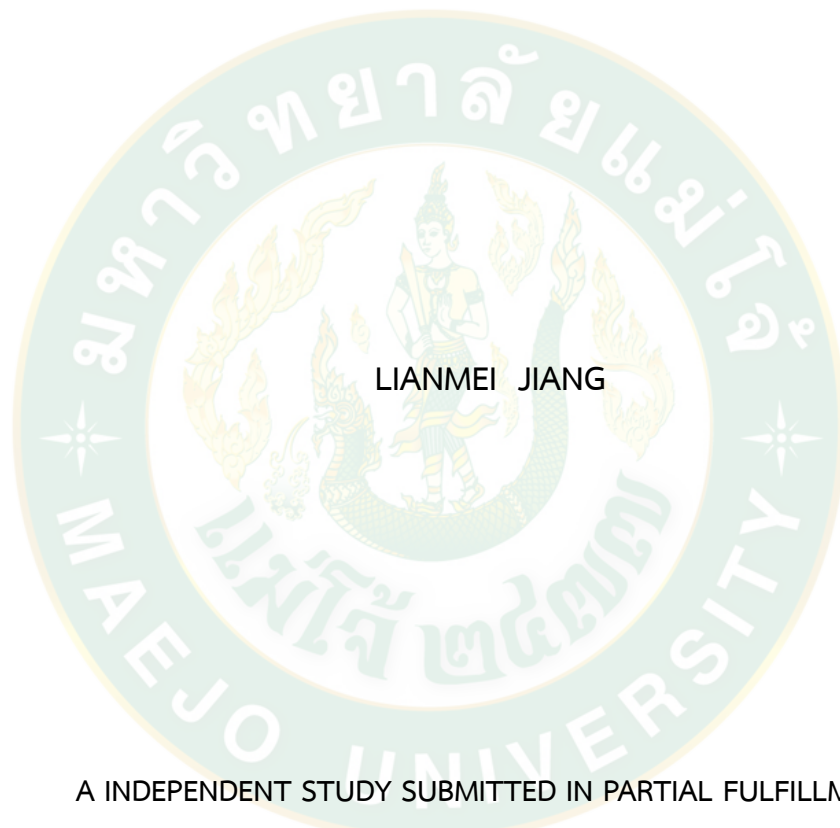TECHNOLOGICAL INNOVATION CAPABILITY IMPACTS

TO FINANCIAL PERFORMANCE AND GROWTH

PERFORMANCE OF SMES IN GUANGXI

LIANMEI JIANG

MASTER OF BUSINESS ADMINISTRATION IN DIGITAL ECONOMICS AND

MANAGEMENT INNOVATION

(INTERNATIONAL PROGRAM)

MAEJO UNIVERSITY

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A INDEPENDENT STUDY SUBMITTED IN PARTIAL FULFILLMENT

OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF BUSINESS

ADMINISTRATION

IN DIGITAL ECONOMICS AND MANAGEMENT INNOVATION (INTERNATIONAL

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APPROVED BY   Advisory Committee

Chair ....

(Assistant Professor Dr. Prapassorn Vannasathid)

...................../...................../ ....

Committee ....

(Dr. Nateetip Sanpatanon)

...................../...................../ ....

Committee ....

(Assistant Professor Dr. Kunpatsawee Klomthongjaroen)

...................../...................../ ....

Program Chair, Master of Business Administration ....

in Digital Economics and Management Innovation   (Associate Professor Dr. Siriporn Kiratikarnkul)

(International Program)   ..../...................../ ....

CERTIFIED BY THE OFFICE OF   ....

ACADEMIC ADMINISTRATION   (Associate Professor Dr. Yanin Opatpatanakit)

AND DEVELOPMENT   Vice President

...................../...................../ ....

ชื่อเรื่อง	ความสามารถด้านนวัตกรรมทางเทคโนโลยีส่งผลกระทบต่อประสิทธิภาพทางการเงินและประสิทธิภาพการเติบโตของ SMEs ใน Guangxi
ชื่อผู้เขียน	Mrs. Lianmei Jiang
ชื่อปริญญา	บริหารธุรกิจมหาบัณฑิต สาขาวิชาเศรษฐศาสตร์ดิจิทัลและนวัตกรรมการจัดการ (หลักสูตรนานาชาติ)
อาจารย์ที่ปรึกษาหลัก	ผู้ช่วยศาสตราจารย์ ดร.ประภัสสร วรรณสถิตย์

บทคัดย่อ

แนวคิดเกี่ยวกับบทบาทของนวัตกรรมทางเทคโนโลยีที่ส่งผลต่อการพัฒนาองค์กรนั้นถือได้ว่าเป็นแนวคิดที่ได้รับการยอมรับว่ามีความสำคัญเพิ่มมากขึ้นอย่างมีนัยที่สำคัญ ผลการวิจัยจำนวนมากได้ชี้ให้เห็นว่าขีดความสามารถด้านนวัตกรรมทางเทคโนโลยีนั้นส่งผลกระทบทางบวกต่อผลประสิทธิภาพการดำเนินงานขององค์กร ซึ่งวัตถุประสงค์ของการวิจัยในครั้งนี้ประกอบไปด้วยการศึกษาผลกระทบของนวัตกรรมทางเทคโนโลยีที่มีต่อประสิทธิภาพด้านการเงินและความสามารถทางด้านการเติบโตของธุรกิจของขนาดกลางและเล็ก (SMEs) ในกวางซีรวมถึงให้คำแนะนำเพื่อปรับปรุงประสิทธิภาพในการดำเนินงานของ SME's ในเขตปกครองตนเองกวางสี

ทฤษฎีความสามารถด้านนวัตกรรมทางเทคโนโลยี (TICS), ประสิทธิภาพทางการเงิน (FP) และประสิทธิภาพการเติบโต (GP) ได้ถูกนำไปใช้กับการศึกษานี้เพื่อตรวจสอบผลกระทบของ TICs ต่อทั้ง FP และ GP ข้อมูลที่ได้รับจากผู้ตอบแบบสอบถาม 361 คนถูกใช้เพื่อวิเคราะห์ผ่านโปรแกรมทางสถิติ ผลการศึกษาในครั้งนี้พบว่า

(1) ความสามารถในการจัดสรรทรัพยากร ความสามารถในการผลิต ความสามารถทางการตลาด ความสามารถขององค์กร และความสามารถในการวางแผนเชิงกลยุทธ์มีอิทธิพลเชิงบวกต่อประสิทธิภาพทางการเงินของ SMEs ในกวางสี

(2) ความสามารถในการเรียนรู้ ความสามารถด้านการวิจัยและพัฒนา ความสามารถในการจัดสรรทรัพยากร ความสามารถในการผลิต ความสามารถทางการตลาด ความสามารถขององค์กร และความสามารถในการวางแผนเชิงกลยุทธ์มีอิทธิพลเชิงบวกต่อประสิทธิภาพการเติบโตของ SMEs ในกวางสี

จากผลการศึกษาในครั้งนี้ชี้ให้เห็นว่า:

(1) องค์กรควรส่งเสริมขีดความสามารถด้านการเรียนรู้ขององค์กรให้เพิ่มมากขึ้น

(2) องค์กรควรให้ความสำคัญกับการบ่มเพาะให้เกิดบุคลากรที่มีความรู้ความสามารถด้านนวัตกรรมทางเทคโนโลยี

(3) ปรับปรุงและพัฒนานวัตกรรมขององค์กรในด้านต่างๆ พัฒนาความสามารถทางการตลาดขององค์กร และสร้างการรับรู้แบรนด์

(4) กำหนดให้มีมาตรการด้านการจ่ายผลตอบแทนที่จูงใจเพื่อก่อให้เกิดความกระตือรือร้นและความพึงพอใจในการทำงานของพนักงาน

(5) องค์กรควรพิจารณาเพิ่มประสิทธิภาพด้านนวัตกรรมทางเทคโนโลยีในแต่ละด้านอย่างสมดุล

ข้อจำกัดของการศึกษาในครั้งนี้ และข้อเสนอสำหรับการวิจัยในครั้งถัดไป

(1) ข้อจำกัดที่เกี่ยวข้องกับวิธีการวิจัยเนื่องจากการศึกษานี้เน้นการใช้วิธีการเชิงปริมาณและข้อจำกัดด้านเวลาของผู้วิจัยทำให้ไม่สามารถเก็บแบบสอบถามได้ทั่วถึงในทุกกลุ่มอุตสาหกรรมดังนั้นการศึกษาในอนาคตอาจใช้วิธีการวิจัยอื่น ๆ รวมด้วย เช่น การเพิ่มการสัมภาษณ์ หรือเปลี่ยนกลุ่มเป้าหมายไปยังกลุ่มอุตสาหกรรมอื่น ๆ ในกวางสี

(2) ผลของการวิจัยที่เกี่ยวข้องกับประสิทธิภาพในการดำเนินงานที่เกิดขึ้นในครั้งนี้เป็นข้อมูลที่เกิดขึ้นจากข้อมูลความคิดเห็นที่ได้รับผู้จัดการอาวุโสทั้งหมดในภาพรวมมิได้เกิดจากความคิดเห็นของผู้จัดการอาวุโสคนใดคนหนึ่งดังนั้นการนำข้อมูลเกี่ยวกับประสิทธิภาพในการดำเนินงานไปใช้จึงเป็นสิ่งที่จำเป็นที่จะต้องกระทำด้วยความระมัดระวัง

คำสำคัญ : ความสามารถด้านนวัตกรรมเทคโนโลยี, ประสิทธิภาพทางด้านการเงิน, ขีดความสามารถด้านการเติบโต, ธุรกิจขนาดกลางและขนาดย่อมในกวางสี

Title   TECHNOLOGICAL INNOVATION CAPABILITY
IMPACTS TO FINANCIAL PERFORMANCE AND
GROWTH PERFORMANCE OF SMES IN GUANGXI

Author   Mrs. Lianmei Jiang

Degree   Master of Business Administration in Digital
Economics and Management Innovation
(International Program)

Advisory Committee Chairperson Assistant Professor Dr. Prapassorn Vannasathid

ABSTRACT

The role of technological innovation in enterprise development has been gradually recognized, and some studies have shown that technological innovation ability has a significant positive impact on enterprise performance. The research objectives of this study are to investigate the impact of an enterprise's technological innovation capability on the financial performance and growth performance of SMEs in Guangxi, as well as to make recommendations to improve SMEs' performance in the context of SMEs' development in Guangxi".

Theory of Technological Innovation Capability (TICs), Financial Performance (FP), and Growth Performance (GP) have been applied to this study in order to investigate the impact of TICs on both FP and GP. The data received from 361 respondents were used to analyze through statistical software. The results of the study are shown below.

(1) Resource allocation capability, manufacturing capability, marketing capability, organizational capability, and strategic planning capability positively impact the financial performance of SMEs in Guangxi.

(2) Learning Capability, R&D Capability, Resource allocation capability, manufacturing capability, marketing capability, organizational capability, and strategic

planning capability positively impact the growth performance of SMEs in Guangxi.

Based on the results of the study suggested that:

(1) Enterprises should strengthen their learning capabilities.

(2) Pay attention to the cultivation of enterprise technology innovation capability, developing Technological talent.

(3) Improve enterprises' innovation and marketing capability and establish brand awareness.

(4) Take appropriate incentives to improve the enthusiasm of employees' work and improve employee work satisfaction

(5) Enterprises should consider a more balanced focus on the coordinated improvement of their TIC.

This study has some limitations that could potentially lead to an improved future.

(1) Limitations related to the research methodology, as this study emphasized using quantitative methods. Therefore, future studies may utilize other research methods, such as adding interviews. Taking SMEs in private industrial enterprises in Guangxi as the object of the study, whether this generalizability can be applied to all SMEs given the limited sample size of the authors' existing capacity is yet to be investigated.

(2) The results of the data analysis are subject to some significant limitations, so in the long run, the interpretations must be regarded as tentative rather than conclusive since the data were obtained from senior managers of the firms, and the firms themselves are often not the best judges of their own performance.

ACKNOWLEDGEMENTS

First, I would like to express my sincere gratitude to my research project advisor, Asst. Prof. Dr. Prapassorn Vannasathid, for his help and guidance. He taught me much knowledge over more than half a year. I never knew how to choose a topic for my dissertation, I didn't know how to write each chapter of my dissertation, and I didn't know how to analyze the questionnaire data using SPSS. Finally, I slowly learned these skills until my dissertation was completed. During this process, he gave me enough patience to guide and help me and also encouraged me and gave me confidence, which brought a lot of warmth and encouragement to my study and life.

I would also like to thank my Committee (Asst. Prof. Dr. Nateetip Sanpatanon and Asst. Prof. Dr. Kunpatsawee Klomthongjaroen) for taking the time to review my research project and providing me with constructive suggestions. I would also like to express my gratitude to my teacher, Asst. Prof. Dr. Kittinoot Chulikavit who helped me a lot. I would also like to express my gratitude to Prof. Dr. Siriporn Kiratikrnkuls of the International College of Maejo University, who was very concerned about our studies and life, to Mr. Olalekan Israel Aiikulola, Juljanna Sirikhampa, and the rest of the faculty and staff. They sent me the course schedule in a timely manner and patiently answered and resolved my questions.

