

IMPACT OF TRANSFORMATIONAL LEADERSHIP ON THE
INNOVATION PERFORMANCE OF RESEARCH
AND DEVELOPMENT TEAMS IN CHINA

ZHU AIJUN

A thesis submitted in partial fulfillment of the requirements
for The Doctor of Business Administration Program (International Program)

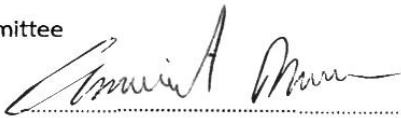
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Thesis Title Impact of Transformational Leadership on the Innovation Performance of Research and Development Teams in China

Author Mr.Zhu Aijun

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(Assistant Professor Dr.Chaiyawit Muangmee)


..... Committee
(Assistant Professor Dr.Nusanee Meekaewkunchorn)

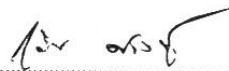

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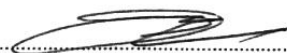
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..... Chairperson
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Title	Impact of Transformational Leadership on the Innovation Performance of Research and Development Teams in China
Author	Zhu Aijun
Program	Doctor of Business Administration
Major Advisor	Assistant Professor Dr.Chiyawit Muangmee
Co-advisor	Assistant Professor Dr.Nusanee Meekaewkunchorn
Co-advisor	Associate Professor Dr.Tatchapong Sattabut
Academic Year	2025

ABSTRACT

This study takes the Chinese automotive industry as an example to explore the factors influencing the innovation performance of R&D teams amid the industry's accelerated transformation. As the automotive sector undergoes rapid technological advancements and market shifts, understanding the mechanisms that drive R&D innovation performance is particularly crucial. This study employs a mixed-methods approach, incorporating both qualitative in-depth interviews and quantitative data analysis to ensure a comprehensive investigation. A total of 407 valid samples were collected from R&D managers across key enterprises in Jiangsu Province, a major hub for China's auto parts industry. To analyze the data, descriptive statistics, factor analysis, correlation analysis, and structural equation modeling (SEM) were applied.

The research findings indicate the following: (1) Transformational leadership plays a pivotal role in enhancing the innovation performance of R&D teams; however, its influence is primarily exerted through the creation of an organizational innovation climate and the promotion of knowledge-sharing behaviors rather than through direct impact alone. (2) A strong innovation climate significantly improves the efficiency and effectiveness of innovation activities, fostering an environment where novel ideas can be developed and implemented successfully. Meanwhile, knowledge sharing, although beneficial, has a comparatively weaker direct effect on innovation performance. (3)

Organizations aiming to maximize R&D innovation performance should not only emphasize transformational leadership behaviors but also focus on cultivating a supportive innovation environment and strengthening structured knowledge-sharing mechanisms to enhance overall innovation outcomes.

These findings provide valuable theoretical and managerial implications for companies seeking to optimize their R&D team performance in a rapidly evolving technological landscape. By fostering a conducive innovation climate and promoting active knowledge exchange, businesses can effectively leverage transformational leadership to sustain long-term competitive advantages in the automotive industry.

Keywords: Transformational Leadership, Organizational Creative Climate, Knowledge Sharing, Innovative Performance

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I hereby solemnly declare that the successful completion of this thesis cannot be achieved without the hard work and selfless dedication of every helper. I will continue to devote myself to academic research and contribute to the progress of society with more enthusiasm and firm conviction.

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Chapter 1

Introduction

Rationale

Automotive Components Industry, Global Growth Opportunities

As an important part of the automotive industry chain, the auto parts industry has a large and continuously growing market. With the continuous expansion of the global automotive market and the advancement of automotive technology, the auto parts industry has ushered in unprecedented development opportunities. Especially with the rapid development of new energy vehicles, intelligent driving and other emerging fields, the demand for auto parts industry has become more diversified, bringing new growth points for the industry.

According to GIR (Global Info Research) data, global sales of automotive parts are shown in the table below:

Table 1.1 Sales size and growth rate in the last three years

Time	Global auto parts sales (Trillion dollars)	Growth rate
2021	1.51	>3%
2022	1.58	3.7%
2023	2.27	3.9%

Global auto parts sales and growth, both are growing, which is a business opportunity.

According to the "2024-2029 Global and China Automotive Components Industry Research and 14th Five-Year Plan Analysis Report" published by Tatsuya Information Consulting, the global automotive components market reached sales of

\$1, 340.4 billion in 2023, and is expected to reach \$1, 574.26 billion in 2030, at a compound annual growth rate (CAGR) of 2.3% (2024-2030).

In the field of new energy vehicles, according to a report released by Grontingway (the official website of Grontingway), the global new energy vehicle market has reached 1029.366 billion yuan (RMB) in 2023, and will grow to 1433.107 billion yuan by 2029 with a CAGR of 5.68%. The rapid growth of the new energy vehicle market has led to an increase in the demand for related components.

According to reports, in 2023, the global mainstream automobile manufacturers invested a total of about equivalent to about 602.98 billion yuan for research and development, an increase of 13%. This significant growth is mainly due to the research and development boom of pure electric vehicles, battery technology and on-board operating systems. (Data source: Youkai)

The rapid development of new energy vehicles has had a significant impact on the parts market. With the popularity of new energy vehicles such as battery electric vehicles and plug-in hybrid vehicles, the demand for core components such as batteries, motors and electronic control systems has increased significantly. The higher technological content and added value of these components have driven the overall growth of the auto parts market. The rapid development of intelligent driving technology has also brought new growth points to the auto parts market. Automatic driving systems require the support of key components such as high-precision sensors, radars, cameras, and computing platforms. The development and production of these components require high technical strength and capital investment, but also bring higher market returns.

Current status of innovation performance of research and development teams in China

Technological innovation is an important driving force for the continued growth of the auto parts market. With the continuous development of new energy vehicles and intelligent driving technology, higher requirements have been put forward for the performance, reliability and safety of parts and components. Only through continuous technological innovation can we meet market demand and

maintain our competitive advantage. R&D strength is the core of the competitiveness of auto parts enterprises. Enterprises with strong R & D strength can launch new products and new technologies faster to meet market demand and increase market share. At the same time, R & D strength is also an important guarantee for enterprises to cope with market changes and resist risks.

To sum up, according to the data and analyses of market research institutes, the scale of the global auto parts market continues to grow, especially in the field of new energy vehicles and intelligent driving, and the growth rate of the market scale is much higher than that of the traditional auto parts market. This fully indicates that technological innovation and R&D strength play a decisive role in the market competitiveness of auto parts enterprises. Therefore, auto parts enterprises should increase R&D investment, strengthen technological innovation, and improve product quality and performance to cope with market changes and maintain competitive advantages.

According to (Prospect Industry Research Institute), the sales and growth of auto parts in China are shown in the table below:

Table 1.2 Sales and growth of auto parts in China

Time	China auto parts sales (Trillion yuan)	Growth rate
2021	4.9	6.2%
2022	5.2	6.1%
2023	5.6	5.7%

Sales are growing, but the growth trend is slowing, which needs to be driven more by research and development innovation.

In contrast, the data for the first quarter of 2022 is: listed companies in the A-share auto parts industry achieved a total of 9.679 billion yuan in research and

development expenses, an increase of 13.13%. The total R&D expenditure of TOP20 companies was 6.397 billion yuan, accounting for 66.09%. (Data source: Report Hall)

According to the global automobile patent big data platform, the growth of patent applications in the field of new energy vehicles is particularly significant. In 2023, for example, the number of automobile patents in China was 327, 300, although it decreased by 9.65% year-on-year, but the number of invention patents granted increased by 14.02% year-on-year, showing the efforts of enterprises in high-quality innovation.

In the automotive patent layout in 2023, the field of intelligent connected vehicles and new energy vehicles has become a hot spot. The total amount of patent disclosure in these two areas accounted for 51.65%, showing that the industry attaches great importance to the trend of electrification, intelligence and networking.

The amount of patent disclosure in the field of new energy vehicles increased by 1.76% year-on-year, accounting for 25.60%, maintaining a steady growth trend. This growth trend reflects the rapid development of the new energy vehicle industry and the continuous investment and innovation of enterprises in new energy vehicle technology.

In the first quarter of 2024, the listed companies in the A-share auto parts industry achieved A total of 11.889 billion yuan in research and development expenses, an increase of 9.38%. Among them, the total R&D expenses of TOP20 companies were 7.76 billion yuan, accounting for 65.27%. Weichai Power Co LTD topped the list with 2.091 billion yuan in R&D expenses, followed by Huayu Automotive Systems Co LTD with 1.643 billion yuan. (Data source: Yubo Zhiye Industry Research Institute)

Transformational Leadership to Improve Business Performance

Transformational leadership is a leadership style that can stimulate employees' potential and promote organisational change and innovation. In research and development teams in the automotive parts industry, transformational leaders are able to stimulate the innovation consciousness and motivation of team members through their unique leadership styles and behaviours, and enhance the team's

innovation performance. This leadership style is important for promoting team technological innovation and coping with industry changes.

“Enterprise Economics”2021, Issue 002, “The Mechanism of the Influence of Transformational Leadership on the Market Performance of Logistics Enterprises - The Dual-Mediating Effect of Management Innovation and Knowledge Sharing”, states that transformational leadership style can significantly contribute to the innovative performance of teams. For example, one study found that transformational leadership promotes the realisation of technological innovation and the enhancement of corporate competitiveness by inspiring employees to innovate, encouraging knowledge sharing and teamwork, and improving employee performance and creativity. Another study, “Journal of Cebu Academy”2021, A Path Study on the Impact of Transformational Leadership and Psychological Empowerment on Job Satisfaction, states that transformational leaders stimulate the innovative potential of employees through their open and inclusive mindset, keen insights into employees' needs, and motivational abilities, which in turn enhances the innovative performance of teams.

Theoretical significance of this study: it helps to enrich and expand the application research of transformational leadership theory in the auto parts industry, and provides new perspectives and ideas for research in related fields. Practical significance of this study: the results of this study can provide practical guidance and reference for automotive parts enterprises to optimise their leadership styles and enhance their team's innovative performance, which will help them to maintain their leading position in the fierce market competition.

In conclusion, improving the level of innovative performance of research and development teams is an important issue for the survival and development of Chinese enterprises at present, and it is a problem that needs to be solved and must be solved. Chinese enterprises need to play a leadership role in the process of improving the innovative performance level of research and development teams, especially the transformational leadership style has a greater impact on the upgrading of enterprises. Transformational leadership theory influences the

innovative performance of research and development personnel and teams in terms of virtue modeling, vision motivation, Charisma leadership, and Individualized consideration. The transformational leadership style's virtue dropping and Individualized consideration, through the social exchange theory, will affect the organization's team motivation, as well as make the employees feel the supervisor's care, so as to positively enhance the organization's innovation atmosphere, and ultimately affect the innovation performance of the research and development team. The transformational leadership style's visionary motivation and Charisma leadership will affect employees' knowledge-sharing behaviors through behavioral reasoning theory, which ultimately affects the innovation performance of research and development teams.

Research Questions

1. What is the current status of innovation performance of research and development teams?
2. What is the relationship between transformational leadership, organizational creative climate and knowledge sharing on innovative performance of research and development teams?
3. What are the strategies for successful innovative performance of research and development teams?

Objectives

1. To study the capabilities and fluctuations of transformational leadership, organizational creative climate and knowledge sharing and innovation performance of research and development teams.
2. To evaluate the direct and indirect relationship between transformational leadership, organizational creative climate and knowledge sharing on innovation performance of research and development teams.
3. To find strategies for the impact of transformational leadership on the innovation performance of Chinese research and development teams.

Research Hypothesis / Hypotheses

1. H1: Transformational leadership has a direct effect on organizational creative climate
2. H2: Transformational leadership has a direct effect on knowledge sharing
3. H3: Transformational leadership has a direct effect on innovation performance of research and development teams
4. H4: Organizational creative climate has a direct effect on innovation performance of research and development teams
5. H5: Knowledge sharing has a direct effect on the innovation performance of research and development teams
6. H6: Transformational leadership has an indirect effect on the innovation performance of research and development teams through the organizational creative climate
7. H7: Transformational leadership has an indirect effect on the innovation performance of research and development teams through knowledge sharing

Scope of the Research

Scope of Content

This research is a study<< Impact of Transformational Leadership on the Innovation Performance of Research and Development Teams in China >> which contains the following variables:

Independent Variable:

Transformational Leadership

Mediating variables:

Organizational Climate for Innovation

Knowledge sharing

Dependent Variable:

Innovative Performance of Research and Development Teams

Scope of Population

Managers responsible for the innovative performance of R&D teams in automotive parts companies in Jiangsu Province, China. Total number 8, 418 managers.

Managers responsible who is responsible for the performance of the research and development team may be the CEO, CTO, CFO or COO, so the object of our study, the Managers responsible who is responsible for the performance of the research and development team, is not limited to a specific position, and the subsequent sample collection process will be written to indicate the sample corresponding to the position. As of 12 July 2024 Sina Finance released "an article to read the current situation of the development of auto parts characteristics of the industry and investment opportunities in Jiangsu Province, " indicating that there are a total of 8, 418 enterprises in China's Jiangsu Province auto parts. One manager from each automotive component company is selected, who is responsible for the innovative performance of the research and development team, and the group consists of 8, 418 managers. For details, refer to Chapter 3, section 3.1 of this thesis.

The sample group

This study samples five cities in Jiangsu Province, China, according to the percentage of output value: Suzhou city 182, Changzhou city 79, Wuxi city 77, Yangzhou city 38, and Nanjing city 30, with a total of 407 samples. Refer to 3.1 The Sample in Chapter 3 of this thesis for details.

Scope of area

The auto parts industry is the main service area of the author's company, so he chose, the leader of the research and development team of the auto parts industry in Jiangsu Province, China, as the subject of the study. Refer to 1.7.5 of this section for the definition of Jiangsu Province in China. Refer to 1.7.6 of this chapter for the definition of the automotive parts industry.

Scope of Time

Step 1 Propose a thesis topic February 2024 to March 2024

Step 2 Review the topic and outline the paper February 2024 to March 2024

Step 3 Thesis Processing March 2024 to July 2024

Step 4 Dissertation Review July 2024 to January 2025

This research was collected from February 2024 to January 2025

Advantages

1. To the top management of the company, it can clearly communicate the vision and goals of the company, ensure that the research and development team has a clear direction and efficiently executes the corporate strategy, so as to enhance the overall strategic execution.

2. For R&D team members, encourage them to come up with new ideas and solutions, and provide a platform for them to showcase their talents, thus stimulating their innovation potential.

3. For customers of the company, the enhanced capability of the research and development team will enable them to continuously meet new customer needs and provide more competitive products and services.

4. For the shareholders of the enterprise, through continuous technological innovation and product upgrading, the enterprise is able to maintain its competitive advantage and sustainable development ability, and bring long-term stable returns to investors and shareholders.

5. The innovative practices of transformational leaders in the field of R&D can promote scientific and technological progress and industrial upgrading, contributing to social and economic development.

Definition of Terms

Transformational Leadership (TFL) refers to leading employees by example, making them have a sense of dedication to the enterprise at the spiritual level, and stimulating their potential to break through themselves and bring more benefits to the enterprise. They care about all aspects of employees in terms of emotion, provide emotional feedback and care for employees, and employees will show a positive attitude towards leaders' behavior at work. Transformational leadership can

be categorized into four measurement dimensions: Moral model, Vision motivation, Charisma Leadership, Individualized consideration.

Moral model refers to by demonstrating idealized influence, that is, by setting an example, leaders establish and demonstrate noble moral qualities and behavioral standards, so as to motivate and lead subordinates to follow these moral standards, achieve common goals and surpass themselves.

Vision motivation refers to by clearly articulating and communicating the vision and goals of the organization or team, leaders inspire motivation, creativity, and a sense of commitment among their subordinates, thereby motivating them to work together to achieve those visions.

Charisma Leadership refers to through his extraordinary personal charm, excellent leadership and strong charisma, the leader inspires the worship, trust and loyalty of the subordinates, and then encourages them to actively invest and contribute to the realization of the organizational goals.

Individualized consideration refers to leaders provide targeted support, guidance, and care through an in-depth understanding of each subordinate's individual needs, abilities, and desires to promote personal growth and professional development while enhancing team cohesion and overall performance.

Organizational creative climate refers to the definition of organizational innovation climate is based on the combination of perceptual and structural perspectives, and argues that the subjective description of the innovative features of the organizational environment by organizational members forms an organizational innovation climate, which exists in the organization, is formed in daily work exchanges, and can have an impact on the innovative activities of organizational members.

Organizational creative climate can be categorized into four measurement dimensions: Team motivation, Perceived supervisor support, Resource guarantee, Work autonomy.

Team motivation refers to a mechanism that stimulates the intrinsic motivation of team members to actively participate in innovation activities and work together to achieve organizational innovation goals.

Perceived supervisor support refers to employees' perception and recognition that their immediate superiors (supervisors) value their contributions, care about their welfare, and support their innovative behavior.

Resource guarantee refers to the stable, sufficient and necessary resource support provided by the organization to ensure the smooth progress of innovation activities, including capital, technology, personnel, equipment, etc.

Work autonomy refers to Employees have the autonomy to make decisions in the completion of work tasks, the ability to arrange work styles and hours flexibly, and the space for independent exploration and implementation of innovative ideas and practices.

Knowledge sharing refers to definition of knowledge sharing: knowledge sharing must exist both knowledge providers and recipients, without either party, knowledge sharing will not be completed; knowledge sharing includes two processes: externalization of knowledge by knowledge providers and internalization of knowledge by knowledge recipients; willingness and ability to share knowledge, team members have the willingness and ability to share knowledge and valuable information with other members.

Knowledge sharing can be categorized into four measurement dimensions: Knowledge contribution, Knowledge collection, Shared willingness, Shared competence.

Knowledge contribution refers to individuals or organizations actively provide their own knowledge, experience, insights, etc. to other individuals or organizations in some form (such as oral communication, document writing, online sharing, etc.) to promote the dissemination, sharing, and application of knowledge. This behavior involves not only explicit knowledge that can be encoded (such as systematic theoretical knowledge, data, etc.), but also implicit knowledge that is

closely related to personal experience and background (such as personal experience, intuition, values, etc.).

Knowledge collection refers to the behavior of an individual or organization to systematically acquire, organize and store the required knowledge through various ways and methods. This process involves not only the collection and sorting of existing knowledge, but also the exploration and discovery of new knowledge and new information. Knowledge collection is the premise and basis of knowledge sharing. Without sufficient knowledge collection, it is difficult to carry out effective knowledge sharing.

Shared willingness refers to individuals or organizations are willing to take the initiative to share their own knowledge, experience, insights, etc., with others, and expect to promote the dissemination, exchange and application of knowledge through sharing of mental states and behavioral tendencies.

Shared competence refers to the comprehensive qualities and professional skills demonstrated by individuals or organizations in the process of knowledge sharing, so that knowledge can be effectively transmitted and received. This sharing capacity covers not only the ability of the knowledge holder to communicate knowledge clearly and accurately to others, but also the ability of the knowledge recipient to understand, absorb and apply this knowledge.

Innovative performance of research and development (R&D) teams refers to a concept consisting of two core terms: R&D teams and innovation performance. R&D teams are defined as groups engaged in the research and development of products or manufacturing processes. Innovation performance is broadly understood as the sum of outcome performance and innovation process performance, while narrowly defined as the increase in a firm's output resulting from innovation—for example, the growth in the number of the firm's products driven by its innovation efforts. Specifically, the innovative performance of R&D teams refers to the outputs achieved by the team through the innovation process, such as an increase in the number of innovative products.

Innovative performance of research and development teams can be categorized into four measurement dimensions: Innovation efficiency, Innovation Effectiveness, Innovation process, and Innovation outcomes.

Innovation efficiency refers to the ability and speed of the R&D team to effectively transform the invested resources (such as time, capital, manpower, etc.) into innovative results (such as new products, new technologies, new patents, etc.) during the innovation process. It reflects the resource utilization efficiency of R&D team in innovation activities and the quality and quantity of innovation output.

Innovation effectiveness refers to the degree of compatibility between the expected goals and actual results achieved by the R&D team through innovation activities, and the actual contribution ability of these innovation results to enterprise business growth, market competitiveness improvement or social value creation.

Innovation process refers to a series of orderly, interrelated activities and steps that the R&D team goes through from the generation of the idea to the realization of the innovation. This process not only includes the core links of creativity incubation, research and development, design, testing and verification, but also covers support activities such as resource allocation, team collaboration, and decision making.

Innovation outcome refers to the specific results and outputs achieved by the R&D team through a series of innovative activities, which usually include new products, new technologies, new services, new patents, new standards, etc., and the actual contribution of these innovative results to the business growth of the enterprise, the improvement of market competitiveness, and the creation of social value.

Jiangsu Province, China refers to Jiangsu Province, abbreviated as "Su", a provincial-level administrative region of China located on the eastern coast of mainland China, spanning latitude 30°45'~35°08'N and longitude 116°21'~121°56'E. It borders Shandong Province to the north, the Yellow Sea to the east, Anhui Province to the west, and Zhejiang Province and Shanghai Municipality to the southeast. Jiangsu has a flat topography, with a landscape consisting of plains, waters, and low

hills, and spans two major water systems: the Yangtze River and the Huaihe River. The province administers 13 prefecture-level cities, with Nanjing as its capital. ("Provincial Administrative Regions of the People's Republic of China").

Jiangsu Province has a well-developed industry, and the auto parts industry is a national leader:

Continuous growth in value added of regulated industry: Jiangsu Province's industrial development continues to maintain strong momentum. According to the latest data, in the first quarter of 2024, the value-added of industries above designated size in Jiangsu Province increased by 9.5% year-on-year, which is higher than the national average growth rate of 3.4 percentage points, showing the strong resilience and vitality of Jiangsu's industrial economy.

Complete and high-quality development of manufacturing sectors: Jiangsu is the province with the most complete manufacturing sectors in the country, and the share of manufacturing value-added in GDP is the highest in the country. Jiangsu has 10 national advanced manufacturing clusters, and the province's manufacturing quality development index has been the first in the country for three consecutive years. These data fully illustrate the leading position of Jiangsu in the field of manufacturing and the level of high-quality development.

The scale of auto parts industry is the first in China: Jiangsu is the largest province of auto parts industry in China. As of the latest data, Jiangsu Province, automobile parts industry on the enterprise, to achieve sales revenue of 1.16 trillion yuan, an increase of 10.5%, ranking steadily in the forefront of the country.

The auto parts industry refers to an industry focused on the manufacturing of various spare parts for motor vehicles and their bodies. These spare parts include, but are not limited to, automotive components (e.g., clutch assemblies, transmission assemblies, drive shaft assemblies) and automotive parts (e.g., buffers, brakes, gearboxes, wheels). As the foundation of the automobile industry, auto parts are essential to supporting the sustained and healthy development of the automobile industry. According to the National Economic Industry Classification (GB/T 4754) issued by the National Bureau of Statistics, the manufacture of auto parts and

accessories is explicitly recognized as an independent industry classification—its industry code may vary across different versions of the classification, but all aim to accurately reflect the industry’s characteristics and scope. For details, refer to section 2.1 in Chapter 2 of this thesis.

Research Framework

This paper constructs a model with four variables, the variables are: transformational leadership, organizational creative climate, knowledge sharing, and Innovative performance of research and development teams. As shown in Figure 1.1 below, (1) the independent variable is transformational leadership has a direct impact on organizational creative climate, knowledge sharing and Innovative performance of research and development teams. (2) Transformational leadership has an indirect effect on research and development team innovation performance through the intermediate variables organizational creative climate and knowledge sharing, respectively.

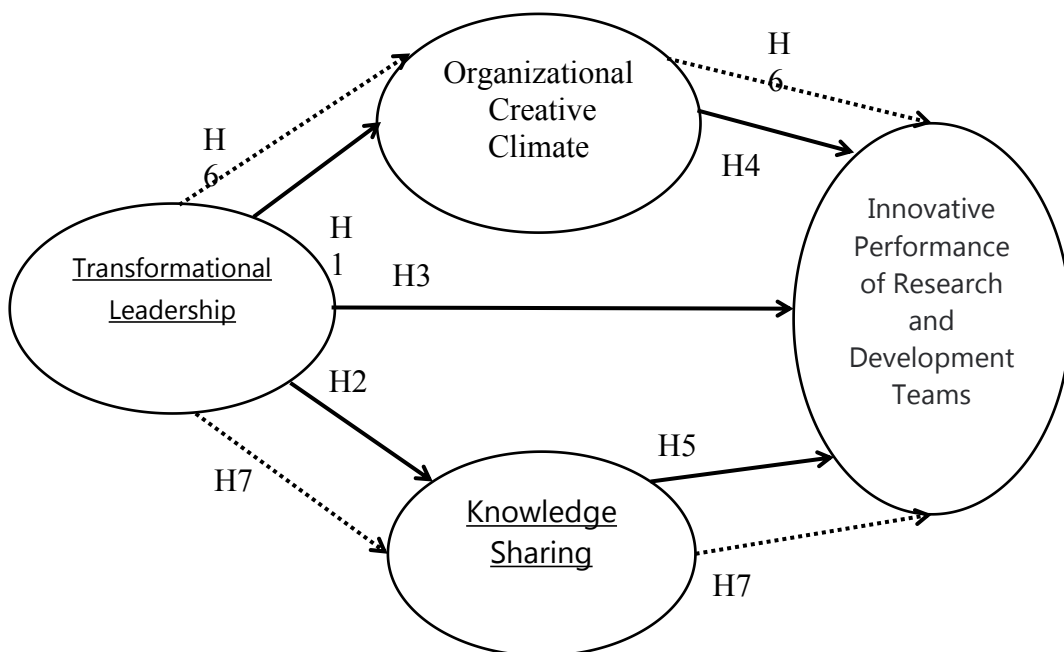


Figure 1.1 Research Framework

Chapter 2

Literature Review

This study will analyze the variables that affect the innovation performance of research and development teams through a literature review. This chapter summarizes the concepts given in previous studies by reviewing them and gives the concepts of this study. The chapter refers to the relevant theories, organizes the relationship between these variables and presents the hypothesized relationship between these variables. Transformational leaders exchange the innovative performance and success of research and development teams through the social exchange theory; transformational leaders use the transformational leadership behavior theory to enhance the organizational creative climate through behaviors such as visionary motivation and employee care; and transformational leaders promote knowledge sharing through the behavioral reasoning theory.

1. General information of the auto parts industry
2. Concepts and theories of Transformational Leadership
3. Concepts and theories of Organizational creative climate
4. Concepts and theories of knowledge sharing
5. Concepts and theories of the innovative performance of research and development teams
6. Concepts and theories of Transformational Leadership Behavior Theory
7. Concepts and theories of Social Exchange Theory (SET)
8. Concepts and theories of Behavioral Reasoning Theory (BRT)
9. Related Research

The details are as follows.

General information of the auto parts industry

The auto parts industry originated from the rise of the automobile industry. Since the birth of the first mass-produced car in 1900, the auto parts industry has taken off. In the early days, the type of auto parts was single, the technical content was low, and mainly depended on imports. With the development of the automobile industry, the auto parts industry has gradually grown into a huge industrial system.

At present, the global auto parts industry is mainly dominated by Europe, the United States, Japan and other developed countries in the auto industry. Companies in these countries have advantages in technology, market share and brand influence. However, with the development of globalization and emerging markets, the strength of auto parts companies in developing countries is also gradually improving. According to the "American Automotive News" 2023 Global Top 100 auto parts suppliers, the top 10 global auto parts suppliers include companies from Germany, Japan, Canada, China, South Korea, France and the United States, showing the diversification and competition of the industry.

China's auto parts industry has ushered in huge development opportunities in recent years. With the rapid growth of China's automobile consumer market and the rise of new energy vehicles, the market scale of the auto parts industry has been expanding. In addition, the competitiveness of Chinese auto parts enterprises in the global market is also gradually improving, and the number of Chinese enterprises in the global Top 100 in 2023 has historically broken through to 13.

As an important province in China's auto parts industry, Jiangsu Province has long been in the forefront of the country's industrial scale. The auto parts industry in Jiangsu Province has the characteristics of complete categories, perfect industrial chain and strong enterprise strength. In the field of new energy auto parts, Jiangsu Province is at the forefront of the country, with many leading enterprises in the field of key parts. For example, Wuxi, Suzhou, Changzhou and other places have laid out new energy auto parts industrial parks, attracting many well-known enterprises at home and abroad. According to statistics, July 2024, there were a total of 8, 418

enterprises of auto parts in Jiangsu Province. This data comes from the article "An article to read the development status and investment opportunities of auto parts featured industries in Jiangsu Province" published by Sina Finance, which analyses in detail the status quo, spatial layout, major projects, industrial relocation and investment opportunities of auto parts featured industries in Jiangsu Province, with a high degree of authority and credibility.

The future auto parts industry will show the following trends:

(1) Technological innovation and upgrading: With the continuous progress of automotive technology, especially the rise of new energy vehicles and intelligent connected vehicles, the auto parts industry will pay more attention to technological innovation and upgrading. New energy vehicle parts such as batteries, motors, electronic control systems, etc., will become the focus of the development of the industry.

(2) Industrial chain optimization and integration: In order to enhance competitiveness, auto parts enterprises will further strengthen the integration and optimization of the upstream and downstream of the industrial chain. Through mergers and acquisitions, restructuring, strategic cooperation and other ways to form a closer industrial alliance and supply chain system.

(3) Global layout: In the context of globalization, auto parts companies will pay more attention to international layout. Through the establishment of overseas research and development centers, production bases and sales networks, expand the international market and enhance brand influence.

(4) Green sustainable development: With the improvement of environmental awareness and the tightening of global carbon emission standards, green sustainable development will become an important direction of the auto parts industry. Enterprises will pay more attention to energy conservation and emission reduction, recycling and the application of environmentally friendly materials.

Concepts and theories of Transformational Leadership

In 1978, Transformational Leadership was first proposed by American political sociologist James Burns in his book "Leadership Theory". Therefore, it has become a form of leadership and has been widely used in various researches. Transformational leadership can bring about change in a complex and changing environment and plays a vital role in an organization. Influence between leaders and employees and can actively promote the initiative, enthusiasm and potential of employees in their work by encouraging caring and leadership influence. In 1985, Bass conducted in-depth research and analysis on transformational leadership and divided it into four measurement dimensions: idealized influence, inspiring motivation, intellectual stimulation and Individualized consideration.

Idealized influence refers to the fact that leaders in an organization have strong personal charm and influence the behavior of employees through their own words and deeds, and leaders have high recognized ethical and moral standards, so that employees can spontaneously produce some behaviors towards leaders, such as worship, follow, trust and love. These behaviors include leadership as a role model for employees. The leader is trusted, respected and recognized by employees, so that employees are full of sense of identity and support the vision plan proposed by the leader, and then employees have confidence and willingness to work for it.

Motivational motivation is when leaders motivate employees to work hard to achieve goals through team cohesion.

Leaders communicate their expectations to employees, communicate the vision of the team's shared mission, and motivate employees to aim for the team's shared mission when they join the team. The encouragement of employees can make the creative performance produced by the organization employees in the team work gradually exceed the performance produced for their personal interests.

Intellectual stimulation refers to an organization in which employees are encouraged by the behavior of leaders, engaged and innovative in their work, with the determination and courage to challenge themselves, able to accept new ideas,

and good at expressing their ideas. Employees will change their values, consciousness, and beliefs through leadership stimulation.

Individualized consideration means that leaders in an organization invest time and energy to give care and patience to employees and understand their real inner needs and expectations. In line with the principle of different people, leaders can be trained and guided in different ways, and leaders are constantly challenging themselves and surpassing themselves in the process of helping employees.

In academic circles, scholars have different definitions of "transformational leadership". Scholar Waldman (1999) believes that the working atmosphere can be created by transformational leaders and employees together, and leaders can create a better learning environment by cultivating and improving employees' personal abilities. Robbins (2001) pointed out that the behaviors of transformational leaders can influence subordinates, and their charisma can inspire subordinates, so that subordinates can take actions beyond their own interests for the benefit of the organization.

Correspondingly, After receiving the corresponding intellectual stimulation and unique personality care from leaders, subordinates can gradually stimulate their own potential, so as to achieve the set goals of the organization. According to Maslow's theory of hierarchy of needs, scholar Shi Kan (2007) drew a conclusion on his analysis of transformational leadership. He believed that, starting from the level of "ordinary self" of intrinsic motivation, he could propose a new approach High ideals and values to stimulate the conscious consciousness of employees, so as to raise the ideological consciousness of employees to the "more self" level of self-realization. Faruk and Herman (2017) pointed out that transformational leadership is correlated with gender, age and experience.

Leaders exert influence on employees through their personal charm, leadership influence, Individualized consideration and intellectual stimulation, so that employees have a clearer understanding of the mission and vision of the enterprise, so as to promote employees to take the goals set within the enterprise as personal goals. Employees will also be more willing to put the interests of the

company above their own personal interests, keep up with the organizational development plan and corporate vision put forward by leaders, and achieve a higher level and better performance for the company through developing their own potential.

With the continuous development and progress of modern society, the theory of transformational leadership has more and more extensive practical significance. Transformational leadership theory has played some effective roles in the recruitment, selection, training, promotion and future development of employees. At the same time, transformational leadership theory can also be applied to team decision-making, organizational innovation and reorganization. With the deepening of research, transformational leadership theory will be more and more influential in many fields of leadership in the future.

Regarding Transformational Leadership, the author has compiled, the literature studied from different dimensions as follows:

Table 2.1 Transformational Leadership Literature Collation

No.	Author	Times	Title of document	Research point
1	Mancheno-Smoak, Lolita	2022	Transformational Leadership, Work-related Cultural Values, and Job Satisfaction	The relationship between work-related cultural values, transformational leadership behaviours and job satisfaction was explored
2	T. Kassa	2021	Transformational Leadership in Higher Education: A Review of Management Theories	Reviewed management theories of transformational leadership in higher education

Table 2.1 (Continued)

No.	Author	Times	Title of document	Research point
3	Y. Gong, J.C. Huang, J.L. Farh	2020	Employee Learning Orientation, Transformational Leadership, and Employee Creativity	The relationship between employee learning orientation, transformational leadership and employee creativity was studied
4	H. Wang, K.S. Law, R.D. Hackett	2020	leader-member exchange as a mediator of the relationship between transformational leadership and followers' performance and organizational citizenship behavior	The mediating role of leader-member exchange between transformational leadership and employee performance and organisational citizenship behaviour is explored
5	Deanne, N., Den	2020	Transactional versus Transformational Leadership: An Updated Analysis	Transformational and transactional leadership were analysed in comparison to each other

In summary, this study defines transformational leadership as: leading employees by example, making them have a sense of dedication to the enterprise at the spiritual level, and stimulating their potential to break through themselves and bring more benefits to the enterprise. They care about all aspects of employees in

terms of emotion, provide emotional feedback and care for employees, and employees will show a positive attitude towards leaders' behavior at work.

Transformational leadership can be categorized into four measurement dimensions: Moral model, Vision motivation, Charisma Leadership, Individualized consideration.

(1) Moral model: By demonstrating idealized influence, that is, by setting an example, leaders establish and demonstrate noble moral qualities and behavioral standards, so as to motivate and lead subordinates to follow these moral standards, achieve common goals and surpass themselves.

(2) Vision motivation: By clearly articulating and communicating the vision and goals of the organization or team, leaders inspire motivation, creativity, and a sense of commitment among their subordinates, thereby motivating them to work together to achieve those visions.

(3) Charisma Leadership: Through his extraordinary personal charm, excellent leadership and strong charisma, the leader inspires the worship, trust and loyalty of the subordinates, and then encourages them to actively invest and contribute to the realization of the organizational goals.

(4) Individualized consideration: Leaders provide targeted support, guidance, and care through an in-depth understanding of each subordinate's individual needs, abilities, and desires to promote personal growth and professional development while enhancing team cohesion and overall performance.

Concepts and theories of Organizational creative climate

Organizational innovation atmosphere is an organizational atmosphere that adds elements of innovation and is based on a specific situation. Therefore, it is necessary to define the organizational climate clearly. Parker believes that organizational atmosphere is a characteristic that members of organizations can distinguish the differences among organizations based on their feelings and cognition, and it has a relatively stable nature (Parker et al., 2003). Since the 1990s, with the increasing attention to innovation, the research on the factors affecting innovation has

become more in-depth. Many scholars begin to study the organizational climate based on specific situations, such as the organizational creative climate after adding the elements of innovation. Wang Yanfei and Zhu Yu pointed out that the study of organizational climate in a specific context is more predictive in the study of problems (Wang Yanfei, Zhu Yu, 2006). By comparing the studies of scholars on the definition of organizational climate, some of them found that organizational creative climate is an objective existence of an organization and can be objectively described by organization members (West&Farr, 2006). 1990; Ekvall et al., In 1999, West and Ekvall et al., who held this view, proposed that organizational innovation atmosphere is expressed in A concrete form, and activities, rules and regulations that are conducive to stimulating organizational members' innovative behaviors in the working environment can be expressed as organizational innovation atmosphere, while another part of scholars emphasized that it is the perceptual view of individuals' subjective perception of their environment, and the typical scholar is Amabile, in contrast to the objective and sexual views proposed by other scholars, believes that organizational innovation atmosphere is more of a subjective perception, that is, the subjective perception of organizational members on the innovation orientation, innovation encouragement and other innovation characteristics of their environment (Amabile et al., 1996), Chinese scholars Gu Yuandong and Peng Jisheng also explained the organizational innovation atmosphere based on the research results of domestic and foreign scholars, and believed that organizational innovation atmosphere is a characteristic that employees can perceive in their organizations and can be described and measured, and can have an impact on their innovation activities (Gu Yuandong, Peng Jisheng, 2010).

Although there are differences in the intention of organizational creative climate, scholars have the following two points of consensus on the connotation of organizational creative climate: First, organizational creative climate can have a long-term and sustained impact on the behavior mode and innovation motivation of organization members. Second, it is the cognition of organization members to explain the complex organizational events and phenomena within the organization, so the organizational innovation atmosphere is a multi-dimensional variable.

Regarding Organizational creative climate, the author has compiled, the literature studied from different dimensions as follows:

Table 2.2 Organizational creative climate Literature Collation

No.	Author	Times	Title of document	Research point
1	Zhang, H., & Liu, Y.	2024	"The Role of Organizational Innovation Climate in Fostering Employee Creativity"	The role of organisational innovation climate in promoting employee creativity was examined, including the dimensions of supportive leadership, resource availability and psychological safety.
2	Smith, J., & Chen, X.	2023	"Exploring the Relationship between Organizational Innovation Climate and Organizational Performance"	The relationship between organisational innovation climate and organisational performance is analysed, exploring how innovation climate affects performance by improving employee innovation behaviour and organisational learning.
3	Kim, M., & Lee, S.	2022	"The Influence of Organizational Innovation Climate on New Product Development Success"	The impact of organisational innovation climate on the success of new product development is explored, including the dimensions of innovation process, innovation resources and innovation culture.

Table 2.2 (Continued)

No.	Author	Times	Title of document	Research point
4	Wang, L., & Liu, J.	2021	"The Mediating Role of Organizational Innovation Climate in the Relationship between Transformational Leadership and Employee Innovation"	The relationship between transformational leadership and organisational innovation climate is examined and the mediating role of organisational innovation climate between transformational leadership and employee innovation behaviour is explored.
5	Johnson, C., & Brown, D.	2020	"Creating an Environment Conducive to Innovation: The Role of Organizational Climate"	A framework for building an organisational climate conducive to innovation is proposed, including dimensions such as encouraging open thinking, supporting risk-taking and providing resources for innovation.
6	Garcia, R., & Martin, E.	2019	"Organizational Innovation Climate and its Impact on Employee Job Satisfaction and Turnover Intentions"	The impact of organisational innovation climate on employees' job satisfaction and turnover intentions was investigated, and it was analysed how the innovation climate reduces turnover by increasing employee satisfaction.

After summary, it can be seen that the definition of organizational creative climate is based on the combination of perceptual view and structural view, and it is believed that the subjective description of the innovation characteristics of the organizational environment by the members of the organization forms the organizational creative climate, which exists in the organization and is formed in the daily work communication, and will have an impact on the innovation activities of the members.

Organizational creative climate can be categorized into four measurement dimensions: Team motivation, Perceived supervisor support, Resource guarantee, Work autonomy.

(1) Team motivation: A mechanism that stimulates the intrinsic motivation of team members to actively participate in innovation activities and work together to achieve organizational innovation goals.

(2) Perceived supervisor support: Employees' perception and recognition that their immediate superiors (supervisors) value their contributions, care about their welfare, and support their innovative behavior.

(3) Resource guarantee: The stable, sufficient and necessary resource support provided by the organization to ensure the smooth progress of innovation activities, including capital, technology, personnel, equipment, etc.

(4) Work autonomy: Employees have the autonomy to make decisions in the completion of work tasks, the ability to arrange work styles and hours flexibly, and the space for independent exploration and implementation of innovative ideas and practices.

Concepts and theories of knowledge sharing

There are a large number of different expressions of the definition of knowledge sharing, and different researchers have different definitions of knowledge sharing due to their different perspectives. In summary, these definitions can be divided into two categories (Bao Gongmin and Xu Bixiang, 2007): (1) Exchange view, that is, knowledge sharing is regarded as an exchange process of individuals asking for

information, views and knowledge. For example, Van den Hooff & De Ridder (2004) argued that knowledge sharing is a process in which individuals ask each other to exchange their (explicit and implicit) knowledge and jointly create new knowledge. Bartol & Srivastava (2002) believed that knowledge sharing is the sharing of relevant information, opinions, suggestions and expertise of an organization by individuals with others. Connelly & Kelloway (2003) believes that knowledge sharing is a set of behaviors about exchanging information or helping others. (2) Conversion view, that is, knowledge sharing is regarded as the process of transforming information, views and knowledge among individuals, such as Ipe (2003) believes that knowledge sharing among individuals is the process in which knowledge of individuals is transformed into knowledge that can be understood, absorbed and used by other individuals.

To understand the connotation of knowledge sharing, we can grasp the following points: Bao Gongmin and Xu Bixiang (2007) : (1) Knowledge sharing must exist at the same time as knowledge providers and receivers; without either party, knowledge sharing cannot be completed; (2) Knowledge sharing includes two processes: knowledge externalization by knowledge providers and knowledge internalization by knowledge recipients. (3) It is emphasized that the participants of knowledge sharing share Ipe of knowledge together, rather than monopolizing knowledge by a certain party, so as to generate knowledge spillover effect and maximize the value potential of knowledge.

We can think of knowledge sharing as a process in which members of an organization exchange their implicit and explicit knowledge and create new knowledge together. As mentioned above, in this process, the most critical thing is how to convert the knowledge owned by individuals into the knowledge of the organization.

In the above description of the knowledge sharing process, it can be seen that the so-called knowledge sharing process is composed of two aspects: on the one hand, knowledge transfer, we call it "knowledge contribution"; The other is the receiving of knowledge, which we call "knowledge gathering." Many researchers also

hold the same view. For example, Ardichvili et al. (2003) divided knowledge sharing into two aspects: the supply of new knowledge and the demand for new knowledge. Weggeman (2000) distinguished the difference between "knowledge source" and "knowledge receiver" in the process of knowledge sharing. Oldenkamp (2001) believes that knowledge sharing includes "knowledge carriers" and "knowledge requesters".

Regarding knowledge sharing, the author has compiled, the literature studied from different dimensions as follows:

Table 2.3 knowledge sharing Literature Collation

No.	Author	Times	Title of document	Research point
1	Kim, H. & Lee, J.	2024	"Facilitating Knowledge Sharing in Virtual Teams: The Role of Trust and Communication Technology"	Trust, communication techniques, virtual team knowledge-sharing processes
2	Johnson, S. & Smith, A.	2023	"Knowledge Sharing Practices in the Digital Age: Challenges and Opportunities"	Challenges and Opportunities of Knowledge Sharing in the Digital Age, Technology Impact, Organisational Culture
3	Wang, X. & Chen, Y.	2023	"The Impact of Social Capital on Knowledge Sharing in Open Innovation Communities"	Social Capital, Open Innovation Communities, Knowledge Sharing Willingness and Behaviour

Table 2.3 (Continued)

No.	Author	Times	Title of document	Research point
4	Davis, T. & Brown, M.	2022	"The Role of Leadership in Fostering a Culture of Knowledge Sharing"	Leadership style, organisational culture, knowledge-sharing climate, employee engagement
5	Garcia, R. & Martinez, L.	2022	"Inter-Organizational Knowledge Sharing: A Case Study of the Healthcare Sector"	Cross-organisational knowledge sharing, healthcare industry, knowledge transfer mechanisms, collaborative networks
6	Thompson, L. & Williams, J.	2022	"Knowledge Sharing Barriers and Facilitators in Global Virtual Teams"	Global Virtual Teams, Knowledge Sharing Barriers, Facilitators, Cultural Differences and Communication Strategies

In summary, Definition of knowledge sharing, (1) knowledge sharing must exist both knowledge providers and recipients, without either party, knowledge sharing will not be completed; (2) knowledge sharing includes two processes: externalization of knowledge by knowledge providers and internalization of knowledge by knowledge recipients. (3) Willingness and ability to share knowledge, team members have the willingness and ability to share knowledge and valuable information with other members.

Knowledge sharing can be categorized into four measurement dimensions: Knowledge contribution, Knowledge collection, Shared willingness, Shared competence.

(1) Knowledge contribution: Individuals or organizations actively provide their own knowledge, experience, insights, etc. to other individuals or organizations in some form (such as oral communication, document writing, online sharing, etc.) to promote the dissemination, sharing, and application of knowledge. This behavior involves not only explicit knowledge that can be encoded (such as systematic theoretical knowledge, data, etc.), but also implicit knowledge that is closely related to personal experience and background (such as personal experience, intuition, values, etc.).

