innovation and the competitive advantage model for university library. As is shown in Table 4.23, the *Non-standardized Estimate value* between the service innovation and competitive advantage model for the university library is 0.344 (S.E.=0.095, C.R.=3.613), and the *Standardized Estimate value* is 0.309. Therefore, service innovation positively impacts the competitive advantage model for university library**.**

Hypothesis 3: Knowledge-based dynamic capabilities have a positive impact on the competitive advantage model for university library (**Accepted Hypothesis)**.

This hypothesis explains the relationship between knowledge-based dynamic capabilities and the competitive advantage model for university library. As is shown in Table 4.23, the *Non-standardized Estimate value* between knowledge-based dynamic capabilities and competitive advantage model for the university library is 1.034 (S.E.=0.178, C.R.=5.793), and the *Standardized Estimate value* is 0.579. Therefore, knowledge-based dynamic capabilities positively impact the competitive advantage model for university library**.**

Hypothesis 4: Knowledge-based dynamic capabilities have a positive impact on the competitive advantage model for university library through service innovation (**Accepted Hypothesis)**.

This hypothesis explains the relationship between knowledge-based dynamic capabilities, service innovation, and the competitive advantage model for university

library. As shown in Table 4.23, knowledge-based dynamic capabilities positively affect service innovation, and service innovation affects the competitive advantage model for university libraries. Therefore, knowledge-based dynamic capabilities positively impact the competitive advantage model for university library through service innovation.

Table 4.24 Hypotheses Testing

NO.	Hypothesis	Result
H1	Knowledge-based dynamic capabilities have a positive impact on service innovation.	Accepted
H2	Service innovation has a positive impact on the competitive advantage model for university library.	Accepted
H3	Knowledge-based dynamic capabilities have a positive impact on the competitive advantage model for university library.	Accepted
H4	Knowledge-based dynamic capabilities have a positive impact on the competitive advantage model for university library through service innovation.	Accepted

4.2 Qualitative Analysis

4.2.1 In-Depth Interviews

In-depth interviews are a commonly used interview method that aims to understand their opinions, experiences, and concepts through in-depth conversations with specific groups of people. Through in-depth interviews with a group of China's “Double First-Class” university libraries, this study aims to explore how they enhance the competitive advantages of university libraries from knowledge-based dynamic capabilities in the context of the digital intelligence era.

The main purpose of this in-depth interview is: the first purpose is to verify the statistical analysis results of the university library competitive advantage model scale based on knowledge-based dynamic capabilities, form a mutual response between quantitative and qualitative evaluation conclusions, and further improve the reliability of the research conclusions, the second is to explain the special phenomena presented by the quantitative evaluation results and the important issues reflected, see the essence through the phenomenon, analyze the problems and find the causes, and provide a scientific basis for formulating effective responses and policies; the third is to supplement the content not mentioned in the quantitative evaluation results to form a more scientific and comprehensive research conclusion.

To achieve the above interview objectives, this study designed a four-part semi-structured interview outline (see Appendix E). The interview outline revolves around the characteristics of knowledge-based dynamic capabilities, service innovation, and key factors of competitive advantage of university libraries.

This study interviewed 9 department directors from different university libraries with rich experience in library development and management. Among the interviewees, 6 are women, and 3 are men, ranging in age from 35 to 55 (see Table 4.25). To facilitate content organization and analysis, this study numbered the respondents, such as No.1, No.2, No.3, No.4, No.5, No.6, No.7, No.8, No.9.

Table 4. 25 Interviewee Information Table of The Competitive Advantage Model of University Libraries Based on Knowledge-Based Dynamic Capability Survey

No.	Gender	Position	Professional title	University location
1	Male	Department director	Deputy research librarian	Southwest China
2	Female	Department director	Librarian	Southwest China
3	Female	Department director	Librarian	Central China
4	Male	Department director	Deputy research librarian	Central China
5	Male	Department director	Deputy research librarian	North China
6	Female	Department director	Librarian	North China

7	Female	Department director	Deputy research librarian	East China
8	Female	Department director	Deputy research librarian	South China
9	Female	Department director	Librarian	South China

4.2.2 Content Analysis

During the interviews, interviewees generally believed that current university libraries need a series of service innovation strategies to enhance the competitive advantages of university libraries from knowledge-based dynamic capabilities to cope with today's rapidly developing digital intelligence environment.

In this study, the purpose of the interviews was explained to the interviewees before the interviews, how the collected data would be used, and confidentiality. The interview process of this study is that the interviewee first introduces the library's situation, then introduces the library's knowledge-based dynamic capabilities and service innovation, and finally talks about the library's competitive advantages.

4.2.2.1 The Basic Situation of The Library

"The library is the heart of the university"; it undertakes the essential functions of providing information resources, inheriting knowledge, and enlightening wisdom for the university. With the leapfrog development of the university in the past decade, the university library has made significant progress in hardware equipment, software facilities, human resources, and service quality. It has gradually entered a period of stable development.

The first part of the interview for the interviewee is to talk about the basic situation of the library where they work, including the basic situation and development goals. They proudly introduced the library's area, collection of documents, subject databases, reading seats, and knowledge services to readers. The continuous collection system that reflects the professional characteristics of the university provides strong document resource support for “Double First-Class” teaching, scientific research, and the cultivation of top innovative talents.

Then, the interviewees were guided to discuss the library's development goals, such as short-term and long-term development goals and specific development plans. No.2 interviewee has proposed that the libraries of “Double First-Class” universities are cultural organisms that integrate knowledge education, spiritual education, and cultural education. From the perspective of the strategic goals of higher education, the long-term goal of university libraries is to educate people through culture. The short-term goal of cultural education includes three aspects. The first is that the library must establish a new knowledge field and, more importantly, provide a space for knowledge exchange. The second is to transform the university's spiritual culture creatively, permeating the students' souls. In addition, outside the classroom and laboratory, the library's unique cultural attributes enable it to shoulder the critical mission of enhancing students' cultural identity and improving the cohesion of the university. The third is to realize the main functions of university libraries, namely talent training, scientific research, serving society, and cultural inheritance and innovation (see Figure 4.6).

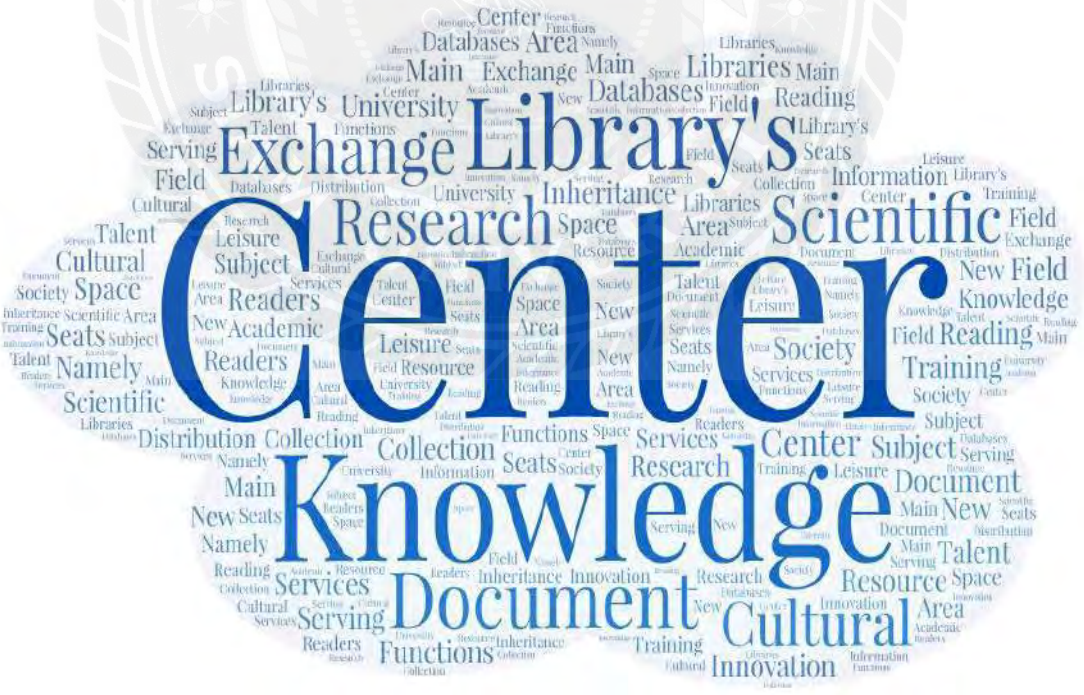


Figure 4.6 The Word Cloud of The Basic Situation of University Library

The interviewees agreed that university libraries will become the university's document resource distribution center, scientific research information center, academic exchange center, and cultural and leisure center. Knowledge management will become increasingly important, and libraries will enhance their competitive advantage through innovative knowledge services.

4.2.2.2 The Status of Library's Knowledge-Based Dynamic Capabilities

The second part of the interview was to let the interviewees talk about the library's situation in knowledge-based dynamic capabilities in the past two years and how to implement knowledge-based dynamic capabilities in library knowledge work, as is shown in Table 4.26.

At the stage of implementing knowledge absorption capability, No.1 believed that university libraries should first have the capability to perceive readers' needs and the capability to perceive technology choices. Libraries should have in-depth communication and interaction with readers and deeply understand readers' potential needs through direct dialogue, reader management, and borrowing data analysis. The capability to perceive technology choices is the process and practice of libraries using technology choices through different information source channels to enhance their competitive advantages.

Therefore, the acquisition of technical knowledge and knowledge about readers' needs complement each other and enrich the diversity of university libraries' knowledge perception capabilities. University libraries mine practical information from massive amounts of data through big data analysis. They obtain valuable information and internalize it by perceiving readers' needs and technology selection, generating new knowledge. Therefore, in the knowledge acquisition stage, the library's ability to perceive readers and the ability to perceive technology selection are the basis for the library to provide knowledge innovation services. This stage's practical results can enhance university libraries' resource, technical, space, and service advantages.

In the implementation stage of knowledge integration capability, most interviewees agreed that dynamic and effective knowledge integration is conducive to

improving the service innovation capability of university libraries, thereby further enhancing the competitive advantage of libraries.

However, there are different views on the focus of knowledge integration. No.5 believed that information resource integration is essential because they think that the knowledge service of the library is mainly the service of information resources. She explained in detail that information resource integration includes information resource integration based on OPAC (Online Public Access Catalog), information resource integration based on data sources, and information resource integration based on knowledge management systems.