Finally, I would like to thank my husband, who encouraged and supported me in my studies, my lovely son, my dad, my brother, my sister, and my friends. Thanks for their understanding, support, and help. I wish you all good health and a bright future.

Lianmei Jiang

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CHAPTER I
INTRODUCTION

Background

Innovation is the first motivation to lead development, the strategic support for promoting high-quality development and building a modern economic system. Facing the fierce competition of the complex international situation and the high scientific and technological system, technological innovation is undoubtedly an important weapon to deal with new challenges. Enterprise technology innovation capabilities are an important part of the national innovation system and the core element to promote my country's economy towards high-quality development. The country attaches great importance to scientific and technological innovation in enterprises. China's 12th Five-Year Plan clearly proposes to accelerate the construction of a national innovation system and continuously strengthen the position of enterprises as the main body of technological innovation. (Wang, Wei, & Mou, 2021). In 2015, the State Council issued the "Opinions of the State Council on vigorously promoting several policies and measures for public entrepreneurship innovation," encouraging the whole people to participate in innovation work. The source comes from the official website of the Central People's Government of the People's Republic of China https://www.gov.cn/govweb/zhengce/content/2015-06/16/content_9855.htm.

In 2020, the Proposal of the Central Committee of the CPC on Formulating the 14th Five-Year Plan for National Economic and Social Development and the Vision of 2035, adopted at the Fifth Plenary Session of the 19th Central Committee of the Communist Party of China, proposed to improve the technological innovation capability of enterprises, put forward clear requirements for the construction of technological innovation capability of enterprises and pointed out the focus and direction of the construction of technological innovation capability of enterprises. The source comes from the official website of the Central People's Government of the People's Republic of China: https://www.gov.cn/zhengce/2020-11/03/content_5556991.htm .

From the National Bureau of Statistics official website report, from 2013 to 2021, China's average annual growth rate of industrial added value was 6.1%, much higher than the growth level of other major economies in the world. In 2021, China's industrial value-added increased by 9.6% over the previous year, driving economic growth by 3.1 percentage points, contributing 38.1% to gross domestic product (GDP) growth, and being an important supporting force for the smooth operation of the national economy. Through the implementation of a series of policies, including tax cuts and fee reductions, the Central Committee of the Communist Party of China (CPC) has continued to optimize the business environment and accurately assist

small and microenterprises and self-employed households, resulting in the growth of the size of the private economy, improved profitability, increased employment absorption and the rapid growth of small and medium-sized enterprises (SMEs). From 2013 to 2021, the average annual growth rate of added value of private industrial enterprises above the designated size was 8.0%, and the growth rate was higher than the overall level of all industrial enterprises above the designated size by 1.2 percentage points. In 2021, private industrial enterprises above designated size realized a total profit of RMB 2.9 trillion yuan, representing an increase of 44.4% over 2012 and an average annual growth rate of 4.2%, and the growth rate was higher than that of all industrial enterprises above designated size by 0.3 percentage points. In 2021, private industrial enterprises above the designated size will absorb 35.82 million people, an increase of 14.7% over 2012, accounting for 48.1% of all industries above the designated size.

Data sources: http://www.stats.gov.cn/sj/sjjd/202302/t20230202_1896673.html

After the completion of the China -ASEAN Free Trade Zone, SMEs in Guangxi have developed rapidly. SMEs have become an important force in promoting Guangxi's economic growth and increasing fiscal revenue, expanding employment, and increasing the economic income of urban and rural residents.

According to the 2021 Guangxi Zhuang Autonomous Region National Economic and Social Development Statistics Bulletin, the number of small and medium-sized enterprises (SMEs) in China has exceeded 40 million, accounting for 99.5 percent of the total number of enterprises in the country. SMEs are mainly concentrated in labor-intensive industries such as manufacturing, wholesale and retail trade, catering, and accommodation. Among them, small and micro enterprises account for 78% of the total number of SMEs. According to the National Bureau of Statistics, SMEs have realized growth in sales revenue and profits. In addition, the management level of SMEs has improved, and the quality of employees and productivity have been enhanced. In Guangxi's annual above-scale industry, the added value of the agricultural food processing industry increased by 11.3% over the previous year, wood processing and wood, bamboo, rattan, palm, and grass products industry increased by 15.7%, petroleum, coal, and other fuels processing industry increased by 30.1%, non-metallic mineral products industry increased by 0.8%, ferrous metal smelting, and rolling processing industry increased by 7.1%, non-ferrous metal smelting and rolling processing industry increased by 12.3%, The specialized equipment manufacturing industry grew by 2.1%, the automobile manufacturing industry declined by 3.8%, the electrical machinery and equipment manufacturing industry grew by 12.0%, the computer, communication, and other electronic equipment manufacturing industry grew by 3.6%, and the electric power and heat production and supply industry grew by 12.2%.

The profit of industrial enterprises above the designated size increased by 28.1% over the previous year. By economic type, the profit of state-controlled

enterprises increased by 36.7% over the previous year; joint-stock enterprises increased by 42.4%; foreign, Hong Kong, Macao, and Taiwan business enterprises decreased by 7.2%; non-public enterprises increased by 22.7%. By category, profits from the mining industry increased by 70.8% over the previous year, the manufacturing industry increased by 35.7%, and the electricity, heat, gas, and water production and supply industry decreased by 26.9%. Data sources: http://tjj.gxzf.gov.cn/tjsj/tjgb/qqgb/t16230750.shtml

The Party Secretary of the Statistics Bureau of the Guangxi Zhuang Autonomous Region mentioned in his interpretation of the Statistical Bulletin on National Economic and Social Development of the Guangxi Zhuang Autonomous Region in 2021 that the investment in innovation has increased. Four thousand three hundred six projects were arranged for scientific research and technological development programs in the region in 2021, an increase of 53.8% over the previous year. Obtained 7,014 registered scientific and technological achievements at provincial and ministerial levels or above, an increase of 13.7% over the previous year. Three patents were authorized 46,800, an increase of 35.8% over the previous year, including 4,573 invention patents, an increase of 30.0% over the previous year. A total of 16,267 technology contracts were signed throughout the year, and the turnover of technology contracts amounted to 219.457 billion yuan, an increase of 2.9 times over the previous year.

However, a reading of the relevant information reveals that while SMEs have made a series of achievements, there are also some problems:

Firstly, the price of raw materials has risen, leading to an increase in costs for SMEs. Secondly, environmental protection requirements have increased, which has put some pressure on the development of SMEs. Thirdly, SMEs are facing competitive pressure from large and emerging enterprises. Due to the limitations of scale and economic strength, SMEs are disadvantaged in procurement, sales, and brand promotion. Fourthly, many SMEs face financing difficulties, especially those in the start-up and growth stages, with more significant financial pressure. Fifthly, the bottleneck of technological innovation capability needs to be broken or improved. Finally, the need for more talent, especially senior talent, also restricts the development of SMEs.

However, it is worth being happy that under the guidance of the policy, small and medium-sized enterprises (SMEs) have begun to focus on research and development (R&D) and technological innovation, and many of them have succeeded in developing new products and services, which have enhanced their competitiveness and market influence.

On August 28, 2022, the construction of the Pinglu Canal began. The development of shipping is the main focus, combined with water supply, irrigation, flood control, and improvement of the water ecological environment. Data source: https://baijiahao.baidu.com/s?id=1742389853433842690&wfr=spider&for=pc This is a

once-in-a-lifetime external development opportunity for small and medium-sized enterprises in Guangxi, and more large-scale industrial enterprises have already settled in Guangxi and Nanning one after another, which at the same time This also means that SMEs will face more opportunities and challenges.

Therefore, attaching importance to the technological innovation of SMEs in Guangxi, studying the technological innovation capabilities of SMEs in Guangxi has particular theoretical significance for the development of SMEs in Guangxi. In a practical sense, the impact of the technological innovation capabilities of SMEs in Guangxi on financial performance and growth performance has a particular reference value for corporate managers, which has particular reference significance for other companies in the industry.

Research of Problems

1. Whether technological innovation capabilities will affect the financial performance of SMEs in Guangxi.
2. Whether technological innovation capabilities will affect the growth performance of SMEs in Guangxi.

Objectives of the study

The objectives of this study are:
1. Research the impact of technological innovation capabilities on the financial performance of SMEs in Guangxi.
2. Research the impact of technological innovation capabilities on the growth performance of SMEs in Guangxi.

Expected Results

By employ TICs as independent variables and setting up both Financial Performance and Growth Performance as dependent variables. The expected result of the research are:
1. By investigating the technological innovation capabilities of small and medium-sized enterprises in Guangxi, understand the impact of technological innovation capabilities on the financial performance of enterprises.
2. By investigating the technological innovation capabilities of small and medium-sized enterprises in Guangxi, understand the impact of technological innovation capabilities on the growth performance of enterprises.

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Scope of the study

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Scope of Population

Guangxi SMEs were chosen as the population, and the specific industry was private industrial enterprises. According to the statistical yearbook of Guangxi in 2021, the population of private industrial enterprises in small and medium-sized enterprises in Guangxi is 5935.

Scope of Content

The study requires using theories related to technological innovation, economic growth, and technological innovation capability. Researcher choose the TIC model constructed by Lau, Yam, and Tang (2010) as the theoretical framework, which includes Learning capability, R&D capability, Resource allocation capability, Manufacturing capability, Marketing capability, Organizing capability, and Strategic planning capability.

Scope of Area

The research scope of this thesis is Guangxi, China. The main research object is the private industrial enterprises among the small and medium-sized enterprises in Guangxi. According to the data of the Guangxi Statistical Yearbook in 2021, there are 8065 industrial enterprises in Guangxi, 5935 private industrial enterprises, and private industrial enterprises account for 73.8% of industrial enterprises. Therefore, the research object selected in this study is the middle and senior managers of private industrial enterprises in Guangxi SMEs. Because SMEs are an essential part of Guangxi enterprises, private industrial enterprises account for a high proportion of industrial enterprises, contribute a lot to Guangxi's GDP, and are an important force in increasing fiscal revenue, a main channel to expand employment, and an important source to improve the economic income of urban and rural residents in Guangxi. Therefore, we hope to provide some reference for managers of small and medium-sized enterprises in Guangxi by studying the influence of technological innovation capability on enterprise performance.

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Technical definition of terms

</div>

To make it easier to understand this study, the Technological terms used in this research are clarified as follows:

SMEs: The Law of the People's Republic of China on the Promotion of Small and Medium-sized Enterprises mentions that small and medium-sized enterprises refer to all types of ownership enterprises established within the territory of the People's Republic of China that are small and medium-sized in terms of their scale of operation in line with the basic policies of the State, the provision of jobs and the

basic needs of society. In 2017, the National Development and Reform Commission (NDRC), the Ministry of Industry and Information Technology (MIIT), the Bureau of Statistics (BOSTAT), and the Ministry of Finance (MOF) jointly issued the "Measures for the Classification of Statistical Large, Medium-sized, Small, and Micro Enterprises (2017)". The document provides a unified division of all industrial enterprises with business qualifications established in China, in which small and medium-sized enterprises contain three types: medium-sized, small, and micro-enterprises, and the criteria for the division need to refer to the characteristics of each sub-sector, and the basic criteria of business revenue, personnel size, and total assets are used as the basic criteria for the specific division. The criteria for industrial SMEs are shown in Table 1.

Table 1 Standards for the Classification of Industrial Small, Medium and Micro Enterprises

Type of business	small, medium and microenterprise	medium-sized enterprise	small-sized enterprise	Microenterprise
Industry (mining, manufacturing, electricity, heat, gas and water production and supply)	Less than 1,000 employees or less than 40,000,000 yuan in business revenue	300 or more employees, and business revenue of 20 million	20 or more employees, and business revenue of 3 million yuan or more	Less than 20 employees or less than 3 million yuan in business revenue

Source: Statistical Classification of Large, Small, Medium and Micro Enterprises (2017).

Technological innovation capability: Xiong Peter proposed the word innovation for the first time in 1912. He believes that innovation is combining the original production factors with new technological methods and using this new production method in the production and operation process to help enterprises in fierce market competition get an advantage to achieve better economic benefits. At the end of the 20th century, Chinese economist Fu Jiazheng proposed that technological innovation was continuously carried out through research and development activities through existing resources in production and operation and developed new production technology, thereby the production office of new products (Fu Jiaji, 1989).

Financial performance: Financial performance refers to the business operating effect and manager role reflected by enterprises in the internal assets and resources within the enterprise within a certain period.

Growth performance: It refers to improving enterprise management innovation Capability, which can be roughly reflected in the expansion speed of enterprise scale, employee growth expectation, and retention rate of high-quality employees.