(2) Knowledge collection: The behavior of an individual or organization to systematically acquire, organize and store the required knowledge through various ways and methods. This process involves not only the collection and sorting of existing knowledge, but also the exploration and discovery of new knowledge and new information. Knowledge collection is the premise and basis of knowledge sharing. Without sufficient knowledge collection, it is difficult to carry out effective knowledge sharing.

(3) Shared willingness: Individuals or organizations are willing to take the initiative to share their own knowledge, experience, insights, etc., with others, and expect to promote the dissemination, exchange and application of knowledge through sharing of mental states and behavioral tendencies.

(4) Shared competence: The comprehensive qualities and professional skills demonstrated by individuals or organizations in the process of knowledge sharing, so that knowledge can be effectively transmitted and received. This sharing capacity covers not only the ability of the knowledge holder to communicate knowledge clearly and accurately to others, but also the ability of the knowledge recipient to understand, absorb and apply this knowledge.

Concepts and theories of the innovative performance of research and development teams

Team innovation performance is, as the name suggests, the performance or efficiency of the team as a whole in terms of innovation activities. Because of the different definitions of the scope and activities included in team innovation, scholars are not consistent in defining the concept of research and development team innovation performance. In general, most studies at home and abroad adopt West's (2002) definition of research and development team innovation performance, which West (2002) believes that research and development team innovation performance is the introduction of innovative ideas, processes, and product types that are helpful to the work of the team. He believes that team innovation should be divided into two stages: idea generation and idea execution, and the evaluation of research and development team innovation performance can be carried out in terms of the number of ideas, the degree of novelty, the feasibility and the final practical effect. Shen Haihua (2006) believes that the innovation performance of research and development team is actually the performance of the innovation process that can be objectively perceived and accurately measured, which contains not only the direct benefits but also the indirect benefits brought by the innovation. Another definition often adopted by scholars comes from Gray (2001), who regarded the sum of the team's innovation ability and innovation behavior as the research and development team's innovation performance. Domestic scholars, such as Liu Huiqin (2007), also adopt Gray's (2001) view that the enhancement of innovation capability and innovation behavior is the basis of innovation performance.

Scholars define the concept of team innovation performance mainly from the following two perspectives.

(1) Performance perspective

In their research on team innovation performance, Zhu Shaoying and Qi Ershi (2008) conducted an in-depth discussion on process performance, and concluded that team innovation performance is embodied in improving team innovation ability and promoting team innovation behavior. Different from the research of Zhu

Shaoying and other scholars, Qian Yuanyuan (2010) focuses on outcome performance, believing that team innovation performance is the completion of team innovation tasks, which is mainly represented by the completion degree of innovation achievements in terms of time, cost, quality and innovation. In addition, some scholars believe that the research on team innovation performance should take into account the perspectives of process and result. For example, Cohen & Levinthal (1990) believes that team innovation performance refers to the creative use of ideas, methods and processes by teams to promote the transformation of innovation results.

(2) Perspective of innovation behavior

According to Hibenlu et al. (2017), team innovation performance is the performance that can be objectively identified and measured as the result of innovative activities, which can not only bring direct economic benefits to the team, such as new product profit rate and new product sales rate, but also bring indirect economic benefits to the team, such as patents or technological inventions. Based on the research object and purpose of this paper, this paper believes that the innovation performance of research and development team of high-tech enterprises is based on the innovation activities at the level of research and development team, which is mainly represented by the completion degree of the research and development team to achieve the innovation goal, that is, the effective output of the research and development team in the process of achieving the innovation goal.

This paper mainly combs the dimensional division and measurement of team innovation performance from the following three aspects.

(1) Lovelace (2015) believes that team innovation performance should be divided into two dimensions, namely innovation promotion and constraint inhibition, and points out that it can be evaluated from the four aspects of producing new products, proposing innovative ideas, promoting technology iteration and upgrading, and adapting to market changes. Shi Yang and Li Nan (2010) believe that the innovation performance of research and development team involves the whole

process of research and development, and set up an evaluation system including measurement indicators such as finance, customer and learning growth.

(2) Classification according to innovation stage Scott & Bruce (1994) Based on the theory of innovation behavior, conducted an empirical study around research and development team managers. A measuring scale containing 6 items was developed. Janssen & Yperen (2004) evaluated team innovation performance from three aspects: process, ability and result, and developed a measurement scale applicable to different cultural contexts based on this, with a total of 9 items.

(3) Sarin & Mahajan (2001) studied the innovation performance of cross-functional teams, divided the team innovation performance into three dimensions of product innovation, quality and characteristics, and developed a scale containing 10 items. With the deepening of theoretical research and the development of practice, scholars have proposed to evaluate the innovation performance of research and development teams from two aspects: innovation effectiveness and innovation efficiency (Zheng Xiaoyong and Lou Yang, 2009; Money Flow, 2010). Zhang Guanglei et al. (2011) drew on the scale designed by Vandewalle & Cummings (1997) and compiled a scale conforming to the actual situation of Chinese enterprises according to the Chinese cultural context, with a total of 7 items.

Regarding the innovative performance of research and development teams, the author has compiled, the literature studied from different dimensions as follows:

Table 2.4 Literature on R&D Teams' Innovation Performance

No.	Author	Times	Title of document	Research point
1	Q Chen, GH Shi, SO Management, J University	2024	Research on influence between the Emotional Intelligence and Performance of Innovative Team	Emotional intelligence, innovative team performance, knowledge sharing, team conflict, structural mechanisms
2	DMVD Heuvel	2019	The Influence of Leader Emotionally Intelligent Behavior on Team Effectiveness: a video-based study	Leader Emotionally Intelligent Behaviour, Team Effectiveness, Mediating Role
3	Yan Liang, Yang Zhiyi, Zou Linfeng, Fu Mingxia	2021	Work Experience, Knowledge Sharing and Team Innovation Performance - Based on the Red Queen Competition Theory	Work experience, knowledge sharing, team innovation performance
4	Kang, Daewoong, Park, et al.	2015	Emotional Intelligence and Team Effectiveness: The Moderating Role of Self- efficacy	Emotional intelligence, team effectiveness, self-efficacy, moderating effects

The definition in this paper considers: The innovation performance of R&D team contains two terms, one is R&D team and the other is innovation performance. R&D teams refer to research and development teams engaged in products or manufacturing processes. Innovation performance is broadly and generally understood as the sum of outcome performance and innovation process performance; and narrowly as the increase in output of a firm as a result of innovation, e.g., the increase in the number of products of a firm as a result of its innovation. Innovation performance refers to the outputs obtained by the R&D team through the innovation process, such as an increase in the number of innovative products. In this paper, we give a definition of innovation performance of research and development teams that considers four dimensions: innovation efficiency, innovation effectiveness, innovation process, and innovation outcomes.

Innovative performance of research and development teams can be categorized into four measurement dimensions: Innovation efficiency, Innovation Effectiveness, Innovation process, and Innovation outcomes.

Innovation efficiency: The ability and speed of the R&D team to effectively transform the invested resources (such as time, capital, manpower, etc.) into innovative results (such as new products, new technologies, new patents, etc.) during the innovation process. It reflects the resource utilization efficiency of R&D team in innovation activities and the quality and quantity of innovation output.

Innovation effectiveness: The degree of compatibility between the expected goals and actual results achieved by the R&D team through innovation activities, and the actual contribution ability of these innovation results to enterprise business growth, market competitiveness improvement or social value creation.

Innovation process: A series of orderly, interrelated activities and steps that the R&D team goes through from the generation of the idea to the realization of the innovation. This process not only includes the core links of creativity incubation, research and development, design, testing and verification, but also covers support activities such as resource allocation, team collaboration, and decision making.

Innovation outcomes: The specific results and outputs achieved by the R&D team through a series of innovative activities, which usually include new products, new technologies, new services, new patents, new standards, etc., and the actual contribution of these innovative results to the business growth of the enterprise, the improvement of market competitiveness, and the creation of social value.

Concepts and theories of Transformational Leadership Behavior Theory

Based on Bass's concept of transformational leadership behavior, many scholars have further expanded and deepened this concept.

Podsakoff et al. (1990) pointed out that leaders' transformational behavior facilitates knowledge flow and sharing within the organization, and the process of knowledge transfer is due to the fact that the leadership behavior greatly facilitates employees' knowledge transfer.

The process of knowledge transfer is due to the fact that the leader's transformational behavior greatly facilitates the exchange and communication of employees.

Communication. 21 Yukl's (1994) study states that transformational leadership behaviors make organizational members aware of the importance of the organization's mission and goals, and that they are aware of the importance of the organization's mission and goals.

Importance of the organization's mission and goals, and changes subordinates' attitudes so that they develop organizational commitment. It argues that leaders who practice transformational

It is argued that leaders who practice change will give employees more autonomy in their work and motivate them to accomplish their goals through changes in organizational structure, culture, and corresponding management strategies.

Waddell (1996) argues that transformational leadership is the process by which leaders guide their employees to work together to create a better environment for the achievement of organizational goals.

Waddell (1996) believes that transformational leadership is a process by which leaders guide their employees to co-create attitudes and behaviors suitable for decision sharing, professional development, and self-worth enhancement.

According to Waddell (1996), transformational leadership behavior is a way for leaders to guide their employees to co-create attitudes and behaviors that are suitable for decision sharing, professional development, and self-worth enhancement, thus creating a friendly and harmonious environment that is conducive to communication.

Pillai et al. (1999) concluded that transformational leadership is a process of stimulating employees' self-actualization needs in order to enhance organizational interests, solidify organizational trust, and promote employees' superpower.

Pillai et al. (1999) concluded that transformational leadership behavior is a leadership style or behavior that enhances organizational benefits, solidifies organizational trust, and drives employees to exceed performance expectations by stimulating their need for self-fulfillment.⁵¹ Waldman et al.

Ackoff (2007) argues that transformational leadership is a leadership behavior that inspires and motivates subordinates to achieve an organization's vision.

Ackoff (2007) believes that transformational leadership behavior is a kind of leadership behavior that inspires and motivates subordinates to achieve the organization's vision.

It is based on spiritual motivation, creating satisfaction, and guiding subordinates to self-actualization.

From the summary of the above scholars' views, we can think that transformational leadership behavior is no longer limited to only

Focus on the management, control and coordination of the leadership process, but the leader through personal charisma to motivate subordinates to constantly challenge

It is a process in which the leader inspires his subordinates to constantly challenge themselves through their personal charisma, enhances their intrinsic

motivation level, and prompts them to constantly pursue the process of exceeding their expectations.

Regarding Transformational Leadership Behavior Theory, the authors have collated the literature based on the former study in the following table:

Table 2.5 Transformational Leadership Behavior Theory Literature Collation

No.	Author	Times	Title of document	Research point
1	MacKie, J.	2024	Transformational Leadership Behaviors: Theory and Reflections	Theoretical frameworks, practical reflections on transformational leadership behaviours
2	F Munir, M. Aboidullah	2023	Gender Differences in Transformational Leadership Behaviors and their Impact on Teachers' Academic Effectiveness	Gender differences, transformational leadership behaviours, teacher academic effectiveness
3	LC Lin	2022	Team Psychological Empowerment as a Mediator of the Relationship between Transformational Leadership, Team Effectiveness, and Innovation	Team Psychological Empowerment, Transformational Leadership, Team Effectiveness, Innovation
4	DT Harrison	2021	Transformational Leadership and Organizational Performance: A Meta-Analytic Review	Transformational leadership, organisational performance, meta-analysis

Table 2.5 (Continued)

No.	Author	Times	Title of document	Research point
5	H Asencio, E Mujkic	2021	Leadership Behaviors and Trust in Leaders: Insights from the Private Sector	Leadership behaviour, trust, transformational leadership, private sector
6	GC Liu, B Wang	2021	Transformational Leadership Behaviors and their Effectiveness in Sports Leaders in Colleges	Transformational leadership behaviours, sport leadership, effectiveness, HE environment
7	A Bassi, A Volpato	2020	Transformational Leadership and Employee Engagement: An Empirical Investigation	Transformational leadership, employee engagement, empirical study

Concepts and theories of Social Exchange Theory (SET)

The relationship between leadership behavior and employee behavior can be explained by the theory of social exchange. The relationship between employees and their leaders and organizations is often described as one of exchange. Social Exchange Theory describes the constant occurrence of reciprocal relationships between individuals. In human social life, many factors affect our life process, social exchange is an important aspect of these factors. Through social exchange, we are able to build positive connections with others. In the view of psychologists, social exchange is one of the basic principles that human social life follows. Whether it is business behavior in economic life, or people's communication activities in social life, all are affected by exchange, it can be said that social exchange determines our life to some extent. Social exchange theory, which was first proposed by American

sociologist Homans in 1958, systematically expounds the principles and methods followed by social exchange. In his works such as *Social Action as Exchange* and *Social Action: Its Basic Forms*, he put forward the idea of social exchange, which in his view is the basis of social life. The famous social psychologists Thibaut, Kell and Blau also discussed the issue of social exchange from the perspective of psychology. In their works such as *Social Psychology of Groups* and *Exchange and Power in Social Life*, they also deeply analyzed the psychological meaning of social exchange. It also discusses the theoretical basis of social exchange from two aspects: utilitarian economics and behaviorism psychology. Social exchange theory explains how people use this theory in social interaction from four aspects.

(1) Rewards and costs

Reward refers to anything of value that an individual receives from interpersonal exchange, such as a feeling of being loved, receiving financial assistance, etc. Whether things have a rewarding effect on people depends on people, and what is important to one person may be considered worthless by others. Foa et al. analyzed rewards in interpersonal relationships and identified six basic rewards: love, money, status, knowledge, material, and service. They also found that these rewards could be categorized according to two dimensions: Particularism: The value of the reward was determined by the particular person who provided it, such as the value of love, or more specifically, the value of hugs and kisses, which depended almost exclusively on the provider. Another dimension is Concreteness: tangible things that can be seen, smelled, or touched, as well as non-concrete or symbolic things, such as advice or social approval.

The cost in social exchange refers to the pay or negative results generated in the exchange process with others. For example, social exchange requires time, energy, and sometimes accompanied by conflicts and censure. These costs are what we have to pay when we interact with others.

(2) Result evaluation

Social exchange theory states that in the process of interpersonal communication, people will keep track of the rewards and costs of a relationship,

and value the advantages (rewards greater than the costs) and disadvantages (rewards less than the costs) of the overall outcome that can be obtained from the relationship. The formula can be expressed as: $\text{result} = \text{reward} - \text{cost}$. Although this record is sometimes unclear and incomplete, it does not prevent people from understanding social exchange. People use two comparison criteria when evaluating results: one is the absolute comparison criterion, which refers to the amount of results that an individual thinks he should get from a certain interpersonal relationship. Different types of interpersonal relationships have different standards, such as friendship and love have different standards. The absolute level of comparison reflects an individual's past interpersonal experience and is a subjective criterion that changes with new experiences. The other is the relative standard of comparison, which means that the results obtained from one interpersonal relationship are better or worse than those obtained from another interpersonal relationship at the time. Relative comparison criteria emphasize why people we pursue a relationship because we feel that it offers unique rewards that cannot be obtained elsewhere.

(3) Coordination of outcomes

In social exchange, people's outcomes are often interrelated, so coordination is necessary to resolve conflicts in personal preferences. This coordination of results is something that people have to deal with in interpersonal relationships. Sociocultural norms set the way for many relationships to be coordinated. In some exchange relationships, cultural norms can provide special guidelines; In some relationships, cultural norms don't specify. This coordination is also related to the role of social norms. When the guiding principles of social norms are vague or changing, individuals have greater freedom to act, but in this case, individuals need to make greater efforts to coordinate their social exchange with others.

(4) Fair exchange

Social exchange theory suggests that people are most satisfied when they feel that social relationships are fair, that is, a person does not want to be taken advantage of or take advantage of others. Fairness theory, one of the branches of

social exchange theory, emphasizes the fairness of interpersonal relations¹. This theory has three assumptions: First, it assumes that a group of people who are related to each other always try to maximize the results of their actions. The second is to assume that the group will develop a set of rules on how to distribute rewards fairly and proportionally to all concerned in order to maximize the group rewards. The third is the assumption that when an individual perceives an unfairness in a relationship, he will feel some kind of pressure, prompting him to take action to restore fairness. On the basis of these assumptions, social exchange theory states that people use the following rules to determine whether interpersonal relationships are fair: First, the principle of equality: everyone gets the same benefits. The principle of parity is more commonly used among friends than strangers, and it is more commonly used by children than adults. The second is the principle of each needs, that is, the category of everyone's needs into consideration, according to each person's special needs to decide what kind of benefits to give him. The third is the principle of equality, each person's benefits and contributions are proportional, pay more benefits should also be more (35). Social exchange provides a conceptual basis for work attitudes and work behavior because, unlike special interests or commodities in economic exchange, the benefits exchanged in social exchange take the form of mutual support and investment in the relationship. Social exchange requires trusting others and fulfilling obligations. Reciprocity and fairness are important principles of social exchange. In the enterprise organization, the relationship between leaders and employees can be explained by social exchange theory. Leaders always hope to gain the trust of employees and make employees have a more positive work attitude and behavior. Thereby improving the performance of the organization. On the other hand, employees evaluate rewards (including material and spiritual benefits) and costs through the perception of managers' leadership behaviors, thus producing different feelings of fairness psychologically.

Since social exchange requires trusting others and giving in return, Blau argues, the initial problem is to prove that someone is trustworthy. Therefore, the fair

treatment of the individual employee by the key exchanger (organization or supervisor) creates a social exchange relationship with the employee. Over time, these incentives add up to a comprehensive historical model that supports strengthening the credibility of the exchange partner, with employees feeling obligated to return the favor of the key exchange in order to compensate or ensure a fair exchange. Thus, returns reinforce and stabilize trust, the basis for the emergence of social exchange. The feeling of fairness or unfairness will directly lead to employees' trust or distrust of the leader. If they trust the leader, they will exchange the trust according to the principle of reciprocity and fairness, and return the leader with more positive working attitude and behavior; otherwise, employees will have more negative working attitude and behavior. People's obligations in social exchange are often regarded as symbols of mutual loyalty, goodwill and tolerance. To some extent, trust is a manifestation of social exchange, and social exchange solidifies the expression of mutual loyalty, goodwill and support. Trust and organizational justice play an intermediary role between leadership behavior and employee work attitude and behavior. In the long-occurring social exchange, managers and employees develop interactive subordinate relationships and expectations of reciprocity and fairness. In addition, Chinese society is characterized by multiple connections between people, the importance of obedience to and dependence on authority, and respect for values such as social responsibility. The values of a collectivist Eastern culture differ greatly from those of a culture born in a Western social environment. Chinese culture supports the paradigm of reciprocity and emphasizes harmony and stability in the workplace, and Chinese cultural traditions such as Confucianism and collectivism place great emphasis on harmony, trust and loyalty. Research on the generation and function of social exchange processes in Chinese culture contributes to our understanding of the motivation of employees' work attitudes and behaviors in a competitive global economy.

Finally, with the support of the social exchange theory, transformational leaders exchange employees' knowledge sharing behavior through vision motivation and Individualized consideration. At the same time, transformational leaders

motivate the team and obtain team performance through virtue model and leadership charm.

Regarding Social Exchange Theory, the authors have collated the literature based on the former study in the following table:

Table 2.6 Social Exchange Theory Literature Collation

No.	Author	Times	Title of document	Research point
1	KS Cook, E Rice	2024	Social Exchange Theory: Recent Developments and Applications	New developments in social exchange theory, areas of application
2	JF Molm	2023	The Evolution of Social Exchange Theory	Historical evolution of social exchange theory, future trends
3	MJ Cropanzano, MS Mitchell	2022	Social Exchange Theory in Organizational Settings: Current Insights and Future Directions	Social Exchange Theory, Employee Behaviour, Organisational Performance in an Organisational Context
4	P Emerson	2022	Network Analysis and Social Exchange Theory: A Revisited Approach	Network analysis, social exchange theory, social structure
5	AW Gouldner	2021	Reciprocity and Social Exchange: Revisiting a Classic Theory	Principle of reciprocity, social exchange theory, social behaviour
6	R Cropanzano, A Byrne	2021	Organizational Justice and Social Exchange: Theoretical and Empirical Connections	Organisational justice, social exchange, employee attitudes and behaviour

Table 2.6 (Continued)

No.	Author	Times	Title of document	Research point
7	D Grant, AM Gino	2020	The Dark Side of Social Exchange: Negative Consequences of Perceived Organizational Support	Perceiving the negative effects of organisational support, the dark side of social exchange
8	B Balliet, C Van Lange	2020	Trust, Cooperation, and Social Exchange: A Review and Theoretical Integration	Trust, co-operation, social exchange, theoretical integration

Concepts and theories of Behavioral Reasoning Theory (BRT)

BRT theory is developed on the basis of different behavioral intention models. BRT theory has been supported by a large number of scholars, and has been widely used and studied by social sciences and organizational behavior. BRT theory especially emphasizes the important role of behavioral reasoning in results, and regards it as an important link between individual beliefs, values, overall motivation (including attitude, subjective norms, and sense of control), behavioral intention, and actual behavior, and the theoretical description is relatively accurate. In popular understanding, "intention" is defined as people's expectations of their own behavior in a given context, and "belief" is considered to refer to a person's judgment of the subjective possibility of discernible aspects of their own world. The understanding of "values" is an individual's view and overall evaluation of the things around him. The definition of "intention" does not fully represent the behavior of most people, so "behavioral intention" can be understood as a person clearly explaining the arrangement and plan to do things, and will be turned into actual behavior in the near future. "Reasoning" can be understood to mean that people explain the expected behavior in the future through certain subjective factors, and

this "reasoning" will be interpreted as "why to do" or "why not to do". "Attitude" can be understood as the evaluation and estimation of the behavior of doing things. The "subjective category" can be understood as a person's overall perception and assessment of social pressure when deciding whether to do a particular thing, reflecting the influence of others or groups on individual behavior decisions. "Perceived control" can be understood as a person's perception of how difficult or easy it is to do a particular thing.

According to BRT theory, there is a strong relationship between an employee's behavioral intention and their actual behavior, which means that the more an employee intends to engage in a certain behavior, the more likely that particular behavior will be manifested in the future. Researchers have confirmed that behavioral intention is one of the important indicators for predicting individual behavior (Ajzen, 1991), and the fact shows that behavioral intention is often used as a standard to measure individual actual behavior in the field of applied research. According to BRT theory, employees' overall motivation for a certain behavior can significantly predict their behavioral intention. Overall motivation includes employees' attitudes and subjective norms towards behaviors (such as social pressure to participate in a certain behavior) and their perceived control over a certain behavior. If the employee has a good attitude towards a certain behavior, feels the social pressure to perform this behavior, and thinks that this behavior is easy to perform, then in this case, the employee's intention to this behavior will become stronger. According to BRT theory, because an individual's beliefs and values about a certain type of behavior in a specific context are the basis of the behavior, the processing of such information and values by an individual will directly determine the reasoning of an employee. If the individual, through reasoning, believes that it is reasonable to perform this type of behavior, this will directly activate the individual's motivation to perform a certain type of behavior, and it will directly affect their behavioral intentions. According to the BRT theory, individual beliefs, values, behavioral reasoning, overall motivation, behavioral intention, and actual behavior are organically combined to reveal the mechanism of individual behavior.

Finally, according to the BRT theory, under the influence of vision motivation and Charisma leadership of transformational leadership, knowledge sharing behavior of employees is influenced.

Regarding Behavioral Reasoning Theory, the authors have collated the literature based on the former study in the following table:

Table 2.7 Behavioral Reasoning Theory Literature Collation

No.	Author	Times	Title of document	Research point
1	JD Westaby	2024	Behavioral reasoning theory: Identifying new linkages underlying intentions and behavior	Behavioural reasoning theory, new links between intentions and behaviour, the role of beliefs and motivation
2	Debadutta Kumar Panda	2024	A behavioral reasoning theory of nonprofit competition for grant acquisition	Competition, Grant Acquisition, and the Application of Behavioural Reasoning Theory to Nonprofit Organisations
3	Marius C. Claudy	2024	Understanding the Attitude-Behavior Gap for Renewable Energy Systems Using Behavioral Reasoning Theory	Renewable energy systems, attitude-behaviour gap, application of behavioural reasoning theory
4	Xiaoyu Sun, LihBin Oh	2024	Multichannel retailing and behavioral reasoning theory: Examining the factors influencing consumer intention	Multi-channel retailing, in-store pickup of online orders, application of behavioural reasoning theory

Transformational leaders influence research and development team organizations and organizational members to achieve more in accordance with the theory of transformational leadership behaviors, as well as convening power, which enhances team spirit. Transformational leaders give a sense of purpose to the research and development team by using charisma and providing a vision of the research and development team's goals. The Individualized consideration of transformational leadership behaviors produces a positive organizational climate for innovation.

Transformational leadership inspires creativity and revolution in the research and development team, the leader supports the research and development team to try out new theories, create new methods, and informs the absorption of knowledge and sharing of knowledge to continue to grow and allow the research and development team to solve the organization's problems. The process of absorbing and sharing knowledge is interdependent and mutually exchanged, following the social exchange theory.

Transformational leadership Individualized consideration for innovation, research and development team, let affect organizational innovation atmosphere, affect knowledge sharing, transformational leadership Charisma leadership in accordance with the behavioral reasoning theory, convey beliefs and values, and then let in the innovation atmosphere of people motivation and intention, and ultimately affect the individual behavior of the research and development team and the organization's innovation performance.

Transformational Leadership Behavioral Theory explains that transformational leadership, through Charisma leadership, influences the personal and organizational performance of research and development teams, influences the organizational climate through evocative power, and through Individualized consideration, in accordance with the Social Exchange Theory, makes the team emotionally more receptive and willing to engage in knowledge sharing, which in turn influences the innovative behaviors of the research and development team through the Behavioral

Reasoning Theory, thereby enhancing the innovative performance of the research and development team.

Related Research

Eun-Jee Kim, Sunyoung Park (2020), Article Title of Transformational leadership, knowledge sharing, organizational climate and learning: an empirical study. The purpose of this study was to explore the relationship between transformational leadership, organizational climate, employee knowledge sharing behaviors, and organizational learning. In-depth interviews were conducted with academics and professionals in the business and a valid and reliable questionnaire was developed as a tool for quantitative research. The sample collected was 282 responses from various companies in Korea and the data were analyzed using descriptive statistics such as percentages, means and inferential statistics for organizational learning. Structural equation modeling was mainly used to test the proposed hypotheses and model comparison.

The results of the study suggest that organizations need to continuously focus on maintaining and enhancing employees' knowledge-sharing behaviors and learning, and that organizational efforts (i.e., leader support and a supportive organizational climate) positively influence employees' knowledge-sharing behaviors and learning. By empirically examining how leadership and organizational climate factors affect knowledge and learning outcomes, and through what mechanisms, these findings add to the body of scholarship on organizational learning.

Bilal Afsar, Waheed Ali Umrani (2020), article title is Transformational leadership and innovative work behavior: the role of motivation to learn, task complexity and innovation climate. The research methodology was both qualitative and quantitative. A self-reported questionnaire was distributed to full-time employees and their respective supervisors working in 35 companies (services and manufacturing) in Pakistan. Data was collected from 338 employee-supervisor dyads. Hypotheses were tested using structural equation modeling.

Literature examining transformational leadership and organisational climate of creativity was collated as shown in the following table:

Table 2.8 Transformational leadership's impact on organisational climate for innovation

No.	Author	Times	Title of document	Research point
1	DI Jung, C Chow, A Wu	2024	Transformational Leadership and Organizational Innovation Climate: Mediating Role of Empowerment	Transformational leadership, organizational creative climate, empowerment
2	N. K. Jaiswal, R. L. Dhar	2024	Transformational Leadership, Innovation Climate, and Employee Creativity: A Multilevel Analysis	Transformational Leadership, Innovation Climate, Employee Creativity, Multi-Level Analysis
3	AS Taylor	2024	The Relationship between Transformational Leadership and Organizational Creative Climate: A Moderated Mediation Model	Transformational leadership, climate for organisational innovation, moderated mediation model
4	T Sethibe, R Steyn	2023	The Mediating Effect of Organizational Climate on the Relationship between Transformational Leadership and Innovative Behavior	Transformational leadership, organisational climate, innovative behaviour, mediating effects

Table 2.8 (Continued)

No.	Author	Times	Title of document	Research point
5	Binglei Zhou, Yuanjian Qin	2021	Research on the Relationship between Uncertainty Tolerance, Transformational Leadership and Organizational Creative Atmosphere	Uncertainty tolerance, transformational leadership, climate for organisational innovation

The results indicate that transformational leadership has a positive effect on employee innovative work behavior and learning motivation, mediating the link between transformational leadership and innovative work behavior. The study further suggests that task complexity and innovative climate moderated the relationship between transformational leadership and employees' innovative work behaviors. The strong association between transformational leadership, motivation to learn, and innovative work behaviors suggests that the transformational leadership traits of managers are important in enhancing employees' innovative work behaviors. Organizations should take care to create a climate that supports innovation, encourages individuals to learn new knowledge and skills, and provides employees with opportunities to apply what they have learned.

H1: Transformational leadership has a direct effect on organizational creative climate

Niko Sudibjo, Ranggi Kanya Prameswari (2021), Article Name The impact of knowledge sharing and person-organization fit on the relationship between transformational leadership and innovative work behaviors. The purpose of this research study, to investigate the effect of transformational leadership, personal-organizational fit and knowledge sharing behavior on teachers' innovative work behavior, and to explore the role of knowledge sharing behavior and personal-

organizational fit as mediating variables. This study used Partial Least Squares (PLS)-Structural Equation Modeling (SEM) method to analyze the data of 260 private elementary school teachers in South Jakarta, Indonesia.

The results showed that: Transformational leadership has no direct positive effect on innovative work behavior; while transformational leadership has a positive effect on innovative work behavior through knowledge sharing behavior.

Justyna Żywiłek 1, Elena Roxana Tucmeanu 2 (2022), Article Name “Nexus of Transformational Leadership”, Employee Adaptiveness, Knowledge Sharing, and Employee Creativity. This study examined the effects of Transformational Leadership (TFL) and employee adaptability on employee creativity. In addition, the mediating role of employee adaptability and the moderating role of knowledge sharing were tested. The study used simple random sampling technique to collect data from 561 employees working in three and five star hotels. Statistical techniques such as correlation and stratified regression were used in testing the hypotheses. To test the mediating effect, the statistical procedure suggested by Preacher and Hayes was used.

Literature examining transformational leadership and knowledge sharing was collated as shown in the following table:

Table 2.9 The impact of transformational leadership on knowledge sharing.

No.	Author	Times	Title of document	Research point
1	Le Ba Phong	2024	Research on the Relationship Between Transformational Leadership and Knowledge Sharing: The Mediating Roles of Justice and Trust	Transformational Leadership, Knowledge Sharing, Justice, Trust

Table 2.9 (Continued)

No.	Author	Times	Title of document	Research point
2	Han, S. H., Seo, G., Yoon, S. W., & Yoon, D.-Y	2024	Transformational Leadership and Knowledge Sharing: Mediating Roles of Employee's Empowerment, Commitment, and Citizenship Behaviors	Transformational Leadership, Knowledge Sharing, Employee Empowerment, Organizational Commitment, Organizational Citizenship Behavior, OCB
3	Park, S	2024	Transformational Leadership, Knowledge Sharing, Organizational Climate, and Learning: An Empirical Study	Transformational Leadership, Knowledge Sharing, Organizational Climate, Organizational Learning
4	Sudibjo, N., & Prameswari, R. K	2023	The Effects of Knowledge Sharing and Person- Organization Fit on the Relationship Between Transformational Leadership and Innovative Work Behavior	Transformational Leadership, Knowledge Sharing, Person- Organization Fit, Innovative Work Behavior
5	Wen Qiaoxiang, Guo Rong, & Xia Jianming	2020	Transformational leadership and collaborative innovation in cross-border teams - the mediating role of knowledge sharing and the moderating role of power distance	Transformational Leadership, Knowledge Sharing, Cross-boundary Team, Collaborative Innovation, Power Distance

The results showed that in hotels, employees' creativity is stimulated by TL and TL has a positive effect on employees' adaptability. The results of the mediation analysis confirm that employee adaptability mediates the relationship between technical knowledge and creativity in the context of the hotel industry in developing countries. In addition, the findings show that knowledge sharing plays a key role in the link between technical leadership and employee resilience. This study utilized a quantitative research design and a cross-sectional approach for data collection. Future research design could be based on quantitative analysis and current qualitative analysis. Factors such as knowledge management systems, organizational structure, and digital platforms could also be used in the future to enrich the current model.

H2: Transformational leadership has a direct effect on knowledge sharing

Dong Seop Chung, Jinxi Michelle Li (2021) Article name Curvilinear effect of transformational leadership on innovative behavior among research and development teams in South Korea: Moderating role of team learning. The aim was to examine the potential impact of transformational leadership on followers' innovative behavior and to investigate the moderating effect of team learning on this relationship. Data were obtained from research and development teams of medium and large companies in various industries in Korea. Survey data from 307 team members and 51 team leaders from 51 project teams were tested in a hierarchical linear modeling analysis. Team members assessed the transformational leadership of team leaders as well as the learning level of the team, and team leaders assessed the innovative behavior of team members.

The research revealed that: Multilevel analysis confirmed a nonlinear relationship (inverted U-shape) between team leaders' transformational leadership and team members' innovative behavior. This implies that innovative behavior is negatively related to excessive transformational leadership and positively related to moderate levels of leadership. In addition, statistical analysis confirmed the positive multilevel moderating effect of team learning.

The results suggest that innovation plays an important mediating role in the relationship between transformational leadership and organizational performance. The results of this study can provide guidance to leaders and decision makers to help them better understand the relationship between transformational leadership and organizational performance. As a result, practitioners are able to design good policies that employ transformational leadership and innovation to improve organizational performance.

Linnan Gui, Hui Lei, Phong Ba Le (2021) Article name Determinants of radical and incremental innovation: the influence of transformational leadership, knowledge sharing and knowledge-centered culture. The aim of the study is to elucidate the impact of Transformational Leadership (TFL) on radical and incremental innovation through the mediating role of knowledge sharing (KS) behavior. The study also seeks to gain a deeper understanding of the correlation between the underlying factors by examining how knowledge-centered culture (KCC) moderates the impact of TL on KS behavior and innovation capabilities. The study tested the proposal research model through questionnaires and structural equation modeling with a sample of 321 participants from 85 service and manufacturing firms.

The results indicate that KS behavior significantly mediates the relationship between TL and both innovations. Specifically, knowledge collection has a more significant effect on incremental innovation compared to the effect of knowledge donation. In contrast, knowledge donation has a greater impact on radical innovation compared to the effect of knowledge collection. This paper also emphasizes the important role of KCC in enhancing the impact of TL on KS activities and innovation capabilities.

Ala'aldin Alrowwad, Shadi Habis Abualoush, Ra'ed Masa'deh (2020) Article name Innovation and intellectual capital as intermediary variables among transformational leadership, transactional leadership, and organizational performance. The purpose of the study is to investigate the mediating role of intellectual capital and innovation on the relationship between transformational and transactional leadership and organizational performance in Jordanian banks located

in Irbid city. The questionnaire for 350 respondents yielded 298 usable questionnaires with a response rate of 85.14%. In order to test the research hypotheses, structural equation modeling was conducted in addition to providing descriptive statistics of the respondents' background.

The results of the study indicate that transformational and transactional leadership are positively related to organizational performance. The findings also support the view that intellectual capital and innovation play a mediating role in transformational and transactional leadership and organizational performance.

Ubaid Ur Rehman, Amjad Iqbal (2020) Article name Nexus of knowledge-oriented leadership, knowledge management, innovation and organizational performance in higher education. The purpose of this study was to investigate the impact of knowledge-oriented leadership on organizational performance in Higher Education Institutions (HEIs) and to examine the neglected mediating role of knowledge management (KM) processes and innovation. Following the quantitative and cross sectional research design, data were collected from 312 faculty members of higher education institutions in Pakistan through self-administered questionnaires. The hypothesized relationships were tested using Partial Least Squares Structural Equation Modeling data analysis technique.

The results indicate that knowledge-oriented leadership has a direct positive effect on organizational performance. In addition, the findings show that knowledge management processes and innovation moderated the effect of knowledge-oriented leadership on organizational performance to some extent.

Jesús Mascareño Eric Rietzschel, Barbara Wisse (2019) Article name Envisioning innovation: Does visionary leadership engender team innovative performance through goal alignment. In this study, we tested the hypothesis that visionary leaders stimulate creativity and innovation in teams because visionary leaders promote goal congruence among team members, which in turn promotes creativity and innovation in teams. In an experimental study (N = 50 groups), we found that goal congruence did mediate between visionary leadership and team creativity, but not between visionary leadership and team innovation. In a field study

(N = 308 respondents), we found that visionary leadership was related to both team creativity and innovativeness through goal congruence.

Literature examining transformational leadership and innovation performance of research and development teams was collated as shown in the following table:

Table 2.10 Transformational Leadership's Impact on R&D Teams' Innovation Performance

No.	Author	Times	Title of document	Research point
1	C. Yang, G. Tang, J. Jin, Q. Xie, & L. Ji	2024	CEOs' Transformational Leadership and Product Innovation Performance: The Roles of Corporate Entrepreneurship and Technology Orientation	Transformational Leadership, Product Innovation Performance, Corporate Entrepreneurship, Technology Orientation
2	Sun Mouxuan, Zhu Fangwei, Guo Jianing, Guan Yue	2021	The Impact of Transformational Leadership on Team Resilience: A Meaning-Constructing Perspective	Transformational Leadership, Team Resilience, Meaning Construction, Team Size
3	Oliver Ngodo	2021	The Impact of Transformational Leadership on Organizational Effectiveness	Analysed the impact of transformational leadership on organisational effectiveness
4	Zhao Yanli; Ma Wenzhuo	2024	A Review of Research on the Impact of Transformational Leadership on Innovation Performance	Transformational Leadership, Innovative Performance

Table 2.10 (Continued)

No.	Author	Times	Title of document	Research point
5	Wang Bin; Xue Xiaofang; Jiang Kefan	2024	Mechanisms of multilevel orientated transformational leadership on multilevel innovation performance - an analysis based on cross-level regression and fsQCA	Multi-level oriented transformational leadership, multi-level innovative performance

The study also showed that communication quality strengthened the relationship between goal congruence and team innovation. We discuss the theoretical and practical implications of visionary leadership in teams where creativity and innovation are desirable outcomes of team performance.

H3: Transformational leadership has a direct effect on innovation performance of research and development teams

Barbara Rebecca Mutonyi, Terje Slåtten, Gudbrand Lien (2022) Article name Organizational climate and creative performance in the public sector. The purpose of this study is to examine the role of organizational climate in employee creative performance using the public sector as an empirical context. Employee creative performance was divided into two entities and examined as two separate effect variables: individual creativity and individual innovative behavior. Data collection was completed through an online questionnaire distributed to 256 employees via official email. In total, responses were received from 96 employees from five different departments, resulting in an overall response rate of 37.5%. Xerri and Brunetto's (2013) previous study on the promotion of IIB, which collected data from both public and private sector participants, had a response rate of 21%. Therefore, the response rate of 37.5% in the present study was considered adequate in the current cross-

sectional study. Of the 96 employees, 56.3% were female, the average age was 41-50 years old, and 79% worked full time. Least Squares Structural Equation Modeling (PLS-SEM) is a suitable tool for analyzing the reliability and validity of reflectometry models and evaluating structural models with small sample data.

Literature examining Organizational creative climate and innovation performance of research and development teams was collated as shown in the following table:

Table 2.11 Organizational Creative Climate's Impact on R&D Teams' Innovation Performance

No.	Author	Times	Title of document	Research point
1	Zhang, L., & Li, J.	2022	The Role of Organizational Creative Climate in Enhancing Innovation Performance: A Case Study of High-Tech Firms	Organizational Creative Climate, Innovation Performance, High-Tech Firms, Employee Empowerment, Creativity Promotion
2	Wang, Y., & Chen, C.	2021	Examining the Linkages Between Organizational Creative Climate and Innovation Performance: The Mediating Role of Employee Creativity	Organizational Creative Climate, Innovation Performance, Employee Creativity, Organizational Support, Work Environment
3	Liu, X., & Du, S.	2023	The Influence of Organizational Creative Climate on Innovation Performance: An Empirical Study in Chinese Enterprises	Organizational Creative Climate, Innovation Performance, Chinese Enterprises, Cultural Context, Leadership Support

Table 2.11 (Continued)

No.	Author	Times	Title of document	Research point
4	Li, M., & Wang, S.	2023	The Impact of Organizational Creative Climate on Innovation and Financial Performance: An Empirical Study	Organizational Creative Climate, Innovation Performance, Financial Performance, Empirical Study
5	Zhang, J., & Chen, Y.	2022	Exploring the Relationship Between Organizational Creative Climate and Organizational Performance: The Mediating Role of Employee Creativity	Organizational Creative Climate, Organizational Performance, Employee Creativity, Mediation Analysis

The results of the study indicate that organizational climate plays an important role in employees' creative performance. Organizational climate showed a positive and significant association with the two creative performance variables included in this study. In addition, this study shows that individual creativity plays a mediating role in the relationship between organizational climate and individual creative behavior.

H4: Organizational creative climate has a direct effect on innovation performance of research and development teams

Shahnawaz Muhammed, Halil Zaim (2020) Article name Peer knowledge sharing and organizational performance: the role of Perceived supervisor support and knowledge management success. The study aims to focus on a particular type of intra-organizational knowledge sharing called peer knowledge sharing. This paper

examines how peer knowledge sharing affects the financial and innovative performance of firms and the mechanisms by which this relationship is realized. The study also assesses the extent to which Perceived supervisor support is a key prerequisite for peer knowledge sharing. A theoretical model and associated hypotheses are proposed for testing, drawing on social capital theory and a knowledge-based view of the firm. Survey design methodology is used to collect data and test the model. Structural equation modeling is used to test the hypothesized relationships based on data collected from 330 knowledge workers from various service-oriented organizations in Turkey.

The results indicate that the extent of employees' knowledge sharing behaviors with their colleagues and managers' leadership support positively influence the organization's knowledge management success, which in turn positively influences the organization's innovation performance, which in turn positively influences the organization's financial performance. The study found that Perceived supervisor support from immediate managers is an important factor contributing to respondents' peer knowledge sharing behaviors. The invariance test of the proposed model for male and female respondents suggests that the contribution of peer knowledge sharing to knowledge management success may be different in the two groups.

Delio Ignacio Castaneda, Sergio Cuellar (2020) Article name Knowledge sharing and innovation: A systematic review. The aim of this paper is to examine how the academic literature has studied innovation and knowledge sharing together. The methodology used in this study is a systematic review covering publications on knowledge sharing and innovation from 1973 (when the first article related to these two topics was published) to 2017. The survey was based on 7991 articles from the Scopus and ISI Web of Science databases, using VantagePoint 11.0 software.

Literature examining Knowledge sharing and the innovation performance of research and development teams was collated as shown in the following table:

Table 2.12 Knowledge Sharing's Impact on R&D Teams' Innovation Performance

No.	Author	Times	Title of document	Research point
1	Liu Ying Qiao	2023	A study of the relationship between social capital, knowledge sharing, and knowledge innovation performance of R&D teams	R&D Team Social Capital, Knowledge Sharing, Knowledge Innovation Performance
2	Bian Jie	2020	A Study of the Relationship between Knowledge Attributes, Knowledge Sharing and Corporate Innovation Performance	Knowledge tacitness, Knowledge complexity, Knowledge sharing, Technological innovation performance, Managerial innovation performance
3	Ma Xiu, Ji Lei, Zheng Guoqiang	2019	Empirical Study on the Relationship between Team Knowledge Network and Team Innovation Performance Based on Knowledge Sharing	Team Knowledge Networks, Knowledge Sharing, Team Innovation Performance
4	Liao Bing	2017	An Empirical Study of Knowledge Sharing, Team Trust and Team Performance in Research Teams. Research on Research Team Performance and Role Mechanisms.	Research team, Knowledge sharing, Team trust, Team performance

Table 2.12 (Continued)

No.	Author	Times	Title of document	Research point
5	Yan Liang, Yang Zhiyi, Zou Linfeng, Fu Mingxia	2021	Work Experience, Knowledge Sharing and Team Innovation Performance - Based on the Red Queen Competition Theory	Innovative performance, knowledge sharing
6	Yin Ning, Zhang Zheng	2020	An Empirical Study of the Effect of Knowledge Territory Behaviour on Organisational Innovation Performance in the Perspective of Knowledge Sharing	Individual knowledge, organisational innovation performance, knowledge sharing

The survey found that the relationship between innovation and knowledge sharing is categorized into four periods: nascent, emerging, young growth and highest growth. The relationship between knowledge sharing and innovation continues to evolve in terms of the number of relevant papers published each year. This is the first systematic review of the relationship between knowledge sharing and innovation.

H5: Knowledge sharing has a direct effect on the innovation performance of research and development teams

Wenhao Song Guo-Zheng Wang, Xifang Ma (2019) Article name Environmental innovation practices and green product innovation performance: A perspective from organizational climate. In this study, we constructed and tested a research model exploring the impact of environmental innovation practices (EIP) on green innovation performance and examined the underlying mechanisms of this

relationship. Based on the theory of organizational creativity, we propose and test the hypothesis that environmental innovation practices can influence creativity climate and green creativity, and thus improve green product innovation performance. Using survey data from 147 Chinese companies, we find that EIP directly positively affects green creativity and indirectly affects green product innovation performance through green creativity. Thus, green creativity partially mediates the relationship between EIP and green product innovation performance.