Table 4.26 The Keywords of University Library Practice in Knowledge-Based Dynamic Capabilities

Interviewee	**Items**	**Keywords of the interview content**	**Results for University Libraries**
No.1	Knowledge absorption capability	➢ Perceive readers' needs and technology choices ➢ Communication and interaction with readers ➢ Different information source channels for data analysis service	✓ Resource advantages ✓ Technical advantages ✓ Service advantages ✓ Space advantages
No.5, No.3, No.6, and No.7	Knowledge integration capability	➢ Information resource integration ➢ Librarian's knowledge integration capability ➢ Integrate implicit and explicit knowledge ➢ The librarian's personal and team knowledge and internal and external knowledge ➢ The library’s dynamic service	✓ Service advantages ✓ Talent advantage
No.4 and No.8	Knowledge sharing	➢ Information resources ➢ Open access to materials	✓ Resource advantages

	capability	➢ Intellectual property rights ➢ Tool development ➢ Data mining ➢ Digital reconstruction media learning ➢ More accurate knowledge services	✓ Technical advantages ✓ Talent advantage ✓ Service advantages
No.2	Knowledge protection capability	➢ Protect collection resources and documents ➢ Intellectual property protection ➢ Reader information security ➢ Strengthen protection awareness ➢ Establish complete knowledge protection rules and regulations	✓ Resource advantages ✓ Service advantages ✓ Space advantages
No.1, No.2, No.3, No.5 and No.8	Knowledge innovation capability	➢ Recognize and value the crucial strategic role of knowledge innovation ➢ Correctly analyze technical capabilities ➢ Actively carry out knowledge innovation strategy ➢ Provide readers with innovative knowledge	✓ Resource advantages ✓ Technical advantages ✓ Talent advantages ✓ Service advantages ✓ Space advantages

No.3 believed that librarians' knowledge integration capability is crucial. She believes that the knowledge integration capability of librarians includes the capability to identify and capture knowledge, the capability to integrate knowledge, and the capability to apply knowledge. Therefore, each librarian's knowledge integration capability is different. Improving the knowledge integration capability of all librarians can effectively improve the library's knowledge innovation service capabilities, thereby enhancing the library's competitive advantage.

No.6 believed that the library's knowledge integration capabilities should include the library's ability to integrate implicit and explicit knowledge, the librarian's personal and team knowledge, and internal and external knowledge.

No.7 believed that in a dynamically changing environment, the knowledge integration ability of library service librarians is crucial, especially for different librarian teams. At various times, librarians' knowledge integration ability is also different and dynamic. The knowledge integration of library service teams in a dynamic environment is an essential ability for library service teams to organize knowledge efficiently, which is conducive to the knowledge innovation of library service teams and to improve the overall competitive advantage of library knowledge services. Then, this stage's practical results can enhance university libraries' talent and service advantages. Over time, it will gradually become the core competitiveness of library organization knowledge.

In the implementation stage of knowledge sharing capability, most library managers believe that library knowledge sharing has become libraries' core advantage in resource construction and development. At this stage, the knowledge-sharing capability of libraries is developing rapidly, which can continuously promote and improve the academic value and social utility of digital knowledge innovation and knowledge services, and it can give full play to the effectiveness of digital knowledge sharing.

No.4 believed that the implementation basis of knowledge sharing capability is the library's resources, including paper books and databases. Especially in the era of big data information, the library's knowledge sharing practice is to send knowledge services to readers through the Internet, providing readers with literature analysis, subject research hotspots, subject development trends, subject research literature services, and other knowledge sharing services. Library knowledge sharing involves technical support, information resources, open access to materials, intellectual property rights, tool development, data mining, digital reconstruction media learning, and other aspects. By using new media, VR, and other big data information technologies, digital knowledge sharing technology, innovative research methods, enriching research results, and thus exploring support services for scientific research activities, improving research efficiency, and enhancing the library's service advantages,

No.8 believed that libraries should pay special attention to readers' knowledge needs in the practice stage of knowledge sharing to provide more accurate knowledge

services. In the implementation stage, the knowledge sharing behavior of libraries is easily affected by readers' personal cognition and external environment. Then, this stage's practical results can enhance university libraries' resource, technical, space, and service advantages.

In the implementation stage of knowledge protection capability, most respondents believe libraries should pay special attention to protecting collection resources and documents, intellectual property protection, and reader information security. Therefore, regarding knowledge protection, libraries must first strengthen protection awareness, focus on implementing protection systems, establish complete knowledge protection rules and regulations, strengthen librarians' knowledge protection capacity training, and provide readers with better knowledge services.

No.2 believed that document resources are the most fundamental resources of a library and the foundation of its development. Therefore, constructing a library's document resources should be guided by the goals and needs of building a world-class university and provide professional and relatively sufficient document resource guarantees for "Double First-Class" teaching, scientific research, and cultivating top-notch innovative talents.

During the implementation phase of knowledge innovation capabilities, most of the respondents believed that libraries should first recognize and value the crucial strategic role of knowledge innovation in enhancing the library's competitive advantage, actively carry out knowledge innovation, provide readers with innovative knowledge, and promote the development of the library. Most respondents believe that knowledge innovation capability is university libraries' most crucial knowledge management capability.

No.5 believed that libraries should have a clear understanding of the matching relationship between knowledge innovation strategy and the library's technical capabilities, correctly analyze their technical capabilities, carry out knowledge innovation strategy decisions in a targeted manner, give full play to the strategic effectiveness of knowledge innovation, and respond to current competitive challenges.

No.8 believed that libraries should clearly understand the matching relationship between knowledge innovation strategy and the technical capabilities of the library, correctly analyze their technical capabilities, carry out targeted knowledge innovation strategic decisions, give play to the strategic effectiveness of knowledge innovation, and respond to current competitive challenges.

No.3 said that in the past two years, many university libraries have used library WeChat public accounts, mobile library APPs, TikTok, Bilibili, and others. To improve knowledge innovation capabilities and provide readers with personalized knowledge services. Taking the mobile library APP as an example, readers can apply for electronic library cards through mobile libraries. Readers can borrow books with electronic borrowing cards. At the same time, it can also provide readers with search functions. Readers can search for relevant information according to their own needs.

On the other hand, libraries can collect and analyze the data retrieved by readers through mobile libraries, judge readers' preferences and needs, and then actively push relevant content to them, thereby improving the initiative, pertinence, and effectiveness of knowledge services in university libraries. As is shown in the Figure 4.7. In summary, this stage's practical results can enhance university libraries' advantages in terms of resources, technology, space, talent, and service.

Figure 4.7 The Word Cloud of Interview Content on The Current Status of Library's Knowledge-Based Dynamic Capabilities

4.2.2.3 Library Service Innovation

This part mainly asks the interviewees to give a general introduction to the current status and measures of service innovation in the library in the past two years. Most interviewees believe that in the past two years, the service innovation of university libraries has gradually shifted from resource services to knowledge innovation services, from static services to dynamic services, from single services to multiple services, and from single professional services to cross-professional services. In other words, libraries are using progressive service innovation to improve service quality, increase resource utilization, and enhance the library's competitive advantage.

One of the interviewees believed that when the library has low technical capabilities, providing high-quality information resource support services (such as interlibrary loans of resources and information literacy training) to different user groups through a progressive service innovation strategy can not only shorten the time it takes for users to obtain resources, but also enable resources to function to meet user needs, which is more conducive to improving the library's competitive advantage, user needs, and resource performance.

No.5 believed that in the process of readers using the library, the library's high-quality information resource support services can no longer meet the knowledge needs of users. By adopting a breakthrough service innovation strategy, reconstructing existing resources and services, providing users with technology-intensive services that integrate resources (dynamic analysis of professional resources, professional topic intelligence, subject services, novelty search, and citation.), further leveraging the library's existing technical advantages, creating new knowledge value for users, and thus enhancing the library's competitive advantage.

For the libraries of “Double First-Class” universities, we should attach importance to the critical strategic role of service innovation in gaining competitive advantages, actively carrying out service innovation practices, promote the transformation and upgrading of libraries. At the same time, we should clearly understand the matching relationship between service innovation strategy and library technical capabilities,

correctly analyze our technical capabilities, carry out targeted service innovation strategic decisions, give play to the strategic effectiveness of service innovation, and respond to current competitive challenges.

In the current development environment of Chinese university education, libraries of “Double First-Class” universities need to pay more attention to the strategic role of service innovation, carry out service innovation around factors such as people, machines, objects, and space, and reduce the uncertainty risks and professional development competition pressures brought by the external dynamic education environment through service innovation strategies. At the same time, due to the dynamic adjustment strategy of China's “Double First-Class” universities, libraries of “Double First-Class” universities should use Internet thinking to appropriately strengthen breakthrough service innovation strategies and improve and enhance the ability to serve the construction of school professional groups. As is shown in the Figure 4.8.

Figure 4.8 The Word Cloud of Interview Content on The Library Service Innovation

4.2.2.4 Competitive Advantages of Libraries

The content of this part is mainly to let the interviewees talk about the advantages of his library and how to improve its competitive advantage.

No.9 believes that the advantages of her library mainly include the following: First, the collection of documents covers the humanities, social sciences, natural sciences, applied technology, and other disciplines, basically covering the main disciplines and research fields of the university. Various digital resources with rich varieties and high quality provide strong support for comprehensively improving the university's teaching, scientific research, and discipline construction.

Second, the library should innovate the types of reader space according to the needs of readers, such as adding coffee leisure areas, new media experience areas, multi-functional exhibition areas, reading promotion corners, reading halls, and other spaces; strengthen cultural construction, and set up new high-quality platforms such as reading spaces and traditional culture exhibition areas; improve reader services, and have modern service functions such as self-service book borrowing and returning systems, intelligent sorting systems and reader self-service systems, to ensure unified management of multi-campus buildings and realize cross-campus borrowing and returning services.

Third, the library should increase the introduction and use of new technologies. For example, it provides readers with knowledge and information services such as technology search, collection, and citation, subject services, talent assessment, patent services intelligent services such as a mobile library, RFID, information sharing space, 3D navigation, self-service borrowing and returning self-service printing, self-service book sterilizer, and multimedia audio-visual new equipment experience services such as Samsung curved screen, ultra-high-definition 4k LCD, tablet computer, kindle reader, 3D printer, information release machine, electronic newspaper reader.

No.1 thought that the "Double First-Class" university libraries generally have a team of librarians with high theoretical levels and rich practical experience. The educational structure of librarians is usually dominated by master's degrees, and librarians with doctoral degrees are also familiar with university libraries. The professional title distribution of university libraries is generally dominated by librarians and associate research librarians. They have extensive work experience, proficient information service skills, and substantial information search and processing capabilities.

No.4 believed that the library always adheres to the library's purpose of being "management-led, service-based, scientific research-driven, and talent-driven," follows the service concept of "readers first, service-oriented and education-oriented," advocates the library motto of "love the library, wisdom, harmony, and dedication," and continues to work hard in service innovation and resource construction to make more significant contributions to the university's "Double First-Class" construction.

No.7 believed that to build a "Double First-Cass" university library that meets the times' development needs. The university library should follow the construction ideas of resource strategy, technology intelligence, and service intelligence, take moral education and service education as the foundation, and create a knowledge service center that integrates learning, research, and decision-making support through ubiquitous, personalized, and refined services. It will carry out all-round service support around the various stages of the academic life cycle of teachers and students and gradually establish a service evaluation feedback mechanism with the satisfaction of needs and the influence of library services as the primary evaluation objects to promote the transformation of library services.