Private Owned Industrial Enterprises: Industrial enterprises are profit-making economic organizations directly engaged in industrial production and business activities (or labor services). A private enterprise is a profit-making economic organization established by a natural person or controlled by a natural person based on wage labor. Therefore, private industrial enterprises in this paper refer to profit-making economic organizations established by natural persons or controlled by natural persons, directly engaged in industrial production and operation activities (or labor services), and based on wage labor. I selected the population based on statistics from the statistical yearbook of Guangxi; in the statistical yearbook of Guangxi, industrial enterprises mainly contain Mining, manufacturing, electricity, heat, gas, and water production and supply industries.
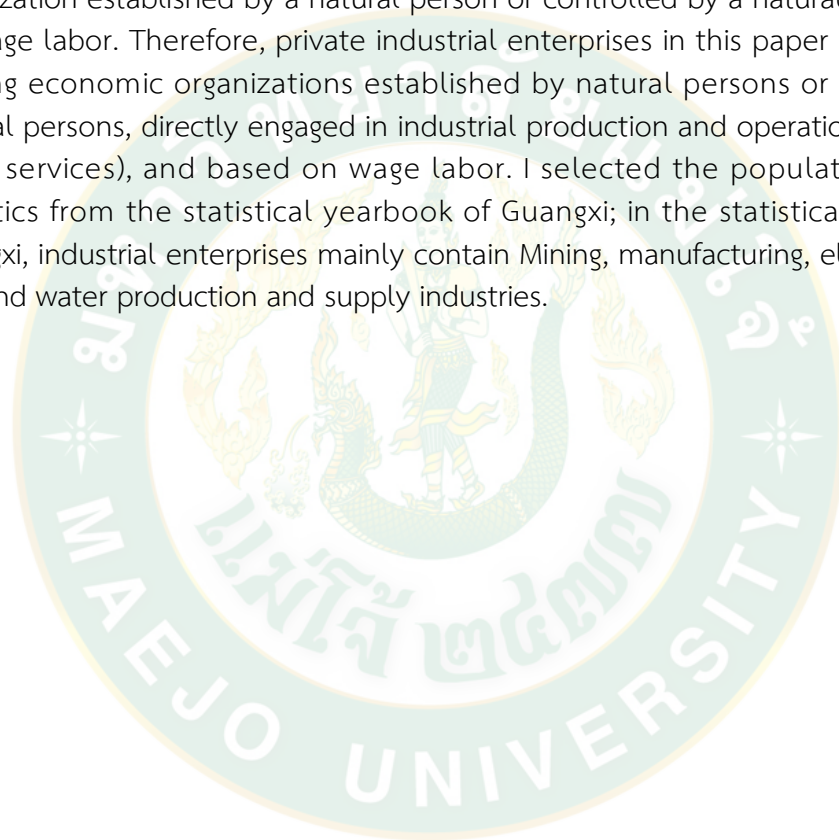
CHAPTER II
REVIEW OF RELATED LITERATURE

Theories Related to the study

Theory of technological innovation and economic growth

Austrian economist Xiong Peter proposed the term "technological innovation" and economic growth theory in early 20th century (Rostami, Khyareh, & Mazhari ,2019). Technological innovation is a new outlook on economic development. Only the capability of enterprises to have technological innovation can enable enterprises to develop and grow. Human and material investment is the process, and economic benefits are the results. The most obvious feature of technological innovation is to effectively combine scientific research and development with economic development. The fundamental purpose of technological innovation is to promote the application of research and development results in the process of production activities, open a new product market, liberate productivity, and eventually produce more real estate as much as possible. Economic benefits finally promote the high -quality development of the economy. Xiong Peter's technological innovation and development theory treats technological innovation as the core driving force of economic growth, which coincides with the theory of "science and technology is the first productive forces" in China. American economist Paul Romer first proposed the "endogenous economic growth theory" at the end of the 20th century. The two factors of technological progress and labor capital are regarded as the endogenous variables of economic growth. Innovation Capability is the core factor of technological progress. Under the conditions of technological progress, capital investment can make marginal benefits more than equal to zero and increase. Relying on external forces to promote continuous growth, that is to say, under the circumstances of technological progress, the scale effect of the enterprise has increased the scale income, and the company's long-term continuous growth may occur. Classical economic growth theory. Paul's endogenous growth theory has far -reaching significance for the economics community in the future. The academic community generally regards the development of technological innovation as the core driving force for the sustainable development of the enterprise. In the "Technical Innovation Science" published by Chinese economist Fu Jiaji in the early 21st century, the development of economic development is determined by technological innovation. Only continuous technological innovation activities can make the accumulation of human knowledge effectively use (Fu, J.J，1989). Based on the theoretical analysis above, it can be known that in the development of its production and operation, enterprises should pay attention to the cultivation of technological innovation capabilities. Technological innovation capabilities can promote the development of social science

and technology, improve social productivity, give excavation of enterprises' development potential, increase corporate economic benefits Provide strong guarantee. These economics theories of Peter and Paul also provide strong theoretical support for theoretical analysis and case analysis of this article.

Technological Innovation Capability

Chinese economist Fu Jiaji proposed in the late 20th century that technological innovation is a company's continuous research and development activities in the production and operation process through available resources to develop new production technologies and thus produce new products (Fu J.J, 1989). Scholars understand innovation capabilities differently (Waldemar & Maciej, 2016). Important factors that need to be considered regarding innovation capabilities can be found in works dedicated to the competitiveness and strategy of the company. It is emphasized that the company's capabilities are an essential element in building and maintaining its competitive advantage and implementing its strategy (Akman & Yilmaz, 2008; Guan & Ma, 2003). TIC is a particular asset or resource that includes technology, products, assets or knowledge, experience, and organization (Guan & Ma, 2003). Evangelista et al. (1997) consider R&D activities a core component of firms' technological innovation activities and the essential intangible innovation expenditure (Evangelista et al.,1997). Successful technological innovation relies on technological and other innovative capabilities in manufacturing, marketing, organization, strategic planning, learning, and resource allocation (Yam et al., 2004; Romijn & Albaladejo, 2002).

Guan and Ma (2003) concluded that Innovation capability is a special asset of the firm. Innovation capabilities are classified into seven dimensions:

1. learning capability,

2.R&D capability,

3. manufacturing capability,

4. marketing capability,

5. organizational capability,

6. resources exploiting capability,

7. strategic capability.

Yam et al. (2004: 2011) Technological innovation capabilities are an organization's comprehensive set of characteristics that facilitate and support its technological innovation strategies. Technological innovation capabilities are classified into seven elements:

1. learning capability is a firm's ability to identify, assimilate, and exploit knowledge from the environment,

2. R&D capability refers to a firm's ability to integrate R&D strategy, project implementation, project portfolio management, and R&D expenditure,

3. Resource allocation capability is a firm's ability to acquire and allocate appropriate capital, expertise, and technological innovation.

4. manufacturing capability refers to a firm's ability to transform R&D results into products that meet market needs, accord with design requests and can be manufactured,

5. marketing capability is a firm's ability to publicize and sell products based on understanding consumer needs, the competitive environment, costs and benefits, and the acceptance of the innovation.

6. organizing capability refers to a firm's ability to secure organizational mechanisms and harmony, cultivate organizational culture, and adopt good management practices,

7. strategic planning capability is a firm's ability to identify internal strengths and weaknesses and external opportunities and threats, formulate plans per corporate vision and missions, and adjust the plans for implementation.

Wang et al. (2008) concluded that Technological innovation capability is a complex, elusive, and uncertain concept that is difficult to determine. Technology innovation capability is classified into five interactive aspects:

1. R&D capability,
2. innovation decision capability,
3. marketing capability,
4. manufacturing capability,
5. capital capability.

Cheng & Lin (2012) concluded that Technological innovation capabilities depend on determining multiple criteria and building a performance and implementation plan. Technological innovation capability is classified into seven elements:

1. planning and commitment of the management capability,
2. marketing capability,
3. innovative capability,
4. knowledge and skills capability,
5. information and communication capability,
6. external environment capability,
7. operations capability

Zastempowski, et al. (2020) Concludes that the company's innovation capabilities can be divided into the following areas: research and development, manufacturing, organization, marketing, logistics, human factors, and strategy. The empirical study was carried out in 2015, using the CAPI method, on a representative sample of 250 SMEs, and the results obtained show the importance of 19 variables in all specific competencies and environmental factors, and their impact proved to be positive.

According to Peteraf (1993), the firm's heterogeneous resource mix (including human, capital, and technological resources) is responsible for the observed changes in technological innovation capabilities and financial returns. These are the specific capabilities of a company that contributes significantly to sales growth and competitive advantage. There must be a causal relationship between a firm's resources and performance. Dierickx and Cool (1989) argue that firms should try to imitate high-performing resources or develop alternative resources that produce similar benefits. Therefore, it is advantageous for firms to improve TIC as a key Therefore, it is advantageous for firms to improve TIC as a key resource of the firm (Guan & Ma, 2003).

Lau et al. (2010) It is concluded that Technology Innovation Capability (TIC) should contain seven dimensions, which are Learning capability, R&D capability, Resource allocation capability, Manufacturing capability, Marketing capability, Organizing capability, and Strategic planning capability.

1. Learning capability is identifying, assimilating, and utilizing new knowledge, which is critical to a firm's competitive success.

2. R&D capability is a firm's ability to integrate R&D strategy, project implementation, portfolio management, and R&D expenditures.

3. Resource allocation capability refers to a firm's ability to mobilize and expand its Technological, human, and financial resources in the innovation process.

4. Manufacturing capability refers to the ability to transform R&D results into products that meet market demand, conform to design requirements, and can be mass-produced.

5. Marketing capability refers to the ability to promote and sell products based on current and future consumer needs, customer access, and competitor knowledge.

6. Organizational capacity is the ability to create a sound organizational structure, foster an organizational culture, coordinate the work of all activities to achieve common goals and influence the speed of the innovation process through the infrastructure created for development projects.

7. Strategic planning capability is the ability to identify internal strengths and weaknesses as well as external opportunities and threats and to adopt different types of strategies that can adapt to changes in the environment and stand out in a highly competitive environment.

Lau et al. (2010) 7 dimensions of TIC as variables were selected for this study.

Financial performance

Some scholars believe that financial performance refers to the enterprise through the optimization of internal assets and resource allocation in a certain period reflected in the business results and the role of managers. Regarding the evaluation method of financial performance, the current academic community presents the

trend of a hundred competitions, commonly used DuPont analysis, EVA evaluation system, and so on.

Bai, L. (2011) believed that financial performance usually refers to a period the enterprise makes reasonable use of its resources, such as financial resources, human resources, material resources, etc., production and operation and achieved in the financial business results. It can reflect the enterprise's financial position, operation and profitability level, and other situation aspects. Chen, D. (2015) argues that corporate financial performance can provide a comprehensive and objective integrated measure of a company's operating results. The financial performance of an enterprise can be represented in terms of the following capabilities.

Firstly, profitability reflects an enterprise's ability to obtain economic returns after investing various resources. If the economic profit that the enterprise can obtain is high, it has good profitability in the production and operation process. The opposite is true. The ability of an enterprise to obtain sound financial returns is the basis for realizing sustainable development of the enterprise, as well as the goal of technological innovation. Generally speaking, many indicators can be used to assess the profitability of enterprises, such as operating profit margin, return on net assets, and so on.

Secondly, operational capacity refers to the ability of a firm to run its operations. Mainly, it refers to the ability to use and manage its operating assets. Operating capacity can reflect an enterprise's capital turnover, mainly in the enterprise's assets, inventory accounts receivable, and other aspects of the turnover. Under the condition of ensuring average production and operation, the faster the turnover speed, the stronger the liquidity of the assets, representing a solid operating ability of the enterprise, the enterprise can obtain more economic returns. Many indicators, such as inventory turnover and accounts receivable turnover, can represent the profitability of an enterprise.

Thirdly, development capacity refers to the potential ability of an enterprise to enhance its strength and realize scale expansion, i.e., the potential to achieve and maintain a sustainable level of profitability and value growth in terms of total asset growth. The growth rate of operating income and other indicators can be used to reflect the development capacity.

Financial performance is divided into the following ability indicators: profitability, market share, and sales growth rate.

Growth performance

1. The meaning of growth performance

Wang, H. H., P. Xie & L. Xiong. (2019) argued that growth performance results from all the resources and market opportunities together.

Zhang, Z. G., & Yu, C.P. (2014) defined enterprise growth as the sum of work effectiveness achieved by an organization at a specific time, specifically including

financial performance, market performance, innovation performance, organizational performance, etc., and performance is the core of management and one of the ultimate goals of all organizations. Wu, Dan. (2015) argued that the growth of high-tech enterprises is the objective reflection of the enterprise's financial, human, technological, and social capital performance, a general term for business results.

Although scholars have different specific descriptions of enterprise growth, the same point recognizes that enterprise growth covers quantitative expansion and qualitative growth.