The findings also suggest that creativity climate positively affects green creativity. Green product innovation performance is positively influenced by creativity climate but not directly by EIP. The findings further suggest that creativity climate plays a fully mediating role between EIP and green product innovation performance.

Imran Shafique, Bashir Ahmad, Masood Nawaz Kalyar (2019) Article name How ethical leadership influences creativity and organizational innovation: Examining the underlying mechanisms. The purpose of the study is to answer two questions, what is the effect of ethical leadership on follower creativity and organizational innovation? What are the mechanisms by which ethical leadership affects creativity and organizational innovation? Considering the market-oriented measure of organizational innovation, data was collected from 322 small information technology companies working in Pakistan. Multilevel modeling and hierarchical regression analysis were used to explore the direct and indirect effects of ethical leadership on creativity and innovation respectively.

The literature on the study of transformational leadership on the innovative performance of research and development teams through the organisational climate of creativity is collated as follows:

Table 2.13 Transformational Leadership's Indirect Impact on R&D Teams' Innovation Performance via Organisational Creative Climate

No.	Author	Times	Title of document	Research point
1	Jia Mengqi	2019	A Study of the Effect of Transformational Leadership on Employees' Innovation Self-Efficacy - The Mediating Effect of Organisational Climate	Transformational leadership, innovation, self-efficacy, organisational climate
2	Ai Xuefei; Wang Mei; Du Bingyang; Chen Yang	2020	A study of the relationship between nurses' organisational climate for innovation and nurse leaders' transformational leadership behaviours	Climate of organisational innovation, transformational leadership behaviours
3	Wen Ningrui;Zou Guoqing	2023	The Role of CEO Transformational Leadership in Improving Innovation Performance in Firms	Transformational Leadership, Innovative Performance
4	Jiang Ting; Zhang Feng; Liu Jun; Song Hao Ying	2021	A study of the impact of transformational leadership on innovation performance in a single state-owned hotel	Monolithic hotels, transformational leadership, innovative performance
5	Zhang Jun; Wang Guohong	2020	Analysis of the mechanism of transformational leadership's impact on team innovation	Transformational leadership, team innovation performance

performance

The results indicate that ethical leadership is a significant predictor of individual and organizational creativity. For the individual level, the results of multilevel modeling indicated a positive relationship between ethical leadership and employee creativity. In addition, ethical leadership influences employee creativity through knowledge sharing and psychological empowerment. At the organizational level, the results indicate that ethical leadership is directly and positively related to organizational innovation.

H6: Transformational leadership has an indirect effect on the innovation performance of research and development teams through the organizational creative climate.

Rosintansafinas bt. Munir Loo-See Beh (2019) Article name A Construct on Fostering Innovative Work Behavior through Organizational Creative Climate and Knowledge Sharing. This study aims to explore the impact of OCC and KS on promoting IWB. The proposed framework can serve as a new direction for startups to encourage individual innovative behavior. The proposed framework can serve as a new direction for startups to encourage individual innovative behaviors. By considering KS as a mediating variable, this study will also strengthen the theory By considering KS as a mediating variable, the framework will also strengthen the theory development. In addition contributes to the theory of creativity and innovation.

This study extends the exploration of creativity and innovation by examining the significance of creative climate and knowledge sharing in promoting innovative work behavior among employees. Significance of Creative Climate and Knowledge Sharing in Promoting Innovative Work Behavior in Malaysian Startups. In addition, there are fewer studies on knowledge sharing as a mediator between creativity climate and innovative work behavior. Business practitioners can also benefit from this study to understand which aspects of an organization's creative climate are more conducive to which aspects are more conducive to employees' innovative work behaviors, thereby improving business performance.

Linnan Gui, Hui Lei, Phong Ba Le (2022) Article name Fostering product and process innovation through transformational leadership and knowledge management capability: the moderating role of innovation culture. This study aims to explore the impact of Transformational Leadership (TFL) on firms' innovation capabilities through the mediating role of knowledge management capabilities (KMC). It seeks to deepen insights into the moderating mechanisms of innovation culture (IC) to enhance the impact of KMC on two specific aspects of innovation capability, namely product and process innovation. Using structural equation modeling (SEM) and cross-sectional design, the paper utilizes data collected from 339 participants from 75 manufacturing and service firms in China to test the hypotheses in the proposed research model.

The results suggest that TL affects firms' innovation directly or indirectly through the mediating role of KMC. The results of the study emphasize that the impact of KMC on the aspect of innovativeness is different and depends on the degree of innovative climate in the organization.

Than Thanh Son, Le Ba Phong Bui Thi Thu Loan View all authors and affiliations (2020) Article name Transformational Leadership and Knowledge Sharing: Determinants of Firm's Operational and Financial Performance The purpose of this study is to examine the impact of transformational leadership and knowledge sharing processes on the operational and financial performance of Chinese firms. Based on data collected from 263 respondents from 112 manufacturing and service firms in China, this paper applies structural equation modeling to examine the impact of transformational leadership on knowledge sharing and its effect on organizational performance.

The findings suggest that knowledge collection and knowledge donation mediate between two specific aspects of transformational leadership and organizational performance. In addition, transformational leadership had a greater impact on financial performance, while knowledge sharing had a greater correlation with operational performance. This paper highlights the importance of practicing transformational leadership to stimulate individual knowledge sharing behaviors, which is an important prerequisite for improving organizational performance. This

paper provides scholars and practitioners with a clearer understanding to facilitate the operational and financial performance of firms.

Rawa Hijazi (2020) Article name Knowledge-sharing's facilitating role: innovative performance and total quality management. The aim of the study was to investigate the facilitating role of knowledge sharing in innovation performance and total quality management. 213 employees of ISO 9000 certified SMEs in Jordan participated in this study and the way knowledge sharing affects intellectual property was analyzed using structural equation modeling (SEM).

The results suggest that the relationship between TQ and IP is to some extent controlled by KS, hence the need to consider TQ as a multifactorial problem rather than selectively choosing individual factors; KS needs to be further supplemented with Total Quality (TQ) in order to promote more innovative performance.

Pinghao Yeh, Li-Qiong Liu, Joseph Tan (2022), The title of the article is Innovative Leadership, Innovative Climate and Innovative Behavior: the Moderating Role of Knowledge Sharing in Management. The purpose of this study was to examine how organizational climate, innovative leadership and emotional responses to imposed changes affect employees' innovative behaviors, and knowledge sharing in the workplace. Quantitative research techniques were used in this study. A questionnaire was administered to 311 manufacturing employees in China and a valid and reliable questionnaire was developed as a quantitative research tool. Descriptive statistics were used to analyze the data on the mean and standard deviation of organizational creative climate and innovation leadership (leadership skills, visionary motivation) and employee innovation behaviors, and the proposed research model was validated by inferential statistics through intelligent PLS.

The literature on the study of transformational leaders' innovative performance on research and development teams through knowledge sharing is collated as follows:

Table 2.14 Transformational leaders indirectly influence the innovative performance of research and development teams through knowledge sharing

No.	Author	Times	Title of document	Research point
1	Yi Gaofeng; Wang Yang	2021	The Mechanism of Transformational Leadership on Market Performance of Logistics Firms - The Dual Mediating Effect of Management Innovation and Knowledge Sharing	Transformational leadership, market performance, management innovation, knowledge sharing
2	Niu Tony	2021	A Study of the Effect of CEO Transformational Leadership on Employee Creative Behaviour	CEO Transformational Leadership, Employee Creative Behaviour
3	Samuel Afriyie	2020	The Impact of Innovation on Marketing Performance in Ghanaian SMEs	SMEs, innovation, marketing performance
4	Miao Honghui	2019	The Effect of Transformational and Transactional Leadership Styles on Employee Innovation Performance	Transformational Leadership, Transactional Leadership, Innovative Performance
5	Jia Chunyang	2019	A study of the effect of transformational leadership, knowledge sharing on innovation performance of corporate managers	Transformational leadership, knowledge sharing, innovative performance of managers

The results of the study reveal several key factors that positively influence organizational innovation leadership. Specifically, innovation leadership, emotional response to imposed change, innovation climate, and knowledge sharing positively influenced innovation behavior, while supportive and risk-taking climate and emotional response positively influenced innovation climate. In addition, knowledge sharing moderated the relationship between innovation climate and innovation behavior.

H7: Transformational leadership has an indirect effect on the innovation performance of research and development teams through knowledge sharing

In conclusion, by combining transformational leadership theory, social exchange theory (SET) and behavioural reasoning theory (BRT), it can be found that there is a close relationship between leadership behaviours, R&D team's innovation performance, organisational innovation climate and knowledge sharing. Transformational leadership theory explains the role of transformational leadership in the formation and change of employees' work attitudes and behaviours. From previous studies, it can be found that transformational leadership behaviours have a significant effect on R&D team innovation performance, organisational innovation climate and knowledge sharing, and organisational innovation climate has a significant effect on knowledge sharing. On the basis of previous research, this paper tries to expand the research results in this field through the integrated model of transformational leadership theory, social exchange theory and behavioural reasoning theory. The specific relationships are as follows: Figure 2.1 General Research Framework.

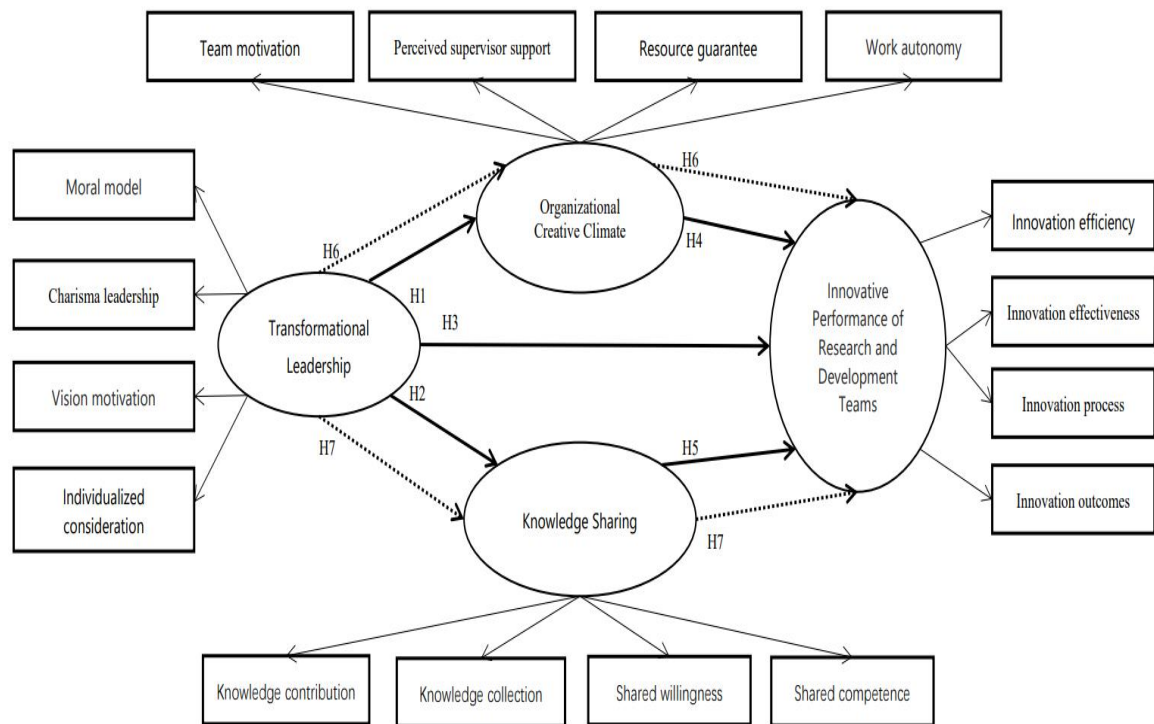


Figure 2.1 General research framework

Chapter 3

Research Methodology

To "Impact of Transformational Leadership on the Innovation Performance of Research and Development Teams in China" the researchers have procedures consisting of research formats target population Sample selection research tools Tool Quality Check data collection protection of the rights of the sample group and statistics used to analyze the data the details of each issue were presented as follows:

1. The population and the sample
2. Research Instruments
3. Data Collection
4. Statistics Used for Data Analysis

The population and the Sample

The Population

8148 managers of auto parts enterprises in five cities in Jiangsu Province, China, namely Suzhou, Wuxi, Changzhou, Nanjing and Yangzhou, are responsible for the innovative performance of research and development teams .

Jiangsu Province Department of Industry and Information Technology released "Response to Recommendation No. 1108 of the Fifth Session of the 13th Provincial People's Congress" clearly points out the leading position of Jiangsu Province's auto parts industry in the country. The Intellectual Property Protection Centre of Jiangsu Province, released on 27 November 2023, "Jiangsu Province New Energy Vehicle Industry Patent Navigation Report", shows that as of 24 November 2023, the number of patent applications in Jiangsu's new energy vehicle industry reached 58, 900, accounting for 11.60% of the national total and ranking second in the country. This fully proves Jiangsu Province's technological innovation ability and patent layout intensity in the field of new energy automobile parts. Prospective Industry Research

Institute on 8 August 2024, "Jiangsu Province Auto Parts Characteristic Industry Development Status and Investment Opportunity Analysis Report", specified that in 2023, Jiangsu Province auto parts industry on the enterprise, achieve sales revenue of 1.16 trillion yuan, an increase of 10.5% year-on-year, and steadily ranked in the forefront of the country.

As of 12 July 2024, there were a total of 8, 418 enterprises of auto parts in Jiangsu Province. This data comes from the article "An article to read the development status and investment opportunities of auto parts featured industries in Jiangsu Province" published by Sina Finance, which analyses in detail the status quo, spatial layout, major projects, industrial relocation and investment opportunities of auto parts featured industries in Jiangsu Province, with a high degree of authority and credibility.

Auto parts industry quality management system standard (IATF 16949) contains "Product quality planning" (APQP) requirements, the standard emphasizes the importance of comprehensive quality planning and control in the product development process, so auto parts enterprises must have, R & D responsibility and ability, otherwise it does not meet the industry requirements, can not receive orders. Research and development responsibility and ability, otherwise it does not meet the quality management system requirements of the auto parts industry, it can not receive orders.

Auto parts enterprises are required to have the function and capability of research and development. In reality, enterprises may be constrained by the pressure of corporate finance, and there is the possibility of insufficient investment in research and development. In order to circumvent this risk, the author will reduce this risk by sampling from the Jiangsu Provincial People's Government's website, "2024 Jiangsu Province Auto Parts Key Enterprises Directory".

Managers responsible for the performance of the research and development team in an automotive parts company in Jiangsu Province, China

The leader who is responsible for the performance of the research and development team may be the CEO, CTO, CFO or COO, so the object of our study,

the Manager who is responsible for the performance of the research and development team, is not limited to a specific position.

The auto parts industry is the main service area of the author's company, so the author chose the head of the R&D team of the auto parts industry in Jiangsu Province, China, as the object of the study, and each company chose one head, and the group is 8, 418, managers responsible for the innovation performance of the research and development team.

The Sample

This study samples five cities in Jiangsu Province, China, according to the percentage of output value: Suzhou city 182, Changzhou city 79, Wuxi city 77, Yangzhou city 38, and Nanjing city 30, with a total of 407 samples.

China's Jiangsu Provincial People's Government Network '2024 Jiangsu Province auto parts key enterprise directory' shows that China's Jiangsu Province auto parts industry is mainly distributed along the Yangtze River, Suzhou City, Changzhou City, Wuxi City, Nanjing City, Yangzhou City, the five cities auto parts invoicing the province's forefront, accounting for a combined total of 80.3% of the province, of which Suzhou City accounted for 36.51%, Changzhou City accounted for 15.82%, Wuxi City accounted for 15.55%, Yangzhou 7.74%, Nanjing 4.68%. There are 13 cities in Jiangsu Province, Suzhou, Changzhou, Wuxi, Nanjing and Yangzhou, which account for 80.3 per cent of the province's total, and the remaining eight cities together account for 19.7 per cent, with an average ratio of 2.43 per cent per city, which is too small to be included in the current sampling.(The Pareto 20: 80 principle).

"He Application of PPS Sampling in the Estimation of China's Gross Industrial Output - A Comparison of Sampling Effectiveness" (Modern Business Industry, No. 24, 2013) shows that in the sampling estimation of China's gross industrial output, Probability Proportionate to Size Sampling (PPS) sampling is better than the conclusion of stratified sampling and simple random sampling, so this study follows the sampling according to the percentage of output value.

In this study, there are 1 independent variable, 1 dependent variable, and 2 intermediate variables, each of which has 4 measured variables, so there are 16

measured variables, totalling 20 variables, and the sample size was calculated in accordance with (Lindeman, Merenda & Gold, 1980), which is equal to 20 multiplied by the number of variables, and the formula is as follows:

$$\begin{aligned}\text{Sample Size} &= 20 \text{ times all variables} \\ &= 20 \times 20 \\ &= 400\end{aligned}$$

It has been suggested that multivariate data analysis should have a sample size of at least 20 times the number of parameters (variables) to be estimated. (Lindeman, Merenda & Gold, 1980)

The sample for this study is planned to be 400 samples from the top five cities, Suzhou, Changzhou, Wuxi, Yangzhou, and Nanjing, in Jiangsu Province, China, which account for 80.3 per cent of the output value of automotive parts and components. The number of samples taken from each city is calculated according to the ratio of output value, and the detailed data is shown in the table below:

Table 3.1 Sample size of five cities

City name	Value of output ratio	Weighting output ratio/80.3 per cent	Sample size (400*weight)
Suzhou city	36.51%	$36.51/80.3=0.4547$	$400*0.4547=182$
Changzhou city	15.82%	$15.82/80.3=0.1970$	$400*0.1970=79$
Wuxi city	15.55%	$15.55/80.3=0.1936$	$400*0.1936=77$
Yangzhou city	7.74%	$7.74/80.3=0.0964$	$400*0.0964=38$
Nanjing city	4.68%	$4.68/80.3=0.0583$	$400*0.0583=23(30)$
Total	80.3%	100%	407

Note: Based on statistical principles (e.g., the Large Numbers Theorem and the Central Limit Theorem), 30 samples are taken when the sample is less than 30.

The samples identified in this final group, Suzhou city 182, Changzhou city 79, Wuxi city 77, Yangzhou city 38, Nanjing city 30, total 407 samples.

Research Instruments

The research on the impact of transformational leadership on the innovation performance of Chinese R&D teams is a combination of qualitative and quantitative research. For qualitative and quantitative research, there are two kinds of data collection tools : 1) in-depth interview and 2) questionnaire survey.

1. In-depth interview.

In-depth interviews with 3 groups of people, 20 experts, including 6 consultants in business management, 7 research scholars, and 7 senior managers with practical experience.

2. Questionnaire (questionnaire)

A total of 407 questionnaires were distributed to managers responsible for the performance of R&D innovation teams in automotive component companies in five cities in Jiangsu Province, China, with reference to the distribution of Table 3.1.

Research Methodology Pathway Diagram, refer to Figure 3.1 Research Methodology Roadmap:

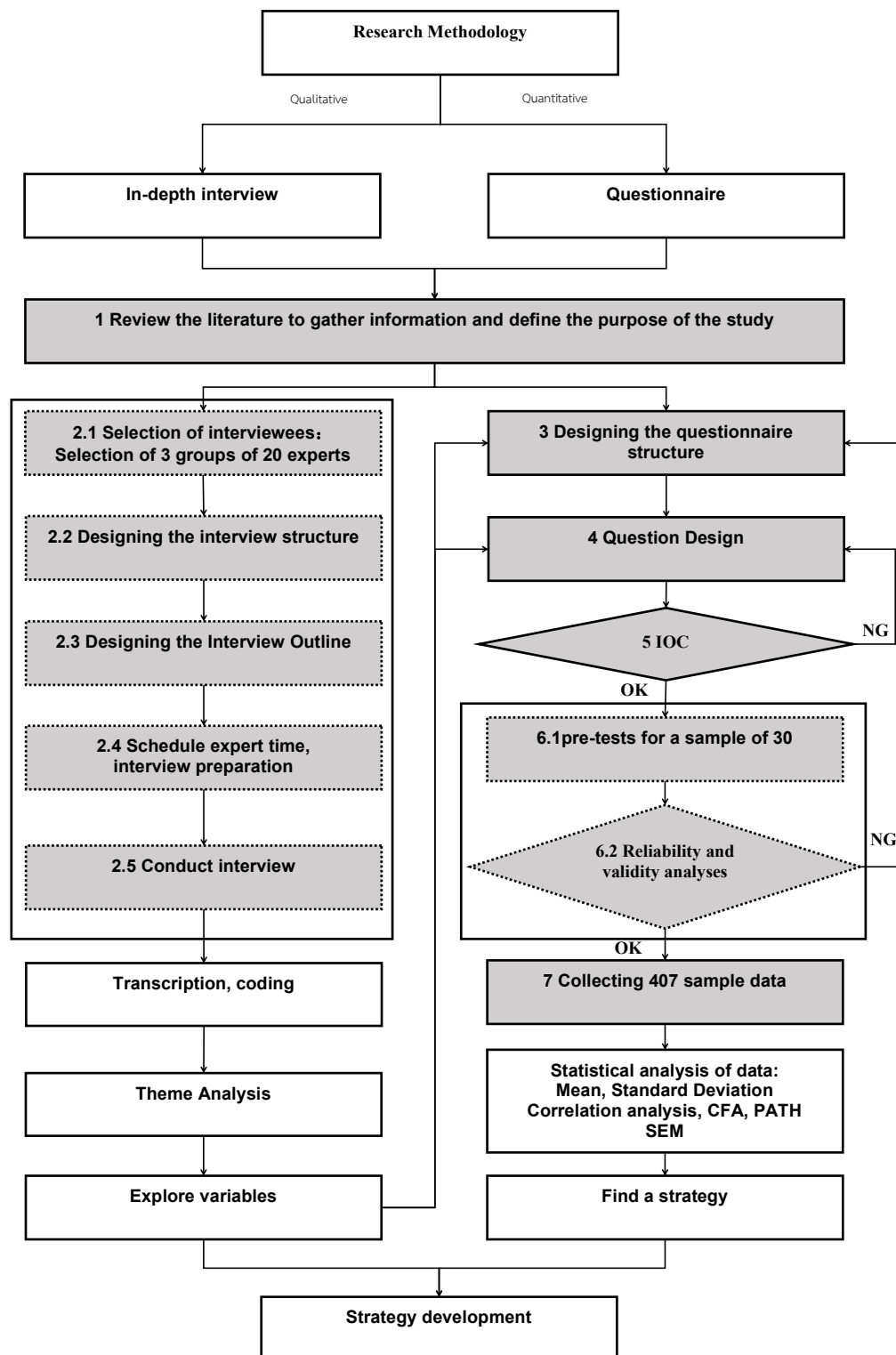


Figure 3.1 Research Methodology Roadmap

The steps of in-depth interview and questionnaire survey are summarized as follows:

Step 1: Consult literature and related books to clarify the research purpose of in-depth interview and questionnaire survey.

Step 2: Select interview subjects, design interview structure, design interview outline, schedule expert time and conduct interview. Then, transcription, coding, topic analysis, and finally exploratory variable analysis were performed as inputs for questionnaire structure design and question design.

Step 3: Refer to literature and books to design the structure of the questionnaire survey.

Step 4: Consult literature and related books and design questionnaire questions.

Step 5: invite three experts to perform IOC analysis. If the IOC is different, modify the design problem and perform IOC again until the IOC is qualified.

Step 6: Select 30 pre-test samples, conduct pre-test, collect data, and conduct reliability and validity analysis. If they do not meet the requirements, return to Step 3 until qualified.

Step 7: Data collection of 407 samples was formally conducted, and questionnaires were issued to collect data using the "Questionnaire Star App". Then, statistical software SPSS and AMOS were used for statistical analysis. Corresponding to the research purpose, mean value, standard deviation, skewness, kurtosis, correlation analysis, PATH and SEM were calculated to find strategies and finally formulate strategies.

The grey numbered columns correspond to the 7 steps from earlier in this chapter. Corresponding to 3.2.1 to 3.2.7 below is a detailed expansion of these 7 steps.

References and books are consulted for the purpose of the research

Qualitative research, data collection was done using in-depth interviews. To explore, what are the variables that affect the innovation performance of R&D teams, e.g., transformational leadership, organisational creativity climate, knowledge sharing,

and what are the measurement variables that affect these variables? What are the strategies to improve the innovation performance of R&D teams? (In preparation for the future presentation of strategies in Chapter 5).

Quantitative research, the data collection method is carried out by questionnaire survey, through the statistical analysis of data, to study the ability and fluctuation of R&D team's innovative performance, transformational leadership, organisational creativity atmosphere, knowledge sharing; to evaluate the relationship between R&D team's innovative performance, transformational leadership, organisational creativity atmosphere, knowledge sharing; to find the model of transformational leadership, organisational creativity atmosphere, knowledge sharing, and R&D team's innovative performance. models to prepare for strategy development.

The process of conducting in-depth interviews

(1) Selection of in-depth interviewers

Interviews with 3 groups of people: in-depth interviews will be conducted with three groups of people: experts in business management, who are senior consultants from the management consulting industry, a total of 6 people; competent academics, who consist of university professors, associate professors and Ph.D.'s, a total of 7 people; and senior management practitioners from automotive parts and accessory companies, a total of 7 people, and the results of the interviews will be analysed and summarised as a The results of the interviews will be analysed and summarised as a reference for the quantitative questionnaire setting(as listed in Appendix A).

Understanding the background of the interviewee: Before the interview, it is important to learn as much background information as possible about the interviewee, such as occupation, age, gender, education level, etc. This helps to build a relationship of trust during the interview and to better guide the interview. The breakdown of the interviewers is shown in Table 3.2 List of Experts in business management, 3.3 List of scholarly experts, 3.4 List of Practical Managers.

Interviews with experts from three organizations: from Kunshan Chengwei Management Consulting Co., Ltd, Wuxi Jiacheng Mingwei Management Consulting Co. Jinnuo Management Consulting Co. All three companies are organizational change, transformational leadership, management consulting with visibility and influence, serving as senior consultants are well-known experts in performance. The list is shown in table 3.2 below:

Table 3.2 Interview with experts in business management

Experts	Qualifications	Number (people)
Wang Xingang	Senior consultant of Kunshan Chengwei Management Consulting Co., Ltd. and qualified human resource manager.	2
Tao Weisheng		
Zhou Fenyong	Senior consultant of Wuxi Jiacheng Mingwei Management Consulting Co., Ltd. and qualified human resource manager.	2
Chen Jibin		
Zhou Zhiyong	Senior consultant of Kino Management Consulting Co. Ltd., qualified as a human resource manager	2
He Jianjun		
Total		6

The scholars interviewed were from three institutions, Zhejiang University, The Hong Kong Polytechnic University and Peking University, and the scholars were working as professors or associate professors at the universities as well as independent researchers. Zhejiang University, The Hong Kong Polytechnic University and Peking University are all ranked in the top 100 by QS. The professors, associate professors and PhDs are all well known scholars in their field. The list is shown in table 3.3 below:

Table 3.3 List of scholarly experts

Experts	Qualifications	Number (people)
Xiong Wei	D., Professor, Zhejiang University, Research	3
Wang Duanxu	Interests Organizational Change	
Zhu Jiping		
Hong Yixian	D., Professor, Hong Kong Polytechnic University,	3
Yang Changliang	research interests quality management	
He Chengxiao		
Wang Haijiang	D., Peking University Research Interests Innovation Performance and Quality Management	1
Total		7

The people interviewed below are all senior managers with more than 15 years of practical experience in positions such as, general manager, chairman, R&D director or quality director. Their companies all belong to the automotive parts industry. The list is shown in table 3.4 below:

Table 3.4 List of Practical Managers

Experts	Qualifications	Number (people)
Sun Xinmin	General Manager of Nantong Starfish Electronics Co.	1
Qu zhengqing	Quality Director, Suzhou Lilong Electronics Co.	1
Hu Xinming	Director of Research and Development Department, Suzhou National Giant Co.	1
Wang Bin	President of Yunzuka Technology Electronic Technology Co., Ltd	1

Table 3.4 (Continued)

Experts	Qualifications	Number (people)
Ma Zhengliang	General Manager of Kunshan Hongzhide Electronic Technology Co.	1
Pan Yunlong	General Manager of Kunshan Heilida Hardware Co.	1
Liu Fengmao	Chairman of Nantong Gransoe Spring Co.	1
Total		7

(2) Design the in-depth interview structure

Table 3.5 Structure design table for in-depth interview

Questions about opinions	Number of verses
Part 1 Transformational Leadership	4 Items
1. How does moral model relate to transformational leadership?	
2. How does charisma leadership relate to transformational leadership?	
3. How does vision motivation relate to transformational leadership?	
4. How does individualized consideration relate to transformational leadership?	
Part 2 Organizational creative climate	4 Items
1. How does team motivation relate to Organizational creative climate?	
2. How does perceived supervisor support relate to Organizational creative climate?	
3. How does resource guarantee relate to Organizational creative climate?	
4. How does work autonomy relate to Organizational creative climate?	

Table 3.5 (Continued)

Questions about opinions	Number of verses
Part 3 knowledge sharing	4 items
1. How does knowledge contribution relate to knowledge sharing?	
2. How does knowledge collection relate to knowledge sharing?	
3. How does shared willingness relate to knowledge sharing?	
4. How does shared competence relate to knowledge sharing?	
Part 4 Innovative performance of research and development teams	4 items
1. How does innovation efficiency relate to Innovative performance of research and development teams?	
2. How does innovation effectiveness relate to Innovative performance of research and development teams?	
3. How does innovation process relate to Innovative performance of research and development teams?	
4. How does innovation outcomes relate to Innovative performance of research and development teams?	
Total	16 Items

(3) Design an in-depth interview outline

Purpose of the in-depth interviews: To find the reasons why automotive component companies influence the innovative performance of their R&D teams and to explore the relationships between transformational leadership, organisational creativity climate, knowledge sharing, and their measurement variables.

The outline for designing in-depth interviews is as follows:

Interview outline

Interviewee Information:

Name: _ Gender: _ Age:

Title: __Time: __Address:

Quotes:

*** Hello! Thank you very much for accepting my interview in your busy schedule. The content of our interview today is focused on the impact of innovation performance of R&D teams and other reasons, and would like to hear your thoughts. The content of this interview is confidential, please feel free to express your true thoughts, thank you very much for your cooperation and understanding.

Interview Questions

1) Please tell us, for transformational leadership, do you think it has significance for the innovation performance of R&D teams? If so, what kind of significance? In your opinion, what are the factors that contribute to these implications? Can you give examples of the reasons for these factors? (The first question was an open-ended question to allow the respondents to reduce the pressure and answer truthfully, and then follow up questions were used to gather information about possible influences on the R&D team's innovative performance).

2) Have you noticed that there is some concern in the auto parts industry about the poor innovation performance of R&D teams? If so, what do you think are the reasons? Can you provide examples of these reasons? (Gather information about the factors that influence the innovation performance of R&D teams, gathering examples from three areas).

3) Have you noticed that some people in the auto parts industry are more concerned about the innovation performance results of their R&D teams? If so, what do you think are the reasons? Can you give examples of these reasons? (Gather information on the factors that influence the innovation performance of R&D teams and examples from the three areas).

4) Have you noticed that some people in the auto parts industry are still concerned about the creative climate in their organisations? If so, what do you think are the reasons? Can you give examples of these reasons. (Gather information about the factors that influence the innovation performance of R&D teams and collect examples from the three areas).

5) Have you noticed that some people are apprehensive when it comes to knowledge sharing? If so, what do you think are the reasons? Can you give examples of these reasons. (Gather information about the factors that influence the innovation performance of R&D teams, gathering examples from three areas).

6) Have you noticed that there are still concerns about leadership styles in the auto parts industry? If so, what do you think are the reasons? Can you give examples of these reasons. (Gather information about the factors that influence the innovative performance of R&D teams and collect examples from three areas).

7) What assistance do you feel the company provides that you feel would reduce the concerns above? (List three areas to prepare for the subsequent development of countermeasures as a reference point. (For the last question, you can use the 5-WHY of the quality management tool, longitudinal depth interview).

Conclusion: Thank you very much for accepting my interview, thank you!

(4) Schedule expert time to be interviewed

Firstly, the email explains, the purpose of this in-depth interview, and the importance of the expert in-depth interview for this study, then invites the expert can be scheduled, and finally determines the implementation time of the in-depth interview, and reminds the expert again 3 days before the implementation.

Preparation of interview tools: audio-recording equipment, notebooks, interview outlines, etc. The audio recording equipment is used to record the content of the interviews for subsequent analysis; the notebooks are used to record key information and feelings from the interviews.

The steps are further described in section 3.3 Data Collection of this paper.

(5) The implementation of in-depth interviews

Establishing a relationship of trust: At the beginning of the interview, establish a good relationship of trust with the interviewee. This can be achieved by briefly introducing oneself, explaining the purpose of the interview and the principle of confidentiality.

Flexible Adjustment of Interview Outline: Although the interview outline is prepared in advance, it should be flexibly adjusted in the course of the interview

according to the answers and reactions of the interviewees. If the interviewee is particularly interested in a certain topic or has unique insights, it can be explored in depth; if the interviewee is confused or unwilling to answer certain questions, the questions can be adjusted at the right time or moved to other topics.

Encourage interviewees to express themselves: During the interview, interviewees should be encouraged to fully express their views and feelings. Body language such as nodding and smiling can be used to show concern and support; questions can also be asked to guide interviewees to think deeply and express themselves.

Recording the interviews: During the interview process, the interviews should be recorded in detail. Recordings can be made using audio recording equipment, and key information and feelings can be recorded in a notebook.

The steps are further described in section 3.3 Data Collection of this paper.

Structuring of the questionnaire

Table 3.6 Questionnaire structure design table

Variable	Number of verses	Clause	Data	Measurement
Part 1				
Transformational Leadership	17			
1. Moral model	(5)	1-5	Likert Scale	5 opinion levels
2. Charisma leadership	(4)	6-9		
3. Vision motivation	(4)	10-13		
4. Individualized consideration	(4)	14-17		
Part 2				
Organizational creative climate	17			
1. Team Motivation	(6)	18-23	Likert Scale	5 opinion levels
2. Perceived supervisor support	(4)	24-27		
3. Resource guarantee	(4)	28-31		
4. Work autonomy	(3)	32-34		

Table 3.6 (Continued)

Variable	Number of verses	Clause	Data	Measurement
Part 3				
knowledge sharing	23			
1. Knowledge contribution	(6)	35-40	Likert Scale	5 opinion levels
2. Knowledge collection	(4)	41-44		
3. Shared willingness	(7)	45-51		
4. Shared competence	(6)	52-57		
Part 4				
Innovative performance of research and development teams	17			
1. Innovation Efficiency	(4)	58-61	Likert Scale	5 opinion levels
2. Innovation effectiveness	(5)	62-66		
3. Innovation process	(4)	67-70		
4. Innovation outcomes	(4)	71-74		
Total	74			

The question design of the questionnaire

Consult the literature, refer to the in-depth interview information, design the questionnaire (The questionnaire's in Appendix C). The design rules of the questionnaire are as follows:

Scoring criteria

Score level 5 means the highest level of agreement.

Score level 4 means high level of agreement.

Score level 3 means moderate level of agreement.

Score level 2 means low level of agreement.

Score level 1 means the least level of agreement.

The criteria for interpreting the average scores of the observed variables are divided into 5 levels as follows.

Average score	4.50 – 5.00, highest level
Average score	3.50 – 4.49, high level
Average score	2.50 – 3.49, moderate level
Average score	1.50 – 2.49, low level
Average score	1.00 – 1.49, lowest level

The reasons for setting such rules are as follows:

1. The calculated arithmetic mean can be any value in the range 1-5, such as 1.75, 4.50...., 5.00.

2. The score level 1-5 is a continuous value represented by a straight line. And can be defined as a continuous scoring range which is represented by a straight line and can be defined as a continuous scoring range Each period is separated by 1 unit as follows:

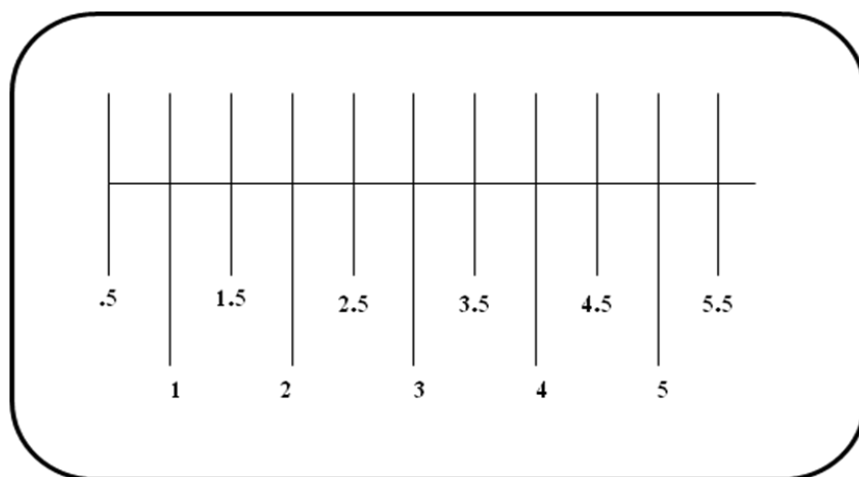


Figure 3.2 Mean Interpretation Interval Determination

Source. From Wanichbancha, K. (2008)

3. Based on the actual data collected from the scores The minimum value is 1 and the maximum is 5, so use the criterion 1.00 – 1.50 instead of .50 – 1.50 and use the criterion 4.50 – 5.00 instead of 4.50 – 5.50.

4. In the case where the calculated arithmetic mean ($\bar{X}$) has a value corresponding to the interval between the levels the opinions to be interpreted are at a higher level of opinion, for example, the arithmetic mean = 4.50 will mean that there is the highest level of opinion on that matter, etc.

Invitation to 3 experts for IOC review

The completed questionnaire was submitted to experts for measurement and evaluation, and the content validity was checked. A person with the knowledge and expertise, including two experts with doctorates in business administration and professorships and a statistician, checks whether the security matches the content coverage, linguistic accuracy, and consistency of the research objectives. List of content validators (as listed in Appendix A) The researchers used the IOC index (project objective consistency), which has the following scoring characteristics:

+1 means that you are sure that the questions are consistent with the research objective.

0 means you are unsure whether the question is consistent with the research objective.

-1 means that you are certain that the questions are inconsistent with the research objective.

The selection of question items uses criteria to judge content validity, which specifies that the calculated IOC index value must be greater than 0.6 ($IOC > 0.6$) (Kanlaya Wanichbancha, 2009). It is therefore considered that the question items are consistent with the message to be measured (The IOC Expert review form is in Appendix A).

Table 3.7 IOC content validity examiner (item objective congruence)

Experts	Experts Qualification	Number (person)
Dr.Bundit Phrapratanporn	A university professor with a reputation in statistics, measurement and research methodology.	1
Qi Zhenjiang	Ph.D., Professor, Zhejiang University	1
Fang Ping	Guangxi University for Nationalities (Guangxi province)	1
Total		3

Determining the quality of research tools

To get quality tools The researcher therefore brought a questionnaire that was created. Go test for validity and reliability. (reliability) as follows.

Determination of validity the researcher will check the content validity of each text to ensure that it meets the objectives of the study. by consulting with 3 subject matter specialists to examine the clarity of language, wording, and accuracy in the content Consistency of the questions in the questionnaire with the objectives (index of item objective congruency--IOC) (Kanlaya Wanichbancha, 2009) with the following scoring criteria:

+1 when the expert or expert is sure that the question is consistent with the content.

0 When the expert or expert is not sure that the question is consistent with the content.

-1 when the expert or expert is sure that the question is inconsistent with the content.

follow formula

$$IOC = \frac{\sum R}{N}$$

IOC Instead, it indexes the consistency between queries. with research objectives

$\sum R$ Instead, The sum of the opinions of experts or experts.

N Instead, of the number of experts or experts.

Calculation of the consistency index between questionnaires. with research objectives Must have an Index of Conformity (IOC) value greater than 0.6. It can be concluded that the questionnaire The content accuracy is within acceptable criteria. can be used to collect further data.

The reliability and validity of 30 samples were analyzed

Select 30 samples, which are not among the 407 samples to be tested in the future, and issue questionnaires through the "Questionnaire Star APP". For detailed steps, refer to the steps of 3.3.2 Collecting questionnaires in this chapter.

Determination of reliability (reliability) by using the questionnaire that has been verified by the advisory committee. and experts with expertise have revised and tested (try out) with 30 test recipients of the questionnaire that have similar characteristics to the sample group to be studied before using it with the sample group. to analyze sentiment (reliability) using the Alpha coefficient method of Cronbach (1990). If the reliability coefficient is greater than 0.8 (Kanlaya Wanichbancha, 2008), which indicates that the questionnaire is reliable and can be used in the study. From the data analysis results, the results are summarized in Table 3.8-3.11

Table 3.8 Confidence Levels for the Transformational Leadership Questionnaire

Factors		Number of	Confidence	Interpretation
Transformational Leadership		questions (N)	value (R)	
Part 1	Moral model	5	0.838	
Part 2	Charisma leadership	4	0.839	
Part 3	Vision Motivation	4	0.885	
Part 4	Individualized consideration	4	0.832	
Factors Total		17	0.883	

The results of the analysis showed that Cronbach's Alpha was 0.838 for Moral model for question 1 through question 5; Charisma leadership was question 6 through question 9, and Cronbach's Alpha was 0.839; Vision Motivation was questions 10 through 13, with a Cronbach's Alpha of 0.885; Individualized consideration was questions 14 through 17, with a Cronbach's Alpha of 0.832; and Transformational Leadership totaled 17 questions with a Cronbach's alpha was 0.883, so the reliability of the scale was considered very good.

Table 3.9 Confidence Levels for the Organizational creative climate

	Factors	Number of questions (N)	Confidence value (R)	Interpretation
	Organizational creative climate			
Part 1	Team Motivation	6	0.860	
Part 2	Perceived supervisor support	4	0.864	
Part 3	Resource guarantee	4	0.844	
Part 4	Work autonomy	3	0.854	
	Factors Total	17	0.823	

The results of the analysis show that Team Motivation question 1 to question 6, Cronbach's Alpha is 0.860; Perceived supervisor support is question 7 to question 10, Cronbach's Alpha is 0.864; Resource guarantee question 11 to question 14, Cronbach's Alpha is 0.844; and Work autonomy question 15 to question 18, Cronbach's Alpha is 0.854; Organizational creative climate is a total of 17 questions, Cronbach's Alpha is 0.823, so the reliability of the scale is considered very good. the reliability of the scale is very good.

Table 3.10 Confidence Levels for the knowledge sharing

	Factors knowledge sharing	Number of questions (N)	Confidence value (R)	Interpretation
Part 1	Knowledge contribution	6	0.920	
Part 2	Knowledge collection	4	0.887	
Part 3	Shared willingness	7	0.909	
Part 4	Shared competence	6	0.855	
Factors Total		23	0.926	

The results of the analysis showed that: Knowledge contribution question 1 to question 6, Cronbach's alpha is 0.920; Knowledge collection is question 7 to question 10, Cronbach's alpha is 0.887; Shared willingness question 11 to question 17, Cronbach's alpha is 0.909; Shared competence question 18 to question 23, Cronbach's alpha is 0.855; Knowledge sharing total 23 questions, Cronbach's alpha is 0.926, so the reliability of the scale is considered very good.

Table 3.11 Confidence Levels for the Innovative performance of research and development teams

	Factors Innovative performance of research and development teams	Number of questions (N)	Confidence value (R)	Interpretation
Part 1	Innovation Efficiency	4	0.873	
Part 2	Innovation effectiveness	5	0.891	
Part 3	Innovation process	4	0.863	
Part 4	Innovation outcomes	4	0.854	
Factors Total		17	0.825	

The results of the analysis showed that: Innovation Efficiency question 1 to question 4, Cronbach's alpha is 0.873; Innovation effectiveness is question 5 to question 9, Cronbach's alpha is 0.891; Innovation process question 10 to question 13, Cronbach's alpha is 0.863; Innovation outcomes 14 to question 17, Cronbach's alpha is 0.854; Innovative performance of research and development teams total 17 questions, Cronbach's alpha is 0.825, so the reliability of the scale is considered very good.

From Table 3.8 - Table 3.11, it was found that the confidence values of all factors and the total factors of the questionnaire were over 0.8. Therefore, it can be concluded that Questionnaires can be used to collect real data. with confidence values that pass the acceptance criteria.

Collect large sample data

Formal data collection for the 407 samples was done through 2 channels of contact, channel 1, if the company's customers, by the author himself on the phone, and channel 2, through the introduction of an NGO from the automotive parts industry association, which was then communicated by the author again by email, and then by phone (as listed in Appendix B).

Data Collection

In accordance with the research methodology, data were collected from two sources, one through in-depth interviews and the other through questionnaires.

Data collection from in-depth interviews

The process of in-depth interviews is described in reference to Chapter 3.2.2 of this thesis, and the procedure is as follows:

- (1) Schedule an interview with an expert by notifying him in advance.
- (2) Conduct the interview according to the interview structure and record it in the recording form. Including voice recordings during the interview
- (3) Bring all the information to compose and transcribe completely from the voice recorder. According to the content structure designed in the interview form Including additional useful things received from the interview.

(4) Analyze the data using content analysis techniques and summarize the interview results into descriptive data as follows.

Because this in-depth interview will use both interviews and conversation recordings using a voice recorder. Therefore, data collection used both interview recordings and recordings in the memory of the voice recorder. Then open it to transcribe into a recording later again with the following steps.