No.9 believed that under the strategic guidance of the school's "higher quality, more excellence, more respect, and more dreams," the university library will adhere to the strategic goal and action strategy of high-quality construction of research libraries, run a library that satisfies teachers and students, and provide first-class document information resources and innovative service ecology for the construction of world-class universities and excellent disciplines.

No.8 thought that librarians' knowledge, skills, and quality directly affect the level and quality of services. University libraries should attach importance to the training of librarians, encourage them to take on-the-job training, study tours, further studies after leaving their jobs, academic exchanges, and other learning methods, and regularly hire experts from inside and outside the school to train them on the skills needed in their work. Librarians should strengthen their business knowledge and skills and use modern communication tools and technologies. University libraries should encourage librarians to

master more than two professional levels of expertise, increase their knowledge reserves, comprehensively improve their service quality and ability, and continuously enhance the talent advantages of university libraries. University libraries should strengthen the introduction of multidisciplinary talents proficient in computer technology, network technology, multimedia technology, library majors, and foreign language majors. Libraries should implement two-way selection and competitive recruitment to encourage librarians to move to the most suitable positions. Libraries should establish a reasonable incentive mechanism to mobilize librarians' enthusiasm and strive to make the best use of their talents. University libraries should fully tap the potential of each librarian and give full play to their talent advantages.

No.6 believed that under the strategic guidance of the university's "higher quality, more excellence, more respect, and more dreams," the university library will adhere to the strategic goal and action strategy of high-quality construction of research libraries, run a library that satisfies teachers and students, and provide first-class document information resources and innovative service ecology for the construction of world-class universities and excellent disciplines. As is shown in the Figure 4.9.

Figure 4.9 The Word Cloud of Interview Content on The Competitive Advantage of University Library

After talking with 9 deputy directors or department directors of university libraries, I learned about the situation of university libraries in practicing knowledge-based dynamic capabilities and service innovation to enhance libraries' competitive advantage. This study will summarize the interviews. Although the interviews were difficult, they were mostly successful. The reasons are as follows: (1) The scope of the interviews was correctly selected. I work in a university library. Before doing this study, I also surveyed “Double First-Class” university libraries. At the same time, I often participate in academic essays and academic exchange meetings in libraries. (2) Reasonable use of academic conferences to conduct face-to-face interviews with interviewees.

4.3 The Competitive Advantage Model for University Libraries

This study combines quantitative research with qualitative research scientifically and effectively. First, in the quantitative research stage, this study proposed five hypotheses based on the research content requirements using scientific and practical research methods and divided and analyzed the dimensions of related variables. This study's conceptual model and research hypothesis were verified through the data from 420 valid questionnaires. Then, the quantitative research's conceptual model and research hypothesis were further verified through the content analysis of the qualitative research. The main conclusions of this study are as follows:

Firstly, knowledge-based dynamic capabilities have a positive impact on service innovation. Knowledge-based dynamic capabilities positively impact both sub-dimensions of service innovation, and the degree of influence is in the following order: knowledge integration capability and knowledge sharing capability. In conclusion, it can be seen that university libraries with a higher level of knowledge-based dynamic capabilities are usually in the further stage of service innovation, so they have a higher service innovation status when conducting research.

Second, service innovation has a positive impact on the competitive advantage of libraries: the two dimensions of service innovation have a positive effect on competitive

advantage, and the degree of influence is in the following order: radical service innovation and incremental service innovation. The conclusion of this study shows that digital maturity positively impacts competitive advantage through service innovation. This is consistent with the empirical research conclusion that service innovation positively impacts performance and the content conclusion of this study's qualitative research.

Third, knowledge-based dynamic capabilities have a positive impact on the competitive advantage of libraries. The five dimensions of knowledge-based dynamic capabilities, namely knowledge absorptive capability, knowledge integration capability, knowledge sharing capability, knowledge protection capability, and knowledge innovation capability, all positively impact competitive advantage. The degree of influence is in the order of knowledge sharing capability, knowledge integration capability, knowledge protection capability, knowledge absorptive capability, and knowledge innovation capability. The research results show that knowledge-based dynamic capabilities positively impact libraries' competitive advantage, consistent with the qualitative research content.

Fourth, service innovation plays a mediating role in the impact of knowledge-based dynamic capabilities on the competitive advantage of libraries: the two sub-dimensions of service innovation have a mediating effect on the competitive advantage of libraries: the magnitude of the mediating effect is from large to small: radical service innovation, incremental service innovation. This conclusion reveals the role of service innovation in the performance impact of knowledge-based dynamic capabilities; that is, a high level of knowledge-based dynamic capabilities will lead to a high level of service innovation, and service innovation, as an intermediate result, will enhance the competitive advantage of libraries.

According to Table 4.26, university libraries have put knowledge-based dynamic capability theory into practice in service innovation and gained resource, space, talent, technological, and service advantages.

In summary, knowledge-based dynamic capabilities positively impact both service innovation and the competitive advantage of libraries. In this context, service innovation is shown to mediate in this process. Therefore, this study provides valuable insights into the causal mechanism by which knowledge-based dynamic capabilities affect the competitive advantage of libraries, as well as the effectiveness of dynamic models in strategic management, as is shown in Figure 4.10.

Figure 4.10 The Model of University Libraries' Competitive Advantage Based on Knowledge-Based Dynamic Capabilities

According to Figure 4.10, This study aims to build a competitive advantage model of university libraries from the perspective of knowledge-based dynamic capabilities. First, we analyze the factors of knowledge-based dynamic capabilities. Second, university libraries implement knowledge-based dynamic capabilities and service innovation based on their actual conditions. Then, university libraries can obtain resource, technical, space, talent, and service advantages. By combining the above five advantages, libraries can acquire and enhance their competitive advantages.

1. The theoretical specific steps are as follows:

1) Identify key capabilities

Knowledge absorptive capability: Ability to acquire various types of external knowledge, such as technical, team management, and reading promotion.

Knowledge integration capability: Integrating internal and external knowledge effectively, combining team and individual knowledge and different technologies.

Knowledge sharing capability: Optimization of knowledge sharing environments in resource construction, data processing, text creation, services, and copyright.

Knowledge protection capability: Protection of technical knowledge, professional literature collections, copyright, and reader information.

Knowledge innovation capability: Creation of new technical knowledge, reading promotion activities, talent development, and new ideas for meeting reader needs.

2) Develop improvement plans

For knowledge absorption: Improve processes for acquiring external knowledge and enhance interaction with external sources.

For knowledge integration: Implement better strategies to integrate internal and external knowledge and technology.

For knowledge sharing: Optimize the knowledge sharing environment and processes to ensure effective dissemination and utilization.

For knowledge protection: Strengthen policies and practices to protect intellectual property, collections, and personal information.

For knowledge innovation: Foster a culture of innovation, support new ideas, and leverage new technologies to meet evolving reader needs.

Incremental service innovation: Enhance existing services, extend service hours, and innovate reading activities.

Radical service innovation: Introduce new and effective teaching and learning services

3) Practice results and specific evaluation factors

Resource advantages: Comprehensive document collection, solid digital resources, and support for teaching and research.

Service advantages: Improved reader services, modern service functions, unified management, and cross-campus services.

Space advantages: Innovative reader spaces, cultural construction, and high-quality platforms.

Talent advantages: Highly educated librarians with practical experience and strong information services skills.

Technical advantages: Use new technologies, such as mobile libraries, RFID, and multimedia equipment.

2. University libraries can take the following steps to implement based on the above steps:

1) Assess current capabilities

Evaluate how well the library performs in each capability area: absorptive, integration, sharing, protection, and innovation.

Review current resources, services, spaces, talent, and technologies against the evaluation criteria.

2) Develop improvement plans

For knowledge absorption: Improve processes for acquiring external knowledge and enhance interaction with external sources.

For knowledge integration: Implement better strategies to integrate internal and external knowledge and technology.

For knowledge sharing: Optimize the knowledge sharing environment and processes to ensure effective dissemination and utilization.

For knowledge protection: Strengthen policies and practices to protect intellectual property, collections, and personal information.

For knowledge innovation: Foster a culture of innovation, support new ideas, and leverage new technologies to meet evolving reader needs.

3) Monitor and evaluate

Track progress in each capability area using specific metrics and feedback mechanisms.

Regularly review and adjust strategies based on performance and emerging trends.

4) Communicate and train

Ensure all stakeholders know the new strategies and their roles in implementing them.

Provide training and resources to staff to support the new approaches and technologies.

5) Promote and share

Showcase improvements and innovations through marketing and communication channels to attract more readers and enhance the library's reputation.

By systematically creating and applying this model, university libraries can enhance their capabilities, improve services, and gain competitive advantages.

CHAPTER 5
RESEARCH CONCLUSION, DISCUSSION AND RECOMMENDATION

In the context of China's continuous encouragement of world-class universities and first-class disciplines to build universities and to form first-class innovation teams, this study is about how knowledge-based dynamic capabilities can better promote the competitive advantage of university libraries. First, this study examines the factors that influence the knowledge-based dynamic capabilities of university libraries; second, this study analyzes the mechanism of knowledge-based dynamic capabilities on competitive advantage; and third, it studies the moderating effect of service innovation. Finally, based on the theoretical literature review, this study constructs four research hypotheses and obtains a competitive advantage model of university libraries through a mixed research method.

This chapter will provide an explanation and summary in Chapter 4. It explains the conclusions, discusses the theoretical results and practical sharing of this study, lists the study's limitations, and provides suggestions and future research trends based on the research results.

Therefore, this chapter is summarized from the following five aspects:

5.1 Research Conclusion

5.2 Discussion

5.3 Recommendation

5.4 Limitation

5.5 Future Research

5.1 Research Conclusion

Based on the research and data analysis from Chapter 1 to Chapter 4, this chapter tries to answer the three research questions raised in Chapter 1. This study attempts to

solve the competitive advantage model of university libraries based on knowledge-based dynamic capabilities, with service innovation as the mediating variable, to enhance university libraries' competitive advantage.

The questionnaire in the quantitative research of this study was designed based on references and the actual situation of university libraries, with a total of 44 questions and at least 5 items in each dimension. This study collected questionnaires from 42 "Double First-Class" university libraries in China, and a total of 439 questionnaires were completed, of which 420 were valid questionnaires, with a validity of 96.55%. This study used SPSS26.0 and AMOS 23.0 software for reliability, validity, person correlation analysis, and structural equation model. In the qualitative research, in-depth telephone interviews were conducted with 9 key informants. Then, the interview content was displayed using Word Cloud software. Finally, this study combined the conclusions of quantitative research with the results of qualitative research and got a competitive advantage model for university libraries.