2. Measuring business growth performance

Mu, J., Han, W. X. & Li, Q. S. (2005). Based on a comprehensive analysis of the characteristics of China's top 100 enterprises and their growth performance, the growth performance of enterprises is measured using three indicators: growth rate, profitability, and operating capacity. Coad A., Segarra A., and Teruel M. (2016) used sales growth rate, productivity growth rate, and hiring growth rate to measure firms' growth performance when studying the relationship between innovation and firm growth.

Zhang, W. & Zhang, S.-L. (2008). Argues that growth performance measures often contain both subjective and objective performance indicators. Ji, Lingling. (2012) It is believed that the growth status of enterprises is measured by taking innovation growth performance and operation growth performance as reference indicators. The specific indicators include eight indicators, such as the number of new products, new markets, and other new business developments, the proportion of sales revenue of new business, the proportion of the number of new businesses, the enterprise's market share, the enterprise's total sales, the enterprise's profitability, the change in the number of employees of the enterprise, and the overall competitiveness of the enterprise.

Wong, P. K., Ho, Y. P., & Autio, E. (2005) mentioned in their study that the growth performance of the enterprise is evaluated through the synthesis of economic and socio-cultural elements, which is mainly expressed in revenue growth and scale expansion. Zhang, Y.C, & Du, Chien-Huei. (2018) mentioned that the growth performance of the enterprise is a composite measure, which should include the growth of operating income, the increase of registered capital or actual assets held, the increase in the number of employees, and other factors.

Chinese scholars Zhang, Y.L. (2004) and Sun, X.M. (2004) interpret the dimensions of enterprise growth performance as an increase in "quantity" and an improvement in "quality" with Chinese characteristics. "Quantity" is mainly manifested in financial indicators, such as the increase in corporate resources, asset size, sales, and profits. The "quality" mainly refers to the enterprise's innovation ability, environmental adaptability, technological capability, and other aspects that reflect future growth. "Growth" is a survival state of enterprise survival and development. It includes both scale expansion and structural improvement. Scale expansion refers to

the accumulation of human and non-human resources of the enterprise, manifested in value-added assets, increased sales, production scale expansion, profitability, and personnel increase, etc.; Hsia, Ching-Hua. (2003) argued that business growth should focus more on an organization's development capability and growth potential.

Zhang, Z. G. et al. (2014) evaluated the growth performance of scientific and technological small and micro-enterprises by using four indexes: growth of the number of employees, growth of the leading business, and so on.

Combining the views of the above scholars, this study thus adopts the dimension of growth potential in studying the growth performance of SMEs in Guangxi. This is mainly reflected in the speed of expansion of the company's size, the speed of the company's future employee growth, and the fact that the company can attract and retain better-quality employees.

Technological Innovation Capabilities and SMEs

In the context of China's economy, Xu, L, & Liu, H. (2021) mentioned in their study that many industrial enterprises, especially manufacturing enterprises, are labor-intensive and at the low end of the value chain. With the cost advantages of labor, land, and raw materials, Chinese manufacturing enterprises occupy the manufacturing link in the global manufacturing division of the labor system, and small and medium-sized manufacturing enterprises have gained strong manufacturing capacity from processing trade and OEM production. Ho, W.B. (2020) argued that most Chinese manufacturing enterprises are still in the stage of imitation innovation, passively obeying the technological routes set by foreign countries, with little independent technological innovation capability, and are trapped downstream of the global industrial chain. The core of SMEs' independent innovation, although technological innovation (including product innovation and process innovation), also emphasizes the synergistic effect of other kinds of innovation forms such as scientific innovation, institutional innovation, management innovation, market innovation, and technological innovation. Lu, Binbin. (2017) proposed through the study of SMEs' transformation and upgrading paths that small and medium-sized manufacturing enterprises (SMEs) are due to the industrial organization of China's manufacturing industry, enterprise's knowledge accumulation, technological capabilities, and other characteristics, determines that its transformation and upgrading not only rely on absorbing new technologies to improve technological capabilities, but also should provide complementary resources for technological capability enhancement through non-R&D innovations, upgrading the quality of employees, reconfiguring the organizational process, and integrating external resources.

Compared with large manufacturing enterprises, small and medium-sized enterprises (SMEs) show particular specificity in their innovation approach due to differences in scale and resources, capabilities, and the functions they assume in the industrial chain. Through case studies of typical enterprises, foreign scholars

Evangelos (2018) and Henny (2020) all believe that technological innovation is the lifeline of SMEs to achieve differentiation. SMEs must realize their technological innovation by integrating into a regional and industrial open innovation network. Liu, H.Q., Liu, Y., & Fang, Z.G. (2019) argued that, for domestic enterprises, Chinese SMEs are also increasingly aware of the significance of technological innovation for enterprise development and have begun to increase their investment in enterprise technological innovation and actively seek national innovation policies and innovation projects. Most of China's SMEs focus on imitation innovation and pursue short-term gains, but this also makes most SMEs tend to enter the market as a follower of large firms and are more affected by the technology level of large firms. Wang, Song, & Shen, Jiang. (2019) argued that the relative shortage of SMEs' scientific and technological personnel and the lack of scientific research funds prevent SMEs from developing suitable innovative products even in the face of good market opportunities; the SMEs' unsound scientific and technological management mechanism and their low degree of specialization also fail to provide good Internal and external conditions.

Related research

Technological innovation capability and financial performance

The hot point of competition for enterprises today is science and technology innovation. The essence of innovation is the optimization and evolution of the original resources. The technological innovation capability provides strong support for enhancing the core competitiveness. In terms of status, enterprises must improve the ability of technological innovation. Wang Xigang (2016) analyzed 174 industrial manufacturing enterprises in Shenyang, Dalian, and Changchun as the research object. He decomposed technological innovation capability into product innovation capability and process innovation capability from the perspective of a resource-based view. The study results show that technological innovation capability positively impacts enterprise performance; product innovation capability, as an organizational innovation practice, has a direct impact on enterprise performance, but the moderating effect of product innovation capability moderates the impact of process innovation capability on enterprise performance.

Zhu Nailing (2019) took high-tech enterprises in China as the research object, and the results showed that investment in technological innovation can significantly improve enterprises' short-term financial performance and long-term financial performance.

Huang, Y.W., & Yiyao Li. (2019). By analyzing the financial data of 40 companies in the communication equipment industry from 2010-2017, the results show that technological innovation capability positively relates to overall firm financial performance.

Ding, Z. C. C. (2020) states that the enterprise's cost and the existence of the risk are to determine the new important factors of technology; when the enterprise is in the early stage of technological innovation, the enterprise's cost expenditure is more significant, technological innovation may bring some risk to the enterprise, but in order to enhance the overall value of the enterprise, to ensure the sustainable development of enterprises, must carry out technological innovation. Li, X.Y. & Chen,G. Q. (2019) By analyzing the data of listed companies in China's manufacturing industry from 2012 to 2017, the results show that investment in technological innovation will have a promotional effect on corporate performance.

Ren, H. Y. & Shi, P. (2009) An empirical study on the relationship between R&D investment and firm performance of listed pharmaceutical companies from 2001 to 2004 shows that R&D investment is significantly related to firm performance, and the correlation between the two decreases over time. Jie, M.H., Jin, W. & Liu, D.M. (2014) Measuring firm performance by Tobin's Q. The results show that firms' R&D investment is significantly and positively correlated with firms' business performance, and there is a specific lag effect.

Zhu, N.P., Zhu, L., Kong, Y.S. & Yang, S. (2014). Taking high-tech enterprises as the object of research and using "financial crisis" as the comprehensive evaluation of the company's financial status, the results of the study show that the R&D investment of enterprises has a significant positive impact on the short-term and long-term financial performance of enterprises, and this impact is positively moderated by social responsibility. The results show that R&D investment has a significant positive impact on enterprises' short-term and long-term financial performance, which is positively moderated by social responsibility.

Xu, C.Y., Zhao, X.Y.& Wang, C.C. (2018) Taking strategic emerging industries as the research object and studying from the perspective of financing constraints, the study results show that R&D investment significantly promotes the improvement of corporate performance, and there is a lagged effect in this promotion relationship.

Some domestic and foreign scholars have other views on the relationship between technological innovation and financial performance. Xu J, Liu F, Chen Y H. (2019), in his study, found that R&D expenditures do not have a significant effect on the financial performance of large-scale firms, while they have a significant adverse effect on the financial performance of small-scale firms. Qi E, Deng M. (2019) An empirical study analyzes that the impact of corporate R&D investment on financial performance shows an inverted "U" shape, and the relationship between the two is negatively moderated by environmental regulation. Chen Y, Ibhagui O W. (2019) A study of Nasdaq-listed companies using a threshold model finds a nonlinear relationship between R&D intensity and firm performance and that the global financial crisis impacts this. Huang Z. (2020) in his study used principal component analysis to extract several composite indicators to measure short-term financial performance and Tobin's Q to measure long-term performance, and by studying

listed companies in the healthcare industry, it was obtained that the intensity of corporate R&D investment negatively correlated with short-term financial performance and positively correlated with long-term financial performance.

Ou Chun. (2010) found that R&D personnel investment positively contributes to financial performance, while R&D capital investment is not significantly correlated with financial performance, with no lag in the study of SMEs. Su, X. H. & Zhao, X. H. (2013) concluded that R&D investment is not significantly correlated with profitability but negatively affects debt service, operation, and development ability in a sample of listed companies in China's high-end manufacturing industry. Xu, Z.C. & Hou, J.C. (2019) showed that the innovation investment of enterprises has an inverted "U"-shaped relationship with enterprise performance, i.e., with the increase of innovation investment, the performance of the enterprise shows an increase and then a decrease. Xu Bin. (2019) Considering the inherent needs and capabilities of each stage of the enterprise life cycle, the impact of technological innovation on financial performance is explored from the growth, maturity, and decline periods. It is found that technological innovation has a significant role in promoting the financial performance of the enterprise in general. However, the promotional effect on enterprises' maturity and decline periods is not apparent.

Technological innovation capability and growth performance

In the context of economic globalization, the strength of scientific and technological innovation directly deeply affects economic strength. This is the case between the country and the competition between enterprises. Mastering more advanced science and technology capabilities is enough to support a company. Jie, Wang, and Liu (2014) studied from the perspective of environmental regulation. Studies have found that technological innovation in the scope of environmental permission is conducive to the growth of corporate comprehensive performance. Wang, Fan, and Liu (2021), through the relevant performance functions established by the production function, research show that enterprises will generate the best technological innovation model during the process of technological innovation to determine the technological innovation route and bring the growth of enterprise growth. Come to a lot of value-added. Zhang, Yuan, and Shang (2022), By studying the establishment of the relationship between the Technological capabilities and development models of Chinese manufacturing enterprises, obtained the company's technological innovation capabilities to affect the growth performance of the enterprise with the help of direct or indirect forms.

On the one hand, through technological innovation R & D or iteration or improvement, it can directly promote the integration method of Technological use and Technological resources of the enterprise to enable enterprises to achieve the achievement of growth goals; on the other hand, the improvement of corporate technological innovation capabilities has It is conducive to the corporate

reconstruction of Technological knowledge resources so that enterprises use innovative technology to carry out product innovation or efficient allocation of technological innovation resources, thereby achieving the goal of enterprise growth. Ding, Zhang, and Yang (2022) Believe that technological innovation capabilities have a positive relationship with corporate growth performance. Shen Fei (2021) and others were inspected by empirical inspections that patent execution insurance and corporate technological innovation have significantly promoted corporate performance.

Technological innovation capability and innovation performance

Lau, A. K., YAM, R. C., & Tang, E. P. (2010) study the correlation between TIC and the innovation performance of the electronics industry in the Hong Kong (H.K.)/Pearl River Delta region, and the results show that R&D, resource allocation, learning, and strategic planning capabilities can significantly enhance innovation sales. R&D and resource allocation capabilities can also significantly improve new product introduction.

Technical innovation capability and corporate performance

Zhang and Yang (2021) By constructing a variable model of "digital technology capabilities for business model innovation and an enterprise performance," the effect of digital technology capabilities on corporate performance and the intermediary role of business model innovation, using the Shanghai and Shenzhen stock markets to be listed in the market. The company's annual report data verifies the research assumptions, and the digital technology capabilities of the enterprise can promote the innovation and performance improvement of the enterprise's business model. The enterprise's business model innovation can promote the improvement of the performance of the enterprise. Jiaqi Dong (2022), through a study on the impact of innovation capability on the performance of green food firms in Heilongjiang Province in a crisis, concluded that technological innovation capability has a positive impact on the performance of food firms. Technological innovation capability has a positive effect on growth performance. However, there is no significant positive effect on financial performance.