Table 3.12 Interview results fact sheet

Reasons affecting the innovative performance of research and development teams	Frequency of references	Summary of main issues
Transformational Leadership	76	1. Leadership behavior needs to reflect integrity and lack of self-interest. 2. Leaders must be able to put the collective interests first and be willing to sacrifice personal interests. 3. It is not possible to put shoes on employees or retaliate against them. 4. Employees should be made aware of future developments. 5. To let the team know the company's business philosophy and development goals. 6. Employees do not understand the meaning and purpose of the struggle. 7. Employees want a sense of belonging 8. Employees want to be cared for by their leaders, e.g., to know about their studies and lives. 9. Be able to do help employees grow.

Table 3.12 (Continued)

Reasons affecting the innovative performance of research and development teams	Frequency of references	Summary of main issues
Organizational creative climate	73	1. Innovation indicators need to be related to team member performance appraisals. 2. Employees should be rewarded for having reasonable ideas. 3. The team is able to have material and spiritual rewards. 4. Hopefully, leaders need to be authorized. 5. Leaders should encourage innovation. 6. There is a need for human support in innovation efforts. 7. A reasonable amount of time needs to be given to innovation work. 8. Innovative work can be obtained when there is a need for equipment security. 9. Employees at work can control their own work progress.
knowledge sharing	33	1. Employees learn on their own and have a desire for their coworkers to learn as well. 2. How to make our departmental colleagues, learn my experience and skills. 3. I wish there was a formal way in which I could share my experiences. 4. When I have a question, I can have a way to ask my coworkers.

Table 3.12 (Continued)

Reasons affecting the innovative performance of research and development teams	Frequency of references	Summary of main issues
		5. I seek help from my coworkers when I have a problem, and there is a willingness to help me at the same time. 6. AI technology is the current and future trend and AI should be utilized. 7. In digital transformation, AI spells not only innovation, but also the speed of innovation. 8. AI has fallen behind in China and companies need to pay attention. 9. references to digital transformation are also in that AI technology development and application.

From the results of the above in-depth interviews, it can be seen that in the automotive parts industry, the reasons affecting the innovation performance of the research and development teams are mainly transformational leadership, organisational innovation atmosphere, there are two points of particular concern, one is that the development and application of AI technology has been mentioned 16 times in knowledge sharing, and the application of AI technology is innovative for similar topics when considering the future strategies proposed in this paper, therefore, the Transformational leadership behaviours can also be used to enhance the innovative performance of R&D teams through the application of AI technology. The innovation performance of R&D team is an innovation and breakthrough. Secondly, the innovation performance of R&D team is mainly considered in terms of dimensions, 18 people suggested that it should be measured in terms of two

dimensions, innovation efficiency and innovation effectiveness, and 17 times proposed that, at the same time, it should be considered, and the innovation performance of R&D team should be measured in terms of two dimensions, namely, the process and the result, which is in line with the design of this paper's questionnaire.

Data collection using questionnaires

This time, 407 questionnaires were issued, using the 'Questionnaire Star APP' to push, most of the enterprises are the author's customers, can be directly contacted, a small number of automotive parts through the Association of automotive parts and components introduced, and then through the 'Questionnaire Star APP' to push the questionnaire, the data collection can be summarised as follows:

- (1) The researcher edited the questionnaire into the background of 'Questionnaire Star APP', and then sent the filling path (QR code) to the respondents via email and WeChat.
- (2) Wait for a week, if after a week, has not received the questionnaire to fill in the information, the author will communicate by phone, if 15 days later, and then did not receive, the author will go to the customer to communicate and recover the questionnaire.
- (3) Upon receipt of the questionnaire, check the completeness of the questionnaire and confirm the quantity according to the plan, if it is not enough, further information must be collected and all completed.
- (4) Translate the taxed questionnaire into preliminary statistical values.
- (5) Using SPSS and AMOS software, statistical analyses are carried out.

Statistics Used for Data Analysis

When the questionnaire was returned the researcher manually checked the accuracy and completeness of all questionnaires. The questionnaire was then encoded and processed by a computer. by using a ready-made program Then bring the data to statistical analysis. In explaining the meaning and displaying the results of

all the data obtained, this research used the methods of content analysis, descriptive statistics analysis, inferential statistics analysis (inferential statistics analysis). This statistical method includes, mean, standard deviation, skewness, kurtosis, correlation analysis, path analysis, and SEM.

Statistics are used to analyze data

The researcher uses statistics to analyze data according to the research objectives as follows:

(1) To study the capabilities and fluctuations of transformational leadership, organizational creative climate and knowledge sharing and innovation performance of research and development teams.

The statistics used to analyze the data are Descriptive statistics: To find the basic statistics of the respondents, the arithmetic mean, standard deviation (SD), skewness and kurtosis were used.

(2) To evaluate the direct and indirect relationship between transformational leadership, organizational creative climate and knowledge sharing on innovation performance of research and development teams.

1) Perform multicollinearity analysis. If there is a multicollinearity problem, it is necessary to combine the variables before doing analysis.

2) The statistical method used to analyze the data is confirmatory component analysis (Confirmatory factor Analysis -CFA) to determine the dimensions of each variable. This component analysis is divided into two steps:

Step 1: Second order confirmatory component analysis; (confirmatory factors analysis- second order--CFA) to confirm the question of each variable observed whether it is the indicator of the element to be measured or not. and to confirm the observed variables of each factor as to their constituents. The results in this step were applied in the second step.

Step 2: During the analysis, it was found that the correlation coefficients among multiple independent variables were very high (for example, greater than 0.8), which might imply that they are collinear. This needs to be particularly noted in the subsequent analysis to avoid the influence of multicollinearity on the analysis

results. To avoid multicollinearity, the correlation coefficients are required to be less than 0.8.

Path analysis (PATH):

Step 1: fit multiple linear regression equations, fitting multiple multiple linear regression equations according to the variable relationships assumed in Chapter 2.9 of this thesis.

Step 2: Calculate path coefficients, including direct path coefficients (the direct effect of a particular independent variable on the dependent variable) and indirect path coefficients (the indirect effect of that independent variable on the dependent variable through other independent variables).

Step 3: model evaluation and debugging, evaluating the degree of fit of the sample data for each path, whether it is statistically significant, and considering whether it matches the expertise. If the regression coefficient for a path is not significant, consider removing it from the model.

(3) To find strategies for the impact of transformational leadership on the innovation performance of Chinese research and development teams.

The pattern that was searched for will be the result of component analysis and causal influence analysis at the same time. It is an overall analysis of the model. Whole measurement model and structural model (structural model), also known as (structural equation modeling--SEM). This model is a model that is adjusted in accordance with the empirical data (model fit). Therefore, the resulting model is a model that can be used. Effective application in each factor there are variables that promote various factors. Each factor will have a causal influence on each other. Propose appropriate strategies according to the model.

Structural equation model--SEM analysis

Structural equation model analysis It is an advanced statistical technique for analyzing multivariate relationships. It has the advantage of being able to analyze linear relationships between latent variables, which general statistics cannot do. This is because structural equation models can relax the limitations of other types of analysis, such as regression analysis. Where the original variable must not be

correlated but structural equation model analysis can relax this restriction, etc. A structural equation model consists of two parts: the structural model consists of the relationship paths between each latent variable, And measurement model (measurement model), which consists of observed variables of each latent variable. Therefore, structural equation model analysis can be performed as confirmatory factor analysis. (Confirmatory factors analysis--CFA) and causal influence analysis (path analysis--PA) at the same time. Suitable for proof-of-concept theories, which usually have a structure of variables as a causal model. Structural equation models can also perform other statistical analyses, such as multiple regression analysis. Analysis of covariance, canonical analysis, etc. In analyzing the structural equation model, the analyst must first adjust the model to be consistent with the empirical data. So, the various statistics can be used correctly. You can consider the acceptance criteria as shown in the values in Table 3.13.

Table 3.13 Criteria for agreeing on model conformity with empirical data.

Statistical values	Symbols	Acceptance Criteria	Reference
Chi-square	χ^2	-	
Degrees of freedom	DF	-	
Chi-square/ Degrees of freedom	χ^2/DF	< 2	Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003)
probability	P-Value	> 0.05	
Root means square error of approximation	RMSEA	< 0.05	
Comparative Harmony Index (GFA)	CFI	> 0.9	Hu, L. T., & Bentler, P. M. (1999)
Tucker-Lewis (AGFI)	TLI	> 0.9	
Square root index of standard residuals.	SRMR	< 0.05	

Chapter 4

Results of Analysis

This research was to study “Impact of Transformational Leadership on the Innovation Performance of Research and Development Teams in China”

The data analysis result can be presented as follows:

1. Symbol and abbreviations
2. Presentation of data analysis
3. Results of data analysis

The details are as follows.

This study examines the impact of Transformational Leadership (TFL), Organizational Creative Climate (OCC), and Knowledge Sharing (KS) on the Innovative Performance of Research and Development Teams (IPRD). Transformational leadership is characterized by Moral Model (MM), Charisma Leadership (CL), Vision Motivation (VM), and Individualized Consideration (IC), all of which contribute to fostering an innovation-driven environment. Organizational creative climate includes Team Motivation (TM), Perceived Supervisor Support (PSS), Resource Guarantee (RG), and Work Autonomy (WA), creating conditions that support creativity and collaboration. Knowledge sharing, which consists of Knowledge Contribution (KCT), Knowledge Collection (KCL), Shared Willingness (SW), and Shared Competence (SC), facilitates the flow of ideas and expertise within teams. Ultimately, innovative performance in R&D teams is assessed through Innovation Efficiency (IE), Innovation Effectiveness (IEN), Innovation Process (IP), and Innovation Outcomes (IO), reflecting the comprehensive impact of leadership, climate, and knowledge exchange on innovation success.

Symbol and Abbreviations

Table 4.1 The designation of factor

Designation	Name of factor
$\bar{X}$	refers to mean
SD	refers to standard deviation
n	refers to sample group
MAX	refers to maximum
MIN	refers to minimum
SE	refers to Standard Error
SK	refers to skewness
KU	refers to kurtosis
P-Value	refers to probability
χ^2	refers to Chi-square
Df	refers to Degrees of freedom
χ^2/df	refers to Chi-square/ Degrees of freedom
RMSEA	refers to Root Mean Square Error of Approximation
CFI	refers to Comparative Harmony Index
GFI	refers to goodness of fit index
AGFI	refers to adjusted goodness of fit index
RMR	refers to root mean squared residual
SRMR	refers to Square root index of standard residuals.
TLI	refers to Tucker-Lewis
AVE	refers to Average Variance Extracted
CR	refers to Composite Reliability
*	refers to $p < 0.05$
**	refers to $p < 0.01$
TFL	Transformational leadership
MM	Moral model
CL	Charisma leadership

Table 4.1 (Continued)

Designation	Name of factor
VM	Vision Motivation
IC	Individualized consideration
OCC	Organizational creative climate
TM	Team Motivation
PSS	Perceived supervisor support
RG	Resource guarantee
WA	Work autonomy
KS	knowledge sharing
KCT	Knowledge contribution
KCL	Knowledge collection
SW	Shared willingness
SC	Shared competence
IPRD	Innovative performance of research and development teams
IE	Innovation Efficiency
IEN	Innovation effectiveness
IP	Innovation process
IO	Innovation outcomes

Table 4.2 The designation of question

No.	Designation	Question
Transformational Leadership		
1	MM1	My supervisor is incorruptible and does not seek personal gain.
2	MM2	My supervisor, he suffers before he enjoys himself.
3	MM3	My supervisor, regardless of personal gain or loss, dedicated to the work
4	MM4	My supervisor is willing to sacrifice personal interests for the good of the department/unit
5	MM5	My supervisor can put his own personal interests before the interests of the group and others
6	CL1	My supervisor keeps employees informed about the development prospects of the unit/department
7	CL2	My supervisor is able to keep employees informed of the business philosophy and development goals of the unit/department
8	CL3	My supervisor explains the long-term significance of what they're doing
9	CL4	My supervisor is going to paint a picture of the future
10	VM1	My supervisor, in the process of dealing with employees, will consider the actual situation of the individual employee
11	VM2	My supervisor is willing to help employees with their life and family problems
12	VM3	My supervisor is able to communicate with employees regularly to understand their work, life and family situation
13	VM4	My supervisor patiently instructs employees and answers questions for employees
14	IC1	My supervisor has excellent business ability
15	IC2	My supervisor is open-minded and has a strong sense of innovation

Table 4.2 (Continued)

No.	Designation	Question
16	IC3	My supervisor loves his job and has strong ambition and initiative
17	IC4	My supervisor is very dedicated to his work and always maintains a high level of enthusiasm
Organizational creative climate		
18	TM1	The performance appraisal system for team members has indicators related to innovation.
19	TM2	The team is able to objectively evaluate team members' innovations
20	TM3	The team rewards employees for having reasonable ideas.
21	TM4	The team is able to offer material incentives such as cash and dividends for employee innovation.
22	TM5	The team is able to give moral rewards such as commendations and honors to employees.
23	TM6	Within teams, innovative members are more likely to be rehired and promoted.
24	PSS1	Team members are able to get leadership support for their creativity at work.
25	PSS2	My leaders are able to delegate appropriately.
26	PSS3	I can get support from my leaders when facing difficulties.
27	PSS4	Leaders encourage new and innovative ideas.
28	RG1	I have full manpower support in getting the job done.
29	RG2	I am fully funded in the completion of my work.
30	RG3	I have a reasonable use of time in completing my work.
31	RG4	I am fully equipped to complete the job.
32	WA1	I have the autonomy to decide how to implement the work program.

Table 4.2 (Continued)

No.	Designation	Question
33	WA2	I have autonomy at work.
34	WA3	I can set my own work schedule.
knowledge sharing		
35	KCT1	When I learn something new, I make it possible for my departmental colleagues to learn it as well.
36	KCT2	I let my colleagues in my department share the information I have.
37	KCT3	I let my coworkers in my department share my skills.
38	KCT4	When I learn something new, I make it available to my coworkers outside of my department.
39	KCT5	I let my colleagues outside my department share the information I have.
40	KCT6	I let my coworkers outside of my department share my skills.
41	KCL1	When I ask my departmental colleagues, they tell me what they know.
42	KCL2	When I ask my departmental colleagues, they tell me about the skills they possess.
43	KCL3	When I ask my colleagues outside my department, they tell me what they know.
44	KCL4	When I ask my colleagues outside my department, they tell me about the skills they know.
45	SW1	I am willing to share learning materials with my colleagues often
46	SW2	I am willing to provide skills and methods to other colleagues on a regular basis
47	SW3	I am always willing to share my technical experience and skills with my colleagues

Table 4.2 (Continued)

No.	Designation	Question
48	SW4	At the request of other colleagues, I am always willing to provide information that I know
49	SW5	I am willing to try to share the expertise I have gained from technical training with my colleagues
50	SW6	I am willing to share my knowledge from informal sources with other colleagues
51	SW7	I am willing to share with colleagues the valuable information I have obtained from various sources
52	SC1	I have the ability to pass on my wisdom and experience to others
53	SC2	I have the ability to speak my mind
54	SC3	I have the ability to answer questions from my team members
55	SC4	I have the ability to provide the data and documentation my team needs when they need it
56	SC5	I believe in the value of passing on my expertise and experience to others
57	SC6	I have the ability to easily find the information I need in my workplace
Innovative performance of research and development teams		
58	IE1	The team was able to accomplish the goals initially set.
59	IE2	The team is able to deliver within budget.
60	IE3	The team is able to stay on schedule and within deadlines.
61	IE4	The team is able to stay on schedule and within deadlines.
62	IEN1	The product developed (improved) by our team is unique compared to the competitor's recognizable products.
63	IEN2	The products developed (improved) by the team are of high quality compared to competitors' recognizable products.

Table 4.2 (Continued)

No.	Designation	Question
64	IEN3	Our team has developed (improved) products whose performance has been well received by customers.
65	IEN4	The team develops (improves) products whose sales performance meets the targets set by the company.
66	IEN5	The team is able to launch similar products at a faster pace than competitors.
67	IP1	Research and development teams often introduce new technologies and methods that improve work processes
68	IP2	Research and development teams often adopt methods to improve product performance or work processes
69	IP3	Research and development teams often implement new ways to improve team performance
70	IP4	Research and development teams develop new products or services quickly
71	IO1	Research and development teams often develop products or services that can be accepted by the market
72	IO2	The research and development team has a relatively large number of R&D and innovation results
73	IO3	The research and development team will change the service items or improve the service side based on customer feedback
74	IO4	Research and development teams often adopt new product components and service items

Presentation of data analysis

Conduct frequency analysis on the samples

Part 1 General Information of Respondents

Table 4.3 The results of the frequency analysis of demographics

Item	Options	Frequency	Percentage (%)
Gender	Male	161	39.56%
	Female	246	60.44%
	Total	407	100.00%
Age	20 to 30	79	19.41%
	31 to 40	172	42.26%
	41 to 50	112	27.52%
	51and above	44	10.81%
	Total	407	100.00%
Status	Single	172	42.26%
	Married	235	57.74%
	Total	407	100.00%
Education	High School,	19	4.67%
	College Degree	121	29.73%
	Bachelor Degree	186	45.70%
	Master's Degree	47	11.55%
	Doctoral Degree	34	8.35%
	Total	407	100.00%

The demographic profile of the respondents provides valuable insights into the composition of the sample population (N=407). The majority of respondents are female, accounting for 60.44% (n=246), while males represent 39.56% (n=161). This indicates a slight gender imbalance, with female participants comprising a larger proportion of the sample. The age distribution of respondents reveals a

concentration in the 31 to 40 years age group, which constitutes 42.26% (n=172) of the total sample. This is followed by individuals aged 41 to 50 years, comprising 27.52% (n=112). Respondents in the youngest category (20 to 30 years) make up 19.41% (n=79), while those aged 51 years and above account for the smallest proportion at 10.81% (n=44). These results suggest that the sample is predominantly middle-aged, with fewer participants at the extremes of the age spectrum. In terms of marital status, the majority of respondents are married (57.74%, n=235), while single individuals make up 42.26% (n=172). This indicates that the sample leans toward participants who are in marital relationships, with single individuals forming a significant, but smaller, proportion. The educational attainment of respondents highlights a highly educated sample. Over half (45.70%, n=186) hold a bachelor's degree, followed by 29.73% (n=121) who possess a college degree. Advanced degrees are well-represented, with 11.55% (n=47) holding a master's degree and 8.35% (n=34) holding a doctoral degree. Only 4.67% (n=19) of respondents reported having completed only high school. These findings suggest that the majority of participants have attained at least a college-level education, with a substantial proportion holding advanced degrees.

Overall, the sample is composed predominantly of females, middle-aged individuals, and married participants, with a notably high level of educational attainment. These characteristics suggest that the sample reflects a population that is both demographically stable and academically advanced, which could have implications for interpreting the study's findings.

Part 2 Survey Results of study Transformational Leadership and Innovative performance of research and development teams.

Table 4.4 Descriptive Statistical Analysis of Measure variable

Latent	Measure	Maxima	Minima	Mean	SD	SK	KU	
TFL	MM	1.200	5.000	3.518	0.937	-0.648	-0.322	high level
	CL	1.250	5.000	3.544	1.110	-0.688	-0.999	high level
	VM	1.000	5.000	3.459	1.147	-0.603	-1.212	high level
	IC	1.000	5.000	3.445	1.168	-0.665	-1.103	high level
	Total	1.113	4.825	3.491	0.878	-0.645	-0.247	
OCC	TM	1.500	5.000	3.620	1.040	-0.499	-0.877	high level
	PSS	1.000	5.000	3.723	0.936	-0.987	1.134	high level
	RG	1.000	5.000	3.669	1.045	-1.063	0.674	high level
	WA	1.000	5.000	3.771	1.034	-0.687	-0.086	high level
	Total	1.125	4.938	3.696	0.819	-0.863	0.581	
KS	KCT	1.000	5.000	3.610	0.962	-0.613	-0.250	high level
	KCL	1.250	5.000	3.570	0.957	-0.489	-0.621	high level
	SW	1.143	5.000	3.833	0.887	-0.763	0.141	high level
	SC	1.000	5.000	3.875	0.717	-0.901	1.887	high level
	Total	1.238	4.964	3.722	0.713	-0.719	0.882	
CE	IE	1.000	5.000	3.781	1.019	-0.884	0.418	high level
	IEN	1.400	5.000	3.657	1.032	-0.588	-0.785	high level
	IP	1.000	5.000	3.805	0.911	-1.156	1.378	high level
	IO	1.000	5.000	3.672	1.037	-1.124	0.759	high level
	Total	1.100	5.000	3.729	0.819	-1.095	1.089	

Here is the descriptive statistical analysis of the provided data, with variability represented using standard deviation (SD):

Descriptive Statistical Analysis

Transformational Leadership (TFL)

Measure Variables: Moral Model (MM) (Mean = 3.518, SD = 0.937): Represents high levels of ethical leadership and providing meaning. Charisma Leadership (CL) (Mean = 3.544, SD = 1.110): Reflects strong charisma and inspiration within leadership. Vision Motivation (VM) (Mean = 3.459, SD = 1.147): Highlights high levels of visionary communication and planning. Individualized Consideration (IC) (Mean = 3.445, SD = 1.168): Indicates personalized attention given by leaders. Total (Mean = 3.491, SD = 0.878): Overall, the transformational leadership factor is rated highly. Skewness (-0.645 to -0.688) and kurtosis (-0.247 to -1.212) suggest near-normal data distribution.

Organizational Creative Climate (OCC)

Measure Variables: Team Motivation (TM) (Mean = 3.620, SD = 1.040): Shows high team management and motivational practices. Perceived Supervisor Support (PSS) (Mean = 3.723, SD = 0.936): Indicates strong perceptions of support from supervisors. Resource Guarantee (RG) (Mean = 3.669, SD = 1.045): Reflects sufficient resource availability and assurance. Work Autonomy (WA) (Mean = 3.771, SD = 1.034): Highlights adaptability and freedom in workplace decision-making. Total (Mean = 3.696, SD = 0.819): Organizational creative climate is highly rated overall. Skewness (-0.499 to -1.063) and kurtosis (-0.877 to 1.134) indicate slight negative skewness with acceptable distribution.

Knowledge Sharing (KS)

Measure Variables: Knowledge Contribution (KCT) (Mean = 3.610, SD = 0.962): Indicates high levels of knowledge creation and sharing. Knowledge Collection (KCL) (Mean = 3.570, SD = 0.957): Reflects strong processes for acquiring and retaining knowledge. Shared Willingness (SW) (Mean = 3.833, SD = 0.887): Highlights satisfaction with knowledge-sharing activities. Shared Competence (SC) (Mean = 3.875, SD = 0.717): Represents a strong culture of shared knowledge and expertise. Total (Mean = 3.722, SD = 0.713): Knowledge sharing is highly rated overall. Skewness (-0.489 to -0.901) and kurtosis (-0.621 to 1.887) indicate responses concentrated in the high-score range.

Innovative Performance of Research and Development Teams (IPRD)

Measure Variables: Innovation Efficiency (IE) (Mean = 3.781, SD = 1.019): Shows high individual efficiency in innovation tasks. Innovation Effectiveness (IEN) (Mean = 3.657, SD = 1.032): Reflects success in implementing new ideas effectively. Innovation Process (IP) (Mean = 3.805, SD = 0.911): Indicates strong focus on systematic and creative workflows. Innovation Outcomes (IO) (Mean = 3.672, SD = 1.037): Highlights measurable and impactful results from innovative efforts. Total (Mean = 3.729, SD = 0.819): Innovative performance of R&D teams is rated highly overall. Skewness (-0.588 to -1.156) and kurtosis (0.418 to 1.378) indicate slightly negative skewness and concentrated high scores.

Table 4.5 Descriptive statistics of the TFL question

Measure variable	question	Maxima	Minima	Mean	SD	SK	KU
MM	MM1	5	1	3.56	1.108	-0.328	-0.675
	MM2	5	1	3.62	1.200	-0.441	-0.882
	MM3	5	1	3.45	1.137	-0.514	-0.415
	MM4	5	1	3.45	1.146	-0.382	-0.688
	MM5	5	1	3.50	1.153	-0.386	-0.655
	Total	5	1	3.52	0.937	-0.648	-0.322
CL	CL1	5	1	3.52	1.375	-0.721	-0.723
	CL2	5	1	3.56	1.334	-0.609	-0.808
	CL3	5	1	3.56	1.334	-0.721	-0.593
	CL4	5	1	3.54	1.253	-0.685	-0.491
	Total	5	1	3.54	1.110	-0.688	-0.999

Table 4.5 (Continued)

Measure variable	question	Maxima	Minima	Mean	SD	SK	KU
VM	VM1	5	1	3.59	1.244	-0.501	-0.870
	VM2	5	1	3.51	1.337	-0.523	-0.946
	VM3	5	1	3.38	1.391	-0.435	-1.065
	VM4	5	1	3.36	1.307	-0.518	-0.920
	Total	5	1	3.46	1.147	-0.603	-1.212
IC	IC1	5	1	3.40	1.380	-0.430	-1.024
	IC2	5	1	3.50	1.284	-0.534	-0.829
	IC3	5	1	3.46	1.358	-0.579	-0.854
	IC4	5	1	3.42	1.396	-0.447	-1.061
	Total	5	1	3.44	1.168	-0.665	-1.103

This study conducted a descriptive statistical analysis of the four dimensions of Transformational Leadership (TFL): MM, CL, VM, and IC. The results show that the mean values range from 3.36 to 3.62, indicating that respondents generally perceive TFL at a moderately high level across all measurement items. The standard deviations (SD) range from 0.937 to 1.396, suggesting a moderate level of variability in responses while maintaining overall stability in the dataset.

All measurement items exhibit negative skewness values (ranging from -0.328 to -0.721), indicating a left-skewed distribution. Notably, MM3 (-0.514) and IC3 (-0.579) show relatively higher skewness, suggesting that a notable proportion of respondents provided lower ratings for these items. However, as all SK values remain within the acceptable ± 1 range, the data distribution is considered relatively symmetrical without severe skewness issues.

Regarding kurtosis, all measurement items show negative kurtosis values (ranging from -0.322 to -1.212), indicating a flatter distribution compared to the normal distribution. Specifically, VM3 (-1.065) and IC4 (-1.061) demonstrate the lowest kurtosis values, indicating a more even distribution of responses with fewer

extreme values. Lower kurtosis suggests that respondents' choices are more dispersed rather than concentrated on specific values, reducing the likelihood of extreme clustering.

In summary, the descriptive statistical analysis indicates that respondents have a consistent and moderately high perception of Transformational Leadership across its various dimensions. The lack of extreme skewness or kurtosis suggests a well-balanced data distribution, which strengthens the foundation for subsequent Structural Equation Modeling (SEM) analysis. These findings reinforce the reliability and stability of TFL as a measurement construct, contributing to its validity in leadership research.

Table 4.6 Descriptive statistics of the OCC question

Measure variable	question	Maxima	Minima	Mean	SD	SK	KU
TM	TM1	5	1	3.37	1.338	-0.304	-1.044
	TM2	5	1	3.73	1.247	-0.683	-0.626
	TM3	5	1	3.57	1.182	-0.515	-0.591
	TM4	5	1	3.76	1.216	-0.759	-0.425
	TM5	5	1	3.63	1.325	-0.622	-0.823
	TM6	5	1	3.65	1.258	-0.596	-0.660
	Total	5	1	3.62	1.040	-0.499	-0.877
PSS	PSS1	5	1	3.65	1.106	-0.826	0.214
	PSS2	5	1	3.74	1.176	-0.838	0.060
	PSS3	5	1	3.76	1.084	-0.823	0.287
	PSS4	5	1	3.74	1.057	-0.751	0.337
	Total	5	1	3.72	0.936	-0.987	1.134
RG	RG1	5	1	3.84	1.170	-0.928	0.173
	RG2	5	1	3.60	1.257	-0.890	-0.134
	RG3	5	1	3.65	1.200	-0.886	0.084
	RG4	5	1	3.59	1.297	-0.812	-0.322
	Total	5	1	3.67	1.045	-1.063	0.674

Table 4.6 (Continued)

Measure variable	question	Maxima	Minima	Mean	SD	SK	KU
WA	WA1	5	1	3.75	1.189	-0.829	-0.044
	WA2	5	1	3.73	1.217	-0.652	-0.382
	WA3	5	1	3.83	1.183	-0.766	-0.242
	Total	5	1	3.77	1.034	-0.687	-0.086

This study conducted a descriptive statistical analysis of the four dimensions of Organizational Creative Climate (OCC): Team Motivation (TM), Perceived Supervisor Support (PSS), Resource Guarantee (RG), and Work Autonomy (WA). The mean values range from 3.37 to 3.84, indicating that respondents generally hold a positive perception of OCC. Notably, RG1 (3.84) and WA3 (3.83) received the highest ratings, suggesting strong recognition of resource availability and work autonomy. In contrast, TM1 (3.37) had the lowest mean, indicating relatively lower agreement on team motivation aspects. Additionally, the standard deviation (SD) values range from 0.936 to 1.338, implying a moderate level of variation in responses while maintaining overall data stability.

All measurement items exhibit negative skewness values (ranging from -0.304 to -1.063), indicating a left-skewed distribution. Items such as RG1 (-0.928), RG2 (-0.890), and PSS1 (-0.826) show relatively higher skewness, suggesting that a majority of respondents provided higher ratings for these aspects. This implies that resource availability and supervisor support are perceived favorably by most respondents in the context of organizational creative climate.

The kurtosis values range from -1.044 to 1.134, with most values being negative, indicating a relatively flat distribution without excessive outliers. However, PSS total (1.134) and RG total (0.674) exhibit higher kurtosis, suggesting a more concentrated distribution, where certain response categories were selected more frequently. Conversely, TM1 (-1.044) and TM5 (-0.823) have lower kurtosis, implying a more dispersed pattern in respondent choices.

Overall, the findings suggest that respondents generally perceive the organizational creative climate positively, particularly in terms of resource guarantee (RG) and work autonomy (WA). The absence of extreme skewness or kurtosis indicates a well-balanced and stable data distribution, supporting the reliability of the measurement tool. These results highlight the role of transformational leadership in fostering an innovative organizational climate, providing a strong foundation for further analysis in leadership and creativity research.

Table 4.7 Descriptive statistics of the KS question

Measure variable	question	Maxima	Minima	Mean	SD	SK	KU
KCT	KCT1	5	1	3.67	1.197	-0.483	-0.812
	KCT2	5	1	3.67	1.139	-0.535	-0.466
	KCT3	5	1	3.59	1.175	-0.545	-0.464
	KCT4	5	1	3.50	1.174	-0.347	-0.787
	KCT5	5	1	3.67	1.090	-0.563	-0.312
	KCT6	5	1	3.56	1.222	-0.850	-0.096
	Total	5	1	3.61	0.962	-0.613	-0.250
KCL	KCL1	5	1	3.62	1.105	-0.317	-0.751
	KCL2	5	1	3.66	1.193	-0.448	-0.886
	KCL3	5	1	3.48	1.100	-0.310	-0.682
	KCL4	5	1	3.52	1.136	-0.318	-0.697
	Total	5	1	3.57	0.957	-0.489	-0.621
SW	SW1	5	1	3.95	1.047	-0.578	-0.606
	SW2	5	1	3.92	1.136	-0.809	-0.231
	SW3	5	1	3.86	1.014	-0.538	-0.516
	SW4	5	1	3.62	1.157	-0.337	-0.849
	SW5	5	1	3.73	1.098	-0.604	-0.313
	SW6	5	1	3.79	1.162	-0.652	-0.472
	SW7	5	1	3.96	1.038	-1.200	1.351
	Total	5	1	3.83	0.887	-0.763	0.141

Table 4.7 (Continued)

Measure variable	question	Maxima	Minima	Mean	SD	SK	KU
SC	SC1	5	1	3.85	0.918	-0.564	0.261
	SC2	5	1	3.88	0.938	-0.648	0.247
	SC3	5	1	3.76	0.922	-0.556	0.215
	SC4	5	1	3.89	0.924	-0.750	0.764
	SC5	5	1	3.81	0.975	-0.484	-0.056
	SC6	5	1	4.04	0.844	-0.800	0.983
	Total	5	1	3.88	0.717	-0.901	1.887

This study conducted a descriptive statistical analysis of the four dimensions of Knowledge Sharing (KS): Knowledge Contribution (KCT), Knowledge Collection (KCL), Shared Willingness (SW), and Shared Competence (SC). The mean values range from 3.50 to 4.04, indicating that respondents generally hold a positive perception of knowledge sharing. Notably, SC6 (4.04) received the highest rating, suggesting strong recognition of shared competence, whereas KCT4 (3.50) had the lowest mean, indicating relatively lower willingness to contribute knowledge. Additionally, the standard deviation (SD) values range from 0.717 to 1.222, suggesting a moderate level of variation in responses while maintaining overall data stability.

All measurement items exhibit negative skewness (ranging from -0.310 to -1.200), indicating a left-skewed distribution. Items such as SW7 (-1.200) show relatively higher skewness, suggesting that the majority of respondents provided higher ratings for shared willingness. In contrast, KCT4 (-0.347) has the lowest skewness, meaning that responses for this item are closer to a normal distribution. Overall, the negative skewness values indicate that respondents generally have a favorable attitude toward knowledge sharing.

Regarding kurtosis, most measurement items exhibit negative kurtosis values (ranging from -0.886 to 1.887), suggesting a relatively flat distribution with fewer extreme values. However, SC6 (0.983) and SW7 (1.351) display higher kurtosis,

indicating that responses are more concentrated around specific values. Conversely, KCT6 (-0.096) and KCT1 (-0.812) have lower kurtosis, suggesting that respondent choices are more dispersed.

In summary, the findings suggest that respondents generally perceive all four dimensions of knowledge sharing positively, with particularly strong recognition of shared competence (SC) and shared willingness (SW). The skewness and kurtosis analysis further validates the balanced data distribution, supporting the reliability of the measurement tool. These results provide a strong foundation for further exploration of the impact of knowledge sharing on organizational innovation performance.

Table 4.8 Descriptive statistics of the IPRD question

Measure variable	question	Maxima	Minima	Mean	SD	SK	KU
IE	IE1	5	1	3.69	1.213	-0.650	-0.406
	IE2	5	1	3.85	1.161	-0.773	-0.143
	IE3	5	1	3.84	1.194	-0.815	-0.144
	IE4	5	1	3.75	1.227	-0.867	-0.057
	Total	5	1	3.78	1.019	-0.884	0.418
IEN	IEN1	5	1	3.53	1.213	-0.496	-0.711
	IEN2	5	1	3.58	1.331	-0.631	-0.805
	IEN3	5	1	3.65	1.279	-0.623	-0.645
	IEN4	5	1	3.78	1.150	-0.776	-0.200
	IEN5	5	1	3.74	1.222	-0.688	-0.560
	Total	5	1	3.66	1.032	-0.588	-0.785
IP	IP1	5	1	3.80	1.094	-0.968	0.557
	IP2	5	1	3.76	1.066	-1.026	0.902
	IP3	5	1	3.66	1.205	-0.692	-0.281
	IP4	5	1	4.00	0.915	-0.940	0.864
	Total	5	1	3.80	0.911	-1.156	1.378

Table 4.8 (Continued)

Measure variable	question	Maxima	Minima	Mean	SD	SK	KU
IO	IO1	5	1	3.63	1.228	-0.943	0.029
	IO2	5	1	3.60	1.257	-0.821	-0.198
	IO3	5	1	3.66	1.203	-0.912	0.078
	IO4	5	1	3.79	1.172	-0.844	-0.036
	Total	5	1	3.67	1.037	-1.124	0.759

This study conducted a descriptive statistical analysis of the four dimensions of Innovative Performance of Research and Development Teams (IPRD): Innovation Efficiency (IE), Innovation Effectiveness (IEN), Innovation Process (IP), and Innovation Outcomes (IO). The mean values range from 3.53 to 4.00, indicating that respondents generally hold a positive perception of innovative performance. Notably, IP4 (4.00) received the highest rating, suggesting strong recognition of the innovation process. IEN1 (3.53) had the lowest mean, indicating a relatively weaker perception of innovation effectiveness. Additionally, the standard deviation (SD) values range from 0.915 to 1.331, suggesting moderate variation in responses while maintaining overall data stability.

All measurement items exhibit negative skewness values, indicating a left-skewed distribution. Items such as IE4 (-0.867) and IP2 (-1.026) show relatively higher skewness, suggesting that the majority of respondents provided higher ratings for these aspects. Conversely, IEN5 (-0.688) has a lower skewness value, indicating that the distribution for this item is closer to normal with more balanced ratings. Overall, the negative skewness suggests that most respondents perceive the innovation performance positively.

The kurtosis values range from -0.198 to 1.378, with most values being negative, indicating a relatively flat distribution without excessive outliers. IO1 (0.029) has a kurtosis value close to 0, suggesting that the ratings are concentrated, with some extreme scores. IP4 (0.864) and IO3 (0.078) show higher kurtosis, indicating

more concentrated responses where certain rating categories were chosen more frequently. Conversely, IEN1 (-0.711) and IEN2 (-0.805) have lower kurtosis, indicating more dispersed responses and a more evenly distributed data pattern.

In summary, the descriptive statistical analysis suggests that respondents generally perceive the innovative performance of research and development teams positively, particularly in terms of innovation efficiency (IE) and innovation process (IP). The skewness and kurtosis analyses further validate the balanced and stable data distribution, supporting the reliability of the measurement tool. These results provide a solid foundation for further exploration of the factors influencing innovation performance and the role of transformational leadership in driving innovation.

Part 3 Analysis results of the potential mechanism of the impact of transformational leadership, organizational innovation climate and knowledge sharing on R&D team innovation performance

Confirmatory Factor Analysis (CFA) is usually conducted as a re-verification on the basis of Exploratory Factor Analysis. The strength of Confirmatory Factor Analysis lies precisely in its ability to allow researchers to clearly describe the details of a theoretical model. The Confirmatory Factor Analysis test is to see whether a measurement item has a significant loading with the factor it is designed for and no significant loading with irrelevant factors.

Table 4.9 Confirmatory Factor Analysis for Model

Statistical values	TFL	OCC	KS	IPRD
χ^2	135.239	140.286	250.687	140.727
DF	115	115	226	115
χ^2/DF	1.176	1.22	1.109	1.224
P-Value	0.096	0.055	0.125	0.052
SRMR	0.028	0.029	0.03	0.031
CFI	0.995	0.994	0.995	0.994
TLI	0.994	0.993	0.995	0.993
RMSEA	0.021	0.023	0.016	0.023

This study conducted Confirmatory Factor Analysis (CFA) on Transformational Leadership (TFL), Organizational Creative Climate (OCC), Knowledge Sharing (KS), and Innovative Performance of Research and Development Teams (IPRD). The results indicate that the chi-square values for TFL (135.239), OCC (140.286), KS (250.687), and IPRD (140.727) are relatively low. Additionally, the chi-square to degrees of freedom ratio (χ^2/DF) for all constructs is below 3.0 (ranging from 1.109 to 1.224), suggesting that the measurement models exhibit a good fit. The low χ^2/DF ratio indicates minimal deviation between the hypothesized model and the observed data, supporting the adequacy of the models.

In terms of p-values, TFL (0.096), OCC (0.055), KS (0.125), and IPRD (0.052) all exceed the 0.05 threshold, confirming that the models do not significantly deviate from the observed data, thus validating their acceptability. Additionally, the Standardized Root Mean Square Residual (SRMR) values for all constructs are below 0.08 (TFL: 0.028, OCC: 0.029, KS: 0.030, IPRD: 0.031). These low SRMR values indicate minimal residual errors, confirming the models' strong ability to explain the observed data and further supporting their excellent fit.

The Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) exceed 0.99 for all constructs: TFL (CFI: 0.995, TLI: 0.994), OCC (CFI: 0.994, TLI: 0.993), KS (CFI: 0.995, TLI: 0.995), and IPRD (CFI: 0.994, TLI: 0.993). Conventionally, CFI and TLI values above 0.90 indicate a well-fitting model, and with values exceeding 0.99, these results confirm that the measurement models exhibit an exceptionally high level of fit, accurately reflecting the underlying latent constructs.

Regarding the Root Mean Square Error of Approximation (RMSEA), the values for TFL (0.021), OCC (0.023), KS (0.016), and IPRD (0.023) are well below the recommended threshold of 0.06, confirming that the models have minimal approximation errors and exhibit a high level of fit. Overall, the CFA results demonstrate that all measurement models exhibit strong structural validity and goodness-of-fit, providing a robust theoretical foundation for subsequent Structural Equation Modeling (SEM) analyses.

Transformational Leadership (TFL)

Table 4.10 Confirmatory Factor Analysis for Transformational Leadership

Variable	Item	loading coefficient	R2	CR	AVE
TFL	MM	0.800	0.640	0.857	0.601
	VM	0.753	0.567		
	CL	0.774	0.599		
	IC	0.772	0.596		
MM	MM1	0.831	0.691	0.876	0.587
	MM2	0.775	0.601		
	MM3	0.667	0.445		
	MM4	0.781	0.610		
	MM5	0.766	0.587		

Table 4.10 (Continued)

Variable	Item	loading coefficient	R2	CR	AVE
VM	VM1	0.825	0.681	0.893	0.677
	VM2	0.844	0.712		
	VM3	0.755	0.570		
	VM4	0.864	0.746		
CL	CL1	0.829	0.687	0.861	0.608
	CL2	0.818	0.669		
	CL3	0.715	0.511		
	CL4	0.750	0.563		
IC	IC1	0.821	0.674	0.885	0.658
	IC2	0.836	0.699		
	IC3	0.802	0.643		
	IC4	0.785	0.616		
Chi-Square=135.239, DF=115, Chi-Square/ DF =1.176					
P=0.096, CFI=0.995, TLI=0.994, SRMR=0.028, RMSEA=0.021					

This study conducted Confirmatory Factor Analysis (CFA) for Transformational Leadership (TFL). The chi-square value ($\chi^2=135.239$) and degrees of freedom (DF=115) resulted in a chi-square/ DF ratio ($\chi^2/DF=1.176$), which is below the recommended threshold of 2, indicating a good model fit. Furthermore, the p-value (P=0.096) exceeds 0.05, suggesting no significant discrepancy between the hypothesized model and the observed data, confirming the acceptability of the measurement model.

Regarding model fit indices, the Comparative Fit Index (CFI=0.995) and the Tucker-Lewis Index (TLI=0.994) are both close to 1, demonstrating an excellent model fit. Additionally, the Standardized Root Mean Square Residual (SRMR=0.028) is well below 0.08, and the Root Mean Square Error of Approximation (RMSEA=0.021) is significantly lower than the recommended 0.06 threshold.** These results further

validate the robustness and appropriateness of the measurement model, indicating its strong ability to explain variance in the observed variables.

All factor loadings range between 0.667 and 0.864, indicating strong explanatory power for each observed variable. The Composite Reliability (CR) values exceed 0.85 (ranging from 0.857 to 0.893), confirming high internal consistency and strong reliability of the constructs. Moreover, the Average Variance Extracted (AVE) values are all above 0.50 (ranging from 0.587 to 0.677), demonstrating good convergent validity, meaning that each latent variable is effectively measured by its corresponding observed indicators.

Overall, this study successfully validated the measurement model for Transformational Leadership. The CFA results confirm that the model exhibits excellent fit, strong reliability, and good validity, effectively measuring the four dimensions of Transformational Leadership (Moral Model, Vision Motivation, Charisma Leadership, and Individualized Consideration). These findings establish a solid foundation for subsequent Structural Equation Modeling (SEM) analysis and demonstrate that the measurement instrument employed in this research is robust, making it suitable for further empirical studies.