The research objectives are:（1）To investigate the factors of knowledge-based dynamic capabilities through service innovation on university libraries' competitive advantage.（2）To reveal the effect of knowledge-based dynamic capabilities factors through service innovation factors on university libraries' competitive advantage.（3）To develop a competitive advantage model for university libraries from knowledge-based dynamic capabilities through service innovation.

Knowledge-based dynamic capabilities are knowledge-based development dynamic capabilities. Knowledge is the core element of knowledge-based dynamic capabilities, and the development and change of knowledge directly lead to the development and change of dynamic capabilities. Based on the knowledge-based dynamic capability theory, this study found that the knowledge existing inside and outside the university library is the main driving force for practicing and developing knowledge-based dynamic capabilities.

5.2 Discussion

From the research analysis in Chapter 4, it is found that knowledge-based dynamic capabilities can affect the competitive advantage of university libraries. At the same time, service innovation will also affect the competitive advantage of university libraries. Service innovation significantly mediates knowledge-based dynamic capabilities' impact on university libraries' competitive advantage (Li et al., 2023). Therefore, the following questions are explained:

1. What are the factors of knowledge-based dynamic capabilities and service innovation that affect the competitive advantage of China's "Double First-Class" university libraries?

Based on the theoretical analysis of the actual background of university libraries and relevant literature, this paper explores the definition of the connotation and dimension of knowledge-based dynamic capabilities in university libraries. Although many scholars have studied the theory of knowledge-based dynamic capabilities, there are few studies on analyzing knowledge-based dynamic capabilities in university libraries or analyzing knowledge-based dynamic capabilities by taking university libraries as the research object.

This research first sorts out the research on knowledge-based dynamic capabilities, and then, based on previous research and combined with the research object to be studied in this paper, that is, taking China's "Double First-Class" university libraries as the research object, defines the connotation of knowledge-based dynamic capabilities in university libraries. The knowledge-based dynamic capabilities in university libraries include five demissions: knowledge absorptive capability, knowledge integration capability, knowledge sharing capability, knowledge protection capability, and knowledge innovation capability.

Knowledge absorptive capability is the ability of an individual to internalize acquired knowledge into another kind of knowledge, and the transformed knowledge can

be used to solve specific problems or bring new benefits. It is also defined as an organization's ability to acquire, absorb, transform, and use knowledge to improve performance. The key to an organization's competitive advantage lies in knowledge integration, not single knowledge. Through knowledge integration, organizations can transform internal and external local knowledge advantages into global ones and form a new knowledge system.

Knowledge sharing capability is the ability to transform, disseminate, absorb, reorganize, and utilize personal knowledge, experience, opinions, or understanding, including explicit and tacit knowledge.

Knowledge protection capability refers to the ability of an organization to protect the legitimate rights and interests of its knowledge through legal means, limit the abuse of knowledge, protect knowledge owners, regulate the use and exchange of knowledge, and selectively transfer organizational knowledge and create value under regular and guaranteed circumstances.

Knowledge innovation capability refers to acquiring new natural and technological scientific knowledge through scientific research, including primary and applied research.

According to the definition of service innovation, service innovation can be divided into two critical levels: incremental and radical. Incremental service innovation is the gradual and continuous improvement of existing concepts, products, or services.

2. How can a competitive advantage model be developed for China's "Double First-Class" university libraries from knowledge-based dynamic capabilities through service innovation?

Based on the review and sorting of fundamental theories, this paper sorted out the research on knowledge-based dynamic capabilities, university library service innovation, and competitive advantages, constructed the conceptual model of this paper and put forward four theoretical hypotheses. First, this study used questionnaire surveys and data analysis of quantitative research to prove a positive influence relationship between

knowledge-based dynamic capabilities, service innovation, and the competitive advantage of university libraries. Secondly, this study used in-depth interviews of qualitative research to prove that university libraries have enhanced their competitive advantages after practicing dynamic knowledge-based capabilities and service innovation. Finally, this study combined the conclusions of quantitative research with the results of qualitative research and proposed a competitive advantage model for university libraries.

This study uses the questionnaire survey method to collect the data required for the research (Liao et al., 2021). The questionnaire is revised according to the results of the preliminary survey. After the formal questionnaire is formed, a large-scale survey is carried out nationwide, and 420 valid questionnaires are finally collected. The sample data are analyzed using SPSS26.0 and AMOS 23.0 software, mainly descriptive statistical analysis, reliability and validity analysis, correlation analysis, and confirmatory factor analysis. Through empirical study, it is found that the theoretical hypotheses proposed in this paper have passed the empirical test.

The research conclusions are as follows:

First, this study explores the impact of the five dimensions of knowledge-based dynamic capabilities on competitive advantage. The direct effect test results show that these five dimensions positively impact the competitive advantage of university libraries.

Secondly, this study introduces service innovation, an essential mediating variable, and explores the mediating role of service innovation in the relationship between knowledge-based dynamic capabilities and competitive advantage.

Finally, this study explores how knowledge-based dynamic capabilities positively impact the competitive advantage of university libraries through the mediating role of service innovation.

This study conducted in-depth phone interviews with 9 key informants in the qualitative research. By analyzing the interview content, this study obtained information about the practice of university libraries in knowledge-based dynamic capabilities and service innovation and got a competitive advantage model for university libraries.

3. What is the model for enhancing the competitive advantage of China's "Double First-Class" university libraries from knowledge-based dynamic capabilities through service innovation?

Based on the research results, this study obtains a competitive advantage model of university libraries regarding knowledge-based dynamic capabilities through service innovation, as shown in Figure 4.10. This model mainly examines how academic libraries can enhance their competitive advantage based on knowledge-based dynamic capabilities.

First, this study put the five dimensions of knowledge-based dynamic capabilities into practice in university libraries: knowledge absorptive capability, knowledge integration capability, knowledge sharing capability, knowledge protection capability, and knowledge innovation capability.

In the process of practicing knowledge absorption capability, university libraries should acquire more of the following 6 aspects:

- ✓ Technical knowledge from the outside.
- ✓ Management knowledge from the outside.
- ✓ Reading marketing knowledge from the outside.
- ✓ Academic knowledge from the outside.
- ✓ Knowledge from the outside.
- ✓ Ability to acquire and apply new knowledge.

In the process of practicing knowledge integration capability, university libraries should effectively integrate the following 5 aspects:

- ✓ Internally created and externally acquired knowledge.
- ✓ The knowledge of teams and individuals.
- ✓ Different technologies or different professional knowledge.
- ✓ New knowledge and existing knowledge.

- ✓ The internal organizational structure or service workflow.

In the process of practicing knowledge sharing capability, the university library should effectively do the following 5 aspects:

- ✓ Optimize the knowledge-sharing service environment from five aspects: resource construction, data processing, text construction, service, and copyright.
- ✓ Build a practical knowledge sharing service network.
- ✓ Strengthen the construction of the librarians' knowledge-sharing service team.
- ✓ Effectively share existing literature or scientific research reports with readers.
- ✓ Effectively provide innovative services for knowledge sharing.

In the process of practicing knowledge protection capability, the university library should effectively protect the following 5 aspects:

- ✓ Technical knowledge.
- ✓ Protect the professional collection of literature.
- ✓ The copyright of reading promotion brand activities.
- ✓ The personal information of readers.
- ✓ Enough space to preserve literature resources.

In the process of practicing knowledge innovation capability, the university library should effectively do the following 5 aspects:

- ✓ Try new work ideas or ideas.
- ✓ Create technical knowledge from its capabilities.
- ✓ Create knowledge of reading promotion activities through its capability.
- ✓ A team of talented people who carry out knowledge innovation services.
- ✓ Create a lot of management knowledge from the inside through its capability.

Second, university libraries can practice service innovation while practicing knowledge-based dynamic capabilities. University libraries should integrate incremental and radical service innovation when practicing service innovation. On the one hand, incremental service innovation is a resource performance improvement strategy to improve resource utilization effectively. On the other hand, the radical service innovation strategy takes resource value innovation as its strategic goal, customizes personalized knowledge services for users through integrating resources and services, creates knowledge value, and enhances the value of the library.

In the process of practicing incremental service innovation, the university library should effectively do the following 5 aspects:

- ✓ Improved the existing services.
- ✓ Extend the existing services.
- ✓ Innovate the form of reading activities.
- ✓ Extend its opening hours.
- ✓ Focus on meeting the service requirements of some readers.

In the process of practicing radical service innovation, the university library should effectively do the following 5 aspects:

- ✓ Develop off-campus reader services.
- ✓ Develop a new service standard.
- ✓ Effectively provide a new and effective service for teaching.
- ✓ Effectively innovate unique subject services.
- ✓ Effectively obtain higher satisfaction from readers.

Compared with other university libraries, university libraries that have or have improved their competitive advantages should meet the following 8 conditions:

- ✓ Higher innovation advantages.

- ✓ Higher service quality.
- ✓ Better regarding reading promotion and services.
- ✓ Better grasp readers' needs than other university libraries.
- ✓ Library staff is more motivated to work in our unit than other university libraries.
- ✓ Reflects readers' needs faster.
- ✓ The university departments are more satisfied with the library's service than other university libraries.
- ✓ Reading service brand has a more substantial influence. Compared with other university libraries.

Finally, university libraries can enhance their resource, service, space, talent, and technical advantages by practicing knowledge-based dynamic capabilities and service innovation, thereby improving their competitive advantages.

5.2.1 Discussion on Variable: Knowledge-Based Dynamic Capabilities

Based on the existing relevant literature, many studies have been on knowledge-based dynamic capabilities. In digital transformation, the study conducted a structured analysis of papers. It proposed the concept of knowledge-based dynamic capabilities by studying the development of knowledge-based dynamic capabilities in the context of digital transformation. That is, knowledge-based dynamic capabilities in the era of digital transformation are a kind of context-dependent high-order capabilities that enable enterprises to integrate, build, and reconfigure internal and external knowledge, digital or material resources, and low-order capabilities to respond to changes related to digital transformation quickly (Mele et al., 2023). Based on the theory of knowledge-based dynamic capabilities, data research on more than 300 companies found that knowledge-based dynamic capabilities have a specific impact on the business model innovation of enterprises (Zhang et al., 2022). The research results show that knowledge-based

companies can promote the development of the company and gain competitive advantages through knowledge-based dynamic capabilities, especially the positive impact of knowledge management, knowledge methods, and strategic management on the competitive advantage of the company (Alireza Abdolhosseini Khaligh et al., 2020). The study shows that knowledge-based dynamic capabilities significantly impact small enterprises' innovation performance in Tanzania, based on the mediating role of innovation culture (Ismail, 2024). Based on the existing relevant literature, this study divides knowledge-based dynamic capabilities into five capability dimensions: knowledge absorptive capability, knowledge integration capability, knowledge sharing capability, knowledge protection capability, and knowledge innovation capability.