Conceptual Framework

This article is based on the TIC model built by Lau, A. K., YAM, R. C., & Tang, E. P. (2010) and the innovative capabilities built by Dong Jiaqi (2022) corporate performance models are the theoretical framework, which builds a learning capability, R&D capability, Resource allocation capability, manufacturing capability, marketing capability, organizing capability, strategic planning capability are independent variables, and financial performance and growth performance as the

conceptual framework for variables. This study aims to explore the impact of the seven independent variables of this technological innovation capabilities on corporate financial performance and growth performance, thereby discussing the impact of TIC on the performance of Guangxi SMEs. The following is the concept framework:
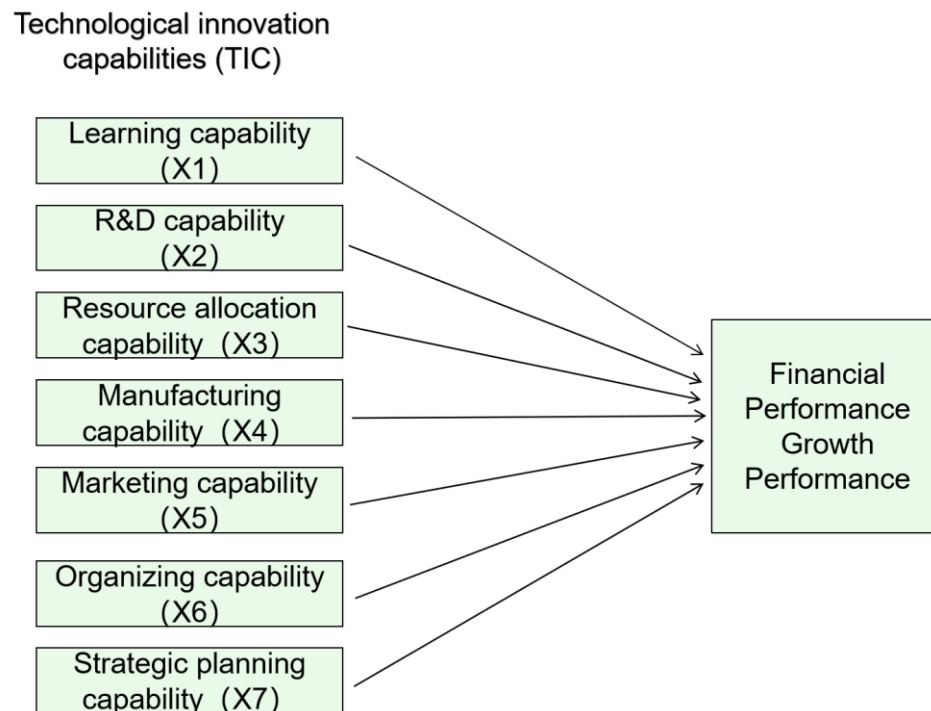
Figure 1 concept framework

Research Hypothesis

H1: Technological Innovation Capabilities (X1, X2, X3, X4, X5, X6, X7) positively impact the financial performance of SMEs in Guangxi.

H2: Technological innovation capabilities (X1, X2, X3, X4, X5, X6, X7) positively impact the growth performance of SMEs in Guangxi.

CHAPTER III
RESEARCH METHODOLOGY

Local of the study

Nanning, Guangxi, China

Population and Sampling Procedure

Population of the study and sample

In 2021, there were 5,935 SMEs in Guangxi. The crowd of this study is the middle and senior management staff of SMEs in Guangxi. Compared with ordinary employees, managers as the target group think that they have a more comprehensive understanding of the company's technological innovation capability and performance and have a deeper understanding of the dimensions of the conceptual framework. This study aims to investigate the impact of TIC on the financial performance and growth performance of SMEs in Guangxi and will use non-probability sampling methods.

The demand for representative statistical samples in empirical research continues to increase, which requires an effective method to determine the sample size. In order to solve the existing gap, Krejcie and Morgan (1970) proposed a form that determines the sample size of a specific crowd to facilitate reference. In this study, the sample table using Krejcie & Morgan (1970) determines the sample size. Therefore, to determine the sample size for a finite population, the study follows Krejcie and Morgan (1970) table. According to the table, when population size, N= 6000 and above, sample size, s = 361, is sufficient to get an accurate result.

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—N is population size.   S is sample size.
Source: Krejcie & Morgan, 1970

Figure 2 table using sample size formula for finite population

Source Krejcie & Morgan (1970)

Sampling method

This study selected the non-probability sampling method to select the respondent from the target group. Non-probability sampling refers to the method of extracting samples based on their convenience or subjective judgment. Non-probability sampling mainly includes occasional sampling, subjective sampling, quota sampling, snowball sampling, etc.

The sampling process is divided into three steps: the first step is to distribute the questionnaire to the staff of GG Talent Network and ask them to help them to the group's corporate managers and ask them to help issue questionnaires. In the second step, convenient sampling is adopted. The law distributes the questionnaire to the high-level managers of the Guangxi SMEs so that researchers can review it; the third step is to distribute the respondents who have received the questionnaire to other managers of their company or the high-level in Guangxi who are sampled by snowballs. Manager. Snowball sampling is a method that is used when the sample is challenging to find. It refers to a method by which researchers find a few research participants and then ask them to help look for similar respondents (QesumonPro, N.D.).

Measurement of Variable

A questionnaire will measure the variables. The SMEs of Guangxi questioned the 361 middle and senior managers research on the impact of TIC on financial performance and growth performance of SMEs in Guangxi. The questionnaire consists of 4 parts, a total of 59 questions. It includes:

Part 1: Personal information. There are four questions in this part (: gender, age, education, occupation.)

Part 2: Technological Innovation Capability. This part of the 49 measurement indicators involved seven factors involved in 7 factors of technological innovation capabilities.

Part 3: Financial performance. There are 3 problems in this part.

Part 4: Growth performance. There are three problems in this part.

The rating level of parts 1-3 is level 5, as shown below:

Strongly Agree	=	5
Agree	=	4
Neutral	=	3
Lower agree	=	2
Lowest agree	=	1

Scale	Range
Strongly Agree	4.21-5.00
Agree	3.41-4.20
Neutral	2.61-3.40
Lower agree	1.81-2.60
Lowest agree	1.00-1.80

Figure 3 Interpretation Scale of Descriptive Statistics

The table above shows the scale range based on the questionnaire. These ranges will be used to explain the mean and standard deviation of performance.

Research Instrument

One of the most integral parts of research is data collection. The generation of data for this study is solely obtained from primary data collection. There are various methods to attain data through observations, interviews, or questionnaires in survey research. This study then applied the questionnaire method as it is known to have the advantage of obtaining data efficiently in terms of cost, time, and energy (Sekaran & Bougie, 2013). Using a questionnaire, respondents were asked questions related to the tested variables. These issues are reflected in Appendix 1.

The way is to use questionnaires to make questionnaires and distribute the two-dimensional code. After that, the corresponding social software will be used to communicate and investigate the questionnaire through social software, such as WeChat, QQ, Douyin, and other channels. Finally, the relevant software is used to analyze the collected data statistically.

Pretesting of the Instrument

Reliability Analysis

Reliability analysis can be understood as the determination of the level of consistency by using the same survey and analysis means and repeated measurement based on the established survey objects. In the analysis process, the author chose Cronbach's alpha as the reliability to quantify the internal consistency and the reliability of the questionnaire. Generally speaking, this indicator is above 0.7, which means it is trusted. Regarding the check for Reliability Analysis, when the questionnaire review has been completed, the researcher tests the questionnaire with population characteristics close to the actual sample (Pre-test) with 44 sets. Then, these tables as follow is the confidence test results of this questionnaire, which is based on Cronbach's Alpha coefficient formula:

Table 1 Cronbach's Alpha for Independent Variables

Independent Variables	Cronbach's Alpha	Number of items
X1.Learning capability	.898	7
X2.R&D capability	.949	9
X3.Resource allocation capability	.925	7
X4.Manufacturing capability	.920	7
X5.Marketing capability	.939	7
X6.Organizing capability	.932	6
X7.Strategy planning capability	.933	6

Table 2 Cronbach's Alpha for Dependent Variables

dependent Variables	Cronbach's Alpha	Number of items
Financial Performance	.869	3
Growth performance	.856	3

Remark: Mean and Standard Deviation for all Variables (see appendix 2).

Data Gathering

This study uses questionnaire surveys to collect data. The data collection step uses the "Questionnaire Star "platform to make questionnaires. Generate questionnaire links and QR codes through the platform to facilitate the distribution of questionnaires to corresponding groups.

The questionnaire collection process was as follows:

1. The researcher separated the sample in this study into three groups according to company sizes: Medium, Small, and Micro. According to the 2021 Statistical Yearbook data, private industrial enterprises include medium-sized, small, and micro-enterprises. Their numbers are 306, 4879, and 750, respectively. This study used a quota random sampling method for sampling design.

2. Researcher distributed questionnaires to the three groups of samples via online mediums. It mainly used WeChat and QQ channels to distribute and collect questionnaires, with email assistance.

First of all, the questionnaire was collected thanks to the help of the staff of GG Talent Network because they have enterprise groups and get the manager's permission to distribute the questionnaires. Secondly, the researcher herself is engaged in human resources work, has specific enterprise resources, and also has corresponding enterprise work groups, such as enterprise social insurance group, enterprise housing provident fund group, etc. Most people in the groups are

enterprise human resources management workers or financial managers. Permission was sought from the work group managers to distribute the questionnaire in the enterprise work groups, and the relevant personnel were cordially invited to forward the questionnaire on behalf of the relevant enterprises. Thirdly, my workplace, which employs several industry experts from enterprises, was supported by these industry professionals when doing the test and the formal questionnaires. Finally, my brother's enterprise is engaged in the sugar manufacturing industry, and He's the head of one of the departments in the business. He has peer resources in the enterprise, and some of the questionnaires were asked to be distributed on behalf of my brother and my friends. The questionnaire collection started in March 2023 and ended in May. The number of questionnaires distributed and the number of valid questionnaires collected

Table 3 The number of questionnaires distributed and the number of valid questionnaires collected

Business Type	Number of questionnaires distributed	Number of valid questionnaires collected
Medium-sized enterprise	36	19
Small sized enterprise	552	296
Micro enterprise	86	46
total	681	361

Analysis of Data

In this part, the researchers used statistical software to analyze the quantitative data, and the findings were utilized to analyze the questionnaire data and perform inferential analysis. The analysis is performed based on the research hypothesis.

Descriptive Statistics

The descriptive statistical analysis method was adopted, the investigation object's information elements were analyzed and analyzed, and relevant data were obtained on this basis, including descriptive statistical analysis of samples and descriptive statistical analysis of variables. The descriptive statistical content in this study is Part 1: Personal information. Include gender, age, education, and occupation.); Part 2: Technological Innovation Capability; Part 3: Financial performance. Part 4: Growth performance.

Hypothesis testing

H1: Technological Innovation Capabilities positively impact the financial performance of SMEs in Guangxi.

Independent variable: Technological Innovation Capability.

Dependent variable: financial performance (FP).

Technological innovation capabilities positively impact the growth performance of SMEs in Guangxi.

Independent variable: Technological Innovation Capability.

Dependent variable: growth performance (GP).

The study uses data to test the influence of independent variables Technological Innovation Capability, on the dependent variable financial performance and growth performance through multiple regression analysis.

Set the independent variables' Learning capability, R&D capability, Resource allocation capability, Manufacturing capability, Marking capability, Organizing capability, and strategic planning capability. Perform regression models with Financial Performance and Growth Performance to test the influence of independent variables on dependent variables.

CHAPTER IV
RESULTS

In this chapter, in the logical order of Chapter 3, the data collected from the questionnaire will be analyzed.

The results from a survey that a sample of 361 respondents who matched our criteria for targeting completed are presented in this chapter. March to May 2023, the information was gathered. The findings are segmented into descriptive statistics and inferential analyses of hypotheses. The regression analysis was carried out by using SPSS to see if technological innovation capabilities will affect the financial performance and growth performance of SMEs in Guangxi.

Descriptive Statistics

General Demographic Description

This part illustrates the general demographic data of the respondents. Gender, Age, Education and Position.

Table 4 Gender

Demographic Characteristics		Frequency	Percent
Gender	male	192	53.2
	female	169	46.8

Table 4 shows majority respondent 46.8% are female and 53.2% are male.

Table 5 Age

Demographic Characteristics		Frequency	Percent
Age	Age 21-30	26	7.2
	Age 31-40	241	66.8
	41 to 50 years old	83	23.0
	Over 51 years old	11	3.0

Table 5 shows respondent 7.2% are Age 21-30, 66.8% are Age 31-40, 22.3% are 41 to 50 years old, 3.0% are Over 51 years old.

Table 6 Education

Demographic Characteristics		Frequency	Percent
Education	Associate Degree	32	8.9
	Undergraduate	223	61.8
	Master's Degree	83	23.0
	PHD and above	23	6.4

Table 6 shows majority respondent 8.9% is Associate Degree, 61.8.% is Undergraduate, 23% is Master, 6.4% is PHD and above.

Table 7 Position

	Demographic Characteristics	Frequency	Percent
Position	Marketing Manager	55	15.2
	Financial Manager	69	19.1
	Human Resources Manager	58	16.1
	Production manager	28	7.8
	Marketing Director	21	5.8
	Chief Financial Officer	29	8.0
	Director of Human Resources	25	6.9
	Other Department managers	44	12.2
	General Manager and above	32	8.9

Table 7 shows majority respondent 15.2% is Marketing Manager, 19.1% is Financial Manager, 16.1% is Human Resources Manager, 7.8% is Production manager, 5.8% is Marketing Director, 8.0% is Chief Financial Officer, 6.9% is Director of Human Resources, 12.2% is Other Department managers, 8.9% is General Manager and above.