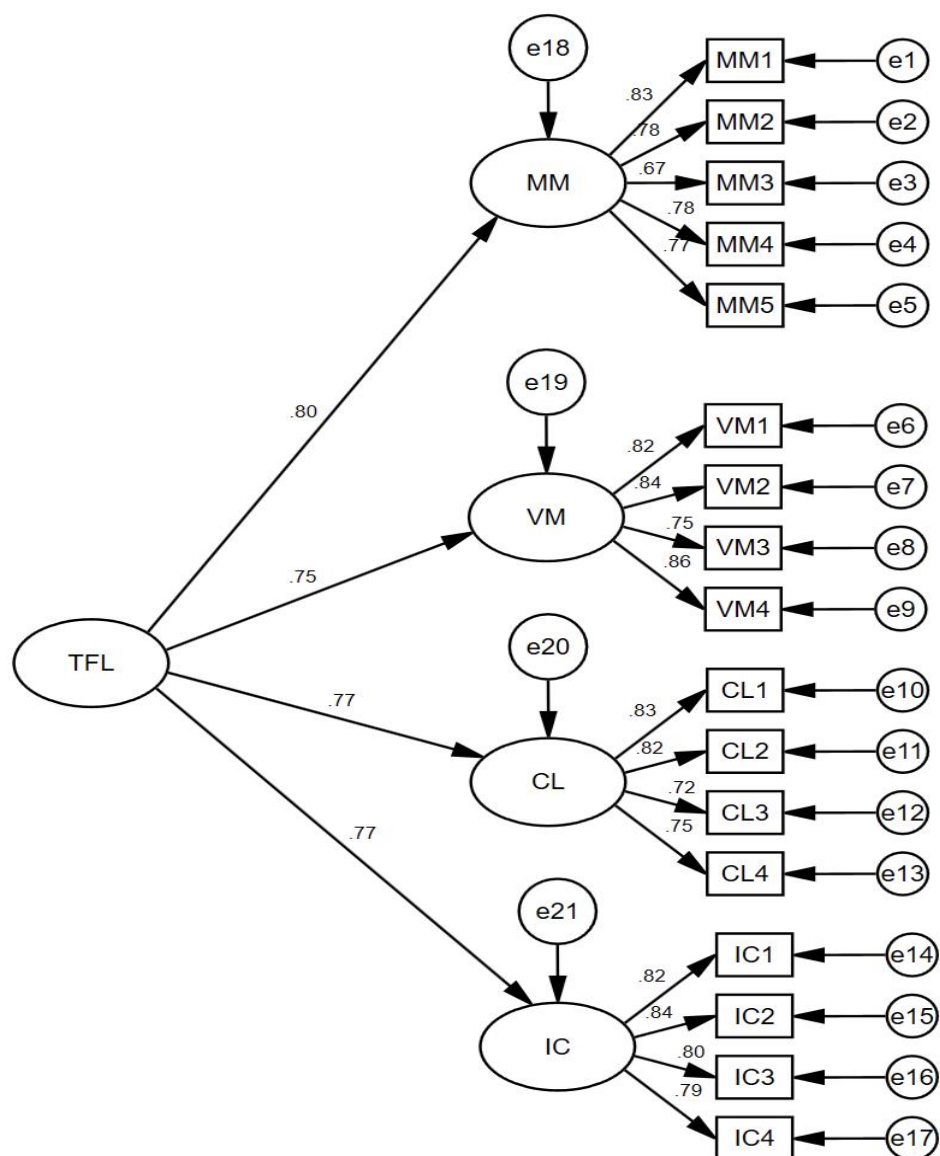


Figure 4.1 Factor analysis diagram of TFL

Organizational creative climate (OCC)

Table 4.11 Confirmatory Factor Analysis for Organizational creative climate

Variable	Item	loading coefficient	R2	CR	AVE
OCC	TM	0.876	0.767	0.864	0.615
	PSS	0.723	0.523		
	RG	0.724	0.524		
	WA	0.803	0.645		
TM	TM5	0.792	0.627	0.907	0.620
	TM6	0.854	0.729		
	TM4	0.797	0.635		
	TM3	0.766	0.587		
	TM2	0.791	0.626		
	TM1	0.72	0.518		
PSS	PSS4	0.676	0.457	0.871	0.63
	PSS3	0.808	0.653		
	PSS2	0.780	0.608		
	PSS1	0.895	0.801		
RG	RG4	0.789	0.623	0.872	0.632
	RG3	0.779	0.607		
	RG2	0.901	0.812		
	RG1	0.697	0.486		
WA	WA3	0.758	0.575	0.832	0.624
	WA2	0.758	0.575		
	WA1	0.850	0.723		
Chi-Square=140.286, DF =115, Chi-Square/ DF =1.22					
P=0.055, CFI=0.994, TLI= 0.993, SRMR=0.029, RMSEA=0.023					

This study conducted Confirmatory Factor Analysis (CFA) for Organizational Creative Climate (OCC). The chi-square value ($\chi^2=140.286$) and degrees of freedom (DF=115) resulted in a chi-square/ DF ratio ($\chi^2/DF=1.22$), which is below the recommended threshold of 2, indicating a good model fit. Furthermore, the p-value ($P=0.055$) is close to 0.05, suggesting a high degree of model fit with no significant deviation from the observed data, confirming the acceptability of the measurement model.

Regarding model fit indices, the Comparative Fit Index (CFI=0.994) and the Tucker-Lewis Index (TLI=0.993) are both close to 1, demonstrating an excellent model fit. Additionally, the Standardized Root Mean Square Residual (SRMR=0.029) is well below the recommended threshold of 0.08, and the Root Mean Square Error of Approximation (RMSEA=0.023) is below 0.06. These results indicate that the measurement model is well-structured and robust, effectively capturing the construct of Organizational Creative Climate.

All factor loadings range between 0.676 and 0.901, indicating strong explanatory power of the observed indicators. The Composite Reliability (CR) values exceed 0.85 (ranging from 0.832 to 0.907), confirming high internal consistency and strong construct reliability. Moreover, the Average Variance Extracted (AVE) values are all above 0.50 (ranging from 0.615 to 0.632), demonstrating good convergent validity, meaning that the latent constructs are effectively measured by their respective indicators.

Overall, this study successfully validated the measurement model for Organizational Creative Climate. The CFA results confirm that the model exhibits excellent fit, strong reliability, and good validity, effectively measuring the four dimensions of Organizational Creative Climate (Team Motivation, Perceived Supervisor Support, Resource Guarantee, and Work Autonomy). The findings establish a solid foundation for subsequent Structural Equation Modeling (SEM) analysis and provide a reliable measurement tool for organizations and businesses aiming to foster an innovative work environment.

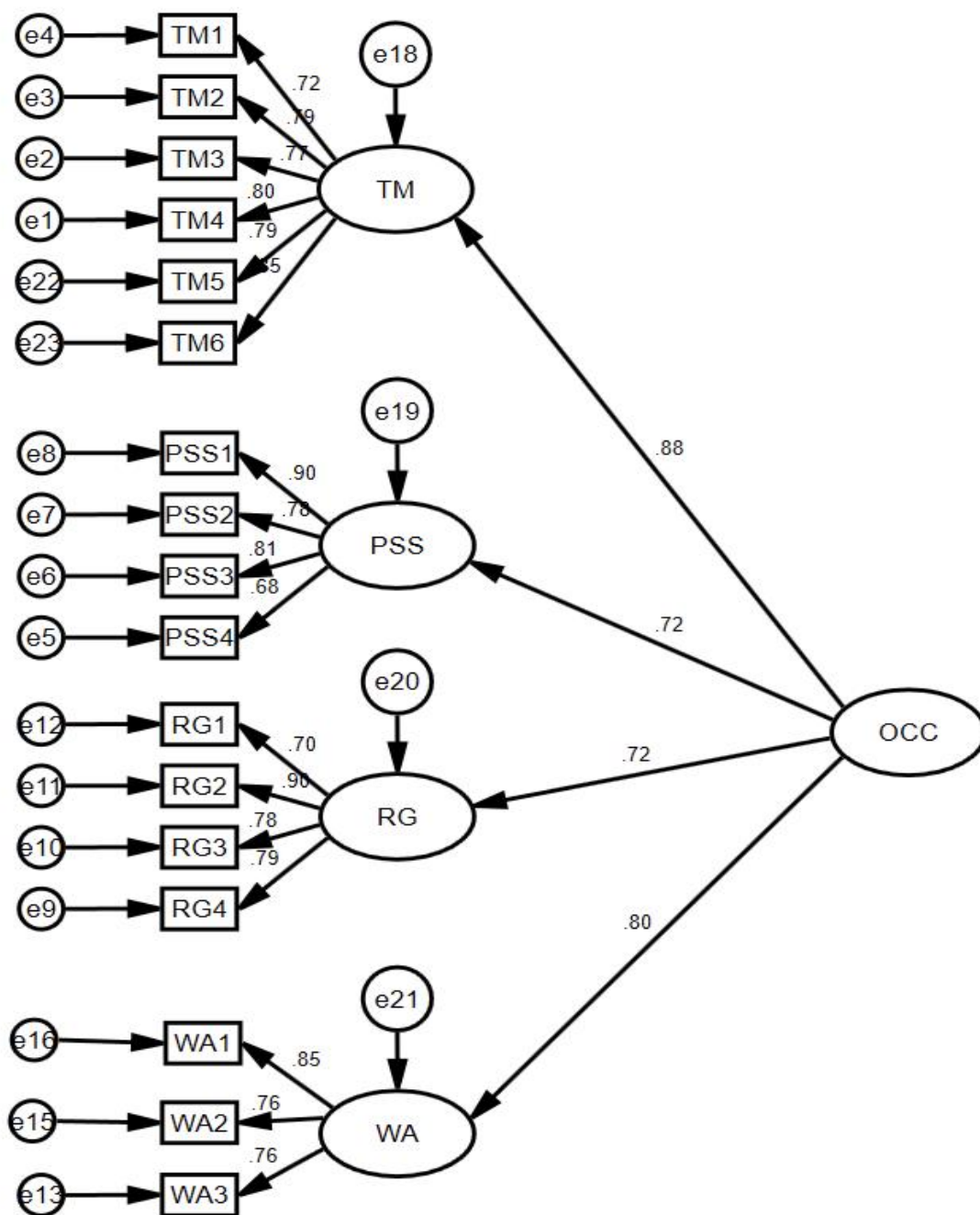


Figure 4.2 Factor analysis diagram of OCC

knowledge sharing (KS)

Table 4.12 Confirmatory Factor Analysis for knowledge sharing

Variable	Item	loading coefficient	R2	CR	AVE
KS	KCT	0.819	0.671	0.857	0.601
	KCL	0.856	0.733		
	SW	0.717	0.514		
	SC	0.697	0.486		
KCT	KCT5	0.776	0.602	0.906	0.617
	KCT6	0.877	0.769		
	KCT4	0.762	0.581		
	KCT3	0.751	0.564		
	KCT2	0.761	0.579		
	KCT1	0.780	0.608		
KCL	KCL4	0.773	0.598	0.866	0.617
	KCL3	0.754	0.569		
	KCL2	0.792	0.627		
	KCL1	0.822	0.676		
SW	SW5	0.722	0.521	0.915	0.606
	SW6	0.770	0.593		
	SW7	0.878	0.771		
	SW4	0.764	0.584		
	SW3	0.737	0.543		
	SW2	0.766	0.587		
	SW1	0.802	0.643		
SC	SC4	0.731	0.534	0.873	0.536
	SC3	0.612	0.375		
	SC2	0.780	0.608		
	SC1	0.837	0.701		
	SC5	0.682	0.465		

Table 4.12 (Continued)

Variable	Item	loading coefficient	R2	CR	AVE
	SC6	0.731	0.534		
Chi-Square=250.687, DF =226, Chi-Square/ DF =1.109					
P=0.125, CFI=0.998, TLI= 0.995, SRMR=0.030, RMSEA=0.016					

This study conducted Confirmatory Factor Analysis (CFA) for Knowledge Sharing (KS). The results indicate that the chi-square value ($\chi^2=250.687$) and degrees of freedom (DF =226) result in a chi-square/DF ratio ($\chi^2/DF=1.109$), which is below the recommended threshold of 2, demonstrating a good model fit. Furthermore, the p-value (P=0.125) is greater than 0.05, suggesting no significant difference between the model and observed data, confirming the acceptability of the measurement model.

Regarding model fit indices, the Comparative Fit Index (CFI=0.998) and the Tucker-Lewis Index (TLI=0.995) are both close to 1, indicating an excellent model fit. Additionally, the Standardized Root Mean Square Residual (SRMR=0.030) is well below the recommended threshold of 0.08, and the Root Mean Square Error of Approximation (RMSEA=0.016) is far below 0.06. These findings suggest that the measurement model is well-structured and highly reliable in capturing the construct of Knowledge Sharing.

The factor loadings range between 0.612 and 0.878, indicating strong explanatory power of the observed indicators. The Composite Reliability (CR) values exceed 0.85 (ranging from 0.857 to 0.915), confirming high internal consistency and strong construct reliability. Moreover, the Average Variance Extracted (AVE) values are all above 0.50 (ranging from 0.536 to 0.617), demonstrating good convergent validity, meaning that the latent constructs are effectively measured by their respective indicators.

Overall, this study successfully validated the measurement model for Knowledge Sharing. The CFA results confirm that the model exhibits excellent fit, strong reliability, and good validity, effectively measuring the four dimensions of Knowledge Sharing (Knowledge Contribution, Knowledge Collection, Shared

Willingness, and Shared Competence). These findings establish a solid foundation for subsequent Structural Equation Modeling (SEM) analysis and provide a scientifically validated tool for organizations aiming to enhance knowledge-sharing practices.

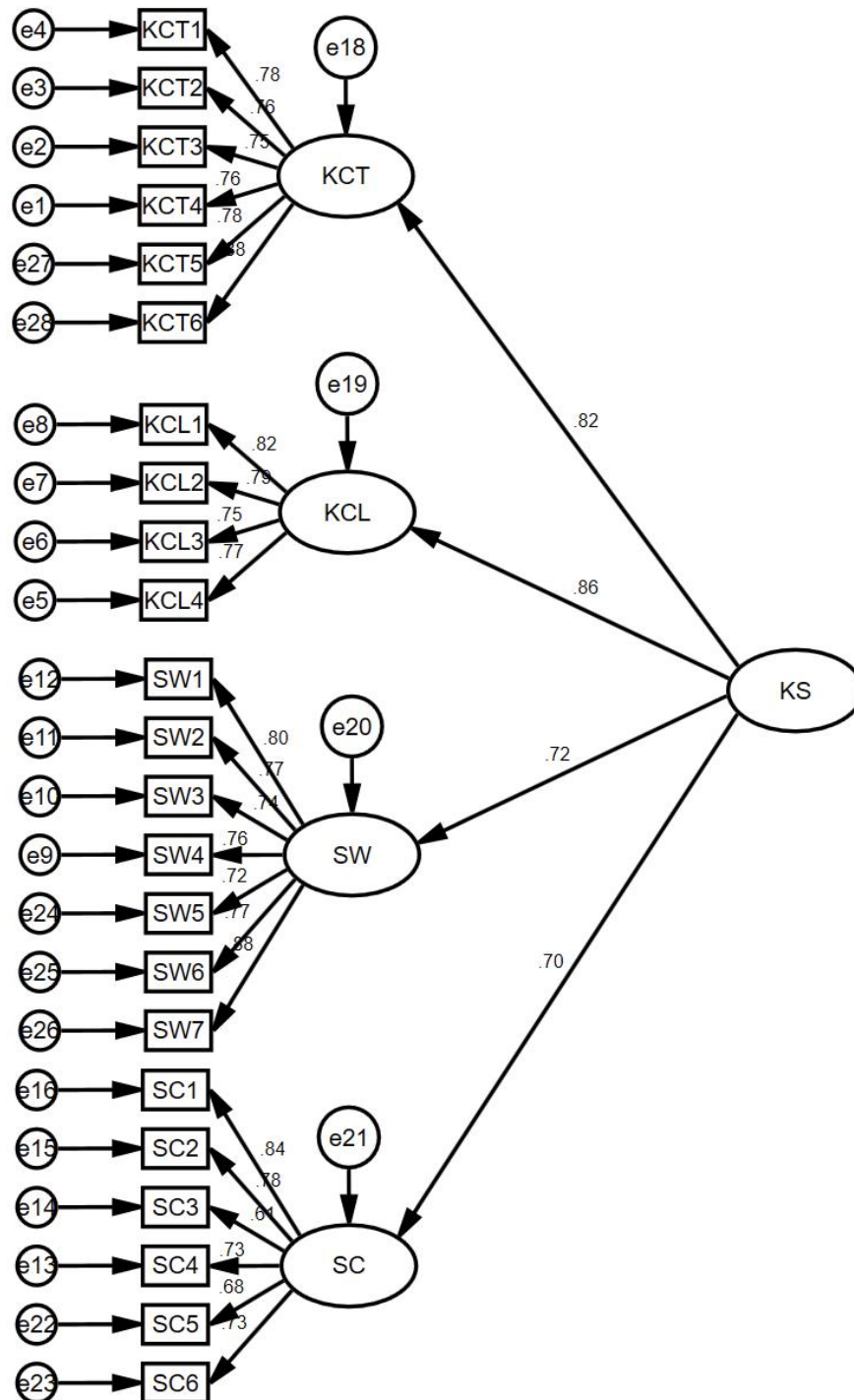


Figure 4.3 Factor analysis diagram of KS

Innovative performance of research and development teams (IPRD)

Table 4.13 Confirmatory Factor Analysis for Innovative performance of research and development teams

Variable	Item	loading coefficient	R2	CR	AVE
IPRD	IE	0.747	0.558	0.874	0.635
	IEN	0.807	0.651		
	IP	0.717	0.514		
	IO	0.904	0.817		
IE	IE4	0.829	0.687	0.874	0.635
	IE3	0.795	0.632		
	IE2	0.838	0.702		
	IE1	0.721	0.520		
IEN	IEN5	0.767	0.588	0.89	0.62
	IEN4	0.79	0.624		
	IEN3	0.857	0.734		
	IEN2	0.810	0.656		
	IEN1	0.704	0.496		
IP	IP4	0.800	0.640	0.875	0.636
	IP3	0.732	0.536		
	IP2	0.834	0.696		
	IP1	0.821	0.674		
IO	IO4	0.726	0.527	0.877	0.642
	IO3	0.792	0.627		
	IO2	0.798	0.637		
	IO1	0.882	0.778		
Chi-Square=140.727, DF =115, Chi-Square/DF =1.224					
P=0.052, CFI=0.994, TLI= 0.993, SRMR=0.031, RMSEA=0.023					

This study conducted Confirmatory Factor Analysis (CFA) for the Innovative Performance of Research and Development Teams (IPRD). The results indicate that the chi-square value ($\chi^2=140.727$) and degrees of freedom (DF=115) result in a chi-square/DF ratio ($\chi^2/DF=1.224$), which is below the recommended threshold of 2, demonstrating a good model fit. Additionally, the p-value ($P=0.052$) is close to 0.05, suggesting a minimal difference between the model and observed data, supporting the acceptability of the measurement model.

Regarding model fit indices, the Comparative Fit Index (CFI=0.994) and the Tucker-Lewis Index (TLI=0.993) are both close to 1, indicating a strong model fit. Furthermore, the Standardized Root Mean Square Residual (SRMR=0.031) is well below the recommended threshold of 0.08, and the Root Mean Square Error of Approximation (RMSEA=0.023) is below 0.06. These findings suggest that the measurement model is well-structured and reliable in capturing the construct of R&D teams' innovative performance.

The factor loadings range between 0.704 and 0.904, indicating strong explanatory power of the observed indicators. The Composite Reliability (CR) values exceed 0.87 (ranging from 0.874 to 0.90), confirming high internal consistency and strong construct reliability. Moreover, the Average Variance Extracted (AVE) values are all above 0.60 (ranging from 0.62 to 0.642), demonstrating good convergent validity, meaning that the latent constructs are effectively measured by their respective indicators.

Overall, this study successfully validated the measurement model for the Innovative Performance of Research and Development Teams. The CFA results confirm that the model exhibits excellent fit, strong reliability, and good validity, effectively measuring the four dimensions of innovative performance (Innovation Efficiency, Innovation Effectiveness, Innovation Process, and Innovation Outcomes). These findings establish a solid foundation for subsequent Structural Equation Modeling (SEM) analysis and provide a scientifically validated tool for improving innovation management practices in R&D teams.

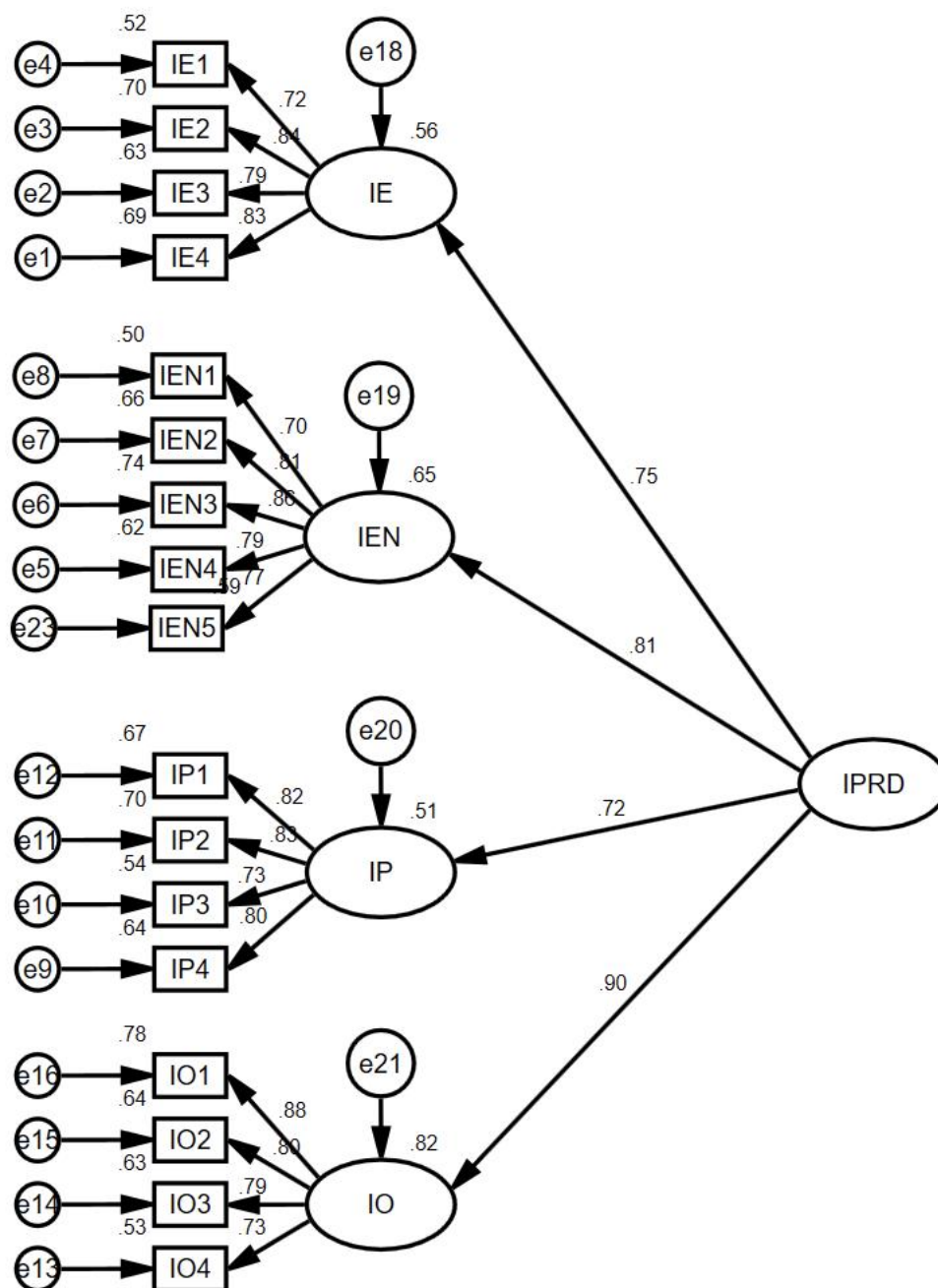


Figure 4.4 Factor analysis diagram of IPRD

Correlation analysis

Correlation Analysis: Also known as statistical correlation, it refers to the interdependence among things. The commonly used correlation coefficients include Pearson's product-moment correlation coefficient and Spearman's rank correlation coefficient. In this paper, Pearson's correlation coefficient is used for presentation. Generally speaking, we consider that $P \leq 0.05$ indicates a correlation between two variables. Correlation coefficient: < 0.4 , weak correlation; $0.4 - 0.8$, moderate intensity correlation; > 0.8 , high correlation; > 0 , positive correlation; < 0 , negative correlation.

Table 4.14 Correlation analysis of Measure variable

	MM	CL	VM	IC	TM	PSS	RG	WA	KCT	KCL	SW	SC	IE	IEN	IP	IO
MM	1															
CL	.560**	1														
VM	.510**	.529**	1													
IC	.558**	.506**	.523**	1												
TM	.333**	.358**	.290**	.337**	1											
PSS	.260**	.289**	.285**	.250**	.555**	1										
RG	.214**	.270**	.228**	.229**	.550**	.522**	1									
WA	.287**	.274**	.242**	.266**	.632**	.480**	.472**	1								
KCT	.410**	.307**	.343**	.332**	.277**	.195**	.135**	.250**	1							
KCL	.338**	.257**	.275**	.313**	.312**	.176**	.150**	.213**	.625**	1						
SW	.286**	.247**	.266**	.297**	.268**	.185**	.140**	.224**	.551**	.533**	1					
SC	.283**	.231**	.295**	.284**	.208**	.109*	0.1	.134**	.498**	.537**	.449**	1				
IE	.355**	.348**	.331**	.335**	.360**	.294**	.281**	.356**	.344**	.284**	.258**	.276**	1			
IEN	.272**	.260**	.244**	.294**	.358**	.277**	.227**	.392**	.266**	.220**	.221**	.237**	.537**	1		
IP	.311**	.285**	.283**	.309**	.363**	.284**	.293**	.382**	.343**	.292**	.344**	.336**	.488**	.510**	1	
IO	.347**	.338**	.335**	.322**	.445**	.318**	.346**	.438**	.329**	.283**	.315**	.319**	.600**	.659**	.559**	1

Note: ***, **, * indicate $p < 0.001$, $p < 0.05$, and $p < 0.10$ respectively.

The correlation analysis reveals that all correlation coefficients are below 0.8, indicating that the correlations between the independent variables are moderate and thus avoiding multicollinearity issues. Multicollinearity occurs when independent variables are highly correlated, which can lead to unstable parameter estimates in regression analysis, affecting the interpretability and predictive power of the model.

By ensuring that the correlations between the independent variables are within a reasonable range, the independence of each variable is maintained, providing a stable foundation for subsequent Structural Equation Modeling (SEM) analysis. Avoiding multicollinearity in SEM helps improve the accuracy and robustness of the model.

Overall, the correlation analysis lays a solid foundation for the construction of the SEM model. The moderate correlations between independent variables not only ensure the stability of the data but also avoid interference from redundant information, ensuring the independent role of each variable in the model. This provides reliable data support for subsequent path analysis and causal exploration, enhancing the explanatory power and credibility of the model.

Path Analysis

Table 4.15 Direct path

	Path	Path Coefficient	unstandardized	S.E.	t	P
OCC	<--- TFL	0.534	0.546	0.06	8.65	***
KS	<--- TFL	0.574	0.32	0.04	8.35	***
IPRD	<--- TFL	0.203	0.174	0.06	2.73	0.01
IPRD	<--- OCC	0.428	0.36	0.05	6.64	***
IPRD	<--- KS	0.241	0.371	0.1	3.74	***

This study's path analysis tested the direct relationships between Transformational Leadership (TFL), Organizational Creative Climate (OCC), Knowledge Sharing (KS), and Innovative Performance of Research and Development Teams (IPRD), revealing the interactions among these factors. First, Transformational Leadership has a significant positive effect on both Organizational Creative Climate and Knowledge Sharing, with path coefficients of 0.534 and 0.574, respectively, both statistically significant ($p < 0.001$). This indicates that transformational leadership

effectively fosters a creative organizational climate and promotes knowledge sharing, laying the foundation for innovative performance. Next, the path from Transformational Leadership to IPRD is smaller but still statistically significant, with a path coefficient of 0.203 ($p = 0.01$), suggesting that leadership has a certain level of influence on team innovation performance.

Additionally, the impact of Organizational Creative Climate on IPRD is very significant, with a path coefficient of 0.428 ($p < 0.001$), showing that the creative climate within the organization strongly drives the team's innovative performance. Similarly, the impact of Knowledge Sharing on IPRD is significant, with a path coefficient of 0.241 ($p < 0.001$), further emphasizing the importance of knowledge sharing in enhancing innovation performance.

Based on the results of the path analysis, the following conclusions can be drawn: 1) Transformational Leadership indirectly promotes Innovative Performance of Research and Development Teams (IPRD) by enhancing Organizational Creative Climate and facilitating Knowledge Sharing. The close connections between these factors indicate that transformational leadership not only directly impacts team innovation capabilities but also fosters a positive work climate and encourages knowledge sharing, which in turn boosts innovation performance. 2) Organizational Creative Climate has a direct and significant impact on innovation performance, highlighting the importance of team motivation, perceived supervisor support, resource availability, and work autonomy in the innovation process. 3) Knowledge Sharing significantly affects innovation performance, showing that knowledge sharing is a key factor in enhancing both innovation efficiency and innovation outcomes within teams.

These conclusions provide empirical support for future research, emphasizing the pivotal role of transformational leadership in enhancing organizational innovation performance. They also offer valuable insights for organizational managers on how to foster innovation through transformational leadership.

Table 4.16 Intermediation Test

Path	Effect	S.E.	Bias-corrected 95%CI		
			Lower	Upper	P
TFL_OCC_IPRD Indirectly	0.228	0.042	0.152	0.32	0
TFL_KS_IPRD Indirectly	0.138	0.043	0.063	0.233	0.001
TFL_IPRD Directly	0.203	0.076	0.043	0.346	0.011
TFL_IPRD Total	0.569	0.055	0.452	0.668	0

The mediation analysis reveals the indirect effects of Transformational Leadership (TFL) on Innovative Performance of Research and Development Teams (IPRD) through Organizational Creative Climate (OCC) and Knowledge Sharing (KS).

The indirect effect of TFL $\rightarrow$ OCC $\rightarrow$ IPRD is 0.228 (Standard Error: 0.042), with a bias-corrected 95% confidence interval of [0.152, 0.32] and a p-value of 0, indicating a statistically significant mediation effect. This shows that transformational leadership influences innovation performance significantly through the creation of an organizational creative climate.

The indirect effect of TFL $\rightarrow$ KS $\rightarrow$ IPRD is 0.138 (Standard Error: 0.043), with a 95% confidence interval of [0.063, 0.233] and a p-value of 0.001, demonstrating a significant effect of transformational leadership on innovation performance through knowledge sharing.

The direct effect of TFL $\rightarrow$ IPRD is 0.203 (Standard Error: 0.076), with a 95% confidence interval of [0.043, 0.346] and a p-value of 0.011, showing that transformational leadership has a statistically significant direct impact on innovative performance, though the effect size is relatively small.

The total effect of TFL $\rightarrow$ IPRD is 0.569 (Standard Error: 0.055), with a 95% confidence interval of [0.452, 0.668] and a p-value of 0, indicating a strong total effect of transformational leadership on innovation performance. This shows that the combined direct and indirect effects are significant and impactful.

The results from the indirect, direct, and total effect analyses indicate that Transformational Leadership influences Innovative Performance of Research and Development Teams (IPRD) both directly and indirectly. Specifically:

Transformational Leadership influences innovation performance indirectly through Organizational Creative Climate and Knowledge Sharing, highlighting that leadership style not only directly impacts innovation but also improves team creativity and enhances knowledge sharing, which in turn boosts innovative capabilities.

The direct effect of transformational leadership, while modest, is still statistically significant, suggesting that leadership behavior directly influences the team's innovation performance.

Overall, transformational leadership has a significant and positive impact on innovation performance through both direct and indirect pathways, providing theoretical support for how leadership style can drive innovation within organizations.

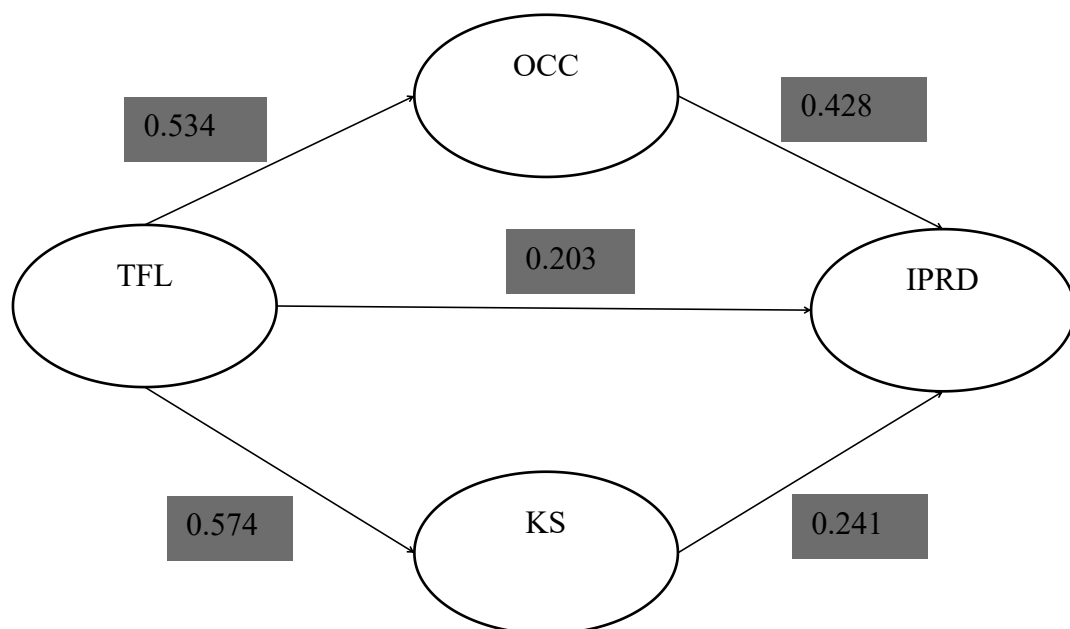


Figure 4.5 Evaluation of research paths

Through the structural equation analysis, a model was discovered

Part 4 Results find a model for improving innovation performance of R&D teams.

Structural equation modeling can be used to establish, estimate and test it. This model not only contains manifest variables but also latent variables that cannot be directly observed. Structural equation modeling can replace methods such as multiple regression, path analysis, factor analysis and covariance analysis. It can clearly analyze the effect of a single indicator on the overall situation and the interrelationships among single indicators. For multivariate data, if $P > 0.05$ under the structural equation model, it verifies the validity of the hypothesis.

Model fitting

Table 4.17 Model Fit Tests

Goodness -of-fit parameters	CMIN	DF	CMIN		GFI	IFI	TLI	CFI	RMSEA	SRMR
			/	p						
			DF							
Result	112.29	99	1.134	0.171	0.967	0.995	0.994	0.995	0.018	0.036
Standard			<2	>0.05	>0.9	>0.9	>0.9	>0.9	<0.05	<0.05

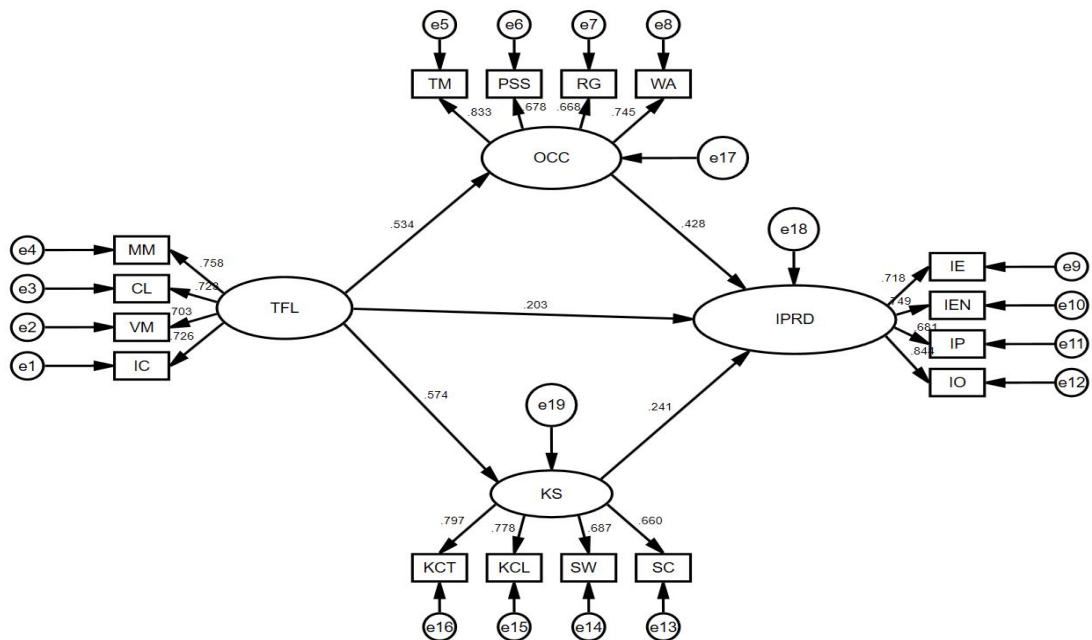


Figure 4.6 Evaluation of the research model

Results of data analysis

Table 4.18 Summary of Hypotheses

NO.	Research Hypotheses	Results
1.	H1: Transformational leadership has a direct effect on organizational creative climate	Accepted
2.	H2: Transformational leadership has a direct effect on knowledge sharing	Accepted
3.	H3: Transformational leadership has a direct effect on innovation performance of research and development teams	Accepted
4.	H4: Organizational creative climate has a direct effect on innovation performance of research and development teams	Accepted
5.	H5: Knowledge sharing has a direct effect on the innovation performance of research and development teams	Accepted
6.	H6: Transformational leadership has an indirect effect on the innovation performance of research and development teams through the organizational creative climate	Accepted
7.	H7: Transformational leadership has an indirect effect on the innovation performance of research and development teams through knowledge sharing	Accepted

Chapter 5

Conclusion Discussion and Recommendations

This study aims to explore the capabilities and fluctuations of transformational leadership, organizational creative climate, knowledge sharing, and innovative performance of research and development

The details are as follows.

Conclusion

According to the demographic profile of the respondents (N = 407), the sample is predominantly female (60.44%), middle-aged (69.78% of respondents are aged between 31 and 50), and married (57.74%), with a notably high level of education. Of the respondents, 45.70% hold a bachelor's degree, 29.73% hold a college degree, and 11.55% hold a master's degree. These characteristics suggest that the sample is composed of individuals with stable career paths and advanced academic backgrounds, which aligns with the first research objective of studying the capabilities and fluctuations of transformational leadership, organizational creative climate, knowledge sharing, and innovation performance in research and development teams. The stable and highly educated nature of the sample may influence the innovative capabilities and performance of the teams.

According to the descriptive statistical analysis, Innovative Performance of Research and Development Teams (IPRD) received the highest overall rating (Mean = 3.729), indicating that innovation efficiency, effectiveness, process, and outcomes are highly valued within the team. Knowledge Sharing (KS) and Organizational Creative Climate (OCC) also performed well, with particularly high scores in Shared Competence (SC) and Work Autonomy (WA), reflecting strong recognition in knowledge sharing and decision-making freedom. Additionally, Transformational Leadership (TFL) scored 3.491 overall, with Charisma Leadership (CL) being the highest, indicating that leadership plays a significant role in motivating the team's innovation. Overall, the innovation performance, knowledge sharing, and

organizational creative climate of the R&D teams were positively rated, and transformational leadership has played a significant role in driving team innovation, aligning with the first research objective, highlighting the importance of transformational leadership in enhancing R&D team innovation.

This study conducted Confirmatory Factor Analysis (CFA) to validate the measurement models for Transformational Leadership (TFL), Organizational Creative Climate (OCC), Knowledge Sharing (KS), and Innovative Performance of Research and Development Teams (IPRD). The results showed excellent model fit ($\chi^2/DF < 2$, CFI > 0.99 , RMSEA < 0.06 , SRMR < 0.08), with factor loadings, composite reliability (CR > 0.85), and average variance extracted (AVE > 0.50) all meeting the required thresholds, indicating strong reliability and validity. Path analysis revealed that Transformational Leadership significantly and positively influenced Organizational Creative Climate (path coefficient = 0.534, $p < 0.001$) and Knowledge Sharing (path coefficient = 0.574, $p < 0.001$), and indirectly impacted Innovative Performance through these mediators (indirect effects = 0.228 and 0.138, respectively, $p < 0.001$). Additionally, the direct effect of Transformational Leadership on Innovative Performance, though smaller, was still significant (path coefficient = 0.203, $p = 0.01$). Both Organizational Creative Climate (path coefficient = 0.428, $p < 0.001$) and Knowledge Sharing (path coefficient = 0.241, $p < 0.001$) had significant direct effects on Innovative Performance. In conclusion, Transformational Leadership significantly enhances the innovative performance of R&D teams by fostering a creative climate and promoting knowledge sharing.

The research model explored the relationships among transformational leadership (TFL), organizational innovation climate (OCC), knowledge sharing (KS), and innovation performance of R&D teams (IPRD). The research background indicated that with the rapid development of the global automotive parts industry, especially the rise of new energy vehicles and intelligent driving technologies, the innovation performance of R&D teams has become the key to enterprise competitiveness. The research purpose was to reveal how transformational leadership can enhance innovation performance by creating an organizational innovation climate and

promoting knowledge sharing. The results show that Transformational Leadership significantly and positively influences Organizational Creative Climate (path coefficient = 0.534, $p < 0.001$) and Knowledge Sharing (path coefficient = 0.574, $p < 0.001$), and indirectly impacts Innovative Performance through these mediators (indirect effects = 0.228 and 0.138, respectively, $p < 0.001$). Additionally, the direct effect of Transformational Leadership on Innovative Performance, though smaller, is still significant (path coefficient = 0.203, $p = 0.01$). Both Organizational Creative Climate (path coefficient = 0.428, $p < 0.001$) and Knowledge Sharing (path coefficient = 0.241, $p < 0.001$) have significant direct effects on Innovative Performance. These findings provide theoretical and practical insights for organizations to enhance innovative performance by improving leadership, optimizing organizational climate, and promoting knowledge sharing.

Discussion

This study examines the impact of Transformational Leadership (TFL) on Organizational Creative Climate (OCC), Knowledge Sharing (KS), and the Innovative Performance (IP) of Research and Development (R&D) Teams in the Chinese automotive industry. The findings confirm that transformational leadership plays a crucial role in fostering an innovation-conducive environment, ultimately influencing R&D teams' innovation performance. By promoting an organizational creative climate and facilitating knowledge sharing, transformational leaders indirectly drive innovation performance rather than exerting a direct influence alone. Below are the key discussion points based on the study's findings:

1. Transformational Leadership and Organizational Creative Climate

The results show that Transformational Leadership significantly enhances Organizational Creative Climate ($\beta = 0.534$), indicating that leaders who exhibit moral modeling, charisma, vision motivation, and individualized consideration create a work environment that encourages creative thinking and collaboration. This aligns with Shin et al. (2017), who highlight that a strong creative climate is a key driver of an organization's capacity for innovation. Leaders who actively encourage risk-taking,

empower employees, and foster open communication contribute to an atmosphere where new ideas can emerge and be implemented effectively.

Additionally, Meekaewkunchorn & Muangmee (2024) emphasize the role of digital media and technology in business innovation, supporting the argument that leadership-driven creativity is essential for an organization's adaptability in dynamic environments. In fast-evolving industries like automotive manufacturing, where new energy technologies and AI-driven solutions are reshaping production and design processes, a strong creative climate becomes a critical enabler of sustained innovation.

2. Transformational Leadership and Knowledge Sharing

This study also found that Transformational Leadership positively influences Knowledge Sharing ($\beta = 0.574$). Leaders who inspire, support, and build trust within their teams create a culture that facilitates knowledge exchange, which is essential for organizational learning and innovation. By promoting open dialogue, cross-functional collaboration, and information-sharing practices, transformational leaders reduce knowledge silos and enable employees to learn from one another, which ultimately supports problem-solving and creative idea generation.

However, the direct effect of Transformational Leadership on Innovative Performance ($\beta = 0.203$) is relatively weak. This suggests that while leadership plays an essential role, additional mediating factors are necessary to strengthen the link between leadership and innovation. Carmeli et al. (2013) also found that while leadership encourages knowledge sharing, organizational mechanisms such as digital tools, structured learning systems, and collaborative technologies are needed to maximize its impact. In the automotive industry, smart manufacturing, AI-powered design platforms, and cross-border R&D collaborations could serve as enablers to further enhance the knowledge-sharing process.

3. The Mediating Role of Organizational Creative Climate and Knowledge Sharing

The findings further indicate that Transformational Leadership improves Innovative Performance primarily through Organizational Creative Climate and

Knowledge Sharing. While transformational leaders set the vision and inspire employees, their impact on innovation materializes through the innovation-supportive environment and knowledge-sharing culture they create. The relatively weak direct impact of Transformational Leadership on Innovative Performance ($\beta = 0.203$) highlights the importance of enabling mechanisms such as collaborative teams, structured innovation processes, and a psychologically safe environment.

This result aligns with Jiang & Chen (2018), who argue that leadership fosters innovation by shaping an atmosphere that encourages experimentation, openness to new ideas, and shared learning. Similarly, Panyasupat, Muangmee, and Soonsawad (2024) emphasize that transformational leadership not only influences innovation within teams but also shapes broader entrepreneurial intention and proactive problem-solving behaviors within the organization. This implies that R&D teams benefit most from leadership when they operate in an innovation-friendly ecosystem where both creative climate and knowledge sharing thrive.

4. Implications for Leadership Development in R&D Teams

The study highlights several practical implications for leadership development in R&D teams, particularly within the Chinese automotive industry:

Investment in Leadership Training: Organizations should implement leadership development programs that focus on transformational leadership behaviors, such as inspiring vision, intellectual stimulation, and individualized consideration. Training programs should incorporate real-world innovation challenges, case studies, and leadership simulations to strengthen leaders' ability to foster innovation-driven teams.

Enhancing Organizational Creative Climate: Companies must actively nurture a creative workplace by providing resources, psychological safety, and an innovation-supportive culture. Leaders should empower employees, encourage calculated risk-taking, and reward innovative contributions.

Strengthening Knowledge-Sharing Mechanisms: Organizations should establish structured platforms for knowledge exchange, such as internal R&D knowledge bases, digital collaboration platforms, and cross-functional project teams. These

mechanisms will enable real-time knowledge sharing and collective problem-solving, reinforcing the impact of transformational leadership on innovation.

Integrating Digital Transformation: With advancements in AI and Industry 4.0, transformational leaders must leverage technology-driven knowledge management systems to enhance collaboration and idea-sharing. Muangmee et al. (2024) suggest that trust, perceived value, and service quality impact organizational success, reinforcing the idea that leaders must cultivate an innovation-driven culture rooted in mutual trust and digital competence.