Knowledge absorptive capability is a subset of knowledge-based dynamic capabilities for external knowledge resources of the organization (Pai & Hung-Fan, 2013). The core part of absorptive capability is the acquisition of external knowledge, which is also the direct background and foundation of the knowledge acquisition capability in the dynamic capability based on the knowledge view (Senivongse et al., 2019). Avila used the second-generation PLS-SEM analysis to investigate the manufacturing industry in the Mexican state, and the results showed that knowledge absorptive capability can impact competitive advantage through the mediating role of innovation capability (Ávila, 2022).

Knowledge integration capability is that the organization acquires, integrates, and develops knowledge through employee communication and information sharing and then forms new knowledge and technology with the help of tools (Acharya et al., 2022). Yang et al. surveyed and analyzed 245 Chinese advanced manufacturing companies. They found that knowledge integration capability moderates the impact of cross-border search on sustainable competitive advantage (Yang et al., 2021). Salman et al. conducted a quantitative study by surveying 134 senior leaders of Iraqi media networks. They obtained one of the survey results: knowledge integration capability positively impacts dynamic capabilities (Salman & Mohammed, 2024).

Knowledge sharing capability involves the individual's knowledge, experience, viewpoint, or understanding being absorbed, reorganized, and used by other individuals

after transformation and dissemination, and the knowledge includes explicit and tacit knowledge (Bhatti et al., 2024). Asbari surveyed 800 teachers and used the PLS-SEM method to find that knowledge sharing ability mediated organizational culture's impact on Indonesian teachers' innovation ability (Bhatti et al., 2024; Sun & Zhao, 2023). Arsawan surveyed 259 managers of exporting SMEs in Bali, Indonesia, and used SmartPLS software to analyze the data. The research results showed the role of knowledge sharing in shaping an innovation culture to improve corporate performance and establish sustainable competitive advantage (Arsawan et al., 2022).

Knowledge protection capability refers to the organization's ability to protect the rights and interests of its knowledge, limit the abuse of knowledge through legal channels, protect knowledge owners, standardize the use and exchange process of knowledge, and selectively transfer the organization's knowledge and create value in a regular and guaranteed situation. Hasan et al. analyzed the disclosure principles of courts in various states of the United States. They found that knowledge protection impacts corporate strategic alliance activities in knowledge-intensive companies (Hasan et al., 2023).

Knowledge innovation capability refers to obtaining new natural and technical science knowledge through scientific research, including primary and applied research (Zou et al., 2022). Wang et al. studied that knowledge innovation capability can promote the innovation of high-tech service enterprises from the perspective of book knowledge spillover (Wang et al., 2019). Huang et al. explained the impact of knowledge innovation on organizational cooperation (Huang, 2017). After obtaining questionnaires from 500 companies in major industrial areas of Saudi Arabia, Aldakhil et al. conducted data analysis. They concluded that companies could use knowledge innovation to introduce new ideas and thus gain a competitive advantage (Aldakhil, 2015). Cao Zhenxiang and Chu Jiewang took the "Double First-Class" universities in the Yangtze River Delta as the research object, used the entropy weight TOPSIS model to set the index weights, measured the knowledge innovation capabilities of each "Double First-Class" university from 2013 to 2017, and constructed an evaluation index system for the knowledge innovation capabilities of "Double First-Class" universities (Zhenxiang Cao & Jiewang,

2020). Based on the research results, strategies for improving knowledge innovation capabilities were proposed: from the perspective of integrating the Yangtze River Delta, the core of improving the knowledge innovation capabilities of "Double First-Class" universities is the coordinated and integrated development of knowledge innovation. Based on this, a knowledge innovation ecosystem for universities that promotes the coordinated and integrated development of knowledge innovation was constructed, and countermeasures for the coordinated and integrated development of knowledge innovation in universities were proposed from three aspects: changing the concept of knowledge innovation, formulating development plans, and establishing a knowledge innovation alliance of universities.

The relationship between these five dimensions is both independent and complementary. Each dimension can independently and positively affect the competitive advantage of university libraries and can also integrate to affect the competitive advantage of university libraries.

5.2.2 Discussion on Variable: Service Innovation

The generation and development of service innovation is essentially a process of knowledge creation and transformation. The service of university libraries involves the interaction of knowledge creation, transfer, and application (Tiwari, 2016). Knowledge is the driving force for promoting service innovation; the ultimate goal of knowledge-based dynamic capabilities is for organizations to achieve better innovative services (Kaur, 2019). University libraries' entire service innovation process is closely related to knowledge. This research establishes a new driving model for service innovation based on knowledge-based dynamic capabilities. In the model, service innovation is used as a mediating variable to promote better knowledge-based dynamic capabilities' role in the competitive advantage of university libraries.

Based on existing relevant literature, service innovation includes two dimensions: incremental service innovation and radical service innovation (Snyder et al., 2016). Incremental innovation is to meet the needs of existing customer groups by improving

existing products, services, and process flows (Santos et al., 2020); radical innovation is the introduction of new technologies, technologies, services, and production processes (Tiberius et al., 2021).

5.2.3 Discussion on Variable: Competitive Advantage Model for University Library

The competitive advantage model for university library is the goal and focus of this study. Through quantitative and qualitative empirical analysis, this study takes China's "Double First-Class" university libraries as research samples, knowledge-based dynamic capabilities as independent variables, and service innovation as a mediating variable to construct a competitive advantage model for university libraries. University libraries can enhance their competitive advantages and promote development by practicing the model process.

When implementing the competitive advantage model based on knowledge-based dynamic capabilities, university libraries should start from the actual situation and needs of university libraries and selectively and gradually enhance competitive advantages (Kaur, 2022). Knowledge-based dynamic capabilities are a systematic project involving library managers, management mechanisms, information technology, resources, personnel, space, and other aspects (Dnyaneshwar Jadhav & Dinesh Shenoy, 2022). The study explored the enhancement of the competitive advantage of Ethiopian commercial banks through knowledge-based dynamic capabilities from the practitioners' perspective using qualitative interpretive and cross-sectional research designs (Wadajo & Kero, 2023). The research applies knowledge-based dynamic capabilities to the innovation ecosystem and, through empirical research, proposes a model centered on knowledge-based dynamic capabilities to enhance the competitive advantage of the innovation ecosystem (Robertson et al., 2023).

Establishing the competitive advantage model of university libraries is a prerequisite for implementing the dynamic capability theory based on knowledge and is also a requirement for constructing knowledge management. Establishing dynamic

management behavior and service innovation based on knowledge can provide a platform for knowledge exchange for university libraries and a friendly interface for knowledge sharing, thereby providing readers with better services. For example, during the qualitative research process of this study, one of our interviewees worked in a university library. This library fully implemented the knowledge-based dynamic capability theory in its management, which promoted the library's service innovation and promoted the library's position in regional influence.

5.2.4 Discussion on Model's Implementation

Based on the qualitative content analysis of this study, academic libraries can take the following steps to implement measures to enhance their competitive advantage: assess current capabilities, develop an improvement plan of the library's knowledge-based dynamic capabilities, monitor and evaluate each plan element, communicate and train, and promote and share.

In addition to the above steps, university libraries should consider external changes when implementing the model, such as government policies on university education, technological updates in university education, facial recognition technology, and new media applications. If university libraries can respond to external changes faster and more accurately than other libraries, their competitive advantage will be better. For example, the Tsinghua University Library follows the trend of constructing a new generation of library services worldwide. It combines its needs to select ALMA as the library's new-generation resource management system, realizing the integrated full-process management of all media resources (Tianfang Dou & Yang, 2020). At the same time, university libraries should also optimize their internal aspects, including service concepts, service forms, service technologies, service spaces, and librarian teams. For example, Wuhan University Library has launched digital literacy courses, including 3D modeling, AI drawing art, and video editing based on the Innovation Space project (Quan Long et al., 2023).

University libraries should pay attention to the benefits that knowledge-based dynamic capabilities bring to the competitive advantage of university libraries. This study found that incremental service innovation and radical service innovation activities play a mediating role between knowledge-based dynamic capabilities and competitive advantage. Directors and department heads of university libraries should always pay attention to the ever-changing external environment and the library's knowledge acquisition, integration, sharing, protection, and innovation so that university libraries can benefit from the knowledge management process.

5.3 Recommendation

For university libraries, competitive advantage can help them obtain more resources, better librarians, and more funds, which can further enhance their status. Therefore, this study provides a model for reference in practice and theory. This study proposes theoretical and practical contributions to knowledge-based dynamic capabilities and the competitive advantage of university libraries.

5.3.1 Findings

Knowledge is the essential element of knowledge-based dynamic capabilities. Therefore, the dynamic development and change of knowledge directly lead to the development and change of knowledge-based dynamic capabilities. As a carrier, the types and functions of knowledge become essential factors in developing knowledge-based dynamic capabilities, thereby promoting the competitive advantage of university libraries.

Based on knowledge-based dynamic capabilities and service innovation, this study uses structural equations to construct a model of the mechanism of action of knowledge-based dynamic capabilities on the competitive advantage of university libraries. It verifies the results of quantitative analysis through in-depth interviews of qualitative research. The research results show that: First, the various dimensions of

knowledge-based dynamic capabilities have different degrees of influence on the competitive advantage of university libraries. Among them, knowledge innovation capabilities have the most significant impact on the competitive advantage of university libraries, followed by knowledge integration capabilities and knowledge sharing capabilities. Among the five dimensions, knowledge protection capabilities have the most negligible impact on the competitive advantage of university libraries. Second, service innovation mediates between the dimensions of knowledge-based dynamic capabilities and competitive advantages. This study proves that university libraries can build different advantages and thus obtain and enhance competitive advantages by practicing the knowledge-based dynamic capabilities theory in service innovation.

Knowledge-based dynamic capabilities include five dimensions: knowledge absorptive, knowledge integration, knowledge sharing, knowledge protection, and knowledge innovation capability. While practicing these five dimensions, university libraries can obtain and enhance their competitive advantages through service innovation. Knowledge-based dynamic capabilities positively affect service innovation, and service innovation affects the competitive advantage of university libraries. Therefore, knowledge-based dynamic capabilities positively affect the competitive advantage model of university libraries under the influence of the mediating variable service innovation.

5.3.2 Recommendations

5.3.2.1 Theoretical contributions

(1) This study provides effective countermeasures to enhance Chinese university libraries' competitive advantages. In reality, university libraries may not be able to consider knowledge-based dynamic capabilities and service innovation to achieve a perfect combination when opening. However, by analyzing the internal and external situations of university libraries and based on their actual situation of knowledge-based dynamic capabilities and service innovation, they can achieve "the right medicine for the right disease" and achieve effective acquisition, integration, sharing, protection, and innovation of service knowledge, thereby developing their dynamic service innovation,

thereby stimulating the vitality of university libraries and obtaining or enhancing competitive advantages.

University library managers should be aware of the vital role of service innovation. In their daily management work, they should always keep the university library based on the dynamic management of knowledge, pay attention to maintaining appropriate knowledge resources, attach importance to service innovation, and obtain more knowledge and services to obtain or enhance their competitive advantages.