Descriptive Results of the Variables

Table 8 Mean, Standard Deviation and Meaning of Learning capability

Learning Capability	$\bar{X}$	S.D.	Meaning
1.Your company systematically monitors technology development trends.	4.03	.929	agree
2.Your company assesses technologies relevant to firm's business strategy.	4.04	.916	agree

Table 8 (Continued)

Learning Capability	$\bar{X}$	S.D.	Meaning
3.Your company encourages work teams to identify opportunities for improvement.	4.28	1.044	Strongly Agree
4.Your company assimilates accessed knowledge.	3.89	1.047	agree
5.Your company understands firm's core capabilities and match it with market needs.	3.89	1.077	agree
6.Your company passes lessons learned across boundaries and time.	3.66	1.079	agree
7.Your company promotes learning culture and invests on learning.	3.91	1.143	agree
Total Learning Capability Mean	3.96	1.034	agree

The above table explained about the mean and standard deviations of all the items of Learning capability. The last item describes the total mean and standard deviation of product scale. Among the seven dimensions, LC3 received the highest mean score of 4.28 (SD=1.044), followed by LC2 with a mean score of 4.04 (SD=0.916), LC1 with a mean score of 4.03 (SD=0.929), LC7 with a mean score of 3.91 (SD=1.143),LC4 with a mean score of 3.89 (SD=1.047),LC5 with a mean score of 3.89 (SD=1.077)and LC6 with a mean score of 3.66 (SD=1.079).Through the analysis of the data collection, it was concluded that the seven dimensions of the variable received a high level of agreement with an average of 3.96, and this score is considered a high level of agreement.

Table 9 Mean, Standard Deviation and Meaning of R&D capability

R&D Capability	$\bar{X}$	S.D.	Meaning
1.Multi-functional departments are involved in concept development and screening of new product.	4.11	.992	agree
2.Your company has highly efficient communication among R&D personnel.	4.09	.971	agree
3.Your company apply advanced designing methods, such as concurrent engineering.	4.19	.903	agree
4.Your company has high quality and quick feedback from manufacturing to design and engineering.	4.07	.933	agree

Table 9 (Continued)

R&D Capability	$\bar{X}$	S.D.	Meaning
5.Your company has good mechanisms for transferring technology from basic research to new product development.	3.83	1.090	agree
6.Your company has great extent of market's and customer's feedback into innovation process.	4.00	.983	agree
7.Your company has high level of investment in new products.	3.89	.886	agree
8.Your company has high level of investment in new process.	3.97	.878	agree
9.Your company has high percentage of R&D personal in firm's total employment.	3.73	.960	agree
Total R&D Capability Mean	3.99	.96	agree

The above table explained about the mean and standard deviations of all the items of R&D Capability. The last item describes the total mean and standard deviation of product scale. Among the nine dimensions, RDC3 received the highest mean score of 4.18 (SD=0.903), followed by RDC1 with a mean score of 4.11 (SD=0.992), RDC32with a mean score of 4.09 (SD=0.971), RDC4 with a mean score of 4.07 (SD=0.993),RDC6 with a mean score of 4.0(SD=0.983),RDC8 with a mean score of 3.97 (SD=0.878),RDC7 with a mean score of 3.89 (SD=0.886), RDC5with a mean score of 3.83 (SD=1.09), and RDC9 with a mean score of 3.73 (SD=0.96).Through the analysis of the data collection, it was concluded that the nine dimensions of the variable received a high level of agreement with an average of 3.99, and this score is considered a high level of agreement.

Table 10 Mean, Standard Deviation and Meaning of Resource allocation capability

Resource allocation capability	$\bar{X}$	S.D.	Meaning
1.Your company can attach importance to human resource.	2.9	1.641	Neutral
2.Your company plan human resource in phase.	2.94	1.609	Neutral
3.Your company can select appropriate personnel in each functional department in innovation process.	2.88	1.545	Neutral

Table 10 (Continued)

Resource allocation capability	$\overline{X}$	S.D.	Meaning
4.Your company can provide steady capital supplement in innovation activity.	2.04	1.129	Lower agree
5.Your company fully use external technologies.	2.43	1.307	Neutral
6.Your company understand competitor 's core technologies.	2.69	1.337	Neutral
7.Your company adapt it's technology level to changes in external environment.	2.51	1.265	Lower agree
Total Resource allocation capability Mean	2.63	1.265	Neutral

The above table explained about the mean and standard deviations of all the items of Manufacturing Capability. The last item describes the total mean and standard deviation of product scale. Among the seven dimensions, MC6 received the highest mean score of 4.11 (SD=1.009), followed by MC7 with a mean score of 4.01 (SD=0.928), MC4 with a mean score of 3.92 (SD=0.96), MC2 with a mean score of 3.9 (SD=1.002), MC3 with a mean score of 3.89 (SD=0.817),MC5 with a mean score of 3.75 (SD=0.986) and MC1 with a mean score of 3.74(SD=1.011).Through the analysis of the data collection, it was concluded that the seven dimensions of the variable received a high level of agreement with an average of 3.9, and this score is considered a high level of agreement.

Table 11 Mean, Standard Deviation and Meaning of Manufacturing capability

Manufacturing capability	$\overline{X}$	S.D.	Meaning
1.Your company can attach importance to human resource.	3.74	1.011	agree
2.Your company plan human resource in phase.	3.90	1.002	agree
3.Your company can select appropriate personnel in each functional department in innovation process.	3.86	.817	agree
4.Your company can provide steady capital supplement in innovation activity.	3.92	.960	agree
5.Your company fully use external technologies.	3.75	.986	agree

Table 11 (Continued)

Manufacturing capability	$\overline{X}$	S.D.	Meaning
6.Your company understand competitor 's core technologies.	4.11	1.009	agree
7.Your company adapt it's technology level to changes in external environment.	4.01	.928	agree
Total Manufacturing Capability Mean	3.9	.959	agree

The above table explained about the mean and standard deviations of all the items of Manufacturing Capability. The last item describes the total mean and standard deviation of product scale. Among the seven dimensions, MC6 received the highest mean score of 4.11 (SD=1.009), followed by MC7 with a mean score of 4.01 (SD=0.928), MC4 with a mean score of 3.92 (SD=0.96), MC2 with a mean score of 3.9 (SD=1.002), MC3 with a mean score of 3.89 (SD=0.817),MC5 with a mean score of 3.75 (SD=0.986) and MC1 with a mean score of 3.74(SD=1.011).Through the analysis of the data collection, it was concluded that the seven dimensions of the variable received a high level of agreement with an average of 3.9, and this score is considered a high level of agreement.

Table 12 Mean, Standard Deviation and Meaning of Marking capability

Marking capability	$\overline{X}$	S.D.	Meaning
1.Your company has good relationship management with major customers.	4.29	.907	Strongly Agree
2.Your company has good knowledge of different market segments.	4.25	.716	Strongly Agree
3.Your company has highly effective marketing intelligence systems.	3.97	1.067	agree
4.Your company has high sales-force efficiency.	4.01	.943	agree
5.Your company provides good performance of after-sale services.	4.11	1.038	agree
6. Your company closely tracks customer satisfaction level.	4.23	.798	Strongly Agree
7.Your company well maintains brand image and corporate image.	4.17	.937	agree
Total Marking Capability Mean	4.15	.915	agree

The above table explained about the mean and standard deviations of all the items of Marking Capability Capability. The last item describes the total mean and standard deviation of product scale. Among the seven dimensions, MKC1 received the highest mean score of 4.29 (SD=0.097), followed by MKC2 with a mean score of 4.25 (SD=0.716), MKC6 with a mean score of 4.23 (SD=0.798), MKC7 with a mean score of 4.17 (SD=0.937), MKC5 with a mean score of 4.11 (SD=1.038),MKC4 with a mean score of 4.01 (SD=0.943) and MKC3 with a mean score of 3.97 (SD=1.069).Through the analysis of the data collection, it was concluded that the seven dimensions of the variable received a high level of agreement with an average of 4.15, and this score is considered a high level of agreement.

Table 13 Mean, Standard Deviation and Meaning of Organizing capability

Organizing capability	$\overline{X}$	S.D.	Meaning
1.Your company can flexibly adjust the organization structure Each sub-units in your company gain entity.	4.01	1.007	agree
2.Your company can handle multiple innovation projects in parallel.	3.98	.850	agree
3.Your company has good coordination and cooperation of R&D, marketing, and manufacturing department.	4.11	.801	agree
4.Your company has good communication between major suppliers and major customers.	3.97	.933	agree
5.Your company has high-level integration and control of the major functional departments with company.	3.96	.953	agree
6.Your company has effective mechanisms to track progress of innovation process.	4.14	.886	agree
Total Organizing Capability Mean	4.03	.905	agree

The above table explained about the mean and standard deviations of all the items of Organizing Capability. The last item describes the total mean and standard deviation of product scale. Among the six dimensions, OC6 received the highest mean score of 4.14 (SD=0.886), followed by OC3 with a mean score of 4.11(SD=0.801), OC1 with a mean score of 4.01 (SD=1.077), OC2 with a mean score of 3.98 (SD=0.85),OC4 with a mean score of 3.9 7(SD=0.933) and OC5 with a mean score of 3.96 (SD=0.953).Through the analysis of the data collection, it was concluded that

the seven dimensions of the variable received a high level of agreement with an average of 4.03, and this score is considered a high level of agreement

Table 14 Mean, Standard Deviation and Meaning of Strategic planning capability

Strategic planning capability	$\overline{X}$	S.D.	Meaning
1.Your company has great extent of contingency thinking and planning.	4.00	1.065	agree
2.Your company is able to identify internal strengths and weaknesses.	3.75	1.065	agree
3.Your company is able to identify external opportunities and threats.	3.94	1.097	agree
4.Your company has clear goals.	3.97	.987	agree
5.Your company has clear plan - a road map of new product and process with measurable milestones.	3.68	1.432	agree
6.Your company is highly adapted and responsive to external environment.	3.97	1.052	agree
Total Strategic planning Capability Mean	3.89	1.12	agree

The above table explained about the mean and standard deviations of all the items of Strategic planning Capability. The last item describes the total mean and standard deviation of product scale. Among the six dimensions,SC1 received the highest mean score of 4.0 (SD=1.065), followed by SC4 with a mean score of 3.97 (SD=0.987), SC6 with a mean score of 3.97 (SD=1.052), SC3 with a mean score of 3.94 (SD=1.097), SC2 with a mean score of 3.75 (SD=1.065) and SC5 with a mean score of 3.68 (SD=1.432).Through the analysis of the data collection, it was concluded that the seven dimensions of the variable received a high level of agreement with an average of 3.89, and this score is considered a high level of agreement.

Table 15 Mean, Standard Deviation and Meaning of Financial Performance

Financial Performance	$\overline{X}$	S.D.	Meaning
1.Compared with competitors in the industry, the company has a good profitability.	3.96	1.039	agree
2.Compared with the competition in the industry, the company has a higher market share.	3.97	.802	agree

Table 15 (Continued)

Financial Performance	$\overline{X}$	S.D.	Meaning
3.Compared with competitors in the industry, the company has a higher sales growth rate.	4.06	.840	agree
Total Financial Performance Mean	4.0	.894	agree

The above table explained about the mean and standard deviations of all the items of Financial Performance. The last item describes the total mean and standard deviation of product scale. Among the three dimensions, FP3 received the highest mean score of 4.06 (SD=0.84), followed by FP2 with a mean score of 3.97 (SD=0.802) and FP1 with a mean score of 3.96 (SD=1.039). Through the analysis of the data collection, it was concluded that the three dimensions of the variable received a high level of agreement with an average of 4.0, and this score is considered a high level of agreement.

Table 16 Mean, Standard Deviation and Meaning of Growth Performance

Financial Performance	$\overline{X}$	S.D.	Meaning
1.The company's scale expansion speed is fast.	3.81	.987	agree
2.The company's future employee growth is expected to be faster.	3.81	.986	agree
3.The company can attract and retain employees who have better quality.	4.09	.940	agree
Total Growth Performance Mean	3.90	.971	agree

The above table explained about the mean and standard deviations of all the items of Growth Performance. The last item describes the total mean and standard deviation of product scale. Among the three dimensions, GP3 received the highest mean score of 4.06 (SD=0.84), followed by GP1 with a mean score of 3.81 (SD=0.987) and GP2 with a mean score of 3.81 (SD=0.986). Through the analysis of the data collection, it was concluded that the three dimensions of the variable received a high level of agreement with an average of 4.0, and this score is considered a high level of agreement.

Hypothesis Testing

Multiple Regression Analysis

H1: Technological Innovation Capability has a positive impact on the financial performance of SMEs in Guangxi.