Recommendations

1. The following are the recommended models.

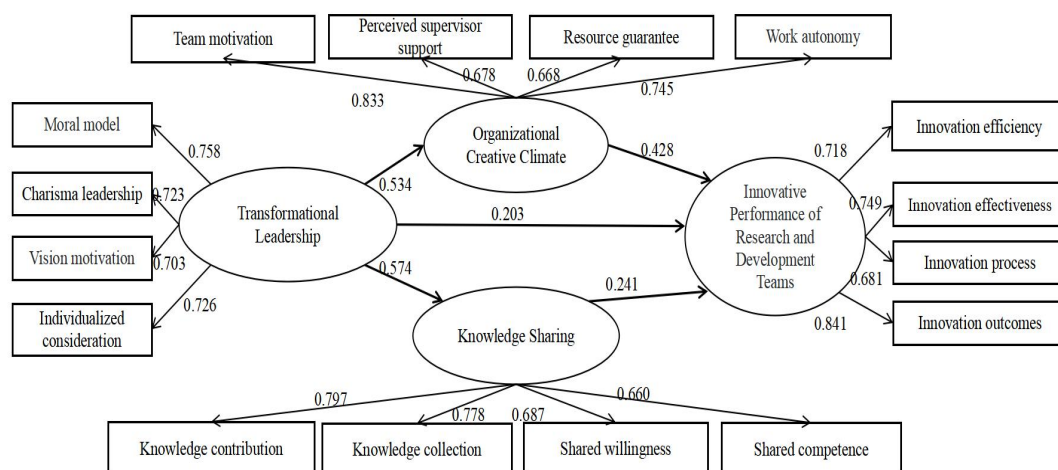


Figure 5.1 Recommended model framework

Enhancing Knowledge Sharing to Improve the Innovative Performance of Research and Development Teams: 1) Knowledge sharing has a significant positive impact on the innovative performance of research and development teams (path coefficient = 0.574). 2) Organizations should strengthen knowledge contribution, knowledge collection, shared willingness, and shared competence to optimize the innovation environment. 3) Specific measures include establishing knowledge-sharing

platforms, implementing incentive mechanisms for knowledge exchange, and organizing regular seminars.

Creating a Supportive Organizational Creative Climate to Enhance Innovation Capabilities: 1) Organizational creative climate positively influences the innovative performance of research and development teams (path coefficient = 0.428). 2) Improving team motivation, providing managerial support, ensuring resource availability, and increasing work autonomy can contribute to a better organizational climate for innovation. 3) Organizations should introduce innovation reward programs, empower employees with greater decision-making autonomy, optimize resource allocation, and encourage supportive leadership behaviors.

The Influence of Transformational Leadership on Organizational Creative Climate and Knowledge Sharing: 1) Transformational leadership has a strong positive impact on organizational creative climate (path coefficient = 0.534) and knowledge sharing (path coefficient = 0.574). 2) Transformational leaders should act as moral role models, enhance their charisma, provide a clear vision, and offer individualized consideration to foster knowledge sharing and an innovative climate. 3) Specific recommendations include: Leaders should serve as ethical role models and exhibit integrity in their actions; They should inspire employees through a compelling vision that encourages innovative thinking; Implementing personalized coaching and mentoring programs to enhance employees' sense of belonging and creativity.

Strengthening the Impact of Transformational Leadership to Drive Innovation: 1) Transformational leadership directly influences the innovative performance of research and development teams (path coefficient = 0.203). 2) Organizations should invest in leadership development programs to enhance transformational leaders' ability to support innovation. 3) This can be achieved through leadership training, innovation management courses, and cross-departmental collaboration initiatives.

Building a Multi-Dimensional Knowledge Sharing Capability: 1) Knowledge contribution (path coefficient = 0.797), knowledge collection (path coefficient = 0.778), shared willingness (path coefficient = 0.687), and shared competence (path coefficient = 0.660) significantly contribute to knowledge sharing. 2) Organizations

should encourage employees to actively share expertise and improve knowledge collection mechanisms by implementing knowledge management systems and cross-functional learning activities. 3) By enhancing employees' willingness and competence to share knowledge, organizations can establish a sustainable knowledge-sharing ecosystem that supports long-term innovation development.

Optimizing Multiple Dimensions of Innovative Performance to Strengthen Overall Competitiveness: 1) The innovative performance of research and development teams consists of innovation efficiency (path coefficient = 0.718), innovation effectiveness (path coefficient = 0.749), innovation process (path coefficient = 0.681), and innovation outcomes (path coefficient = 0.841). 2) Organizations should enhance innovation efficiency and innovation outcomes while optimizing innovation processes to ensure sustainable and high-performance innovation. 3) Adopting agile innovation management, streamlining R&D processes, and increasing cross-department collaboration will contribute to overall innovation quality improvement.

By reinforcing these interrelated factors, organizations can maximize the impact of Transformational Leadership and create a sustainable innovation ecosystem in their R&D teams.

2. Future Researches

While this study provides key insights into the relationship between Transformational Leadership, Organizational Creative Climate, Knowledge Sharing, and Innovative Performance of R&D Teams, there are several areas that require further exploration: 1) Investigating Additional Mediators: Future studies could explore factors such as psychological safety, team collaboration, and digital transformation adoption as additional mediators that strengthen the leadership-innovation link. 2) Examining Industry-Specific Variations: The automotive industry provides a unique context, and further research is needed to examine whether these findings hold in other technology-intensive sectors such as biotechnology, aerospace, and artificial intelligence. 3) Exploring the Impact of Emerging Technologies: The role of AI, big data analytics, and cloud-based knowledge-sharing platforms in shaping

innovation performance should be further analyzed. 4) Cross-Cultural Comparisons: Since leadership behaviors and organizational climates vary across cultures, future research should explore how different cultural contexts influence the effectiveness of Transformational Leadership in fostering innovation.

These directions will provide a more comprehensive understanding of how leadership and organizational mechanisms drive innovation performance in dynamic and technology-driven industries.

References

- Abbas, M., & Ali, R. (2023). Transformational versus transactional leadership styles and project success: A meta-analytic review. *European Management Journal*, (1).
- Abdul Nazer Shah, A. N. S., Saif, N., Muhammad Tahir Khan, M. T. K., & Irfan Ullah Khan, I. U. K. (2022). Demographics impact on management capabilities through the lens of transactional and transformational leadership. *International Journal of Services and Operations Management*, (3).
- Abidi, O., Dženopoljac, V., & Safi, M. (2023). Online meeting tools, tacit knowledge sharing and entrepreneurial behaviours among knowledge workers during COVID-19. *Knowledge Management Research & Practice*, (6).
- Abou-Shouk, M., Zoair, N., Aburumman, A., & Abdel-Jalil, M. (2022). The effect of personality traits and knowledge-sharing on employees' innovative performance: A comparative study of Egypt and Jordan. *Tourism Management Perspectives*.
- Adeel, L., Zhang, Q., Kaur, P., Papa, A., & Dhir, A. (2023). Untangling the role of power in knowledge sharing and job performance: the mediating role of discrete emotions. *Journal of Knowledge Management*, (4).
- Afandy, D., Gunawan, A., Stoffers, J., Kornarius, Y. P., & Angela, C. (2022). Improving Knowledge-Sharing Intentions: A Study in Indonesian Service Industries. *Sustainability*, (14).
- Aichroth, L. S., Nuszbaum, M., & CampoyGómez, L. (2022). Do You Feel It? The Relationship Between the Perceived Team Climate for Innovations and the Experience of Flow and Worry. *International Journal of Innovation and Technology Management*, (06).
- Al Busaidi, A. K., & Al Mawali, H. (2021). Knowledge Sharing Through Enterprise Social Media in a Telecommunications Context. *International Journal of Knowledge Management (IJKM)*, (1).

- Al Hawamdeh, N., & AL-edenat, M. (2024). Investigating the moderating effect of humble leadership behaviour on motivational factors and knowledge-sharing intentions: evidence from Jordanian public organisations. *VINE Journal of Information and Knowledge Management Systems*, (2).
- Alegbeleye, I. D., & Kaufman, E. K. (2022). How Team Members' Transformational Leadership and Effective Followership Work During Team Interactions. *Journal of Leadership Studies*, (2).
- AlQudah, N. F., Mathani, B., Aldiabat, K., Alshakary, K., & Alqudah, H. M. (2022). Knowledge sharing and self-efficacy role in growing managers' innovation: Does job satisfaction matter?. *Human Systems Management*, (6).
- Andreeva, T., Kabalina, V., & MuratbekovaTouren, M. (2022). Mind the gap: Intended versus perceived human resource practices and knowledge sharing of line managers and employees. *European Management Review*, (3).
- ARIFIN, N., TIAHJONO, H. K., HARTONO, A., & MUAFI, M. (2021). The Antecedent of Employee Engagement and Its Effect on Innovative Behavior: A Religiosity-Based Social Exchange Theory (SET) Perspective. *Journal of Asian Finance, Economics and Business*, (7).
- Arshad, M., Chen Kun Yu, C. K. Y., Qadir, A., Ahmad, W., & Xie, C. (2021). The moderating role of knowledge sharing and mediating role of employee creative self-efficacy on the association of empowering leadership and employee creativity. *International Journal of Management Practice*, (6).
- Avolio, B. J., Fong, T. K. H., Lord, R. G., Hannah, S. T., Schaubroeck, J. M., & Kozlowski, S. W. J. (2022). How leader and follower prototypical and antitypical attributes influence ratings of transformational leadership in an extreme context. *Human Relations*, (3).
- Ba, L. P. (2024). Applying knowledge-based human resource management to drive innovation: the roles of knowledge sharing and competitive intensity. *Management Research Review*, (4).
- Bae, H. S., Grant, D. B., Banomyong, R., & Varadejsatitwong, P. (2023). Investigating the impact of the strength of supply chain integration on cost and

- responsiveness. *International Journal of Logistics Research and Applications*, (1).
- Bakri, A. S., Saidan, K. S., & Abd Shukor, A. S. (2022). A Cross-case Analysis on the Barriers to Knowledge Sharing Practices in Construction Joint Ventures. *IOP Conference Series: Earth and Environmental Science*, (1).
- Bala, A., & Mehta, M. (2023). The accomplishment of organisation agility through transformational leadership and organisation citizenship behaviour. *World Review of Entrepreneurship, Management and Sustainable Development*, (3-4-5).
- Blythe, S. (2021). An Assessment of Transformational Leadership Theory against a University EAP Pre-session Course. *Polish Journal of Educational Studies*, (1).
- Buonomo, I., Piccinini, M., Benevene, P., Blasutig, G., & Cervai, S. (2022). Job training satisfaction and knowledge sharing in IT company: a case study. *Journal of Workplace Learning*, (8).
- Cao, T. T., Ba, L. P., & Minh, N. N. T. (2022). Impacts of high-involvement HRM practices on organizational innovation capability: the mediating mechanism of tacit and explicit knowledge sharing. *International Journal of Innovation Science*, (5).
- Chatterjee, S., Chaudhuri, R., Mariani, M., & Fosso Wamba, S. (2023). Examining the role of intellectual capital on knowledge sharing in digital platform-based MNEs and its impact on firm performance. *Technological Forecasting & Social Change*.
- Chatterjee, S., Chaudhuri, R., & Vrontis, D. (2022). Knowledge sharing in international markets for product and process innovation: moderating role of firm's absorptive capacity. *International Marketing Review*, (3).
- Chau Thao Hong Phuong, T. Y. T., & Le Truc Dinh, T. (2022). How does transformational leadership influence on the performance of public service organizations in a developing country? The interventional roles of NPM cultural orientations. *Cogent Business & Management*, (1).

- Chen, M., Mi, X., Xue, J., Li, Y., & Shi, J. (2023). The impact of entrepreneurial team psychological capital on innovation performance: The mediating role of knowledge sharing and knowledge hiding. *Frontiers in Psychology*.
- Chen, S. C., & Shao, J. (2022). Feminine traits improve transformational leadership advantage: investigation of leaders' gender traits, sex and their joint impacts on employee contextual performance. *Gender in Management: An International Journal*, (5).
- Chi, X., Meng, B., Lee, H., Chua, B., & Han, H. (2023). Pro - environmental employees and sustainable hospitality and tourism businesses: Exploring strategic reasons and global motives for green behaviors. *Business Strategy and the Environment*, (7).
- Chitra, D. N. (2024). Paradoxical leadership and employee creativity: knowledge sharing and hiding as mediators. *Journal of Knowledge Management*, (2).
- Coleman, R. A., & Donoher, W. J. (2022). Looking Beyond the Dyad: How Transformational Leadership Affects Leader-Member Exchange Quality and Outcomes. *Journal of Leadership Studies*, (4).
- Duan, Y. (2019). Research on the Impacts of Humble Leadership on R&D Team Innovation Performance based on the Social Information Processing Perspective. In (Eds.) *Proceedings of the 1st International Symposium on Economic Development and Management Innovation (EDMI 2019)* (pp.). Atlantis Press.
- Duan, J., Ren, X., Liu, Z., & Riggio, R. E. (2022). Connecting the dots: How parental and current socioeconomic status shape individuals' transformational leadership. *Journal of Business Research*.
- Eaton, L., Bridgman, T., & Cummings, S. (2024). Advancing the democratization of work: A new intellectual history of transformational leadership theory. *Leadership*, (3).
- Eitan, T., & Gazit, T. (2024). Explaining transformational leadership in the digital age: The example of Facebook group leaders. *Technology in Society*.

- Elarco, O. M. (2024). For whom the bell (really) tolls: A grounded theory of millennial academic supervisors' sensemaking of communitarian values as a springboard to enrich their transformational leadership attributes. *International Journal of Leadership in Education*, (2).
- English, F. W., & Ehrich, L. C. (2024). El Cid: Can an Aesthetics Lens Save Transformational Leadership from Itself?. *Education Sciences*, (6).
- Enwereuzor, I. K., Ugwu, L. E., & Ugwu, L. I. (2023). Unlocking the mask: how respectful engagement enhances tacit knowledge sharing among organizational members. *International Journal of Manpower*, (1).
- Eslami, M. H., Achtenhagen, L., Bertsch, C. T., & Lehmann, A. (2023). Knowledge-sharing across supply chain actors in adopting Industry 4.0 technologies: An exploratory case study within the automotive industry. *Technological Forecasting & Social Change (PA)*.
- Fakhri, M. B., Zhao, J., Yang, C., You, Y., & Mahmoud, A. A. Z. Y. (2022). The impact of self-directed team on high-performance organization with the mediating role of knowledge sharing culture: Organizational support as a moderator. *Frontiers in Psychology*.
- Farooq, R., & Tripathi, N. (2024). Moderating role of power distance in the relationship between leader-leader exchange (LLX) and knowledge sharing: is feedback-seeking behavior a missing link?. *VINE Journal of Information and Knowledge Management Systems*, (1).
- Fattah, J., Yesiltas, M., & Atan, T. (2022). The Impact of Knowledge Sharing and Participative Decision-Making on Employee Turnover Intention: The Mediating Role of Perceived Organizational Support. *SAGE Open*, (4).
- Feser, D. (2022). Innovation intermediaries revised: a systematic literature review on innovation intermediaries' role for knowledge sharing. *Review of Managerial Science*, (5).
- Fullchis, N., Batilmurik, R. W., Fury, P. A., & Parlindungan, F. J. (2022). The relationship between transformational leadership and work engagement. *Moderated*

- mediation roles of psychological ownership and belief in just world. *Organization Management Journal*, (2).
- Gautam, V. (2023). Determinants of Knowledge Sharing Intentions among Academics: Evidence from an Emerging Economy. *Journal of Information & Knowledge Management*, (05).
- Geibel, H. V., Rigotti, T., & Otto, K. (2022). It all comes back to health: A three - wave cross - lagged study of leaders' well - being, team performance, and transformational leadership. *Journal of Applied Social Psychology*, (7).
- Getachew, K. A., & Teklu, T. G. (2022). Corporate entrepreneurship, employee engagement and innovation: a resource-based view and a social exchange theory perspective. *International Journal of Organizational Analysis*, (6).
- Ghasemaghaei, M. (2023). Does Knowledge Sharing Belief of Data Analysts Impact Their Behavior?. *Journal of Computer Information Systems*, (2).
- Göhler, G. F., Hattke, J., & Göbel, M. (2023). The mediating role of prosocial motivation in the context of knowledge sharing and self-determination theory. *Journal of Knowledge Management*, (3).
- Gonzalez, D., Carrard, N., Chhetri, A., Somphongbouthakanh, P., Choden, T., Halcrow, G., & Willetts, J. (2022). Qualities of transformative leaders in WASH: A study of gender-transformative leadership during the COVID-19 pandemic. *Frontiers in Water*.
- Gooderham, P. N., Pedersen, T., Sandvik, A. M., Dasí, À., Elter, F., & Hildrum, J. (2022). Contextualizing AMO Explanations of Knowledge Sharing in MNEs: The Role of Organizational and National Culture. *Management International Review*, (6).
- Goswami, A. K., & Agrawal, R. K. (2023). It's a knowledge centric world! Does ethical leadership promote knowledge sharing and knowledge creation? Psychological capital as mediator and shared goals as moderator. *Journal of Knowledge Management*, (3).

- Grobler, S., & Grobler, A. (2023). Measurement of transformational leadership in South Africa: Assessed from an etic perspective. *SA Journal of Industrial Psychology*, (0).
- Guo, J., & Ahn, B. (2023). Tacit Knowledge Sharing for Enhancing the Sustainability of Intangible Cultural Heritage (ICH) Crafts: A Perspective from Artisans and Academics under Craft-Design Collaboration. *Sustainability*, (20).
- Guo, J. (2022). The significance of green entrepreneurial self-efficacy: Mediating and moderating role of green innovation and green knowledge sharing culture. *Frontiers in Psychology*.
- Gutu, I., Agheorghiesei, D. T., & Alecu, I. C. (2022). The Online Adapted Transformational Leadership and Workforce Innovation within the Software Development Industry. *Sustainability*, (12).
- Han, G., Ma, X., Wang, Y., & Li, Z. (2024). The Impact of Overtime Behavior and Knowledge Sharing on the Innovative Behavior of Knowledge Workers. *Academic Journal of Business & Management*, (2).
- Han, S. H., Seo, G., Yoon, S. W., & Yoon, D.-Y. (2024). Transformational Leadership and Knowledge Sharing: Mediating Roles of Employee's Empowerment, Commitment, and Citizenship Behaviors. *Journal of Workplace Learning*.
- Haniruzila, H., Abd Halim, N., Vafaei-Zadeh, A., & Nawaser, K. (2022). Effect of intellectual capital and entrepreneurial orientation on innovation performance of manufacturing SMEs: mediating role of knowledge sharing. *Journal of Intellectual Capital*, (6).
- Hans, S., Nayeem, A. M., Mikkilineni, S., & Gupta, R. (2023). Exploring the relationship between generational diversity and knowledge sharing: the moderating role of workplace intergenerational climate, boundary-spanning leadership and respect. *Employee Relations: The International Journal*, (6).
- Harper, J. (2022). Innovative knowledge-sharing tools elevate the modern workplace. *KM World*, (4).

- Hassandoust, F., Subasinghage, M., & Johnston, A. C. (2022). A neo-institutional perspective on the establishment of information security knowledge sharing practices. *Information & Management*, (1).
- Hastings, B. J., & Schwarz, G. M. (2022). Mindsets for Change Leaders: Exploring Priming Approaches for Leadership Development. *Journal of Change Management*, (2).
- HOANG, T. N., & TRUONG, C. B. (2021). The Relationship between Social Capital, Knowledge Sharing and Enterprise Performance: Evidence from Vietnam. *The Journal of Asian Finance, Economics and Business (JAFEB)*, (11).
- Huang, H., Qin, C., & Deng, Y. (2023). The Driving Mechanism of Enterprise Marketing Personnel's Job Performance. *Academic Journal of Humanities & Social Sciences*, (25).
- Huang, H., Qin, C., & Deng, Y. (2023). The Effect of Total Rewards on Job Performance. *Academic Journal of Business & Management*, (27).
- Huo, B., Liu, X., & Li, S. (2023). The impact of justice on information sharing and innovation performance: a social exchange theory perspective. *Journal of Business & Industrial Marketing*, (11).
- Iftikhar, R., & Lions, C. (2022). Interorganizational knowledge sharing barriers and enablers: the case of Peshawar Bus Rapid Transit project. *International Journal of Managing Projects in Business*, (5).
- Imamoglu, S. Z., Erat, S., & Turkcan, H. (2023). How organizational identity relates to knowledge sharing and creativity: moderating effect of perceived organizational support. *Kybernetes*, (10).
- Ishfaq, A., Islam, T., & Umar, A. (2023). Bridging organisational and individual green actions through green knowledge sharing & individual values. *Knowledge Management Research & Practice*, (6).
- Islam, T., Zahra, I., Rehman, S. U., & Jamil, S. (2024). How knowledge sharing encourages innovative work behavior through occupational self-efficacy? The moderating role of entrepreneurial leadership. *Global Knowledge, Memory and Communication*, (1-2).

- Islam, T., & Momina, A. (2024). Enhancing employees' creativity through entrepreneurial leadership: can knowledge sharing and creative self-efficacy matter?. *VINE Journal of Information and Knowledge Management Systems*, (1).
- Jaiswal, N. K., & Dhar, R. L. (2024). Transformational leadership, innovation climate, creative self-efficacy and employee creativity: A multilevel study. *Journal of Organizational Behavior*.
- Jang, H. W., Jung, H. S., & Cho, M. (2024). Blockchain adoption in the food and beverage industry from a behavioral reasoning perspective: moderating roles of supply chain partnerships. *Journal of Hospitality and Tourism Technology*, (1).
- Jang, S., Bae, J., & Kim, K. H. (2022). The effect of B2B service experience on repurchase intention: Focus on roles of organizational agility and customer knowledge sharing. *Journal of Global Scholars of Marketing Science*, (4).
- Jette, D. U., Nordstrom, T. M., Gresham, B., Peel, C., Majsak, M. J., & Mohr, T. (2022). A Transformative Leadership Journey: Experiences of Graduates of the American Physical Therapy Association Fellowship in Education Leadership. *Journal of Physical Therapy Education*, (1).
- Jin, X., Zhang, M., Sun, G., & Eriksson, T. (2024). Influence of social capital of innovation network on innovation - the moderating effect of knowledge sharing and knowledge diffusion. *International Journal of Technology Management*, (1).
- Jung, D., Chow, C., & Wu, A. (2024). The role of transformational leadership in enhancing organizational innovation: Hypotheses and some preliminary findings. *Elsevier*.
- Kalra, A., Lee, N. Y., & Dugan, R. (2024). Exploring antecedents and outcomes of salesperson change agility: a social exchange theory perspective. *Journal of Marketing Theory and Practice*, (3).

- Kayani, M. B., Shafique, K., & Ali, M. (2023). How does leadership bring individual creativity? A mediation and moderation analysis. *International Journal of Work Innovation*, (4).
- Khan, K., Shams, M. S., Khan, Q., Akbar, S., & Niazi, M. M. (2022). Relationship Among Green Human Resource Management, Green Knowledge Sharing, Green Commitment, and Green Behavior: A Moderated Mediation Model. *Frontiers in Psychology*.
- Khraishi, A., Paulraj, A., Huq, F., & Seepana, C. (2023). Knowledge management in offshoring innovation by SMEs: role of internal knowledge creation capability, absorptive capacity and formal knowledge-sharing routines. *Supply Chain Management: An International Journal*, (2).
- Kilroy, J., Dundon, T., & Townsend, K. (2022). Embedding reciprocity in human resource management: A social exchange theory of the role of frontline managers. *Human Resource Management Journal*, (2).
- Kim, M., & Kim, S. L. (2023). Employee goal orientation and knowledge sharing: the moderating effect of leader boundary spanning behavior. *Leadership & Organization Development Journal*, (7).
- Kim, H. D., & Cruz, A. B. (2022). Transformational Leadership and Psychological Well-Being of Service-Oriented Staff: Hybrid Data Synthesis Technique. *International Journal of Environmental Research and Public Health*, (13).
- Kumalasari Devi, R., Yulfitri, A., Hidayat, D. S., & Senses, D. I. (2024). Determinants of knowledge sharing among civil servants and the moderating effects of leadership styles. *Business Information Review*, (1).
- Labrague, L. J. (2024). Determinants of Nurse Managers' Transformational Leadership: The Role of Individual Unit and Organizational Characteristics. *The Journal of nursing administration*, (5).
- Lagowska, U., Sobral, F., & Tavares, G. (2022). Joint effects of shared and transformational leadership on performance in street - level bureaucracies: Evidence from the educational sector. *Public Administration Review*, (6).

- Lajoie, D., Rousseau, V., & Boudrias, J. S. (2022). Leader Extraversion as a Boundary Condition in the Relationship between Transformational Leadership, Vitality, and Job Improvement. *The Spanish Journal of Psychology*.
- Lan, N. N. (2024). Tacit knowledge sharing within project teams: an application of social commitments theory. *VINE Journal of Information and Knowledge Management Systems*, (1).
- LaRocca, M. A., & Groves, K. S. (2022). Transformational Leadership in Extreme Contexts: Associations with Posttraumatic Growth and Self-Efficacy Among Combat Veterans. *Armed Forces & Society*, (4).
- Lauritzen, H. H., Grøn, C. H., & Kjeldsen, A. M. (2022). Leadership Matters, But So Do Co-Workers: A Study of the Relative Importance of Transformational Leadership and Team Relations for Employee Outcomes and User Satisfaction. *Review of Public Personnel Administration*, (4).
- Lee, S., Byun, G., & Kim, S. (2021). Effects of Coworkers' Helping Behavior on Employees' Knowledge Sharing and Creativity: The Moderating Role of Interactional Justice. *International Journal of Environmental Research and Public Health*, (24).
- Lester, P. B., Harms, P. D., & DeSimone, J. A. (2024). Taken to the extreme: Transformational leadership, psychological capital, and follower health outcomes in extreme contexts. *Military psychology: the official journal of the Division of Military Psychology, American Psychological Association*, (2).
- Lifuka, R. L., & Haricharan, S. J. (2024). President Mwanawasa's transition to transformational leadership in combating political corruption in Zambia. *SA Journal of Industrial Psychology*, (0).
- Lim, J. Y., & Moon, K. K. (2022). Transformational leadership and employees' helping and innovative behaviors: contextual influences of organizational justice. *International Journal of Manpower*, (4).
- Lina, Sholihin, M., Sugiri, S., & Handayani, W. (2022). The Effect of Formal Performance Evaluation and Intrinsic Religiosity on Trust. *Cogent Business & Management*, (1).

- Lisá, E., & Greškovičová, K. (2022). Is it worth being attached to the leader? Transformational leadership and various types of performance: The mediating role of leader as attachment figure. *Current Psychology*, (32).
- Liu, W. S. K. (2024). The Decision Behaviour Evaluation of Interrelationships among Personality, Transformational Leadership, Leadership Self-Efficacy, and Commitment for E-Commerce Administrative Managers. *Economics*, (1).
- Liu, S., Zhu, S., Hou, Z., & Zhu, S. (2024). Unravelling the dynamics of knowledge sharing in the tourism tips community: based on a cognitive-motivation-behaviour model. *Current Issues in Tourism*, (6).
- Liu, Z., Ozer, M., & Zhou, K. (2023). The role of status diversity in the innovative performance of R&D teams. *R&D Management*, (1).
- López-Lemus, J. A., & De la Garza Carranza, M. T. (2024). The impact of transformational leadership on challenging influence strategies: an approach using structural equation models. *International Journal of Organizational Analysis*, (1).
- Magni, D., Chierici, R., Fait, M., & Lefebvre, K. (2022). A network model approach to enhance knowledge sharing for internationalization readiness of SMEs. *International Marketing Review*, (3).
- Mai, N. (2023). Stay Together to be Strong: How Online Knowledge Sharing Matters. *Australasian Marketing Journal*, (4).
- Mai, N. (2023). I see myself in my leader: transformational leadership and its impact on employees' technology-mediated knowledge sharing in professional service firms. *Journal of Service Theory and Practice*, (2).
- Malhotra, N., & Aggarwal, R. (2022). A Review Based Study on Transformational Leadership and Its Future Prospects. *Electrochemical Society Transactions*, (1).
- Marcel, F. L. G., Supangkat, S. H., & Ranti, B. (2024). Toward Digital Transformation Adoption: A Conceptual Framework from Transformational Leadership Perspective. *Procedia Computer Science*.

- McLeod, J., Jenkin, A., Walters, G., & Irving, R. (2021). The role and performance of supporter directors: A social exchange theory perspective. *Sport Management Review*, (5).
- Meira, J. V. d. S., & Hancer, M. (2021). Using the social exchange theory to explore the employee-organization relationship in the hospitality industry. *International Journal of Contemporary Hospitality Management*, (2).
- Michaud, K., Barbeau Julien, K., & Slinger, M. (2024). Transformational leadership, well-being, morale, and readiness: The mediating role of empowerment. *Military psychology: the official journal of the Division of Military Psychology, American Psychological Association*.
- Mobarak, A. M. A., Dakrory, M. I., Elsotouhy, M. M., Ghonim, M. A., & Khashan, M. A. (2024). Drivers of Mobile Payment Services Adoption: A Behavioral Reasoning Theory Perspective. *International Journal of Human–Computer Interaction*, (7).
- Morf, M., & Bakker, A. B. (2024). Ups and downs in transformational leadership: A weekly diary study. *European Management Journal*, (2).
- Müller, S. D., Konzag, H., Nielsen, J. A., & Sandholt, H. B. (2024). Digital transformation leadership competencies: A contingency approach. *International Journal of Information Management*.
- Mustapha, C. A., Roy, C. M., & Roy, J. M. (2024). Fostering Competency Development Through Knowledge Sharing Capabilities in Onboarding. *International Journal of Knowledge Management (IJKM)*, (1).
- Muzafary, S. S., Wahdat, M. N., Hussain, M., Mdletshe, B., Tilwani, S. A., & Khattak, R. (2021). Intrinsic Rewards for Creativity and Employee Creativity to the Mediation Role of Knowledge Sharing and Intrinsic Motivation. *Education Research International*.
- Muzondiwa, Y. T., Swarts, I., & Schultz, C. M. (2022). The relationship between transformational leadership, perceived organisational effectiveness and organisational culture in a selected multinational corporation in Africa. *SA Journal of Human Resource Management*, (0).

- Naman, S., Chatterjee, S., Bhardwaj, S., & Chitnis, A. (2022). Reasons and intuitions: extending behavioural reasoning theory to determine green purchase behavior. *International Review on Public and Nonprofit Marketing*, (2).
- Naman, S., Dhir, A., Talwar, S., Tan, T. M., & Alharbi, F. (2021). Behavioral reasoning perspectives to brand love toward natural products: Moderating role of environmental concern and household size. *Journal of Retailing and Consumer Services*.
- Ng, K. Y. N. (2023). Effects of servant leadership, affective commitment, and trust on knowledge sharing tendency in the financial industry. *Knowledge Management Research & Practice*, (6).
- Ng, K. Y. N. (2023). Effects of organizational culture, affective commitment and trust on knowledge-sharing tendency. *Journal of Knowledge Management*, (4).
- Nguyen, M., Sharma, P., & Malik, A. (2024). Leadership styles and employee creativity: the interactive impact of online knowledge sharing and organizational innovation. *Journal of Knowledge Management*, (3).
- Nguyen, M., Rundle-Thiele, S., Malik, A., & Budhwar, P. (2023). Impact of technology-based knowledge sharing on employee outcomes: moderation effects of training, support and leadership. *Journal of Knowledge Management*, (8).
- Nguyen Tuyet Mai, N. T. M., & Prentice, C. (2022). Reverse relationship between reward, knowledge sharing and performance. *Knowledge Management Research & Practice*, (4).
- Nguyen Tuyet Mai, N. T. M., & Fry, M. L. (2022). Online knowledge sharing capability of young employees: An empirical study. *Journal of Global Scholars of Marketing Science*, (3).
- Nguyen Tuyet Mai, N. T. M., & Malik, A. (2022). Impact of knowledge sharing on employees' service quality: the moderating role of artificial intelligence. *International Marketing Review*, (3).
- Paolone, F., Pozzoli, M., Chhabra, M., & Di Vaio, A. (2024). Cultural and gender diversity for ESG performance towards knowledge sharing: empirical evidence from European banks. *Journal of Knowledge Management*, (11).

- Park, S. (2024). Transformational Leadership, Knowledge Sharing, Organizational Climate, and Learning: An Empirical Study. *Leadership & Organization Development Journal*.
- Pham, T. M. L., Pham, T. T., Le, D. T., Chau Ngoc Phuong, N., Nguyen Doan Phi, G., & To Mong, N. (2023). Online knowledge sharing and creativity in the context of working from home during the COVID-19 pandemic. *VINE Journal of Information and Knowledge Management Systems*, (2).
- Phong Ba, L. (2024). Research on the Relationship Between Transformational Leadership and Knowledge Sharing: The Mediating Roles of Justice and Trust.
- Pillai, R., Ghanghorkar, Y., Sivathanu, B., Algharabat, R., & Rana, N. P. (2024). Adoption of artificial intelligence (AI) based employee experience (EEX) chatbots. *Information Technology & People*, (1).
- Pinghao, Y., Liqiong, L., & Joseph, T. (2022). Creative leadership, innovation climate and innovation behaviour: the moderating role of knowledge sharing in management. *European Journal of Innovation Management*, (4).
- Puni, A., Hilton, S. K., Ibrahim, M., & Korankye, E. S. (2022). The mediating role of innovative climate on the relationship between transformational leadership and firm performance in developing countries: the case of Ghana. *Leadership & Organization Development Journal*, (3).
- Putra, H. M., Suhariadi, F., Wijoyo, S., Ma'mun, S., Aldhi, I. F., & Hardaningtyas, D. (2024). Crisis and Organizational Sustainability: Empirical Analysis of the Implication of Transformational Leadership on the Decision to Stay Mediated by the Commitment of the Democratic Party in Indonesia. *Social Sciences*, (6).
- Qu, X., Khan, A., & Ali, S. (2022). Now or never: Organizational forgetting as a determinant of knowledge sharing and cross-boundary innovation. *Frontiers in Psychology*.
- Raflinor, Budiyanto, & Agustedi. (2023). The Influence of Transformational Leadership in Moderating the Performance of High School Lecturers Health Sciences (STIKES) in Riau Province. *Journal of Business and Management Studies*, (6).

- Rasheed, H. M. W., Chen, Y., Khizar, H. M. U., & Safeer, A. A. (2023). Understanding the factors affecting AI services adoption in hospitality: The role of behavioral reasons and emotional intelligence. *Heliyon*, (6).
- Rawa, H. (2023). The moderating effect of knowledge-sharing on learning organisation and quality improvement practices. *Business Process Management Journal*, (6).
- Rezaei, M., Giovando, G., Rezaei, S., & Sadraei, R. (2022). What are the fundamental knowledge-sharing drivers of small family businesses in the restaurant and fast-food industry?. *British Food Journal*, (7).
- Roth, P. (2022). Why serendipitous informal knowledge sharing interactions are key to boundary spanning and creativity. *Work* (Reading, Mass.), (4).
- Saglam Yesim, C., Yildiz Çankaya, S., Golgeci, I., Sezen, B., & Zaim, S. (2022). The role of communication quality, relational commitment, and reciprocity in building supply chain resilience: A social exchange theory perspective. *Transportation Research Part E*.
- Sahu, A. K., Padhy, R. K., & Dhir, A. (2022). Determinants and barriers of implementing lean manufacturing practices in MSMEs: a behavioural reasoning theory perspective. *Production Planning & Control*, (12).
- Sayyadi, M. (2022). Developing Transformational Leadership Skills to Impact Organizational Performance in the Post-Pandemic Era. *Management Consulting Journal*, (2).
- Scuotto, V., Nespoli, C., Tran Phuong Tra, T. P. T., & Cappiello, G. (2022). An alternative way to predict knowledge hiding: The lens of transformational leadership. *Journal of Business Research*.
- SERVAJEANHILST, R., & SUURMOND, R. (2024). PURCHASING TEAM INNOVATION CLIMATES AS ANTECEDENTS OF PURCHASING INVOLVEMENT IN OPEN INNOVATION. *International Journal of Innovation Management*, (09-10).
- Sethibe, T., & Steyn, R. (2023). The Mediating Effect of Organizational Climate on the Relationship between Leadership Styles and Their Components on

- Innovative Behaviour. *Journal of Entrepreneurship & Innovation in Emerging Economies*.
- Shahab, A., Shahzad, F., Hussain, I., Pu, Y., Khan, M. M., & Iqbal, Z. (2022). The Outcomes of Organizational Cronyism: A Social Exchange Theory Perspective. *Frontiers in Psychology*.
- Shaikh, F., Gul, A., & Channa, K. A. (2024). Organizational commitment to sustainability: considering the role of leadership, green HRM and green knowledge sharing. *Journal of Organizational Change Management*, (2).
- Sharif, S., Tongkachok, K., Akbar, M., Iqbal, K., & Lodhi, R. N. (2024). Transformational leadership and innovative work behavior in three-star hotels: mediating role of leader-member exchange, knowledge sharing and voice behavior. *VINE Journal of Information and Knowledge Management Systems*, (1).
- Shi, S., & Zhou, M. (2022). Servant leadership, transformational leadership, and customer satisfaction: An implicit leadership theories perspective. *Business Ethics, the Environment & Responsibility*, (1).
- Shuck, B., Kim, W., & Chai, D. S. (2021). The Chicken and Egg Conundrum: Job Satisfaction or Employee Engagement and Implications for Human Resources. *New Horizons in Adult Education and Human Resource Development*, (1).
- Singh, A. (2022). Work engagement, affective commitment, and career satisfaction: the mediating role of knowledge sharing in context of SIEs. *Benchmarking: An International Journal*, (10).
- Siswanto, & Yuliana Indah, Y. (2022). Linking transformational leadership with job satisfaction: the mediating roles of trust and team cohesiveness. *Journal of Management Development*, (2).
- Skar, A. M. S., Braathu, N., Peters, N., Bækkelund, H., Endsjø, M., Babaii, A., & Egeland, K. M. (2022). A stepped-wedge randomized trial investigating the effect of the Leadership and Organizational Change for Implementation (LOCI) intervention on implementation and transformational leadership, and implementation climate. *BMC Health Services Research*, (1).

- Song, L., Ma, Z., & Sun, J. (2022). The Influence of Technostress, Learning Goal Orientation, and Perceived Team Learning Climate on Intra-Team Knowledge Sharing and Innovative Practices Among ICT-Enabled Team Members. *Scientometrics*, (1).
- Srivastava, A., & Pinto, J. (2022). Dynamic linkages of empowering and transformational leadership with knowledge sharing in project teams. *Knowledge Management Research & Practice*, (4).
- Stellner, B. (2022). Influence of Parental Experience on Transformational Leadership Behaviour: A Test of Work–Family Enrichment of Male Managers from an Employee Perspective. *Organizacija*, (2).
- Sudibjo, N., & Prameswari, R. K. (2023). The Effects of Knowledge Sharing and Person-Organization Fit on the Relationship Between Transformational Leadership and Innovative Work Behavior. *Heliyon*, 7(6), e07334.
- Sun, Y. (2024). Digital transformation and corporates' green technology innovation performance–The mediating role of knowledge sharing. *Finance Research Letters* (PA).
- Sundaresan, S., & Zhang, Z. (2022). AI-enabled knowledge sharing and learning: redesigning roles and processes. *International Journal of Organizational Analysis*, (4).
- Sung, S. Y., Li, Y. X., & Choi, J. N. (2024). Upward social comparison toward proactive and reactive knowledge sharing: The roles of envy and goal orientations. *Journal of Business Research*.
- Syed Mustapha, S. M. F. D., Evangelista, E., & Marir, F. (2023). Towards Designing a Knowledge Sharing System for Higher Learning Institutions in the UAE Based on the Social Feature Framework. *Sustainability*, (22).
- Tabrizi Negar, M. (2023). Relational dimensions, motivation and knowledge-sharing in healthcare: a perspective from relational models theory. *International Review of Administrative Sciences*, (1).

- Tan, L., Ma, Z., Huang, J., & Guo, G. (2021). Peer abusive supervision and third-party employee creativity from a social exchange theory perspective. *Social Behavior and Personality*, (5).
- Tang, D. (2023). Transformational Leadership Theory in the Chinese Context: Relevance and Limitations. *International Journal of Frontiers in Sociology*, (6).
- Taylor, A. S. (2024). Transformational Leadership, Diversity, and Creativity at Work: A Moderated Mediation Model. Portland State University Working Paper.
- Tian, H., & Wang, A. (2023). Sustainable Leadership, Knowledge Sharing, and Frugal Innovation: The Moderating Role of Organizational creative climate. *SAGE Open*, (4).
- Tran, P. T. K. (2023). Organization justice, knowledge sharing and employees' innovative behavior: evidence from the knowledge-intensive industry. *Employee Relations: The International Journal*, (6).
- Tran, P. P. N. T., Gorton, M., & Lemke, F. (2022). Buyers' perspectives on improving performance and curtailing supplier opportunism in supplier development: A social exchange theory approach. *Industrial Marketing Management*.
- Trung, L. T., & Ba, L. P. (2023). High-involvement HRM practices stimulate incremental and radical innovation: The roles of knowledge sharing and market turbulence. *Journal of Open Innovation: Technology, Market, and Complexity*, (1).
- Truong, B. T. T., Nguyen, P. V., & Vrontis, D. (2024). Enhancing firm performance through innovation: the roles of intellectual capital, government support, knowledge sharing and knowledge management success. *Journal of Intellectual Capital*, (1).
- Tsen, M. K., Gu, M., Tan, C. M., & Goh, S. K. (2022). Does flexible work arrangements decrease or increase turnover intention? A comparison between the social exchange theory and border theory. *International Journal of Sociology and Social Policy*, (11-12).
- Udin, U., Dananjoyo, R., & Isalman, I. (2022). The Effect of Transactional Leadership on Innovative Work Behavior: Testing the Role of Knowledge Sharing and

- Work Engagement as Mediation Variables. *International Journal of Sustainable Development and Planning*, (3).
- Ul Haq, S., Khan, K. A., Hafeez, H., & Chughtai, M. A. (2023). Trust and knowledge sharing in project teams in construction industry of Pakistan: moderating role of perceived behavioral control. *Kybernetes*, (9).
- Vannarith, N. (2022). Effect of Transformational Leadership on Job Satisfaction, Innovative Behavior, and Work Performance: A Conceptual Review. *International Journal of Business and Management*, (12).
- Vătămănescu, E.-M., Mitan, A., Andrei, A. G., & Ghigiu, A. M. (2022). Linking coopetition benefits and innovative performance within small and medium-sized enterprises networks: a strategic approach on knowledge sharing and direct collaboration. *Kybernetes*, (7).
- Vinh, N. Q., Hien, L. M., & Hung, D. Q. (2022). The Relationship between Transformation Leadership, Job Satisfaction and Employee Motivation in the Tourism Industry. *Administrative Sciences*, (4).
- Virmani, N., Sharma, S., Kumar, A., & Luthra, S. (2023). Adoption of industry 4.0 evidence in emerging economy: Behavioral reasoning theory perspective. *Technological Forecasting & Social Change*.
- Wang, Q., & Shao, Z. (2024). Linking transformational leadership and digital creativity from the lens of social cognitive theory. *Industrial Management & Data Systems*, (6).
- Wang, C., Zhang, Y., & Feng, J. (2023). Is it fair? How and when exploitative leadership impacts employees' knowledge sharing. *Management Decision*, (11).
- Wang, Q., Zhao, T., Wang, Y., & Wang, Q. (2022). When does team cooperative climate lead to creative performance via knowledge sharing? A moderated mediation model. *Current Psychology*, (32).
- Wang, Q., Shi, R., Zhang, F., Wang, X., & Gao, Y. (2022). How organizational psychological ownership affects corporate green operations - Based on a social exchange theory perspective. *Frontiers in Psychology*.

- Wang, D., Zhang, Y., Liu, X., Chen, J., Zhang, X., & He, C. (2022). Can Inter-organizational Knowledge-Sharing Improve Enterprise Innovation Performance? The Mediator Effect of Innovation Capability and the Moderator Effect of Network Characteristics. *Frontiers in Communication*.
- Wang, Y., Yang, L., Russo, E., & Graziano, D. (2021). The Incentive Mechanism of Knowledge Sharing in Cross-Border Business Models Based on Digital Technologies. *Sustainability*, (22).
- Wei, X., Iqbal, Q., & Bai, S. (2022). Factors Affecting Employee's Retention: Integration of Situational Leadership With Social Exchange Theory. *Frontiers in Psychology*.
- Wei, X., Noor Hazlina, A., Iqbal, Q., & Bai, S. (2022). Responsible Leadership and Sustainable Development in East Asia Economic Group: Application of Social Exchange Theory. *Sustainability*, (10).
- Wen, Q., Guo, R., & Xia, J. (2020). Transformational leadership and collaborative innovation in cross-border teams - the mediating role of knowledge sharing and the moderating role of power distance. *Foreign Economics and Management*, 42(2), 17-30.
- Widianto, S., Harsanto, B., & Arviansyah, A. (2024). The link of universalism, transformational leadership, innovativeness, and leader effectiveness: a multivariate dataset. *Frontiers in Psychology*.
- Winarno, A., Prasetyo, A. P., Dudija, N., Pratami Ciptaresmi Nadya, P. C. N., & Liu, R. (2021). The impact of perceived organizational support on knowledge sharing: A mediation analysis through an SEM approach. *Journal of Eastern European and Central Asian Research (JEECAR)*, (4).
- Wu, T., Wang, Y., Ruan, R., & Zheng, J. (2022). Divergent effects of transformational leadership on safety compliance: A dual-path moderated mediation model. *PloS one*, (1).
- Wulandari, S. Z., & Indartono, S. (2021). The role of tacit knowledge sharing and critical adaptability in the dynamic effect of training quality on organisational

- performance: the model of Indonesian banking industry. *International Journal of Management and Enterprise Development*, (3).
- Xi, Z., Peng, Q., & Tian, W. (2022). Leader reward omission and employee knowledge sharing: the moderating role of proactive personality and perceived organizational unfairness. *Baltic Journal of Management*, (4).
- Xu, J., & Wei, W. (2023). A theoretical review on the role of knowledge sharing and intellectual capital in employees' innovative behaviors at work. *Heliyon*, (10).
- Xu, G., Shen, Y., Ji, S., & Xing, Q. (2021). Knowledge sharing of employees who are envied by their workmates: A resource perspective. *Social Behavior and Personality*, (12).
- Yang, M., & Li, Z. (2023). The influence of green human resource management on employees' green innovation behavior: The role of green organizational commitment and knowledge sharing. *Heliyon*, (11).
- Yang, Q., Li, S., Cui, H., & Qiao, J. (2023). How does supplier relationship management affect supplier innovation contribution? Interorganizational learning and social exchange theory integrated perspectives. *Industrial Marketing Management*.
- Yang, C., Tang, G., Jin, J., Xie, Q., & Ji, L. (2024). CEOs' Transformational Leadership and Product Innovation Performance: The Roles of Corporate Entrepreneurship and Technology Orientation. *Journal of Product Innovation Management*.
- YaoKai, L., BaoGuang, Z., & LiJie, A. (2023). Nurturing knowledge absorption in the organizations: examining the role of transformational leadership, learning climate, and proactive personality. *Current Psychology*, (17).
- Yasir, M., Abdul, M., Yousaf, Z., Nassani, A. A., & Haffar, M. (2023). An integrative framework of innovative work behavior for employees in SMEs linking knowledge sharing, functional flexibility and psychological empowerment. *European Journal of Innovation Management*, (2).