(2) Establish a competitive advantage model of university libraries based on knowledge-based dynamic capabilities. Knowledge resources are the most essential resource component in the current knowledge economy. However, in the traditional innovation model, dynamic knowledge management is not carried out, which cannot meet the needs of modern knowledge services. Combined with the model of this study, university libraries should seriously consider the dynamic management of knowledge. Therefore, this study deeply explores the role of knowledge-based dynamic capabilities in service innovation. In the past decade, knowledge-based dynamic capabilities and service innovation have gradually become issues of common concern to practitioners and academia. However, there are still few studies on the relationship between the two. Therefore, combined with the competitive advantage model of university libraries and its characteristics, based on knowledge-based dynamic capabilities, a new type of service innovation is adopted to deeply study the formation process of the competitive advantage model of university libraries, and on this basis, the role of knowledge-based dynamic capabilities on service innovation is examined. This model establishes a complete conceptual framework for the competitive advantage of university libraries. On this basis, university libraries can realize innovative management and strategic planning and choose a suitable competitive advantage model in combination with the actual situation of university libraries themselves. The newly established model can comprehensively summarize competitive advantage content and provide sufficient theoretical guidance and basis for university libraries to obtain or enhance competitive advantages.

5.3.2.2 Practical Recommendations

This study supports the knowledge-based dynamic capability theory, describes its relevant contributions to the competitive advantage model of university libraries from different dimensions of knowledge-based dynamic capabilities, and improves the competitive advantage of university libraries. The following are suggestions for university library managers, as is shown in Table 5.1.

Table 5.1 Practical Recommendations from This Study

Practical Recommendations	**Strategy**	**Example**
Recommendations 1	University library managers should attach great importance to knowledge-based dynamic service innovation capabilities.	Directors and department heads of university libraries always pay attention to the ever-changing external environment and the library's knowledge acquisition, integration, sharing, protection, and innovation so that university libraries can benefit from the knowledge management process.
Recommendations 2	University library managers should actively practice the knowledge-based dynamic capability theory in service innovation, enhancing university libraries' competitive advantage.	The library of Beijing Institute of Technology began to build a metaverse library with a "one library and five groups" model in 2022. It introduced AIGC large model intelligent services such as ChatLibrary.
Recommendations 3	Based on knowledge-based dynamic capability, this competitive advantage model should be practiced from the actual situation.	After summarizing its actual situation, Wuhan University Library proposed that university libraries in the new era should establish a dynamic and innovative subject service and analysis service platform to provide teachers and students with higher knowledge innovation services.

First, university library managers should emphasize knowledge-based dynamic service innovation capabilities. The management goal of university library directors is improving university library's knowledge-based dynamic service innovation. University library managers should improve the traditional fixed management concept and establish a more dynamic knowledge management system. Libraries should flexibly and dynamically organize work teams according to readers' needs, use the latest technical equipment, and provide readers with the best service innovations.

University libraries should pay attention to cultivating university libraries' good ability to perceive readers' needs and perceive technology selection capabilities to obtain information about readers' needs, cultivate librarians' service spirit and innovative thinking, let librarians and managers actively participate in library activities, and actively create a new service plan to ensure the sustainable competitive advantage of university libraries.

Secondly, for university library managers, the library's competitive advantage can benefit the library's capital investment and staff recruitment. Therefore, university library managers should actively practice the knowledge-based dynamic capability theory in service innovation, enhance the competitive advantage of university libraries, and better serve universities and readers. University libraries should respond faster and better to personalized reader needs. For example, the library of Beijing Institute of Technology began to build a metaverse library with a "one library and five groups" model in 2022 (Jing Yang et al., 2023). It introduced AIGC large model intelligent services such as ChatLibrary. In the library knowledge service, the two technologies of metaverse and AIGC are further deeply integrated to create a metaverse "future innovation space" to lead the future development direction of library knowledge services. As a carrier to meet the needs of different innovation scenarios, the "future innovation space of the library" uses the metaverse platform and the embedded AIGC large model to carry out diversified innovation activities.

Finally, from the perspective of university library managers, this competitive advantage model should be practiced from the actual situation from the knowledge-based

dynamic capability. Because the actual situation of each library is different, library managers should start from the actual specific situation and decide how to practice the knowledge-based dynamic capability in service innovation, thereby enhancing the competitive advantage of the library. For example, after summarizing its actual situation, Wuhan University Library proposed that universities in the new era should establish a dynamic and innovative subject service analysis platform to provide teachers and students with higher knowledge innovation services (Xia Liu et al., 2023).

5.4 Limitation

Based on theoretical exposition, this study uses empirical research to clarify the impact path of knowledge-based dynamic capabilities on the competitive advantage model of university libraries. However, there are still many limitations that need to be further improved.

First, the study's sample size is small, which may lead to distortion of individual indicators. This study only surveyed 42 libraries of China's "Double First-Class" universities. Due to the high level of service innovation activity of university libraries, there are high requirements for the dynamic management of knowledge, which may lead to the lack of extensiveness of the research results and impose certain restrictions on its application and promotion.

Second, there is a potential subjective assumption in this study's development: knowledge-based dynamic capabilities positively impact the competitive advantage model of university libraries (Xuan-Nhi & Ngoc-Tien, 2023). When university libraries over-manage knowledge or integrate negative knowledge into university libraries, it will lead to an increase in the management cost of university libraries, a decrease in the efficiency of the original management process, and even affect the core capabilities of university libraries.

Third, multiple mediating factors affect the relationship between knowledge-based dynamic capabilities and university libraries' competitive advantage model. Future research must integrate various mediating factors and further introduce multi-dimensional

mediating variables such as organizational learning, technological updates, environmental dynamics, resource redundancy, and other mediator variables.

5.5 Future Research

This paper systematically studies knowledge-based dynamic capabilities, service innovation, and the competitive advantages of university libraries, construct a competitive advantage model of university libraries, and put forward relevant suggestions on how university libraries can obtain and enhance their competitive advantages from a management perspective. However, due to time and geographical limitations, some shortcomings still need further improvement in follow-up work. In future research, we intend to expand further and deepen the following aspects.

First, expand the number of survey samples. In addition to surveying the first round of "double first-class" university libraries in China, further expansion will be made to study more relevant data on university libraries. At the same time, in terms of surveying university library managers, questionnaires will be purposefully placed in university libraries at different levels in various regions and provinces. More accurate information about Chinese university libraries in knowledge-based dynamic capabilities and service innovation can be collected and obtained through sufficiently large and scientifically selected sample survey data.

Second, continue to study the relevant knowledge of university library competitive advantages and improve and expand the competitive advantage model of this paper according to practical application needs.

Third, the research on mediating variables should be increased. When considering mediating variables, the scope should be expanded, and in future research, multi-dimensional mediating variable research should be added.

Fourth, in terms of model application, future research should consider some external factors, such as government policy, the general subject database platform, and the training and use of ChatGPT. Because the ultimate goal of the competitive advantage

of university libraries is to provide services to schools, future scholars can combine the competitive advantage model with service performance for research. Like China's "Double First-Class" university libraries, other ordinary and local university libraries can also combine their actual conditions to practice this competitive advantage model from knowledge-based dynamic capabilities, enhance their competitive advantages, provide better services to universities, and promote the development of the comprehensive capabilities of universities.

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Appendix

ใบรับรองจริยธรรมการวิจัยในมนุษย์
สถาบันการจัดการปัญญาภิวัฒน์

หมายเลขใบรับรอง: PIM-REC 045/2567

ข้อเสนอการวิจัยนี้ และเอกสารประกอบของข้อเสนอการวิจัยตามรายการแสดงด้านล่าง ได้รับการพิจารณาจากคณะกรรมการจริยธรรมการวิจัยในมนุษย์ สถาบันการจัดการปัญญาภิวัฒน์แล้ว คณะกรรมการฯ มีความเห็นว่าข้อเสนอการวิจัยที่จะดำเนินการมีความสอดคล้องกับหลักจริยธรรมสากล ตลอดจนกฎหมาย ข้อบังคับและข้อกำหนดภายในประเทศ จึงเห็นสมควรให้ดำเนินการตามข้อเสนอการวิจัยนี้ได้

ชื่อข้อเสนอโครงการ: The competitive advantage model of China's "Double First-Class" university libraries from knowledge-based dynamic capabilities

รหัสข้อเสนอการวิจัย (ถ้ามี): (ไม่มี)

หน่วยงาน: Faculty of Management, Siam University

ผู้วิจัยหลัก: Xue Jingjing

ลงนาม.....

(อาจารย์ ดร.พิเชษฐ์ มุสิกะโปดก)
ประธานคณะกรรมการจริยธรรมการวิจัยในมนุษย์
สถาบันการจัดการปัญญาภิวัฒน์

วันที่รับรอง: 28 สิงหาคม 2567 **วันหมดอายุ:** 28 สิงหาคม 2568

เอกสารที่คณะกรรมการรับรอง
1. โครงร่างการวิจัย
2. ข้อมูลสำหรับชี้แจงกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย และ ใบแสดงความยินยอมจากกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย
3. เครื่องมือที่ใช้ในการวิจัย/เก็บรวบรวมข้อมูล เช่น แบบสอบถาม แบบสัมภาษณ์ ประเด็นในการสนทนากลุ่ม เป็นต้น

เงื่อนไขการรับรอง
1. นักวิจัยดำเนินการวิจัยตามที่ระบุไว้ในโครงร่างการวิจัยอย่างเคร่งครัด
2. นักวิจัยรายงานเหตุการณ์ไม่พึงประสงค์ร้ายแรงที่เกิดขึ้นหรือเปลี่ยนแปลงกิจกรรมวิจัยใดๆ ต่อคณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ภายในกำหนด
3. นักวิจัยส่งรายงานความก้าวหน้าต่อคณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ตามเวลาที่กำหนดหรือเมื่อได้รับการร้องขอจากคณะกรรมการฯ
4. หากการวิจัยไม่สามารถดำเนินการเสร็จสิ้นภายในกำหนด ผู้วิจัยต้องยื่นขออนุมัติใหม่ก่อนอย่างน้อย 1 เดือน
5. หากการวิจัยแล้วเสร็จสมบูรณ์ ผู้วิจัยต้องแจ้งปิดโครงการตามแบบฟอร์มที่กำหนด

Questionnaires（English version）

The Competitive Advantage Model of China's “Double First-Class” University Libraries from Knowledge-Based Dynamic Capabilities

Dear teacher:

Thank you for taking time out of your busy schedule to participate in this survey! This questionnaire aims to understand the relationship between knowledge dynamic capabilities and competitive advantages of university libraries.