Independent variable:Technological Innovation Capability

Dependent variable: financial performance (FP)

H2: Technological innovation capability has a positive impact on the growth performance of SMEs in Guangxi.

Independent variable:Technological Innovation Capability

Dependent variable: growth performance (GP)

The study uses data to test the influence of independent variables Technological Innovation Capability on the dependent variable financial performance and growth performance through multiple regression analysis. The results are shown in Table 17-20.

Results of Multiple Regression Analysis

Set the independent variables Learning capability, R&D capability, Resource allocation capability, Manufacturing capability, Marking capability, Organizing capability, Strategic planning capability; Perform regression models with Financial Performance and Growth Performance to test the influence of independent variables on dependent variables.

Table 17 Model Summary of Financial Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson	F	Sig.
1	.926[a]	.858	.855	.31239	1.393	304.798	.000

The model fit is shown in Table 17, Adjusted R Square is 0.855, indicating that the independent variable can explain 85.5% of the variation in the dependent variable; Durbin-Watson value is 1.393 less than 3, F value is 304.798, significance level is less than 0.05, the model fit is good.

Table 18 Coefficients

Model	B	Std. Error	Beta	t	Sig.	VIF
(Constant)	-.835	.168		-4.965	.000	
Learning capability	.038	.029	.038	1.300	.194	2.169
R&D capability	.005	.038	.005	.129	.898	3.108
Resource allocation capability	.131	.019	.195	6.876	.000	2.008
Manufacturing capability	.122	.033	.120	3.722	.000	2.580
Marking capability	.209	.038	.209	5.505	.000	3.573
Organizing capability	.279	.030	.349	9.430	.000	3.403
Strategic planning capability	.469	.040	.463	11.697	.000	3.898

*$p<0.05$ **$p<0.01$

The specifics of the fitted coefficients of the model are shown in Table 18 where the effects of all variables on the dependent variable are significant except Learning capability and R&D capability. The coefficients of the independent variables on the dependent variable are all greater than 0, indicating that the independent variables have a positive effect on the dependent variable. All hypotheses are valid except the hypothesis that Learning capability and R&D capability have a positive effect on Financial Performance.

Table 19 Model Summary of Growth Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson	F	Sig.
1	.918	.842	.839	.35054	1.067	269.242	.000

The model fit is shown in Table 19, Adjusted R Square is 0.839, indicating that the independent variable can explain 83.9% of the variation in the dependent variable; the Durbin-Watson value is 1.067 less than 3 and the F value is 269.242, the significance level is less than 0.05, the model fit is good.

Table 20 Coefficients

Model	B	Std. Error	Beta	t	Sig.	VIF
(Constant)	-1.106	.189		-5.865	.000	
Learning capability	.066	.033	.062	2.007	.046	2.169
R&D capability	.164	.042	.144	3.853	.000	3.108
Resource allocation capability	.104	.021	.146	4.867	.000	2.008
Manufacturing capability	.076	.037	.070	2.052	.041	2.580
Marking capability	.150	.043	.141	3.524	.000	3.573
Organizing capability	.229	.033	.269	6.898	.000	3.403
Strategic planning capability	.497	.045	.461	11.052	.000	3.898

*p<0.05 **p<0.01

The specifics of the fitted coefficients of the models are shown in Table 20. The effects of the independent variables on the dependent variables are all significant, p<0.05, and the coefficients of the independent variables on the dependent variables are all greater than 0, indicating that the independent variables have a positive effect on the dependent variables, and the hypotheses are all valid.

CHAPTER V
SUMMARY AND DISCUSSION

Summary

The study's main objective was the influence of Research on the impact of technological innovation capabilities on the financial performance and growth performance of SMEs in Guangxi. Thus, this study will explain the following research questions:

1. Whether technological innovation capabilities will affect the financial performance of SMEs in Guangxi.

2. Whether technological innovation capabilities will affect the growth performance of SMEs in Guangxi.

This study conducted a quantitative survey with a sample size of 361 valid respondents. The information was gathered from March to May 2023 by WJX, a Chinese online survey platform. The findings are segmented into descriptive statistics and hypothesis testing. The regression analysis was carried out using SPSS to see if TIC affected the financial performance and growth performance of SMEs in Guangxi. The questionnaire is categorized into four sections (59 items): screening questions 5-point Likert scale charts about TIC.

Firstly, the study checked the scale's validity and reliability. The Cronbach's Alpha values for the seven variables are higher than 0.07, which is acceptable. This study used SPSS to assess the questionnaires from 361 samples, and the statistics for each question are described using descriptive statistical methods, including: 1) the general demographic description (frequency and percentage), 2) mean, standard deviation, and Meaning of TIC, financial performance, growth performance.

Secondly, Multiple Regression Analysis was used to test the following two hypotheses:

H1: Technological Innovation Capability positively impacts the financial performance of SMEs in Guangxi.

H2: Technological innovation capabilities positively impact the growth performance of SMEs in Guangxi.

Demographic

Through descriptive statistical analysis of the basic information, it is summarized that among the respondents, there are more males than females, the most age in the stage of 31-40 years old, the most education in the location of Bachelor's Degree, and terms of the position, the most significant proportion of financial managers. Sample proportions meet requirements.

Hypotheses Testing Conclusion

H1: Technological Innovation Capability positively impacts the financial performance of SMEs in Guangxi.

The results from multiple regression analysis show five independent variables positively affect the dependent variable (FP): Learning capability and R&D capability were insignificant with $P > 0.05$, and the hypothesis was invalid.

These seven independent variables can explain the effects on dependent variables (FP) for 85.5 percent (R 2 adj = 0.855). Except for Learning capability and R&D capability (Sig. .194 and .898), the other Sigs. are .000, and the assumption holds. Therefore, H1 is supported. Additionally, among these seven independent variables, the most influential factor towards Financial performance is Strategic planning capability, with a Beta value of 0.463.

H2: Technological innovation capability positively impacts the growth performance of SMEs in Guangxi.

The results from multiple regression analysis show there are seven independent variables that positively affect the dependent variable (GP):

These seven independent variables can explain the effects on dependent variables (GP) for 83.9 percent (R 2 adj = 0.839), and the equation obtained from the stepwise multiple regression analysis is statistically significant at 0.05. Therefore, H2 is supported. Additionally, among these seven independent variables, the most influential factor towards the growth performance is Strategic planning capability, with a Beta value of 0.461.

Discussion

As Chapter 2 of this paper mentions，the Theories of technological innovation capabilities mentioned by several researchers, and the Financial Performance and Growth Performance Theories all provide solid theoretical support for the theoretical analysis and case analysis of this article.

It was found that except for learning capability and R&D capability ($P > 0.05$), Resource allocation capability, manufacturing capability, marketing capability, organizing capability, and strategic planning capability have a positive and significant effect on the financial performance of SMEs in Guangxi and the hypothesis holds. Technological innovation capability has a positive and significant impact on the growth performance of SMEs in Guangxi, and the hypothesis holds. This Research also confirmed that the technological Innovation Capability Model (TIC) can be used on SMEs' financial performance and growth performance. The hypotheses are valid.

Hypothesis 1: Technological Innovation Capability positively impacts the financial performance of SMEs in Guangxi.

For H1, the study results show that most respondents believe that Resource allocation, manufacturing, marketing, organizational, and strategic planning capabilities positively affect the financial performance of SMEs in Guangxi. The results of this survey study are similar to those of Wang Xigang (2016), Liang, H.S., Wei, J. & Wan X.M. (2018), Zhang, S. & Yang, Q. (2021), Huang, Y.W., & Yiyao Li. (2019) and Nai-Ping Zhu (2019) mentioned in Chapter 2 Theory. They all think that technological innovation capability has a significant positive impact on firm performance.

Learning capability and R&D capability have a negative effect on financial performance. The results of this survey study are similar to those of Jiaqi Dong (2022) and Yam et al. (2004). Dong (2022) mentions technological innovation capability as a variable of innovation capability; through the study of the impact of innovation capability on firm performance of green food enterprises in Heilongjiang Province under a crisis, concluded that innovation capability has a positive effect on the performance of food enterprises as a whole. Still, technological innovation capability has no significant positive impact on financial performance. The time lag effect mainly explains the insignificant effect of learning capability and R&D capability on financial performance. The time lag effect represents the causality of things, which widely exists in nature and human society. The promotion effect of R&D investment on a firm's development can be divided into direct and indirect impacts, but both products are dynamic and have a time lag effect. (Xu, D.L., and Guo, 2007) argue that the time lag effect of R&D investment on firm value is essentially a monetary time lag effect. Through extensive empirical studies, Milton Friedman (1912-2006) found that it takes about 6 to 9 months for a change in the money growth rate to cause a change in the nominal income rate and another 6 to 9 months to cause a change in prices, i.e., there is a total lag of about 12 to 18 months from money growth to price increase. (Yin, He, Fan, Xingyue, and Feng, Jiacong, 2017), through an empirical analysis of the impact of R&D investment on firm value of high-tech companies in China, found that there is a time lag effect on the impact of their R&D investment on firm value, with a lag of one to five years.

To sum up, although the questionnaire results show that the influence of learning capability and R&D capability on financial performance is not significant, it does not indicate that enterprises do not need to strengthen learning capability and R&D capability; just the opposite, for SMEs, it is precisely necessary to pay attention to learning capability and strengthen R&D capability, and at the same time reasonably coordinate and deal with the relationship between various TIC capabilities, so that enterprises can obtain better competitiveness.

Hypothesis 2: Technological innovation capabilities positively impact the growth performance of SMEs in Guangxi.

For H2, the study's results indicate that most respondents believe that TIC positively affects the growth performance of SMEs in Guangxi. The results of this study are similar to those of Wang, J. & Liu, D.M. (2014), Wang, J.W., Fan, L. L. & Liu, L. (2021), Zhang, C.X. et al. (2022), and Samuel Gyedu et al. (2021)

Wang, J. & Liu, D. M. (2014) conducted a study from the perspective of environmental regulation. They found that technological innovation within the scope of ecological permissibility is beneficial to the firm's overall performance growth. Wang, J.W., Fan, L.L., & Liu, Lu. (2021), through a related performance function established by production functions, showed that firms generate optimal technological innovation patterns in technological innovation, thus determining the technological innovation route, which brings excellent value-added to firm growth. By constructing the relationship between technological capabilities and development patterns of Chinese manufacturing firms, Zhang Chungxin et al. (2022) concluded that the technological innovation capabilities of firms influence the growth performance of firms with the help of two forms, either directly or indirectly. Ding, B., Zhang, J.J., & Yang, B. J. (2022). Technological innovation capability positively affects firm growth performance.

In conclusion, in the context of economic globalization, the strength of science and technology innovation directly and profoundly affects the economic strength, as well as the competition between countries and enterprises, and the ability to master more advanced science and technology is sufficient to support an enterprise to endure, showing the importance of technological innovation capability to the growth of SMEs.

Recommendations

Based on the results of the study, the following recommendations are given to managers of SMEs in Guangxi to improve the competitiveness and performance of their enterprises:

1. Enterprises should strengthen their learning capabilities by systematically monitoring technology trends, evaluating technologies that are relevant to the company's business strategy on time, encouraging work teams to look for opportunities for improvement, assimilating acquired knowledge, understanding the company's core competencies and matching them to market needs, advocating the transfer of lessons learned across national boundaries and over time, as well as advocating a culture of learning and investing in learning.

2. Pay attention to cultivating enterprise technology innovation capability and developing Technological talent. Within a reasonable range of inputs and outputs, it is appropriate to increase the R&D capacity of enterprises.

3. Improve enterprises' innovation and marketing capability and establish brand awareness. Innovative marketing capability as a backup support capacity for technological innovation to improve the innovative marketing capability of enterprises, in addition to the training of marketing team talents and the introduction, but also a clear understanding of market demand and the marketing environment. To measures to gradually realize the transformation and upgrading of enterprises, in which to strengthen the role of internalization of enterprises, but also good at seizing external development opportunities, and gradually improve enterprises' innovative marketing capabilities to expand enterprises' market recognition.

4. For the enterprise's employees, the company should take appropriate incentives to fully mobilize the staff's enthusiasm to work, play the staff's innovation and creativity, enhance teamwork ability, and enhance the staff's sense of corporate identity.

5. Enterprises should consider a more balanced focus on the coordinated improvement of their TIC. To maintain sustainable development, plan and implement innovation strategies effectively, and improve the overall innovation capabilities of firms, Chinese firms should closely link their TICs to developing technology strategies and coordinating innovation and R&D activities.

Limitations of the Study

Overall, the Research was successfully conducted with acceptable and reasonable results. The two hypotheses are accepted and similar to previous empirical studies from the literature review. However, there are a few limitations of this study that can be noticed for an improvement of future studies as follows:

1. In terms of data collection, the main way of collecting raw data in this paper is a questionnaire survey. However, the data can pass a series of tests after screening and has certain scientific validity; the data formation process is inevitably affected by the subjectivity of the sample.