- Yeboah Moses, A. (2023). How do family and non-family ties affect knowledge sharing in SMEs in a developing country? Linking social capital and network strength. *Management Research Review*, (10).
- Yin, J., Qu, M., Li, M., & Liao, G. (2022). Team Leader's Conflict Management Style and Team Innovation Performance in Remote R&D Teams—With Team Climate Perspective. *Sustainability*, (17).
- Yuen, S. S. M., & Lam, H. Y. (2024). Enhancing Competitiveness through Strategic Knowledge Sharing as a Driver of Innovation Capability and Performance. *Sustainability*, (6).
- Yuwono, H., Gunawan, D. R., Eliyana, A., Anggraini, R. D., Herlambang, P., & Jalil, N. I. A. (2022). Transformational leaders' approach to overcapacity: A study in correctional institutions. *PloS one*, (11).
- Zhang, G., Zhang, X., & Wang, Y. (2024). Perceived insider status and employees' innovative behavior: the role of knowledge sharing and organizational creative climate. *European Journal of Innovation Management*, (2).
- Zhang, C., Li, S., Liu, X., & Wang, X. (2023). Transformational leadership and supply chain innovativeness: mediating role of knowledge sharing climate and moderating role of supply base rationalization. *Asia Pacific Journal of Marketing and Logistics*, (9).
- Zhao, G., & Luan, Y. (2022). Could transformational leadership predict employee voice behaviour? Evidence from a meta-analysis. *Journal of Psychology in Africa*, (2).
- Zhao, J., & Wu, C. (2021). RETRACTED ARTICLE: Cross-level impact of employees' knowledge management competence and team innovation atmosphere on innovation performance. *Annals of Operations Research (Suppl 1)*.
- Zhou, B., & Qin, Y. (2021). Research on the Relationship between Uncertainty Tolerance, Transformational Leadership and Organizational Creative Atmosphere. 2021 2nd Asia-Pacific Conference on Image Processing, Electronics and Computers, 291-296.

- Zhucui, J., Qiaozhen, H., Yi, Z., & Yingsi, Z. (2022). The Relationship between Female Leadership Traits and Employee Innovation Performance—The Mediating Role of Knowledge Sharing. *Sustainability*, (11).
- Zuo, C., Wongvanichtawee, C., & Chollathanrattanapong, J. (2024). The Effects of the Transformational Leadership Model on Teachers' Organizational Justice and Job Satisfaction in Private Universities in Shandong Province. *International Journal of Asian Business and Information Managem*

Appendices

Appendix A

List of Specialists and Letters of Specialists Invitation for IOC Verification

List of specialists

Name of Experts	Education Qualification	Position/Office	Expertise
Dr.Fang Ping	Doctor's degree	College of Management Guangxi University for Nationalities	Business Performance Evaluation, Agricultural Economic Theory and Policy
Dr.Qi Zhenjiang	Doctor's degree	Zhejiang University, School of Management	Performance management, human resources management
Dr.Bundit Phrapratanporn	Doctor's degree	A university professor with a reputation in statistics, measurement and research methodology.	Business Administration Research Related

Letters of specialists invitation for IOC verification



Seeking Clarification from Experts in Examining Research Instruments.

Dear experts,

This questionnaire for educational purposes for research studies student Doctor of Dr.Fang Ping Program (International Program) in the Faculty of Management Science at Bansomdejchaopraya Rajabhat University prepared by Zhu Aijun, Subject "Impact of Transformational Leadership on the Innovation Performance of Research and Development Teams in China". The questionnaire was designed for Impact of Transformational Leadership on the Innovation Performance of Research and Development Teams in China. The researcher asks for help from experts. Please check the questionnaires as follows.

+1 means that you are sure that the questions are consistent with the research objective.

0 means you are unsure whether the question is consistent with the research objective.

-1 means that you are certain that the questions are inconsistent with the research objective.

With the courtesy of your qualified, this makes this study a powerful research tool. This will be very useful for education. We would like to thank you very much for spending your valuable time reviewing the research instrument.

Expert (Name): Fang Ping

Department: College of Management Guangxi University for Nationalities

Inspection date: October 18th, 2024

Location: No. 188, University East Road, Xixiangtang District, Nanning City,
Guangxi. Postal Code: 530006.

Letters of specialists invitation for IOC verification



Seeking Clarification from Experts in Examining Research Instruments.

Dear experts,

This questionnaire for educational purposes for research studies student Doctor of Qi Zhenjiang Program (International Program) in the Faculty of Management Science at Bansomdejchaopraya Rajabhat University prepared by Zhu Aijun, Subject "Impact of Transformational Leadership on the Innovation Performance of Research and Development Teams in China". The questionnaire was designed for Impact of Transformational Leadership on the Innovation Performance of Research and Development Teams in China. The researcher asks for help from experts. Please check the questionnaires as follows.

+1 means that you are sure that the questions are consistent with the research objective.

0 means you are unsure whether the question is consistent with the research objective.

-1 means that you are certain that the questions are inconsistent with the research objective.

With the courtesy of your qualified, this makes this study a powerful research tool. This will be very useful for education. We would like to thank you very much for spending your valuable time reviewing the research instrument.

Expert (Name) : Qi Zhenjiang

Department : Zhejiang University, School of Management

Inspection date : October 18th, 2024

Location : No. 866, Yuhang Tang Road, Xihu District, Hangzhou City. Postal Code: 310000

Letters of specialists invitation for IOC verification



Seeking Clarification from Experts in Examining Research Instruments.

Dear experts,

This questionnaire for educational purposes for research studies student Doctor of Bundit Phrapratanporn Program (International Program) in the Faculty of Management Science at Bansomdejchaopraya Rajabhat University prepared by Zhu Aijun, Subject "Impact of Transformational Leadership on the Innovation Performance of Research and Development Teams in China". The questionnaire was designed for Impact of Transformational Leadership on the Innovation Performance of Research and Development Teams in China. The researcher asks for help from experts. Please check the questionnaires as follows.

+1 means that you are sure that the questions are consistent with the research objective.

0 means you are unsure whether the question is consistent with the research objective.

-1 means that you are certain that the questions are inconsistent with the research objective.

With the courtesy of your qualified, this makes this study a powerful research tool. This will be very useful for education. We would like to thank you very much for spending your valuable time reviewing the research instrument.

Expert (Name) : Bundit Phrapratanporn

Department : Suan Sunandha Rajabhat University

Inspection date : October 18th, 2024

Location : No. 1, U Thong Nok Road, Dusit District, Bangkok 1030

Appendix B
Official Letter



Ref.No. MHESI 0643.14/2583

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

4 September 2024

Subject: Invitation to validate research instrument

Dear Assoc.Prof.Dr.Fang Ping

Mr.Zhu Aijun is a graduate student in Doctor of Business Administration Program (International Program) of Bansomdejchaopraya Rajabhat University. He is undertaking research entitled "Impact of Transformational leadership on the Innovation Performance of Research and Development Teams in China"

The thesis advisory committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

With your expertise, we would like to ask your permission to validate the attached research instrument. In this regard, we would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Yours faithfully,

(Assistant Professor Dr.Tanaput Chanchaoren)
Vice Dean Acting for of Dean of Graduate School

Bansomdejchaopraya Rajabhat University
Tel.+662-473-7000
www.bsru.ac.th
E-mail: grad@bsru.ac.th

Ref.No. MHESI 0643.14/2584



Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

4 September 2024

Subject: Invitation to validate research instrument

Dear Assoc.Prof.Dr.Qi Zhenjiang

Mr.Zhu Aijun is a graduate student in Doctor of Business Administration Program (International Program) of Bansomdejchaopraya Rajabhat University. He is undertaking research entitled "Impact of Transformational leadership on the Innovation Performance of Research and Development Teams in China".

The thesis advisory committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

With your expertise, we would like to ask your permission to validate the attached research instrument. In this regard, we would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Yours faithfully,

(Assistant Professor Dr.Tanaput Chanchaen)
Vice Dean Acting for of Dean of Graduate School

Bansomdejchaopraya Rajabhat University
Tel.+662-473-7000
www.bsru.ac.th
E-mail: grad@bsru.ac.th



Ref.No. MHESI 0643.14/2585

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

4 September 2024

Subject: Invitation to validate research instrument

Dear Dr.Bundit Phrapratanporn

Mr.Zhu Aijun is a graduate student in Doctor of Business Administration Program (International Program) of Bansomdejchaopraya Rajabhat University. He is undertaking research entitled "Impact of Transformational leadership on the Innovation Performance of Research and Development Teams in China".

The thesis advisory committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

With your expertise, we would like to ask your permission to validate the attached research instrument. In this regard, we would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Yours faithfully,

(Assistant Professor Dr.Tanaput Chanchaen)
Vice Dean Acting for of Dean of Graduate School

Bansomdejchaopraya Rajabhat University
Tel.+662-473-7000
www.bsru.ac.th
E-mail: grad@bsru.ac.th

Appendix C

Research Instrument



Questionnaire

Impact of Transformational Leadership on the Innovation Performance of Research and Development Teams in China

This is an academic questionnaire for the DBA. students of Zhu Aijun, in Bansomdejchaopraya Rajabhat University. The data collected from this questionnaire will be treated with utmost confidentiality. Kindly answer to the best of your knowledge.

The questionnaire will be divided into 2 parts:

Part 1: Basic information

Part 2: Questions about the latent and observed variables of the study

Definitions of the 5-point Likert scale:

- ‘1’ – Strongly Disagree
- ‘2’ – Disagree
- ‘3’ – Neutral (Neither Agree nor Disagree)
- ‘4’ – Agree
- ‘5’ – Strongly Agree

Part1: Basic information

Tick (✓) the option applicable for each of the questions listed below.

1) Your gender :

☐ male ☐ female

2) Your age group:

☐ 20 to 30 ☐ 31 to 40 ☐ 41 to 50 ☐ 51 and above

3) Your marital status: ☐

☐ Single ☐ Married

4) Your highest level of education:

☐ High School ☐ College Degree ☐ Bachelor's Degree ☐
☐ Master's Degree ☐ Doctoral Degree

Part 2: Relationship between Study Variables

Kindly Tick (✓) the option applicable for each of the questions listed below.

Where 1=Strongly Disagree; 2=Disagree; 3=Neutral (Neither Agree nor Disagree);

4=Agree; 5=Strongly Agree

Transformational leadership questionnaire

Moral model	5	4	3	2	1
My supervisor is incorruptible and does not seek personal gain.	☐	☐	☐	☐	☐
My supervisor, he suffers before he enjoys himself.	☐	☐	☐	☐	☐
My supervisor, regardless of personal gain or loss, dedicated to the work.	☐	☐	☐	☐	☐
My supervisor is willing to sacrifice personal interests for the good of the department/unit	☐	☐	☐	☐	☐
My supervisor can put his own personal interests before the interests of the group and others	☐	☐	☐	☐	☐
Charisma leadership	5	4	3	2	1
My supervisor keeps employees informed about the development prospects of the unit/department	☐	☐	☐	☐	☐
My supervisor is able to keep employees informed of the business philosophy and development goals of the unit/department	☐	☐	☐	☐	☐
My supervisor explains the long-term significance of what they're doing	☐	☐	☐	☐	☐
My supervisor is going to paint a picture of the future	☐	☐	☐	☐	☐
Vision Motivation	5	4	3	2	1
My supervisor, in the process of dealing with employees, will consider the actual situation of the individual employee	☐	☐	☐	☐	☐
My supervisor is willing to help employees with their life and family problems	☐	☐	☐	☐	☐
My supervisor is able to communicate with employees regularly to understand their work, life and family situation	☐	☐	☐	☐	☐
My supervisor patiently instructs employees and answers questions for employees	☐	☐	☐	☐	☐
Individualized consideration	5	4	3	2	1
My supervisor has excellent business ability	☐	☐	☐	☐	☐
My supervisor is open-minded and has a strong sense of innovation	☐	☐	☐	☐	☐
My supervisor loves his job and has strong ambition and initiative	☐	☐	☐	☐	☐
My supervisor is very dedicated to his work and always maintains a high level of enthusiasm	☐	☐	☐	☐	☐

Organizational creative climate questionnaire

Team Motivation	5	4	3	2	1
The performance appraisal system for team members has indicators related to innovation.	☐	☐	☐	☐	☐
The team is able to objectively evaluate team members' innovations	☐	☐	☐	☐	☐
The team rewards employees for having reasonable ideas.	☐	☐	☐	☐	☐
The team is able to offer material incentives such as cash and dividends for employee innovation.	☐	☐	☐	☐	☐
The team is able to give moral rewards such as commendations and honors to employees.	☐	☐	☐	☐	☐
Within teams, innovative members are more likely to be rehired and promoted.	☐	☐	☐	☐	☐
Perceived supervisor support	5	4	3	2	1
Team members are able to get leadership support for their creativity at work.	☐	☐	☐	☐	☐
My leaders are able to delegate appropriately.	☐	☐	☐	☐	☐
I can get support from my leaders when facing difficulties.	☐	☐	☐	☐	☐
Leaders encourage new and innovative ideas.	☐	☐	☐	☐	☐
Resource guarantee	5	4	3	2	1
I have full manpower support in getting the job done.	☐	☐	☐	☐	☐
I am fully funded in the completion of my work.	☐	☐	☐	☐	☐
I have a reasonable use of time in completing my work.	☐	☐	☐	☐	☐
I am fully equipped to complete the job.	☐	☐	☐	☐	☐
Work autonomy	5	4	3	2	1
I have the autonomy to decide how to implement the work program.	☐	☐	☐	☐	☐
I have autonomy at work.	☐	☐	☐	☐	☐
I can set my own work schedule.	☐	☐	☐	☐	☐

knowledge sharing questionnaire

Knowledge contribution	5	4	3	2	1
When I learn something new, I make it possible for my departmental colleagues to learn it as well.	☐	☐	☐	☐	☐
I let my colleagues in my department share the information I have.	☐	☐	☐	☐	☐
I let my coworkers in my department share my skills.	☐	☐	☐	☐	☐
When I learn something new, I make it available to my coworkers outside of my department.	☐	☐	☐	☐	☐
I let my colleagues outside my department share the information I have.	☐	☐	☐	☐	☐
I let my coworkers outside of my department share my skills.	☐	☐	☐	☐	☐
Knowledge collection	5	4	3	2	1
When I ask my departmental colleagues, they tell me what they know.	☐	☐	☐	☐	☐
When I ask my departmental colleagues, they tell me about the skills they posses.	☐	☐	☐	☐	☐
When I ask my colleagues outside my department, they tell me what they know.	☐	☐	☐	☐	☐
When I ask my colleagues outside my department, they tell me about the skills they know.	☐	☐	☐	☐	☐
Shared willingness	5	4	3	2	1
I am willing to share learning materials with my colleagues often	☐	☐	☐	☐	☐
I am willing to provide skills and methods to other colleagues on a regular basis	☐	☐	☐	☐	☐
I am always willing to share my technical experience and skills with my colleagues	☐	☐	☐	☐	☐
At the request of other colleagues, I am always willing to provide information that I know	☐	☐	☐	☐	☐
I am willing to try to share the expertise I have gained from technical training with my colleagues	☐	☐	☐	☐	☐
I am willing to share my knowledge from informal sources with other colleagues	☐	☐	☐	☐	☐

Knowledge contribution	5	4	3	2	1
I am willing to share with colleagues the valuable information I have obtained from various sources	☐	☐	☐	☐	☐
Shared competence	5	4	3	2	1
I have the ability to pass on my wisdom and experience to others	☐	☐	☐	☐	☐
I have the ability to speak my mind	☐	☐	☐	☐	☐
I have the ability to answer questions from my team members	☐	☐	☐	☐	☐
I have the ability to provide the data and documentation my team needs when they need it	☐	☐	☐	☐	☐
I believe in the value of passing on my expertise and experience to others	☐	☐	☐	☐	☐
I have the ability to easily find the information I need in my workplace	☐	☐	☐	☐	☐

Innovative performance of research and development teams questionnaire

Innovation Efficiency	5	4	3	2	1
The team was able to accomplish the goals initially set.	☐	☐	☐	☐	☐
The team is able to deliver within budget.	☐	☐	☐	☐	☐
The team is able to stay on schedule and within deadlines.	☐	☐	☐	☐	☐
The team is able to stay on schedule and within deadlines.	☐	☐	☐	☐	☐
Innovation effectiveness	5	4	3	2	1
The product developed (improved) by our team is unique compared to the competitor's recognizable products.	☐	☐	☐	☐	☐
The products developed (improved) by the team are of high quality compared to competitors' recognizable products.	☐	☐	☐	☐	☐
Our team has developed (improved) products whose performance has been well received by customers.	☐	☐	☐	☐	☐
The team develops (improves) products whose sales performance meets the targets set by the company.	☐	☐	☐	☐	☐

Innovation Efficiency	5	4	3	2	1
The team is able to launch similar products at a faster pace than competitors.	☐	☐	☐	☐	☐
Innovation process	5	4	3	2	1
Research and development teams often introduce new technologies and methods that improve work processes	☐	☐	☐	☐	☐
Research and development teams often adopt methods to improve product performance or work processes	☐	☐	☐	☐	☐
Research and development teams often implement new ways to improve team performance	☐	☐	☐	☐	☐
Research and development teams develop new products or services quickly	☐	☐	☐	☐	☐
Innovation outcomes	5	4	3	2	1
Research and development teams often develop products or services that can be accepted by the market	☐	☐	☐	☐	☐
The research and development team has a relatively large number of R&D and innovation results	☐	☐	☐	☐	☐
The research and development team will change the service items or improve the service side based on customer feedback	☐	☐	☐	☐	☐
Research and development teams often adopt new product components and service items	☐	☐	☐	☐	☐

IOC Scoring Sheet

No.	Scales	IOC			Recommendations
		+1	0	-1	
Relationship between Study Variables Transformational Leadership					
1	My supervisor is incorruptible and does not seek personal gain.				
2	My supervisor, he suffers before he enjoys himself.				
3	My supervisor, regardless of personal gain or loss, dedicated to the work				
4	My supervisor is willing to sacrifice personal interests for the good of the department/unit				
5	My supervisor can put his own personal interests before the interests of the group and others				
6	My supervisor keeps employees informed about the development prospects of the unit/department				
7	My supervisor is able to keep employees informed of the business philosophy and development goals of the unit/department				
8	My supervisor explains the long-term significance of what they're doing				
9	My supervisor is going to paint a picture of the future				
10	My supervisor, in the process of dealing with employees, will consider the actual situation of the individual employee				
11	My supervisor is willing to help employees with their life and family problems				
12	My supervisor is able to communicate with employees regularly to understand their work, life and family situation				
13	My supervisor patiently instructs employees and answers questions for employees				

No.	Scales	IOC			Recommendations
		+1	0	-1	
14	My supervisor has excellent business ability				
15	My supervisor is open-minded and has a strong sense of innovation				
16	My supervisor loves his job and has strong ambition and initiative				
17	My supervisor is very dedicated to his work and always maintains a high level of enthusiasm				
Organizational creative climate					
18	The performance appraisal system for team members has indicators related to innovation.				
19	The team is able to objectively evaluate team members' innovations				
20	The team rewards employees for having reasonable ideas.				
21	The team is able to offer material incentives such as cash and dividends for employee innovation.				
22	The team is able to give moral rewards such as commendations and honors to employees.				
23	Within teams, innovative members are more likely to be rehired and promoted.				
24	Team members are able to get leadership support for their creativity at work.				
25	My leaders are able to delegate appropriately.				
26	I can get support from my leaders when facing difficulties.				
27	Leaders encourage new and innovative ideas.				
28	I have full manpower support in getting the job done.				
29	I am fully funded in the completion of my work.				
30	I have a reasonable use of time in completing my work.				

No.	Scales	IOC			Recommendations
		+1	0	-1	
31	I am fully equipped to complete the job.				
32	I have the autonomy to decide how to implement the work program.				
33	I have autonomy at work.				
34	I can set my own work schedule.				
knowledge sharing					
35	When I learn something new, I make it possible for my departmental colleagues to learn it as well.				
36	I let my colleagues in my department share the information I have.				
37	I let my coworkers in my department share my skills.				
38	When I learn something new, I make it available to my coworkers outside of my department.				
39	I let my colleagues outside my department share the information I have.				
40	I let my coworkers outside of my department share my skills.				
41	When I ask my departmental colleagues, they tell me what they know.				
42	When I ask my departmental colleagues, they tell me about the skills they possess.				
43	When I ask my colleagues outside my department, they tell me what they know.				
44	When I ask my colleagues outside my department, they tell me about the skills they know.				
45	I am willing to share learning materials with my colleagues often				
46	I am willing to provide skills and methods to other colleagues on a regular basis				
47	I am always willing to share my technical experience and skills with my colleagues				
48	At the request of other colleagues, I am always				

No.	Scales	IOC			Recommendations
		+1	0	-1	
	willing to provide information that I know				
49	I am willing to try to share the expertise I have gained from technical training with my colleagues				
50	I am willing to share my knowledge from informal sources with other colleagues				
51	I am willing to share with colleagues the valuable information I have obtained from various sources				
52	I have the ability to pass on my wisdom and experience to others				
53	I have the ability to speak my mind				
54	I have the ability to answer questions from my team members				
55	I have the ability to provide the data and documentation my team needs when they need it				
56	I believe in the value of passing on my expertise and experience to others				
57	I have the ability to easily find the information I need in my workplace				
Innovative performance of research and development teams					
58	The team was able to accomplish the goals initially set.				
59	The team is able to deliver within budget.				
60	The team is able to stay on schedule and within deadlines.				
61	The team is able to stay on schedule and within deadlines.				
62	The product developed (improved) by our team is unique compared to the competitor's recognizable products.				
63	The products developed (improved) by the team are of high quality compared to competitors'				

No.	Scales	IOC			Recommendations
		+1	0	-1	
	recognizable products.				
64	Our team has developed (improved) products whose performance has been well received by customers.				
65	The team develops (improves) products whose sales performance meets the targets set by the company.				
66	The team is able to launch similar products at a faster pace than competitors.				
67	Research and development teams often introduce new technologies and methods that improve work processes				
68	Research and development teams often adopt methods to improve product performance or work processes				
69	Research and development teams often implement new ways to improve team performance				
70	Research and development teams develop new products or services quickly				
71	Research and development teams often develop products or services that can be accepted by the market				
72	The research and development team has a relatively large number of R&D and innovation results				
73	The research and development team will change the service items or improve the service side based on customer feedback				
74	Research and development teams often adopt new product components and service items				

Appendix D

The Results of Content Validity and Reliability Analysis (if any)

No.	Scales	Expert Person			Total	IOC	Interpre tation
		1	2	3			
Transformational Leadership							
1	My supervisor is incorruptible and does not seek personal gain.	1	1	1	3	1	Consistent
2	My supervisor, he suffers before he enjoys himself.	1	1	1	3	1	Consistent
3	My supervisor, regardless of personal gain or loss, dedicated to the work	1	1	1	3	1	Consistent
4	My supervisor is willing to sacrifice personal interests for the good of the department/unit	1	1	1	3	1	Consistent
5	My supervisor can put his own personal interests before the interests of the group and others	1	1	1	3	1	Consistent
6	My supervisor keeps employees informed about the development prospects of the unit/department	1	1	1	3	1	Consistent
7	My supervisor is able to keep employees informed of the business philosophy and development goals of the unit/department	1	1	1	3	1	Consistent
8	My supervisor explains the long-term significance of what they're doing	1	1	1	3	1	Consistent
9	My supervisor is going to paint a picture of the future	1	1	0	2	0.67	Consistent
10	My supervisor, in the process of dealing with employees, will consider the actual situation of the individual employee	1	1	1	3	1	Consistent
11	My supervisor is willing to help employees with their life and family problems	1	1	1	3	1	Consistent
12	My supervisor is able to communicate with employees regularly to understand	1	1	1	3	1	Consistent

No.	Scales	Expert Person			Total	IOC	Interpretation
		1	2	3			
	their work, life and family situation						
13	My supervisor patiently instructs employees and answers questions for employees	1	1	1	3	1	Consistent
14	My supervisor has excellent business ability	1	1	1	3	1	Consistent
15	My supervisor is open-minded and has a strong sense of innovation	1	1	1	3	1	Consistent
16	My supervisor loves his job and has strong ambition and initiative	1	1	1	3	1	Consistent
17	My supervisor is very dedicated to his work and always maintains a high level of enthusiasm	1	1	1	3	1	Consistent
Organizational Innovation Climate							
1	The performance appraisal system for team members has indicators related to innovation.	1	1	1	3	1	Consistent
2	The team is able to objectively evaluate team members' innovations	1	1	1	3	1	Consistent
3	The team rewards employees for having reasonable ideas.	1	1	1	3	1	Consistent
4	The team is able to offer material incentives such as cash and dividends for employee innovation.	1	1	1	3	1	Consistent
5	The team is able to give moral rewards such as commendations and honors to employees.	1	1	1	3	1	Consistent
6	Within teams, innovative members are more likely to be rehired and promoted.	1	1	1	3	1	Consistent
7	Team members are able to get leadership support for their creativity at work.	1	1	1	3	1	consistent
8	My leaders are able to delegate	1	1	1	3	1	Consistent

No.	Scales	Expert Person			Total	IOC	Interpretation
		1	2	3			
	appropriately.						
9	I can get support from my leaders when facing difficulties.	1	1	1	3	1	Consistent
10	Leaders encourage new and innovative ideas.	1	1	1	3	1	Consistent
11	I have full manpower support in getting the job done.	1	1	1	3	1	Consistent
12	I am fully funded in the completion of my work.	1	1	1	3	1	Consistent
13	I have a reasonable use of time in completing my work.	1	1	1	3	1	Consistent
14	I am fully equipped to complete the job.	1	0	1	2	0.67	Consistent
15	I have the autonomy to decide how to implement the work program.	1	1	1	3	1	Consistent
16	I have autonomy at work.	1	1	1	3	1	Consistent
17	I can set my own work schedule.	1	1	1	3	1	Consistent
knowledge sharing							
1	When I learn something new, I make it possible for my departmental colleagues to learn it as well.	1	1	1	3	1	Consistent
2	I let my colleagues in my department share the information I have.	1	1	1	3	1	consistent
3	I let my coworkers in my department share my skills.	1	1	1	3	1	Consistent
4	When I learn something new, I make it available to my coworkers outside of my department.	1	1	1	3	1	Consistent
5	I let my colleagues outside my department share the information I have.	1	1	1	3	1	Consistent
6	I let my coworkers outside of my department share my skills.	1	1	1	3	1	Consistent

No.	Scales	Expert Person			Total	IOC	Interpretation
		1	2	3			
7	When I ask my departmental colleagues, they tell me what they know.	1	1	1	3	1	Consistent
8	When I ask my departmental colleagues, they tell me about the skills they possess.	1	1	1	3	1	Consistent
9	When I ask my colleagues outside my department, they tell me what they know.	1	1	1	3	1	Consistent
10	When I ask my colleagues outside my department, they tell me about the skills they know.	1	1	1	3	1	Consistent
11	I am willing to share learning materials with my colleagues often	1	1	1	3	1	Consistent
12	I am willing to provide skills and methods to other colleagues on a regular basis	1	1	1	3	1	Consistent
13	I am always willing to share my technical experience and skills 1with my colleagues	1	1	1	3	1	consistent
14	At the request of other colleagues, I am always willing to provide information that I know	1	1	1	3	1	Consistent
15	I am willing to try to share the expertise I have gained from technical training with my colleagues	1	1	1	3	1	Consistent
16	I am willing to share my knowledge from informal sources with other colleagues	1	1	1	3	1	Consistent
17	I am willing to share with colleagues the valuable information I have obtained from various sources	1	1	1	3	1	Consistent
18	I have the ability to pass on my wisdom and experience to others	0	1	1	2	0.67	Consistent

No.	Scales	Expert Person			Total	IOC	Interpretation
		1	2	3			
19	I have the ability to speak my mind	1	1	1	3	1	Consistent
20	I have the ability to answer questions from my team members	1	1	1	3	1	Consistent
21	I have the ability to provide the data and documentation my team needs when they need it	1	1	1	3	1	Consistent
22	I believe in the value of passing on my expertise and experience to others	1	1	1	3	1	Consistent
23	I have the ability to easily find the information I need in my workplace	1	1	1	3	1	Consistent
Innovative performance of research and development teams							
1	The team was able to accomplish the goals initially set.	1	1	1	3	1	Consistent
2	The team is able to deliver within budget.	1	1	1	3	1	Consistent
3	The team is able to stay on schedule and within deadlines.	1	1	1	3	1	Consistent
4	The team is able to stay on schedule and within deadlines.	1	1	1	3	1	Consistent
5	The product developed (improved) by our team is unique compared to the competitor's recognizable products.	1	0	1	2	0.67	Consistent
6	The products developed (improved) by the team are of high quality compared to competitors' recognizable products.	1	1	1	3	1	Consistent
7	Our team has developed (improved) products whose performance has been well received by customers.	1	1	1	3	1	Consistent
8	The team develops (improves) products whose sales performance meets the	1	1	1	3	1	Consistent

No.	Scales	Expert Person			Total	IOC	Interpretation
		1	2	3			
	targets set by the company.						
9	The team is able to launch similar products at a faster pace than competitors.	1	1	1	3	1	consistent
10	Research and development teams often introduce new technologies and methods that improve work processes	1	1	1	3	1	Consistent
11	Research and development teams often adopt methods to improve product performance or work processes	1	1	1	3	1	Consistent
12	Research and development teams often implement new ways to improve team performance	1	1	1	3	1	Consistent
13	Research and development teams develop new products or services quickly	1	1	1	3	1	Consistent
14	Research and development teams often develop products or services that can be accepted by the market	1	1	1	3	1	Consistent
15	The research and development team has a relatively large number of R&D and innovation results	1	1	1	3	1	Consistent
16	The research and development team will change the service items or improve the service side based on customer feedback	1	1	1	3	1	Consistent
17	Research and development teams often adopt new product components and service items	1	1	1	3	1	Consistent

No.	Scales	Expert Person			Total	IOC	Interpre tation
		1	2	3			
Innovative performance of research and development teams							
1	The team was able to accomplish the goals initially set.	1	1	1	3	1	Consistent
2	The team is able to deliver within budget.	1	1	1	3	1	Consistent
3	The team is able to stay on schedule and within deadlines.	1	1	1	3	1	Consistent
4	The team is able to stay on schedule and within deadlines.	1	1	1	3	1	Consistent
5	The product developed (improved) by our team is unique compared to the competitor’s recognizable products.	1	0	1	2	0.67	Consistent
6	The products developed (improved) by the team are of high quality compared to competitors’ recognizable products.	1	1	1	3	1	Consistent
7	Our team has developed (improved) products whose performance has been well received by customers.	1	1	1	3	1	Consistent
8	The team develops (improves) products whose sales performance meets the targets set by the company.	1	1	1	3	1	Consistent
9	The team is able to launch similar products at a faster pace than competitors.	1	1	1	3	1	consistent
10	Research and development teams often introduce new technologies and methods that improve work processes	1	1	1	3	1	Consistent
11	Research and development teams often adopt methods to improve product performance or work processes	1	1	1	3	1	Consistent

No.	Scales	Expert Person			Total	IOC	Interpre tation
		1	2	3			
12	Research and development teams often implement new ways to improve team performance	1	1	1	3	1	Consistent
13	Research and development teams develop new products or services quickly	1	1	1	3	1	Consistent
14	Research and development teams often develop products or services that can be accepted by the market	1	1	1	3	1	Consistent
15	The research and development team has a relatively large number of R&D and innovation results	1	1	1	3	1	Consistent
16	The research and development team will change the service items or improve the service side based on customer feedback	1	1	1	3	1	Consistent
17	Research and development teams often adopt new product components and service items	1	1	1	3	1	Consistent

The Item test	Expert Person			Total	IOC	Interpre tation
	1	2	3			
Transformational Leadership						
Moral model	1	1	1	3	1	Consistent
Charisma leadership	1	1	1	3	1	Consistent
Vision Motivation	1	1	1	3	1	Consistent
Individualized consideration	1	1	1	3	1	Consistent
Organizational Innovation Climate						
Team Motivation	1	1	1	3	1	Consistent
Perceived supervisor support	1	1	1	3	1	Consistent
Resource guarantee	1	1	1	3	1	Consistent
Work autonomy	1	1	1	3	1	Consistent
knowledge sharing						
Knowledge contribution	1	1	1	3	1	Consistent
Knowledge collection	1	1	1	3	1	Consistent
Shared willingness	1	1	1	3	1	Consistent
Shared competence	1	1	1	3	1	Consistent
Innovative performance of research and development teams						
Innovation efficiency	1	1	1	3	1	Consistent
Innovation effectiveness	1	1	1	3	1	Consistent
Innovation process	1	1	1	3	1	Consistent
Innovation outcomes	1	1	1	3	1	Consistent

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	PCMIN/DF
Default model	38	135.239	115	.096
Saturated model	153	.000	0	
Independence model	17	4160.685	136	.000

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.047	.964	.952	.724
Saturated model	.000	1.000		
Independence model	.686	.241	.146	.215

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.967	.962	.995	.994	.995
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.846	.818	.841
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.333	.050	.000	.132
Saturated model	.000	.000	.000	.000
Independence model	10.248	9.913	9.403	10.441

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.021	.000	.034	1.000
Independence model	.270	.263	.277	.000

AIC

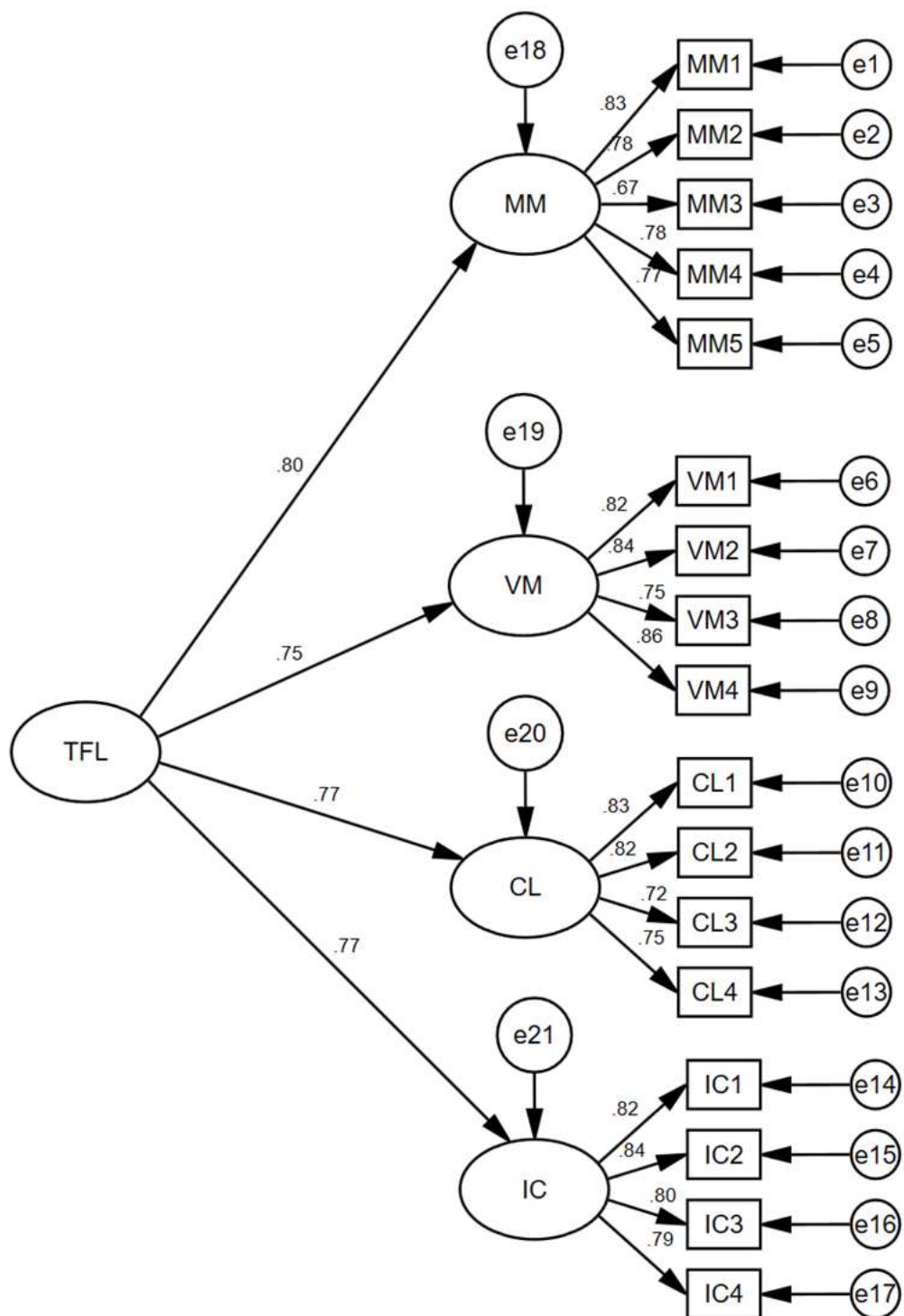
Model	AIC	BCC	BIC	CAIC
Default model	211.239	214.765	363.574	401.574
Saturated model	306.000	320.196	919.348	1072.348
Independence model	4194.685	4196.263	4262.835	4279.835

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.520	.470	.602	.529
Saturated model	.754	.754	.754	.789
Independence model	10.332	9.822	10.859	10.336

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	424	460
Independence model	17	18



Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	PCMIN/DF	
Default model	50	250.687	226	.125	1.109
Saturated model	276	.000	0		
Independence model	23	5697.520	253	.000	22.520

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.034	.950	.939	.778
Saturated model	.000	1.000		
Independence model	.476	.206	.134	.189

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.956	.951	.995	.995	.995
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.893	.854	.889
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

NCP

Model	NCP	LO 90	HI 90
Default model	24.687	.000	67.494
Saturated model	.000	.000	.000
Independence model	5444.520	5202.178	5693.237

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.617	.061	.000	.166
Saturated model	.000	.000	.000	.000
Independence model	14.033	13.410	12.813	14.023

RMSEA

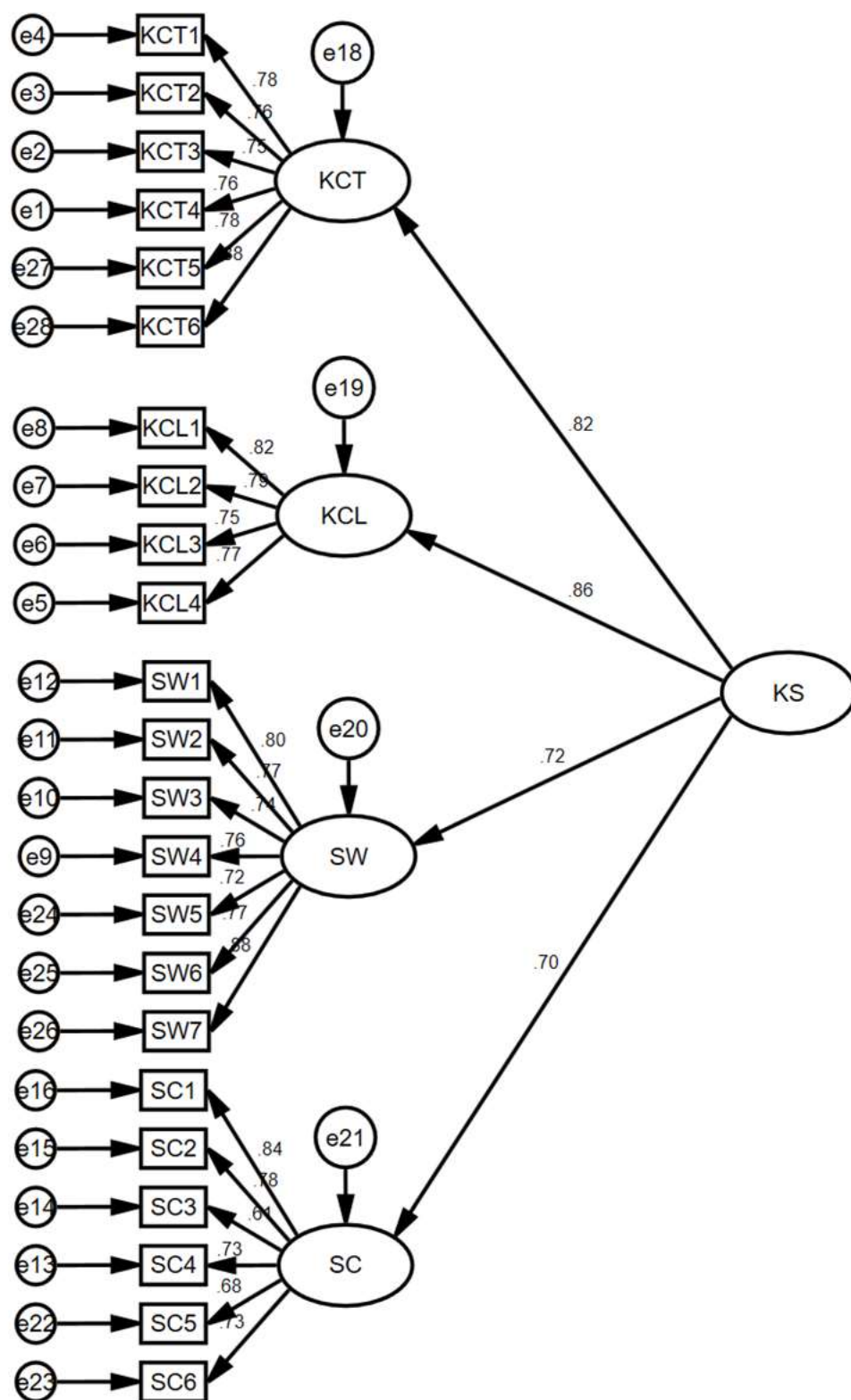
Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.016	.000	.027	1.000
Independence model	.230	.225	.235	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	350.687	356.970	551.128	601.128
Saturated model	552.000	586.681	1658.432	1934.432
Independence model	5743.520	5746.410	5835.723	5858.723

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.864	.803	.969	.879
Saturated model	1.360	1.360	1.360	1.445
Independence model	14.147	13.550	14.759	14.154



Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	PCMIN/DF	
Default model	38	140.286	115	.055	1.220
Saturated model	153	.000	0		
Independence model	17	4207.090	136	.000	30.934

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.042	.961	.948	.722
Saturated model	.000	1.000		
Independence model	.626	.234	.138	.208

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.967	.961	.994	.993	.994
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.846	.817	.840
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	25.286	.000	59.367
Saturated model	.000	.000	.000
Independence model	4071.090	3862.998	4286.453

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.346	.062	.000	.146
Saturated model	.000	.000	.000	.000
Independence model	10.362	10.027	9.515	10.558

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.023	.000	.036	1.000
Independence model	.272	.265	.279	.000