This questionnaire is divided into two parts. The first part deals with the characteristics of organizational structures. The second part focuses on knowledge-based dynamic capabilities and competitive advantage factors. Since the completeness and correctness of the data greatly influence the success or failure of the research results, please read each question carefully. There is no "right or wrong" answer as long as you answer according to your understanding of the library you are in. At the same time, please don't miss any questions. Your energy and time will be a significant contribution to academic research.

I want to thank you for your response. If you need further information or if there is anything we can do to assist you in completing or improving this questionnaire, please do not hesitate to contact me.

Xue Jingjing

Siam University

Section 1 Basic information
Remark: Please choose using ○/ in or fill in the information in the blank.

1. Gender：
○Female
○Male

2. Age：
○Under 25 years old
○26-35 years old
○36-45 years old
○46-55 years old
○Over 56 years old

3. What is Your position in the University Library？
○Senior manager
○Middle manager
○Lower manager
○General staff

4. Education:
○Under junior college
○Junior college
○Bachelor Degree
○Master Degree
○Ph. D. or Postdoctoral Researcher

5. How many years have you worked in the university library?
○Less than 1 year
○1-3 years
○3-5 years
○5-10 years
○Over 10 years

6. The total number of staff in your library：
○1-20
○21-30
○30-50
○50-70
○70-100
○ Over 100

7. The annual expenditure of your library (Unit: Million) in 2022:
○5-10
○10-20
○20-50
○50-70
○70-100
○ Over 100

8. What do you think is the main advantage of your library?

○ Resource advantage
○ Service advantage
○ Space advantage
○ Talent advantage
○ Technical advantage

Section 2

The questionnaire indicators include the 5-level scoring method: 5 points indicating that they agree, 4 points, 3 points, and 2 points agree with degrees in descending order, and 1 point indicating that they strongly disagree.

Please choose the closest number to your actual situation; the larger the number, the more you agree with this statement. There are 44 questions in total; please complete all of them before submitting them. Thank you very much for your cooperation.

The questionnaire used a Likert scale, ranging from 1 to 5 in which 1 = Strongly disagree/ 3 = neutral / 5 Strongly agree

Item	Item Statement	Agreement Leve				
		5	4	3	2	1
Knowledge Absorptive Capability	1. The library can get more technical knowledge from the outside.					
	2. The library can get more management knowledge from the outside.					
	3. The library can get more reading marketing knowledge from the outside.					

	4. The library can get more academic knowledge from the outside.					
	5. The library can get more knowledge from the outside.					
	6. The library has a solid ability to acquire and apply new knowledge.					
Knowledge Integration Capability	7. The library can effectively integrate internally created and externally acquired knowledge.					
	8. The library can effectively integrate the knowledge of teams and individuals.					
	9. The library can effectively integrate different technologies or different professional knowledge.					
	10. The library can effectively integrate new knowledge and existing knowledge.					
	11. The library can effectively adjust the internal organizational structure or service workflow.					
Knowledge Sharing Capability	12. The library can optimize the knowledge-sharing service environment from five aspects: resource construction, data processing, text construction, service, and copyright.					
	13. The library can build an effective knowledge-sharing service network.					
	14. The library can strengthen the construction of the librarians' knowledge-sharing service team.					
	15. The library can effectively share existing literature or scientific research reports with readers.					
	16. The library can effectively provide innovative services for knowledge sharing.					
Knowledge Protection Capability	17. The library can effectively protect technical knowledge.					
	18. The library can effectively protect the professional collection of literature.					

	19. The library can effectively protect the copyright of reading promotion brand activities.					
	20. The library can effectively protect the personal information of readers.					
	21. The library can have enough space to preserve literature resources.					
Knowledge Innovation Capability	22. The library often tries new work ideas or ideas.					
	23. The library can create technical knowledge from the inside by its capability.					
	24. The library can create knowledge of reading promotion activities through its capability.					
	25. The library has a team of talented people who carry out knowledge innovation services.					
	26. The library can create a lot of management knowledge from the inside through its capability.					
Incremental Service Innovation	27. The library has partially improved the existing services.					
	28. The library can extend the existing services.					
	29. The library can innovate the form of reading activities.					
	30. The library can extend its opening hours.					
	31. The library can focus on meeting the service requirements of some readers.					
Radical Service Innovation	32. The library can develop off-campus reader services.					
	33. The library can develop a new service standard.					
	34. The library can effectively provide a new and effective service for teaching.					
	35. The library can effectively innovate unique subject services.					

	36. The library can effectively obtain higher satisfaction from readers.					
The Competitive Advantage Model for University Libraries	37. Compared with other university libraries, our library has higher innovation advantages.					
	38. Compared with other university libraries, our library has higher service quality.					
	39. Compared with other university libraries, the library has done better regarding reading promotion and reading services.					
	40. Our library can better grasp readers' needs than other university libraries.					
	41. Our library staff is more motivated to work in our unit than other university libraries.					
	42. Compared with other university libraries, our library reflects readers' needs faster.					
	43. The university departments are more satisfied with the library's service than other university libraries.					
	44. Compared with other university libraries, the library's reading service brand has a more substantial influence.					

Questionnaires（Chinese version）

(本问卷仅供学术研究，内容绝对保密)

基于知识的动态能力视角下构建我国“双一流”

高校图书馆竞争优势模型

尊敬的老师：

您好！感谢您在百忙之中抽出时间参与本次调查！　本问卷旨在了解高校图书馆知识动态能力与竞争优势之间的关系。

本问卷分为两部分。第一部分涉及组织结构的特征。第二部分侧重于基于知识的动态能力和竞争优势因素。由于数据的完整性和正确性对研究结果的成败影响很大，请仔细阅读每一题。答案没有“对错”之分，只要您根据个人对所在图书馆的理解来回答即可。同时，请不要错过任何问题。您的精力和时间将为学术研究做出巨大贡献。

感谢您的回复，如果您需要更多信息或我们可以帮助您完成或改进此调查问卷，请随时与我联系。

薛静静

暹罗大学

第一部分 基本信息

备注：请用○/进行选择或在空白处填写信息。

1. 您的性别是： [单选题] *
○女
○男

2. 您的年龄是： [单选题] *
○25 岁及以下
○26-35 岁
○36-45 岁
○46-55 岁
○56 岁及以上

3. 您在高校图书馆所处的管理层级是？ [单选题] *
○高层管理者
○中层管理者
○基层管理者
○一般职员

4. 您正在攻读或已获得的最高学历是？ [单选题] *
○大专以下
○大专
○大学本科
○硕士研究生
○博士研究生

5. 您在贵校图书馆已经工作了： [单选题] *
○未满 1 年
○1-3 年
○3-5 年
○5-10 年
○10 以上

6. 贵校图书馆员工总数： [单选题] *
○1-20
○21-30
○30-50
○50-70
○70-100
○100 以上

7.贵校图书馆馆 2022 年年度经费支出（单位：百万元）：
○5-10
○10-20
○20-50
○50-70
○70-100
○ Over 100

8. 您认为贵馆的主要优势是什么？
○ 资源优势
○ 服务优势
○ 空间优势
○ 人才优势
○ 技术优势

第二部分

问卷指标采用 5 级评分法，5 分表示非常同意，4 分、3 分、2 分依次为同意程度，1 分表示非常不同意。

请根据您的实际情况选择最接近的数字。共有 34 个问题，请全部填写后再提交，非常感谢您的配合！

问卷采用李克特量表，范围从 1 到 5，其中 1 = 非常不同意/ 3 = 中立/ 5 非常同意

测项	问题项	同意程度				
		5	4	3	2	1
知识吸收能力	1. 图书馆可以从外部获得更多的技术知识。					
	2. 图书馆可以从外部获得更多的管理知识。					
	3. 图书馆可以从外部获得更多的阅读营销知识。					
	4. 图书馆可以从外部获得更多的学术知识。					
	5. 图书馆可以从外部获得更多的其他知识。					
	6. 图书馆具有扎实的获取和应用新知识的能力。					

知识整合能力	7. 图书馆能够有效整合内部创造的知识和外部获得的知识。					
	8. 图书馆能够有效整合团队和个人的知识。					
	9. 图书馆能够有效整合不同技术或不同专业知识。					
	10. 图书馆能够有效整合新知识和现有知识。					
	11. 图书馆能够有效调整内部组织架构或服务流程。					
知识共享能力	12. 图书馆可从资源建设、数据处理、文本建设、服务、版权五个方面优化知识共享服务环境。					
	13. 图书馆可以构建有效的知识共享服务网络。					
	14. 图书馆可加强知识共享服务馆员队伍建设。					
	15. 图书馆能有效地与读者分享现有文献或科研报告。					
	16. 图书馆能够有效开展知识共享创新服务。					
知识保护能力	17. 图书馆能有效保护技术知识。					
	18. 图书馆能有效保护专业馆藏文献。					
	19. 图书馆能够有效保护阅读推广品牌活动的版权。					
	20. 图书馆能够有效保护读者的个人信息。					
	21. 图书馆能有足够的空间保存文献资源。					
知识创新能力	22. 图书馆经常尝试新的工作思路或想法。					
	23. 图书馆可以凭借其能力从内部创新技术知识。					
	24. 图书馆可以凭借自身的能力，从内部创新阅读推广活动的知识。					
	25. 图书馆拥有一支开展知识创新服务的人才队伍。					
	26. 图书馆可以通过其能力从内部创新出很多管理知识。					

渐进式服务创新	27. 图书馆对现有服务进行了部分改进。					
	28. 图书馆可以对现有的服务进行延伸。					
	29. 图书馆可以创新阅读活动的形式。					
	30. 图书馆可以延长开放时间。					
	31. 图书馆可以重点满足部分读者的服务需求。					
激进式服务创新	32. 图书馆可以开展校外读者服务。					
	33. 图书馆可以制定新的服务标准。					
	34. 图书馆可以有效地为教学提供一种新的、有效的服务。					
	35. 图书馆可以有效地创新独特的学科服务。					
	36. 图书馆可以有效地获得读者更高的满意度。					
大学图书馆的竞争优势	37. 与其他大学图书馆相比，我们图书馆具有较高的创新优势。					
	38. 与其他大学图书馆相比，我们图书馆的服务质量更高。					
	39. 与其他大学图书馆相比，该图书馆在阅读推广和阅读服务方面做得更好。					
	40. 我们图书馆比其他大学图书馆能更好地把握读者的需求。					
	41. 与其他大学图书馆相比，我们图书馆的工作人员在我们单位工作的积极性更高。					
	42. 与其他大学图书馆相比，我们图书馆更快地反映读者的需求。					
	43. 与其他大学图书馆相比，大学各部门对图书馆的服务更加满意。					
	44. 与其他大学图书馆相比，图书馆的阅读服务品牌具有更实质性的影响力。					

The Item Objective Congruence (IOC) Index on The Competitive Advantage Model of China's "Double First-Class" University Libraries from Knowledge-Based Dynamic Capabilities