2. The sample size is limited regarding the SMEs of private industrial enterprises in Guangxi as the research object. The number of data collected is determined considering the existing capacity of the authors, whether it can be applied to all SMEs, and whether such generalizability is to be studied.

3. The results of data analysis are subject to several major limitations. The interpretations must, therefore, be regarded as tentative rather than definitive in the long term since the data are obtained from senior managers in the firms. The firms themselves are often not the best judges of their performance.

Future Research

       1. For future Research, the questionnaire content can be increased: the type of enterprise, the number of years the enterprise was established, the number of years the manager has been working, and other basic information to facilitate the understanding of more information about the enterprise, Industry Type and increase the reliability.

       2. The impact of the technological innovation capability of enterprises in different provinces, cities, and industries on enterprise performance can be studied, and consideration can be given to adding the dimension of the technological innovation capability of enterprises. It can also be considered to learn the coordination of technology strategy formulation and technology innovation capability activities of Chinese enterprises.

       3. The study starts from the perspective of technological innovation capability and does not consider factors such as domestic and international market environment, cultural differences, management differences, etc. Future studies can be regarded as in these aspects to enrich the relevant Research. Meanwhile, many factors affect SMEs' financial performance and growth performance, and technological innovation capability is only a part of them. Other variables can be considered to be added for future Research.

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APPENDICS

APPENDIX A

QUESTIONNAIRE

**Technological Innovation Capability Impacts to Financial Performance
and Growth Performance of enterprises**

Dear Sir/Madam.

Hello! First of all, thank you very much for your sincerity in filling out this questionnaire, which aims to understand the impact of technology innovation capability (TIC) on the financial performance and growth performance of enterprises. Secondly, the questionnaire was conducted using anonymous means and the results of the survey are intended for this master's thesis research only and do not involve any commercial use. Finally, please fill in the questionnaire according to the actual situation of your company, your filling in will be of great help to this research, thank you for your great support!

Part I: Basic personal information (single choice)

INSTRUCTION: Please Check ☑ that describes you best.

1. Your gender: (Single -choice question)
   ☐ man   ☐ women
1. Age: (Single -choice questions)
   ☐ 21-30 years old   ☐ 31-40 years old
   ☐ 41-50 years old   ☐ over 51 years old
2. Education: (single selection questions)
   ☐ Associate Degree   ☐ undergraduate
   ☐ master's degree   ☐ Dr. and above
3. Position: (Single -choice question)
   ☐ Marketing Manager
   ☐ Financial Manager
   ☐ Human resource Manager
   ☐ Production Manager
   ☐ Marketing Director
   ☐ Chief Financial Officer
   ☐ HR Director
   ☐ Other department managers
   ☐ General Manager and above

Part II: Technological innovation capability (single choice)

INSTRUCTION: Please read the questions carefully, and rate it by check that matches how strongly you Agree / Disagree which the following statement.

5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, 1 = Strongly Disagree

X1. Learning capability

Learning capability	Level of Agreement				
	1	2	3	4	5
1.Your company systematically monitors technology development trends.					
2.Your company assesses technologies relevant to firm's business strategy.					
3.Your company encourages work teams to identify opportunities for improvement.					
4.Your company assimilates accessed knowledge.					
5.Your company understands firm's core capabilities and match it with market needs.					
6.Your company passes lessons learned across boundaries and time					
7.Your company promotes learning culture and invests on learning.					

X2. R&D capability

R&D capability	Level of Agreement				
	1	2	3	4	5
1.Multi-functional departments are involved in concept development and screening of new product.					
2.Your company has highly efficient communication among R&D personnel.					
3.Your company apply advanced designing methods, such as concurrent engineering.					
4.Your company has high quality and quick feedback from manufacturing to design and engineering.					
5.Your company has good mechanisms for transferring technology from basic research to new product development.					
6.Your company has great extent of market's and customer's feedback into innovation process.					
7.Your company has high level of investment in new products.					
8.Your company has high level of investment in new process.					
9.Your company has high percentage of R&D personal in firm's total employment.					

X3. Resource allocation capability

Resorce allocation capability	Level of Agreement				
	1	2	3	4	5
1.Your company can attach importance to human resource.					
2.Your company plan human resource in phase.					
3.Your company can select appropriate personnel in each functional department in innovation process.					
4.Your company can provide steady capital supplement in innovation activity.					
5.Your company fully use external technologies.					
6.Your company understand competitor 's core technologies.					
7.Your company adapt it's technology level to changes in external environment.					

X4. Manufacturing capability

Manufacturing capability	Level of Agreement				
	1	2	3	4	5
1.Your manufacturing department has great contribution during the conceptual design stage in innovation process.					
2.Your manufacturing department transforms R&D output into production.					
3.Your company has effectively applied advance manufacturing methods.					
4.Your company has capable manufacturing personnel.					
5.Your company has great extent which is continuously improve manufacturing system.					
6.Your company has high level of importance of overall quality control.					
7.Your company has high degree of manufacturing cost advantage.					

X5. Marketing capability

Marketing capability	Level of Agreement				
	1	2	3	4	5
1.Your company has good relationship management with major customers.					
2.Your company has good knowledge of different market segments.					
3.Your company has highly effective marketing intelligence systems.					
4.Your company has high sales-force efficiency.					

5.Your company provides good performance of after-sale services.					
6.Your company closely tracks customer satisfaction level.					
7.Your company well maintains brand image and corporate image.					

X6. Organizing capability

Organizing capability	Level of Agreement				
	1	2	3	4	5
1.Your company can flexibly adjust the organization structure Each sub-units in your company gain entity					
2.Your company can handle multiple innovation projects in parallel.					
3.Your company has good coordination and cooperation of R&D, marketing, and manufacturing department.					
4.Your company has good communication between major suppliers and major customers.					
5.Your company has high-level integration and control of the major functional departments with company.					
6.Your company has effective mechanisms to track progress of innovation process.					

X7. Strategy planning capability

Strategy planning capability	Level of Agreement				
	1	2	3	4	5
1.Your company has great extent of contingency thinking and planning.					
2.Your company is able to identify internal strengths and weaknesses.					
3.Your company is able to identify external opportunities and threats.					
4.Your company has clear goals.					
5.Your company has clear plan - a road map of new product and process with measurable milestones.					
6.Your company is highly adapted and responsive to external environment.					

Part III: Financial Performance

INSTRUCTION: Please read the questions carefully, and rate it by check that matches how strongly you Agree / Disagree which the following statement.

5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, 1 = Strongly Disagree

Financial Performance	Level of Agreement				
	1	2	3	4	5
1.Compared with competitors in the industry, the company has a good profitability.					
2.Compared with the competition in the industry, the company has a higher market share.					
3.Compared with competitors in the industry, the company has a higher sales growth rate.					

Part IV: Growth performance

INSTRUCTION: Please read the questions carefully, and rate it by check that matches how strongly you Agree / Disagree which the following statement.

5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, 1 = Strongly Disagree

Growth performance	Level of Agreement				
	1	2	3	4	5
1.The company's scale expansion speed is fast.					
2.The company's future employee growth is expected to be faster.					
3.The company can attract and retain employees who have better quality.					

APPENDIX B

Reliability Analysis

Mean and Standard Deviation for Variables

Variables		Mean	S.D.	Number of items
Learning capability	1.Your company systematically monitors technology development trends.	4.07	0.925	44
	2.Your company assesses technologies relevant to firm's business strategy.	4.16	0.713	44
	3.Your company encourages work teams to identify opportunities for improvement.	4.59	0.622	44
	4.Your company assimilates accessed knowledge.	4.23	0.743	44
	5.Your company understands firm's core capabilities and match it with market needs.	4.34	0.745	44
	6.Your company passes lessons learned across boundaries and time.	3.95	0.914	44
	7.Your company promotes learning culture and invests on learning.	4.27	0.817	44
R&D capability	1.Multi-functional departments are involved in concept development and screening of new product.	4.2	0.851	44
	2.Your company has highly efficient communication among R&D personnel.	4.2	0.823	44
	3.Your company apply advanced designing methods, such as concurrent engineering.	4.2	0.823	44
	4.Your company has high quality and quick feedback from manufacturing to design and engineering.	4.18	0.843	44
	5.Your company has good mechanisms for transferring technology from basic research to new product development.	4	0.94	44
	6.Your company has great extent of market's and customer's feedback into innovation process.	4.16	0.888	44
	7.Your company has high level of investment in new products.	4	0.863	44
	8.Your company has high level of investment in new process.	3.95	0.776	44
	9.Your company has high percentage of	3.7	0.93	44

	R&D personal in firm's total employment.			
Resource allocation capability	1.Your company can attach importance to human resource.	4.14	0.955	44
	2.Your company plan human resource in phase.	4.14	0.824	44
	3.Your company can select appropriate personnel in each functional department in innovation process.	4.09	0.858	44
	4.Your company can provide steady capital supplement in innovation activity.	4	0.889	44
	5.Your company fully use external technologies.	4.09	0.772	44
	6.Your company understand competitor 's core technologies.	3.98	0.876	44
	7.Your company adapt it's technology level to changes in external environment.	4.16	0.713	44
Manufacturing capability	1.Your manufacturing department has great contribution during the conceptual design stage in innovation process.	3.91	0.83	44
	2.Your manufacturing department transforms R&D output into production.	4.14	0.824	44
	3.Your company has effectively applied advance manufacturing methods.	4.05	0.776	44
	4.Your company has capable manufacturing personnel.	4.09	0.741	44
	5.Your company has great extent which is continuously improve manufacturing system.	4.02	0.762	44
	6.Your company has high level of importance of overall quality control.	4.39	0.754	44
	7.Your company has high degree of manufacturing cost advantage.	4.18	0.815	44
Marketing capability	1.Your company has good relationship management with major customers.	4.48	0.664	44
	2.Your company has good knowledge of different market segments.	4.3	0.734	44
	3.Your company has highly effective marketing intelligence systems.	4.18	0.87	44
	4.Your company has high sales-force efficiency.	4.2	0.795	44

	5.Your company provides good performance of after-sale services.	4.39	0.784	44
	6.Your company closely tracks customer satisfaction level.	4.36	0.718	44
	7.Your company well maintains brand image and corporate image.	4.36	0.81	44
Organizing capability	1.Your company can flexibly adjust the organization structure Each sub-units in your company gain entity	4.11	0.868	44
	2.Your company can handle multiple innovation projects in parallel.	4.14	0.765	44
	3.Your company has good coordination and cooperation of R&D, marketing, and manufacturing department.	4.16	0.713	44
	4.Your company has good communication between major suppliers and major customers.	4.32	0.674	44
	5.Your company has high-level integration and control of the major functional departments with company.	4.25	0.751	44
	6.Your company has effective mechanisms to track progress of innovation process.	4.18	0.724	44
Strategy planning capability	1.Your company has great extent of contingency thinking and planning.	4.3	0.734	44
	2.Your company is able to identify internal strengths and weaknesses.	4.23	0.831	44
	3.Your company is able to identify external opportunities and threats.	4.27	0.694	44
	4.Your company has clear goals.	4.27	0.758	44
	5.Your company has clear plan - a road map of new product and process with measurable milestones.	4.34	0.713	44
	6.Your company is highly adapted and responsive to external environment.	4.25	0.811	44
Financial Performance	1.Compared with competitors in the industry, the company has a good profitability.	4.11	0.868	44
	2.Compared with the competition in the industry, the company has a higher market share.	4.02	0.762	44

	3.Compared with competitors in the industry, the company has a higher sales growth rate.	4.18	0.786	44
Growth performance	1.The company's scale expansion speed is fast.	3.84	0.939	44
	2.The company's future employee growth is expected to be faster.	3.82	0.971	44
	3.The company can attract and retain employees who have better quality.	4.09	0.858	44

CURRICULUM VITAE

NAME   Mrs. Lianmei Jiang

DATE OF BIRTH   10 May 1985

EDUCATION   2004-2007   Secretary major， Guangxi Oriental
                                      Foreign Language Vocational College,
                                      Guangxi, China

                        2009-2011   Bachelor of Management (Administrative
                                      Management), Guangxi University For
                                      Nationalities, Guangxi, China

                        2011-2014   Graduate class of Administrative
                                      Management, Guangxi University For
                                      Nationalities, Guangxi, China

                        2021-2023   Master of Business Administration
                                      (Digital Economics and Management
                                      Innovation), Maejo University,
                                      Chiang Mai,Thailand

WORK EXPERIENCE   2007-2011   Staff, Faculty of Economics and Trade,
                                      Faculty of Accounting, Guangxi
                                      Oriental Foreign Language
                                      Vocational College

                        2011-2012   Staff, Faculty of Accounting, Guangxi
                                      University of Foreign Languages

                        2012-2016   Chief of Section, Human Resources
                                      Affairs Department, Guangxi University
                                      of Foreign Languages

                        2016-Now   Vice Director, Human Resources Affairs
                                      Department, Guangxi University of
                                      Foreign Languages

International academic conferences:
Academic Conference Name: 18th National
and International Conference on Humanities
and Social Sciences
Event Date : September 25, 2023