Item	Item Statement	Expert Opinion					IOC Index
		1	2	3	4	5	
Knowledge Absorptive Capability	1. The library can get more technical knowledge from the outside.	+1	+1	+1	+1	+1	1
	2. The library can get more management knowledge from the outside.	+1	+1	+1	+1	+1	1
	3. The library can get more reading marketing knowledge from the outside.	+1	+1	+1	+1	+1	1
	4. The library can get more academic knowledge from the outside.	+1	+1	+1	+1	+1	1
	5. The library can get more knowledge from the outside.	+1	+1	+1	+1	+1	1
	6. The library has a solid ability to acquire and apply new knowledge.	+1	+1	0	+1	+1	0.8
Knowledge Integration Capability	7. The library can effectively integrate internally created and externally acquired knowledge.	+1	+1	+1	+1	+1	1
	8. The library can effectively integrate the knowledge of teams and individuals.	+1	+1	+1	+1	+1	1
	9. The library can effectively integrate different technologies or different professional knowledge.	+1	+1	+1	+1	+1	1
	10. The library can effectively integrate new knowledge and existing knowledge.	+1	+1	+1	+1	+1	1
	11. The library can effectively adjust the internal organizational structure or service workflow.	+1	+1	+1	+1	+1	1

Knowledge Sharing Capability	12. The library can optimize the knowledge-sharing service environment from five aspects: resource construction, data processing, text construction, service, and copyright.	+1	+1	+1	+1	+1	1
	13. The library can build an effective knowledge-sharing service network.	+1	+1	+1	+1	+1	1
	14. The library can strengthen the construction of the librarians' knowledge-sharing service team.	+1	0	+1	+1	+1	0.8
	15. The library can effectively share existing literature or scientific research reports with readers.	+1	+1	+1	+1	+1	1
	16. The library can effectively provide innovative services for knowledge sharing.	+1	+1	+1	+1	+1	1
Knowledge Protection Capability	17. The library can effectively protect technical knowledge.	+1	+1	+1	+1	+1	1
	18. The library can effectively protect the professional collection of literature.	+1	+1	+1	+1	+1	1
	19. The library can effectively protect the copyright of reading promotion brand activities.	+1	+1	+0	+1	+1	0.8
	20. The library can effectively protect the personal information of readers.	+1	+1	+1	+1	+1	1
	21. The library can have enough space to preserve literature resources.	+1	+1	+1	+1	+1	1
Knowledge Innovation Capability	22. The library often tries new work ideas or ideas.	+1	+1	+1	+1	+1	1
	23. The library can create technical knowledge from the inside by its capability.	+1	+1	+1	+1	+1	1
	24. The library can create knowledge of reading promotion activities through its capability.	+1	+1	+1	+1	+1	1
	25. The library has a team of talented people who carry out knowledge innovation services.	+1	+1	+1	+0	+1	0.8
	26. The library can create a lot of management knowledge from the inside through its capability.	+1	+1	+1	+1	+1	1

Incremental Service Innovation	27. The library has partially improved the existing services.	+1	+1	+1	+1	+1	1
	28. The library can extend the existing services.	+1	+1	+1	+1	+1	1
	29. The library can innovate the form of reading activities.	+1	+1	+1	+1	+1	1
	30. The library can extend its opening hours.	+1	+1	+1	+1	+1	1
	31. The library can focus on meeting the service requirements of some readers.	+1	+1	+1	+1	+1	1
Radical Service Innovation	32. The library can develop off-campus reader services.	+1	+1	+1	+1	+1	1
	33. The library can develop a new service standard.	+1	+1	+1	+1	+1	1
	34. The library can effectively provide a new and effective service for teaching.	+1	+1	+1	+1	+1	1
	35. The library can effectively innovate unique subject services.	+1	+1	+1	+1	+1	1
	36. The library can effectively obtain higher satisfaction from readers.	+1	+1	+1	+1	+1	1
The Competitive Advantage Model for University Libraries	37. Compared with other university libraries, our library has higher innovation advantages.	+1	+1	+1	+1	+1	1
	38. Compared with other university libraries, our library has higher service quality.	+1	+1	+1	+1	+1	1
	39. Compared with other university libraries, the library has done better regarding reading promotion and reading services.	+1	+1	+1	+1	+1	1
	40. Our library can better grasp readers' needs than other university libraries.	+1	+1	+1	+1	+1	1
	41. Our library staff is more motivated to work in our unit than other university libraries.	+1	+1	+1	+1	+1	1
	42. Compared with other university libraries, our library reflects readers' needs faster.	+1	+1	+1	+1	+1	1

	43. The university departments are more satisfied with the library's service than other university libraries.	+1	+1	+1	+1	+1	1
	44. Compared with other university libraries, the library's reading service brand has a more substantial influence.	+1	+1	+1	+1	+1	1

List of China's Second Round of 147 "Double First-Class" Universities in 2022

S/N	Location	University Name
1	Beijing	Peking University
2		Renmin University of China
3		Tsinghua University
4		Beihang University
5		Beijing Institute of Technology
6		China Agricultural University
7		Beijing Normal University
8		Minzu University of China
9		Beijing Jiaotong University
10		Beijing University of Technology
11		University of Science and Technology Beijing
12		Beijing University of Chemical Technology
13		Beijing University of Posts and Telecommunications
14		Beijing Forestry University
15		Peking Union Medical College
16		Beijing University of Chinese Medicine
17		Capital Normal University
18		Beijing Foreign Language University
19		Communication University of China
20		Central University of Finance and Economics
21		Foreign Economic and Trade University
22		Foreign Affairs College
23		People's Public Security University of China
24		Beijing Sport University
25		Central Conservatory of Music

26		China Conservatory of Music
27		Central Academy of Fine Arts
28		The Central Academy Of Drama
29		China University of Political Science and Law
30		University of Chinese Academy of Sciences
31		China University of Mining & Technology, Beijing
32		China University of Petroleum, Beijing
33		China University of Geosciences Beijing
34		North China Electric Power University
35	Tianjin	Nankai University
36		Tianjin University
37		Tianjin Polytechnic University
38		Tianjin Medical University
39		Tianjin University of Traditional Chinese Medicine
40		Hebei University of Technology
41	Shanxi	Shanxi University
42		Taiyuan University of Technology
43	Inner Mongolia	Inner Mongolia University
44	Liaoning	Dalian University of Technology
45		Northeastern University
46		Liaoning University
47		Dalian Maritime University
48	Jilin	Jilin University
49		Yanbian University
50		Northeast Normal University
51	Heilongjiang	Harbin Institute of Technology
52		Harbin Engineering University
53		Northeast Agricultural University

54		Northeast Forestry University
55	Shanghai	Fudan University
56		Tongji University
57		Shanghai Jiaotong University
58		East China Normal University
59		East China University of Science and Technology
60		Donghua University
61		Shanghai Ocean University
62		Shanghai University of Traditional Chinese Medicine
63		Shanghai International Studies University
64		Shanghai University of Finance and Economics
65		Shanghai University of Sport
66		Shanghai Conservatory of Music
67		Shanghai University
68		ShanghaiTech University
69		Naval Medical University
70	Jiangsu	Nanjing University
71		Southeast University
72		Soochow University
73		Nanjing University of Aeronautics and Astronautics
74		Nanjing University of Science and Technology
75		China University of Mining and Technology
76		Nanjing University of Posts and Telecommunications
77		Hohai University
78		Jiangnan University
79		Nanjing Forestry University
80		Nanjing University of Information Science and Technology
81		Nanjing Agricultural University

82		Nanjing Medical University
83		Nanjing University Of Chinese Medicine
84		China Pharmaceutical University
85		Nanjing Normal University
86	Zhejiang	Zhejiang University
87		China Academy of Art
88		Ningbo University
89	Anhui	University of Science and Technology of China
90		Anhui University
91		Hefei University of Technology
92	Fujian	Xiamen University
93		Fuzhou University
94	Jiangxi	Nanchang University
95	Shandong	Shandong University
96		Ocean University of China
97		China University of Petroleum (East China)
98	Henan	Zhengzhou University
99		Henan University
100	Hubei	Wuhan University
101		Huazhong University of Science and Technology
102		China University of Geosciences, Wuhan
103		Wuhan University of Technology
104		Huazhong Agricultural University
105		Central China Normal University
106		Zhongnan University of Economics and Law
107	Hunan	Central South University
108		National University of Defense Technology
109		Hunan University

110		Xiangtan University
111		Hunan Normal University
112	Guangdong	Sun Yat-sen University
113		South China University of Science and Technology
114		Jinan University
115		South China Agricultural University
116		Guangzhou Medical University
117		Guangzhou University of Chinese Medicine
118		South China Normal University
119		Southern University of Science and Technology
120	Hainan	Hainan University
121	Guangxi	Guangxi University
122	Sichuan	Sichuan University
123		University of Electronic Science and Technology of China
124		Southwest Jiaotong University
125		Southwest Petroleum University
126		Chengdu University of Technology
127		Sichuan Agricultural University
128		Chengdu University of Traditional Chinese Medicine
129		Southwestern University of Finance and Economics
130	Chongqing	Chongqing University
131		Southwest University
132	Guizhou	Guizhou University
133	Yunnan	Yunnan University
134	Tibet	Tibet University
135		Xi'an Jiaotong University
136		Northwestern Polytechnical University
137		Northwest Agriculture and Forestry University

138	Shanxi	Xidian University
139		Chang'an University
140		Northwest University
141		Shaanxi Normal University
142		Air Force Medical University
143	Gansu	Lanzhou University
144	Qinghai	Qinghai University
145	Ningxia	Ningxia University
146	Xinjiang	Xinjiang University
147		Shihezi University

Note: 42 Universities with black fonts belong to the first round of "Double First-Class" universities in 2017.

Research Interview Outline

Pre-interview explanation: Explain the purpose of the interview to the interviewee, explain how to use the collected data, and explain confidentiality.

Interview process: The interviewee first introduces the library's situation, then introduces the library's service innovation, and then talks about the library's competitive advantages.

Part 1 Basic situation of the library

1. Can you describe the basic situation of the library?
2. Briefly describe the development goals of the library.
Content: What are the library's near-term goals? What is the future development direction of libraries? What are the specific development plans for the library?

Part 2 The state of knowledge-based dynamic capabilities of libraries

1. Please talk about the library's knowledge-based dynamic capabilities in general in the past two years, such as knowledge absorption, knowledge integration, knowledge sharing, knowledge protection, and knowledge innovation capability.
2. Please discuss how libraries can better implement knowledge-based dynamic capabilities.

Part 3 Service Innovation in Libraries

1. Please briefly introduce the library's service innovation in the past two years.
2. Please briefly discuss how libraries can better carry out service innovation in general.

Part 4 Competitive Advantages of Libraries

1. Regarding the current situation of your library, in what aspects do you think the main competitive advantages of the library are reflected? Resources, services, talents, technology, space.
2. What do you think are the main factors affecting the competitive advantage of libraries?
3. What suggestions do you have for improving libraries' competitive advantages?

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