AIC

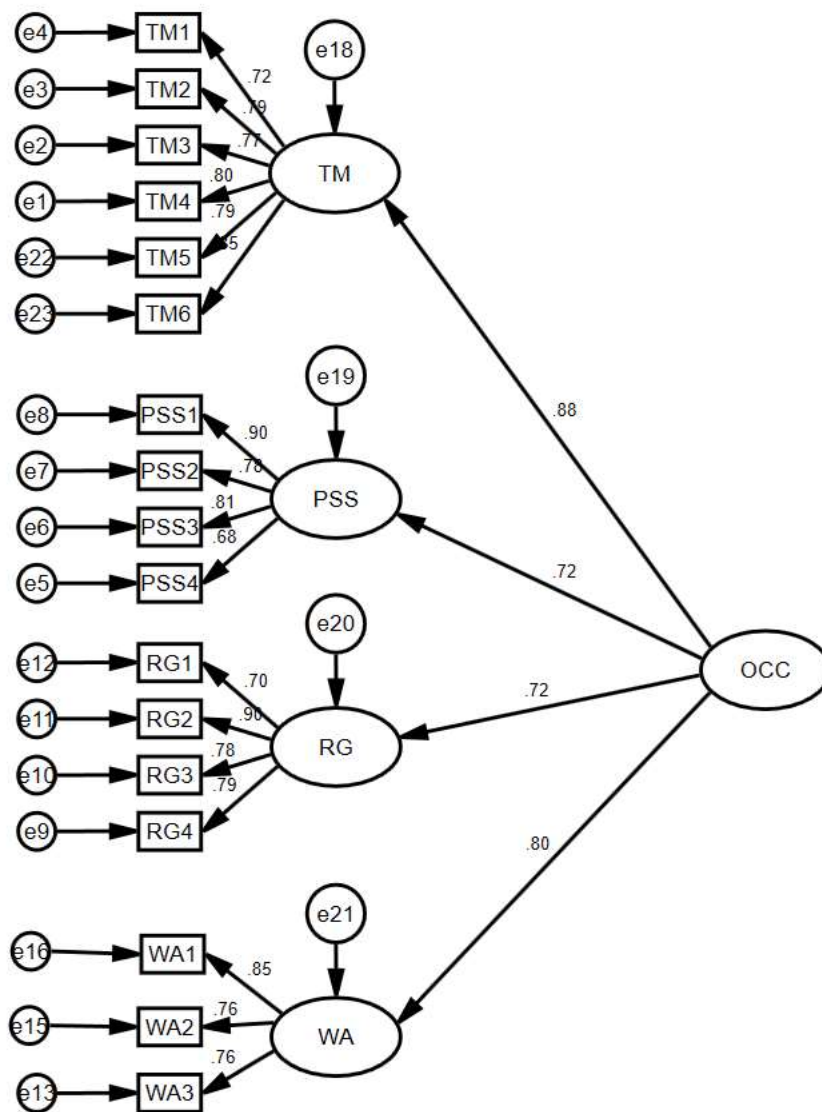
Model	AIC	BCC	BIC	CAIC
Default model	216.286	219.812	368.621	406.621
Saturated model	306.000	320.196	919.348	1072.348
Independence model	4241.090	4242.667	4309.240	4326.240

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.533	.470	.617	.541
Saturated model	.754	.754	.754	.789

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	409	444
Independence model	16	18



Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P CMIN/DF	
Default model	38	140.727	115	.052	1.224
Saturated model	153	.000	0		
Independence model	17	4291.452	136	.000	31.555

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.043	.960	.947	.722
Saturated model	.000	1.000		
Independence model	.615	.227	.131	.202

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.967	.961	.994	.993	.994
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.846	.818	.840
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.347	.063	.000	.148
Saturated model	.000	.000	.000	.000
Independence model	10.570	10.235	9.717	10.771

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.023	.000	.036	1.000
Independence model	.274	.267	.281	.000

AIC

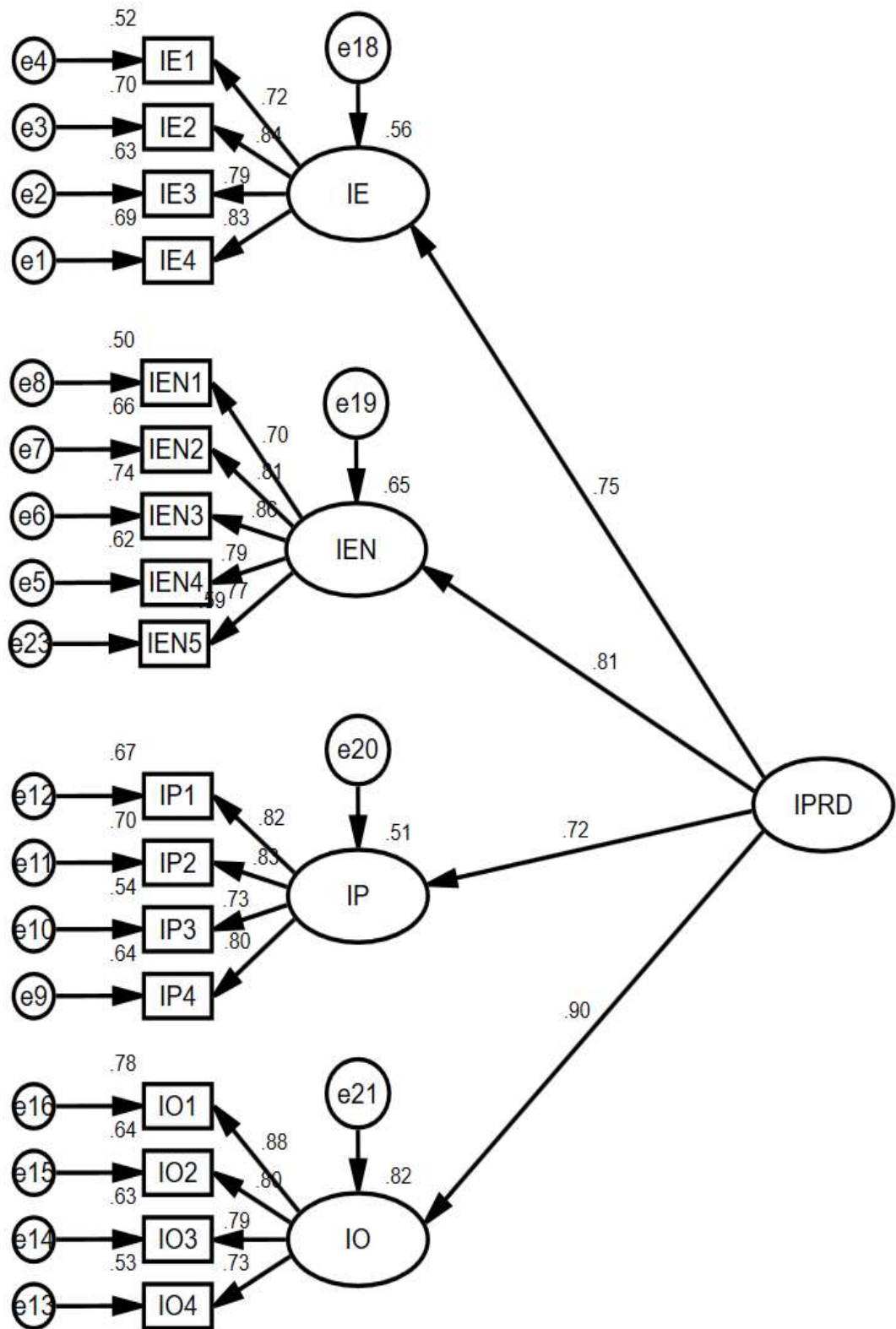
Model	AIC	BCC	BIC	CAIC
Default model	216.727	220.253	369.062	407.062
Saturated model	306.000	320.196	919.348	1072.348
Independence model	4325.452	4327.029	4393.602	4410.602

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.534	.470	.618	.542
Saturated model	.754	.754	.754	.789
Independence model	10.654	10.136	11.190	10.658

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	407	442
Independence model	16	17



Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	PCMIN/DF
Default model	37	112.290	99	.171
Saturated model	136	.000	0	
Independence model	16	2771.313	120	.000

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.034	.967	.955	.704
Saturated model	.000	1.000		
Independence model	.339	.345	.257	.304

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.959	.951	.995	.994	.995
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.825	.792	.821
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

NCP

Model	NCP	LO 90	HI 90
Default model	13.290	.000	43.561
Saturated model	.000	.000	.000
Independence model	2651.313	2483.629	2826.336

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.277	.033	.000	.107
Saturated model	.000	.000	.000	.000
Independence model	6.826	6.530	6.117	6.961

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.018	.000	.033	1.000
Independence model	.233	.226	.241	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	186.290	189.524	334.616	371.616
Saturated model	272.000	283.887	817.199	953.199
Independence model	2803.313	2804.712	2867.454	2883.454

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.459	.426	.533	.467
Saturated model	.670	.670	.670	.699
Independence model	6.905	6.492	7.336	6.908

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.277	.033	.000	.107
Saturated model	.000	.000	.000	.000
Independence model	6.826	6.530	6.117	6.961

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.018	.000	.033	1.000
Independence model	.233	.226	.241	.000

AIC

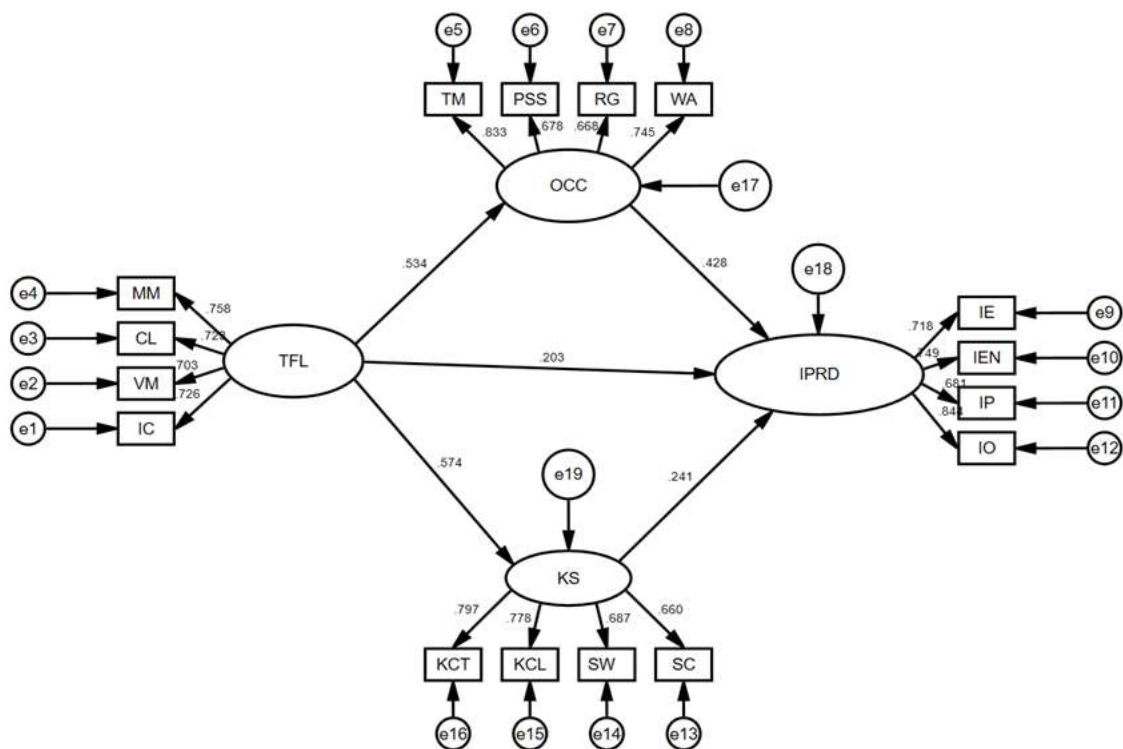
Model	AIC	BCC	BIC	CAIC
Default model	186.290	189.524	334.616	371.616
Saturated model	272.000	283.887	817.199	953.199
Independence model	2803.313	2804.712	2867.454	2883.454

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.459	.426	.533	.467
Saturated model	.670	.670	.670	.699
Independence model	6.905	6.492	7.336	6.908

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	446	487
Independence model	22	24



Appendix E
Certificate of English



This is to certify that

Mr. Zhu Aijun

Achieved BSRU English Proficiency Test (BSRU-TEP) level

C2

Given on 9th August 2022

A handwritten signature in blue ink, appearing to be 'ksa' with a dot over the 'a'.

(Assistant Professor Dr Kulsirin Aphiratvoradej)

Director

Appendix F

Acceptance Letter for Publishing Paper

IMPACT OF TRANSFORMATIONAL LEADERSHIP ON THE INNOVATION PERFORMANCE OF RE- SEARCH AND DEVELOPMENT TEAMS: CHINESE AUTOMOTIVE INDUSTRY

ZHU AIJUN¹, CHAIYAWIT MUANGMEE¹, NUSANEE
MEEKAWEKUNCHORN¹, TATCHAPONG SATTABUT¹

¹FACULTY OF MANAGEMENT SCIENCE, BANSOMDEJCHAOPRAYA RAJABHAT UNIVERSITY, BANG-
KOK, THAILAND, 10600

Abstract: This study considers the Chinese automotive industry as a case study. During the accelerated transformation of the automotive industry, the influence of the innovation performance of R&D teams is crucial. Data were collected from 407 respondents. Descriptive statistics, factor analysis, correlation analysis, and structural equation modeling (SEM) were used to analyze the data. The results show that transformational leadership mainly enhances the innovation performance of R&D teams by creating an organizational innovation atmosphere and promoting knowledge sharing rather than merely achieving this goal through direct influence. Moreover, a strong innovation atmosphere significantly improves innovation efficiency and effectiveness, whereas knowledge sharing is supportive but relatively weak in promoting innovation performance. Organizations should focus on transformational leadership behaviors, strive to create an innovative environment, and strengthen knowledge-sharing mechanisms to maximize innovation outcomes.

Keywords: Transformational Leadership, Organizational Creative Climate, Knowledge Sharing, Innovative Performance of Research and Development Teams.

INTRODUCTION

As an important part of the automotive industry chain, the auto parts industry has a large and continuously growing market (Barnes and Morris, 2008). With the continuous expansion of the global automotive market and advancements in automotive technology, the auto parts industry has ushered in unprecedented development opportunities (Chen et al., 2024). In particular, with the rapid development of new energy vehicles, intelligent driving, and other emerging fields, the demand for the auto parts industry has diversified, bringing new growth points (Barnes and Morris, 2008). According to the Spherical Insights (2024) report, the global automotive components market was valued at USD 1,964.51 billion in 2023 and is expected to reach USD 3,429.54 billion by 2033. In 2023, the use of electric cars showed a year-on-year increase, reaching 3.5 million, which was 3.5 million more than in 2022 (IEA, 2024). This increase translates to a 35% increase in sales. Five years ago, in 2018, the number of utilized electric vehicles was five times lower than that in 2023. In 2023, a new record of over 250,000 new registrations per week was set, surpassing the annual total for 2013. An average of 1.8 million electric vehicles were sold in 2023, which is a 4% growth from the previous year and 16% higher than in 2018 (IEA, 2024). The rapid growth of the new energy vehicle market has increased the demand for related components in recent years.

The rapid development of new energy vehicles has significantly impacted the parts markets. With the popularity of new energy vehicles, such as battery electric vehicles and plug-in hybrid vehicles, the demand for core components, such as batteries, motors, and electronic control systems, has increased significantly (Madaram et al., 2024). The higher technological content and added value of these components have driven the overall growth of the automotive parts market. The rapid development of intelligent driving technology has also created new growth points in the auto parts market (Leminen et al., 2022). Automatic driving systems require the support of key components, such as high-precision sensors, radars, cameras, and computing platforms. The development and production of these components require high technical strength and capital investment, but also bring higher market returns (Sadaf et al., 2023).

Technological innovation is an important driving force behind the continued growth of the auto parts market (Sadaf et al., 2023). With the continuous development of new energy vehicles and intelligent driving technology, higher requirements have been proposed for the performance, reliability, and safety of parts and components (Leminen et al., 2022). This can only meet market demand and maintain competitive advantage through continuous technological innovation (Farida and Setiawan, 2022). R&D strength is the core of the competitiveness of auto parts enterprises (Khilari et al., 2022). Enterprises with strong R&D capabilities can launch new products and technologies faster to meet market demand and increase market share (Farida and Setiawan, 2022). Simultaneously, R&D strength is an important guarantee for enterprises to cope with market

changes and resist risks. This indicates that technological innovation and R&D strength play a decisive role in the market competitiveness of auto parts enterprises (Khilari et al., 2022). Therefore, auto parts enterprises should increase R&D investment, strengthen technological innovation, and improve product quality and performance to cope with market changes and maintain their competitive advantages (Miller, 1994).

Transformational leadership is a leadership style that can stimulate employees' potential and promote organizational change and innovation (Afsar and Umrani, 2020). In research and development teams in the automotive parts industry, transformational leaders can stimulate the innovation consciousness and motivation of team members through their unique leadership styles and behaviors and enhance the team's innovation performance (George and George, 2024). This leadership style is important for promoting technological innovation in teams and coping with industry changes. The dual-mediating effect of management innovation and knowledge sharing states that a transformational leadership style can significantly contribute to the innovative performance of teams (Zhang et al., 2023). For example, one study found that transformational leadership promotes the realization of technological innovation and enhancement of corporate competitiveness by inspiring employees to innovate, encouraging knowledge sharing and teamwork, and improving employee performance and creativity (Kim and Lee, 2011). Transformational leaders stimulate the innovative potential of employees through their open and inclusive mindset, keen insights into employees' needs, and motivational abilities, which in turn enhances the innovative performance of teams (Choi et al., 2016).

Chinese enterprises need to play a leadership role in improving the innovative performance of R&D teams, especially the transformational leadership style, which has a greater impact on upgrading enterprises. Transformational leadership theory influences the innovative performance of R&D personnel and teams regarding virtue modeling, vision, motivation, Charisma leadership, and individualized consideration. The decline in the virtue of the transformational leadership style and individualized consideration, through the social exchange theory, will affect the organization's team motivation, as well as make the employees feel the supervisor's care, enhance the organization's innovation atmosphere positively, and ultimately affect the innovation performance of the R&D team. Visionary motivation and charismatic leadership in transformational leadership influence employees' knowledge-sharing behaviors through behavioral reasoning theory, ultimately affecting the innovation performance of research and development teams. The theoretical significance of this study helps enrich and expand the application of transformational leadership theory in the auto parts industry. This study provides new perspectives and ideas for research in related fields. The results can provide practical guidance and reference for automotive parts enterprises to optimize their leadership styles and enhance their teams' innovative performance, which will help them maintain their leading position in the fierce market competition.

LITERATURE REVIEW

Concepts and Theories of Transformational Leadership Behavior Theory

Based on Bass's concept of transformational leadership behavior, many scholars have further expanded and deepened this concept (Bass and Riggio, 2006). Issa et al. (2024) pointed out that leaders' transformational behavior facilitates knowledge flow and sharing within an organization. The process of knowledge transfer is due to the fact that leadership behavior greatly facilitates employees' knowledge transfer. The knowledge transfer process is due to the fact that the leader's transformational behavior greatly facilitates the exchange and communication of employees.

Concepts and Theories of Social Exchange Theory (SET)

The relationship between leadership and employee behavior can be explained by the social exchange theory (Cook et al., 2013). The relationship between employees, their leaders, and organizations is often described as an exchange. Social Exchange Theory describes the constant occurrence of reciprocal relationships between individuals (Cropanzano and Mitchell, 2005). In human social life, many factors affect our life processes, and social exchange is an important aspect of these factors. Through social exchange, we can build positive connections with others. From the perspective of psychologists, social exchange is one of the basic principles that human social life follows (Cook et al., 2013). Whether it is business behavior in economic life or people's communication activities in social life, all are affected by exchange; it can be said that social exchange determines our life to some extent. Social exchange theory, which was first proposed by American sociologist Homans in 1958, systematically expounds the principles and methods of social exchange (Homans, 1958).

Concepts and Theories of Behavioral Reasoning Theory (BRT)

BRT theory is developed based on different behavioral intention models (Ahmad and Harun, 2024). BRT theory has been supported by many scholars and has been widely used and studied in the fields of social sciences and organizational behavior. BRT theory emphasizes the important role of behavioral reasoning in results and regards it as an important link between individual beliefs, values, overall motivation (including attitude, subjective norms, and sense of control), behavioral intention, and actual behavior, and the theoretical description is relatively accurate (Sreen et al., 2021). In popular understanding, "intention" is defined as people's expectations of their own behavior in a given context, and "belief" refers to a person's judgment of

the subjective possibility of discernible aspects of their own world (Ahmad and Harun, 2024). Transformational Leadership Behavioral Theory explains that transformational leadership, through charismatic leadership, influences the personal and organizational performance of R&D teams and influences the organizational climate through evocative power (Chunhui et al., 2023).

Hypothesis development from literature

As revealed by Afsar and Umrani (2020), transformational leadership positively affects employees' IWB and learning motivation, mediating the link between transformational leadership and innovative work behavior. They further suggest that task complexity and an innovative climate moderate the relationship between transformational leadership and employees' innovative work behaviors. The strong association between transformational leadership, motivation to learn, and innovative work behavior suggests that managers' transformational leadership traits are important in enhancing employees' innovative work behavior (Basit and Hasan, 2022). Organizations should take care to create a climate that supports innovation, encourages individuals to learn new knowledge and skills, and provides employees with opportunities to apply what they have learned.

H1: Transformational leadership has a direct effect on organizational, creative climate

Transformational leadership, personal-organizational fit, and knowledge-sharing behavior on teachers' IWB and explore the role of knowledge-sharing behavior and personal-organizational fit as mediating variables (Sudibjo and Prameswari, 2021). Moreover, Sudibjo and Prameswari (2021) stated that transformational leadership has no direct positive effect on innovative work behavior, while it positively affects innovative work behavior through knowledge-sharing behavior. Another study by Zywiłek et al. (2022) examined the effects of Transformational Leadership (TFL) and employee adaptability on employee creativity. They revealed that TFL stimulates employees' creativity and has a positive effect on employees' adaptability. The mediation results confirmed that employee adaptability mediated the relationship between technical knowledge and creativity in the hotel industry in developing countries. In addition, the findings show that knowledge sharing plays a key role in the link between technical leadership and employee resilience.

H2: Transformational leadership has a direct effect on knowledge sharing

Chung and Li (2021) examined the potential impact of transformational leadership on followers' innovative behavior and investigated the moderating effect of team learning on this relationship. The multilevel analysis confirmed a nonlinear relationship (inverted U-shape) between team leaders' transformational leadership and team members' IB. This implies that innovative behavior is negatively related to excessive transformational leadership and positively related to moderate levels of leadership. In addition, the statistical analysis confirmed the positive multilevel moderating effect of team learning.

H3: Transformational leadership has a direct effect on the innovation performance of research and development teams

Mutonyi et al. (2022) indicated that organizational climate is important for employees' creative performance. Organizational climate was positively and significantly associated with the two creative performance variables in this study. In addition, this study shows that individual creativity plays a mediating role in the relationship between organizational climate and individual creative behavior (Xerri and Brunetto, 2013).

H4: Organizational creative climate has a direct effect on the innovation performance of research and development teams

Moreover, Muhammed and Zaim (2020) focused on a type of intra-organizational knowledge sharing called peer knowledge sharing. This study examined how peer knowledge sharing affects firms' financial and innovative performance and the mechanisms by which this relationship is realized. Their results indicate that the extent of employees' knowledge-sharing behaviors with their colleagues and managers' leadership support positively influenced the organization's knowledge management success, which in turn positively influenced the organization's innovation and financial performance. The study found that perceived supervisor support from immediate managers is an important factor contributing to respondents' peer knowledge-sharing behaviors. The invariance test of the proposed model for male and female respondents suggests that the contribution of peer knowledge sharing to knowledge management success may differ between the two groups.

H5: Knowledge sharing has a direct effect on the innovation performance of research and development teams

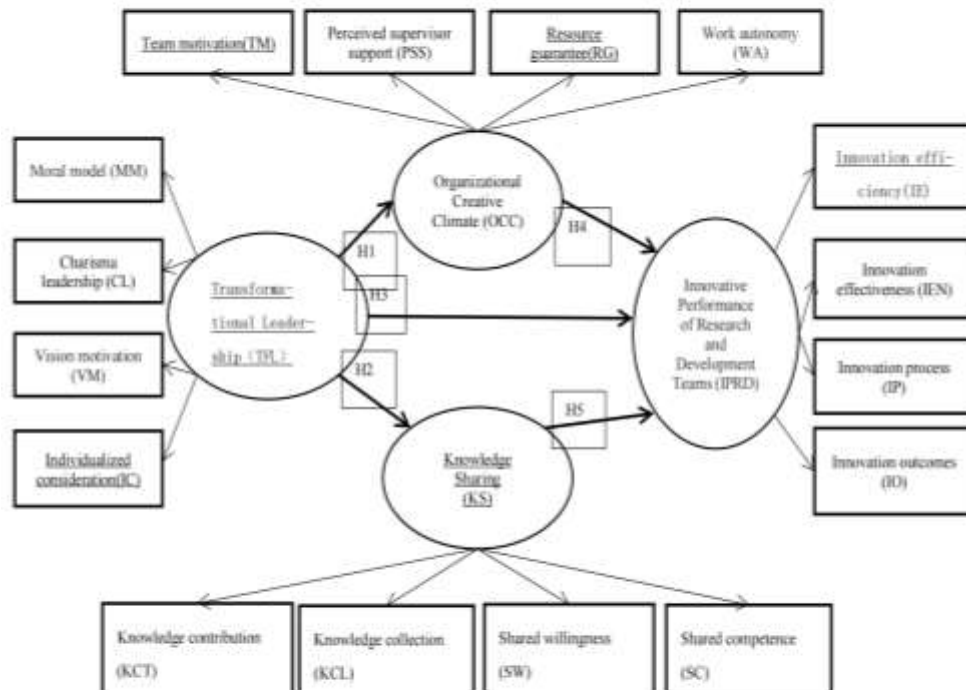


Figure 1. Research Framework

RESEARCH METHODS

The Population and the Sample

Jiangsu Province is a major hub of China's auto parts industry, with 8,418 enterprises concentrated in Suzhou, Wuxi, Changzhou, Nanjing, and Yangzhou. In 2023, the industry achieved 1.16 trillion yuan in sales, reflecting a 10.5% year-on-year growth and highlighting its strong innovation capacity (China Briefing, 2024). To comply with the IATF 16949 quality standards, enterprises must maintain strong R&D capabilities (Bozola et al., 2023). However, financial constraints may limit R&D investments. This study focuses on key enterprises listed in the 2024 Jiangsu Province Auto Parts Key Enterprises Directory to ensure the reliability of the data. The research targeted 8,418 R&D managers, including CEOs, CTOs, CFOs, and COOs. A total of 407 samples were selected from five key cities: Suzhou (182), Changzhou (79), Wuxi (77), Yangzhou (38), and Nanjing (30). These cities account for 80.3% of the province's auto parts industry output, which aligns with the Pareto 80/20 principle. This study adopts probability proportional to sampling, which is more effective than stratified or simple random sampling (Cheung, 2021). Based on Lindeman et al. (1980) criterion, a minimum of 400 samples (20 variables $\times$ 20) is required, and the final 407 samples met statistical validity.

Questionnaire Development

This study collected data through in-depth interviews and questionnaires to examine the factors influencing R&D innovation performance. In-depth interviews with experts followed a structured process, identifying key themes: Transformational Leadership (TFL) integrity, collective interests, employee development, and leadership support; Organizational Creative Climate (OCC) innovation incentives, leadership encouragement, and resource allocation; and Knowledge Sharing (KS)—peer learning, formal knowledge exchange, and AI's role in innovation. The questionnaire survey collected 407 valid samples via an online survey, and the data were analyzed using frequency analysis, descriptive analysis, CFA, correlation analysis, and SEM modeling. Key abbreviations include Transformational Leadership (TFL), Organizational Creative Climate (OCC), Knowledge Sharing (KS), and Innovative Performance of R&D Teams (IPRD). The findings comprehensively reveal the impact of leadership, organizational climate, and knowledge-sharing factors on R&D innovation. The validity of the 30 samples was analyzed. Transformational Leadership consisted of 17 questions, with a Cronbach's alpha of 0.978; organizational creative climate consisted of 17 questions, with a Cronbach's alpha of 0.971; knowledge sharing consisted of 23 questions, with a Cronbach's alpha of 0.889;

and innovative performance of research and development teams consisted of 17 questions, with a Cronbach's alpha of 0.80. Therefore, the validity of the scale is considered to be very good.

Data Analysis

In the questionnaire analysis, statistical software was used to analyze the data. The specific analysis methods included frequency, descriptive, confirmatory factor (CFA), and structural model analyses (SEM). Confirmatory Factor Analysis (CFA) is a statistical analysis method used to determine how well the measured data fit the underlying theoretical model, and it is often employed after Exploratory Factor Analysis (EFA). Confirmatory factor analysis tests the hypothesized relationship between observed variables and latent constructs, based on a theoretical framework. The CFA results are reported with several fit indices, such as χ^2 (Chi-Square), P-value, SRMR (Standardized Root Mean Square Residual), CFI (Comparative Fit Index), TLI (Tucker-Lewis Index), RMSEA (Root Mean Square Error of Approximation), all together to inform how well the model fits the data. The study employed AMOS 26 software to analyze the data. The measurement model for Transformational Leadership (TFL), Organizational Creative Climate (OCC), Knowledge Sharing (KS), and Innovation Performance of R&D Teams (IPRD) was assessed based on factor loadings, R^2 values, composite reliability (CR), and average variance extracted (AVE). A threshold of 0.70 for factor loadings was considered a strong construct representation (Muangmee et al., 2023). This study employed Structural Equation Modeling (SEM) to analyze the data, using multiple fit indices to assess the model's alignment with the observed data.

RESULTS

Respondents' Information

A descriptive analysis of the respondents' information indicates that female (60.44%) respondents dominate male (39.56%). Regarding age distribution, the largest group was aged between 31 and 40 years (42.26%), followed by those aged between 41 and 50 years (27.52%). The sample included 19.41% of respondents aged 20 to 30, while the lowest percentage (10.81%) was those aged 51 and older. Data on marital status showed that most of the respondents were married (57.74%), and the rest were single (37.59%). The level of educational attainment is high, with more than half (50.37%) holding a bachelor's degree. In addition, 29.73% had a college degree, 11.55% had a master's degree, 8.35% had a doctorate, and only 4.67% had a high school education. This demographic data indicates that most respondents were educated and middle-aged.

Table 1. Descriptive Analysis of demographics

Demographics	Frequency	Percentage (%)
Gender		
Male	161	39.56
Female	246	60.44
Age	79	19.41
20 to 30	79	19.41
31 to 40	172	42.26
41 -50	112	27.52
51 and above	44	10.81
Marital Status		
Single	153	37.59
Married	235	57.74
Education		
High school,	19	4.67
College degree	121	29.73
Bachelor degree	205	50.37
Master's degree	47	11.55
Doctoral Degree	34	8.35

Descriptive Statistics of the Study Variables

Overall, the data revealed consistently high levels across all measured latent variables: Transformational Leadership (TFL), Occupational Commitment (OCC), Knowledge Sharing (KS), and Creativity and Efficiency (CE). Within TFL, moral model (MM), charismatic leadership (CL), vision motivation (VM), and individualized consideration (IC) all display mean scores of approximately 3.45 to 3.54, suggesting that leaders in this sample provide strong ethical guidance, inspire through charisma, communicate a clear vision, and offer personalized support (Table 2). For OCC, team motivation (TM), perceived supervisor support (PSS), resource guarantee (RG), and work autonomy (WA) all had mean values above 3.60, indicating a

workforce that is motivated, feels supported by their supervisors, has sufficient resources to do their job, and is relatively free to exercise autonomy in their tasks. In particular, SC showed the highest mean (3.875), suggesting that employees perceive high levels of competence in collaborative settings. Regarding Knowledge Sharing (KS), the findings show a balanced high degree of engagement across all its building blocks. The mean values for Knowledge Contribution (KCT) (Mean = 3.610, SD = 0.962), Knowledge Collection (KCL) (Mean = 3.570, SD = 0.957), Shared Willingness (SW) (Mean = 3.833, SD = 0.887), and Shared Competence (SC) (Mean = 3.875, SD = 0.717). These values indicate a cultural impression of knowledge sharing prevalent in the organization. Moreover, the results indicate that the distribution of the un-normalized frequency was moderately skewed to the left, but the relatively low results in the SK and KU tests indicate that most employees were positive towards knowledge-sharing practices. This indicates that the organization is establishing an atmosphere in which its employees trust their potential to share knowledge, collaborate with one another, and increase overall efficiency. Finally, the CE variables—innovation efficiency (IE), innovation engagement (IEN), innovation performance (IP), and innovation output (IO)—all exceeded a mean of 3.65, indicating a workforce that is both engaged in and capable of producing efficient, high-quality innovations. The standard deviations remained moderate across all measures, implying reasonable variability within the sample. The skewness and kurtosis values suggest that most distributions are slightly left-skewed but generally fall within the acceptable ranges for normality. These results confirm the strong representation of the variables in the research sample, providing a solid foundation for further structural model analysis. Survey Results of Study Transformational Leadership, Organizational, Creative Climate Sharing, and Innovative Performance of Research and Development Teams.

Table 2. Descriptive Analysis of Variables

Latent variable	Measure variable	Max	Min	Mean	SD	SK	KU	Levels
TFL	MM	1.200	5.000	3.518	0.937	-0.648	-0.322	high level
	CL	1.250	5.000	3.544	1.110	-0.688	-0.999	high level
	VM	1.000	5.000	3.459	1.147	-0.603	-1.212	high level
	IC	1.000	5.000	3.445	1.168	-0.665	-1.103	high level
	Total	1.113	4.825	3.491	0.878	-0.645	-0.247	
OCC	TM	1.500	5.000	3.620	1.040	-0.499	-0.877	high level
	PSS	1.000	5.000	3.723	0.936	-0.987	1.134	high level
	RG	1.000	5.000	3.669	1.045	-1.063	0.674	high level
	WA	1.000	5.000	3.771	1.034	-0.687	-0.086	high level
	Total	1.125	4.938	3.696	0.819	-0.863	0.581	
KS	KCT	1.000	5.000	3.610	0.962	-0.613	-0.250	high level
	KCL	1.250	5.000	3.570	0.957	-0.489	-0.621	high level
	SW	1.143	5.000	3.833	0.887	-0.763	0.141	high level
	SC	1.000	5.000	3.875	0.717	-0.901	1.887	high level
	Total	1.238	4.964	3.722	0.713	-0.719	0.882	
CE	IE	1.000	5.000	3.781	1.019	-0.884	0.418	high level
	IEN	1.400	5.000	3.657	1.032	-0.588	-0.785	high level
	IP	1.000	5.000	3.805	0.911	-1.156	1.378	high level
	IO	1.000	5.000	3.672	1.037	-1.124	0.759	high level
	Total	1.100	5.000	3.729	0.819	-1.095	1.089	

Confirmatory Factor Analysis (CFA)

As shown in Table 3, the statistical analyses examining the fit of the four constructs (TFL, OCC, KS, and IPRD) indicated a satisfactory fit. The χ^2/df ratios clustered around 1 for each model (1.176 for TFL, 1.22 for OCC, 1.109 for KS, and 1.224 for IPRD), suggesting an acceptable alignment between the theoretical framework and empirical observations (Nguyen, 2020). Additionally, all probability values surpassed 0.05, signifying that the proposed models did not meaningfully differ from the actual data, further validating a sound fit. The SRMR values, ranging from 0.028 to 0.031, were well below the accepted limit of 0.08, demonstrating a tight fit (Muangmee et al., 2023). The CFI and TLI indices for each construct exceeded 0.90, with the CFI reaching as high as 0.995 for transformational leadership, implying an excellent model fit. The

RMSEA estimates fell between 0.016 and 0.023, affirming that the models adequately accounted for the data, as scores below 0.05 are commonly viewed as acceptable (Nguyen, 2020).

Table 3. Confirmatory Factor Analysis of the Model

Statistics	TFL	OCC	KS	IPRD
χ^2	135.239	140.286	250.687	140.727
Df	115	115	226	115
χ^2/Df	1.176	1.22	1.109	1.224
P-Value	0.096	0.055	0.125	0.052
SRMR	0.028	0.029	0.03	0.031
CFI	0.995	0.994	0.995	0.994
TLI	0.994	0.993	0.995	0.993
RMSEA	0.021	0.023	0.016	0.023

Factor's Loading Results

All loadings exceeded the 0.70 threshold, indicating strong construct representation. The highest loading is 0.876 for Team Motivation (TM) in OCC, while the lowest is 0.697 for Shared Competence (SC) in KS. R^2 Values: All R^2 values were above 0.48, demonstrating that the observed variables explained a substantial portion of their respective latent constructs. Composite Reliability (CR): All CR values surpassed 0.85, ensuring strong internal consistency across the constructs. Average Variance Extracted (AVE): Each construct's AVE exceeded 0.50, confirming good convergent validity. The measurement model met all reliability and validity criteria, indicating that the constructs were robust and suitable for further structural model analysis.

Table 4. Factors' Loading

Latent variable	Measure variable	Loading coefficient	R^2	CR	AVE
TFL	MM	0.800	0.640	0.857	0.601
	VM	0.753	0.567		
	CL	0.774	0.599		
	IC	0.772	0.596		
OCC	TM	0.876	0.767	0.864	0.615
	PSS	0.723	0.523		
	RG	0.724	0.524		
	WA	0.803	0.645		
KS	KCT	0.819	0.671	0.857	0.601
	KCL	0.856	0.733		
	SW	0.717	0.514		
	SC	0.697	0.486		
IPRD	IE	0.747	0.558	0.874	0.635
	IEN	0.807	0.651		
	IP	0.717	0.514		
	IO	0.904	0.817		

Model fit analysis

The Chi-square ratio (CMIN/DF) was 1.134, which was well below the threshold of 2, indicating minimal discrepancies between the model and observed data. Additionally, the p-value was 0.171 (>0.05), suggesting no significant differences between the expected and observed covariance structures, reinforcing the model's validity (Muangmee et al., 2024). Regarding absolute fit indices, the GFI (0.967) surpassed the 0.9 benchmark, demonstrating the model's strong explanatory power over the variance in the dataset. In terms of incremental fit indices, IFI (0.995), TLI (0.994), and CFI (0.995) were all well above 0.9, approaching the

ideal value of 1, signifying substantial improvement over the baseline model and excellent model fit. For error indices, RMSEA (0.018) and SRMR (0.036) were both below 0.05, confirming minimal residual discrepancies and an acceptable error level.

Table 5. Model Fitness

Parameters	CMIN	DF	CMIN/DF	p	GFI	IFI	TLI	CFI	RMSEA	SRMR
Result	112.29	99	1.134	0.171	0.967	0.995	0.994	0.995	0.018	0.036
Standard			<2	>0.05	>0.9	>0.9	>0.9	>0.9	<0.05	<0.05

Results of Model and Hypotheses

The structural model results in the hypothesis testing table provide compelling evidence for the hypothesized relationships between Transformational Leadership, Organizational Creative Climate, Knowledge Sharing, and Innovation Performance of R&D Teams. All five hypotheses (H1–H5) were statistically tested and accepted (Table 6). The initial hypothesis (H1) examines the impact of transformational leadership on the creative climate of the organization. With a path coefficient of 0.534 and a significant t-value of 8.65 ($p < 0.001$), it is evident that transformational leadership plays a fundamental role in cultivating an inventive work environment. Leaders who inspire and motivate their teams while providing intellectual stimulation and supporting individual growth substantially enhance the creative climate of R&D teams. Hypothesis H2 investigates the association between transformational leadership and Knowledge Sharing. The path coefficient of 0.574 and a t-value of 8.35 ($p < 0.001$), the results indicate that transformational leaders facilitate knowledge-sharing practices. Leaders who encourage open communication and build trust among employees enable a culture of knowledge exchange and promote a collaborative atmosphere.

Table 6. Evaluation of the study hypotheses.

Hypothesis	Path	Path Coefficient	S.E.	t	P	Accepted/ Rejected
H1	OCC ← TFL	0.534	0.06	8.65	***	Accepted
H2	KS ← TFL	0.574	0.04	8.35	***	Accepted
H3	IPRD ← TFL	0.203	0.06	2.73	**	Accepted
H4	IPRD ← OCC	0.428	0.05	6.64	***	Accepted
H5	IPRD ← KS	0.241	0.1	3.74	***	Accepted

Note: ***= $p < 0.001$ and **= $p < 0.01$.

The third hypothesis (H3) tests the direct influence of Transformational Leadership on the Innovation Performance of R&D Teams. Although the relationship is significant (t-value = 2.73, $p = 0.01$), the path coefficient of 0.203 denotes a comparatively weaker direct effect than its impact on Organizational Creative Climate and Knowledge Sharing (Figure 2). This suggests that transformational leadership may indirectly contribute more potently to innovation by influencing organizational climate and knowledge-sharing customs. Hypothesis H4 explores the consequence of Organizational Creative Climate on Innovation Performance of R&D Teams. With a path coefficient of 0.428 and a t-value of 6.64 ($p < 0.001$), the results accentuate the importance of an inventive work environment in boosting innovation in the organization. Organizations that encourage idea generation, risk-taking, and collaboration experience higher levels of innovation performance. A robust creative climate provides employees with psychological safety and motivation to experiment and develop novel solutions. The last hypothesis (H5) examines the relationship between Knowledge Sharing and Innovation Performance of R&D teams. The significant path coefficient of 0.241 and t-value of 3.74 ($p < 0.001$) confirm that knowledge-sharing practices enhance the innovative capacity of R&D teams. When employees actively share insights, expertise, and best practices, they contribute to a collective intelligence that fosters problem solving, efficiency, and the development of innovative solutions.

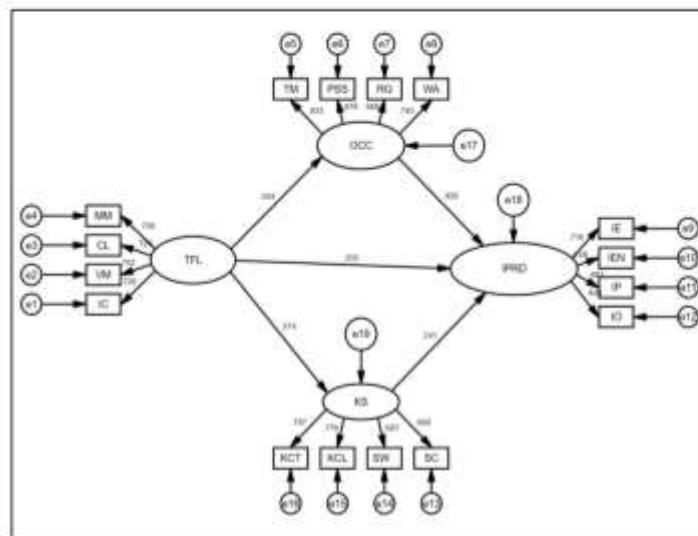


Figure 2. Research model evaluation

This study confirms that Transformational Leadership is a key driver of creative climate and knowledge sharing, significantly contributing to Innovation Performance. While TFL directly impacts innovation, its strongest influence appears to be indirect, through the cultivation of a creative and knowledge-sharing culture. Organizations aiming to enhance R&D innovation should focus on leadership development, foster a collaborative and creative work environment, and implement knowledge-sharing initiatives to maximize innovative outcomes.

DISCUSSION

Innovation has long been a competitive advantage, particularly for automakers developing cutting-edge technologies. Firms must cultivate workplaces conducive to creativity, expertise sharing, and adaptability to maintain industry leadership amid rapid change. Leadership is significant in shaping such environments because it guides team dynamics, knowledge circulation, and problem-solving processes. Transformational leaders seem to be key to fostering organizational climates that welcome novel ideas, collaboration, and improved innovation performance in research and development teams. This study explores these linkages in the Chinese automotive manufacturing sector. It provides insight into how supervision impacts invention within groups developing new designs and engineering, revealing the creative climate and knowledge transfer as potential drivers bringing leadership's effects to execution.

Transformational Leadership and Organizational Creative Climate

The findings in the preceding section demonstrated that Transformational Leadership has a significant positive effect on establishing an Organizational Creative Climate. Leaders who lead through inspiration and intellectual stimulation and consider each employee's needs individually forge a work environment that encourages innovative thinking and collaboration. By inspiring employees with a shared vision for the future, transformational leaders help cultivate a culture in which creative ideas can emerge and blossom. These results echo prior research highlighting the importance of nurturing a strong creative climate to enhance organizational innovation (Shin et al., 2017). An atmosphere conducive to creativity allows workers to experiment freely, without fear of failure. Additionally, recent studies emphasize how digital technologies are increasingly crucial enablers of business model reinvention, underscoring that leadership-driven creativity is key to ensuring that companies can adapt nimbly to rapidly changing industries (Al Maazmi et al., 2024). This reinforces the idea that transformational leadership not only boosts immediate innovation outcomes but also cultivates an agile workforce capable of sustaining competitiveness for years to come (Karimi et al., 2023).

Transformational Leadership and Knowledge Sharing

Transformational Leadership significantly enhances Knowledge Sharing, reinforcing that leadership plays a pivotal role in fostering an open and collaborative work culture, as shown by the study's findings. When leaders inspire and enthusiastically support their teams, they establish an atmosphere in which personnel feel encouraged to exchange ideas, experiences, and know-how, resulting in improved organizational learning and innovation. These results align with previous examinations, such as Carmeli et al. (2013), who also identified a robust bond between leadership and knowledge-sharing behaviors. However, they underscored that structural mechanisms, such as incentive structures, trust-building initiatives, and technological

assistance, are crucial to fully leverage the advantages of knowledge exchange. Furthermore, our outcomes indicate that the direct impact of Transformational Leadership on Innovative Performance is relatively delicate, proposing that knowledge sharing alone is inadequate to propel innovation. This is consistent with Jiang and Chen (2016) argument that leadership cultivates innovation through direct impact and by shaping an empowering environment that bolsters inventiveness and experimentation. Similarly, Zhang et al. (2024) found that knowledge-sharing behavior positively affects innovation only when combined with a powerful organizational learning culture and digital collaboration tools. In the Chinese automotive industry, where technological advances and innovation are key competitive factors, these discoveries have significant implications for leadership progression and corporate strategy. The industry is experiencing swift changes driven by electric vehicle technologies, automation, and artificial intelligence-powered manufacturing. To maintain development and remain globally competitive, Chinese automakers must prioritize transformational leadership and emphasize knowledge-sharing tactics.

Organizational Creative Climate and Knowledge Sharing

The findings show that Transformational Leadership indirectly improves Innovative Performance by nurturing an Organizational Creative Climate and facilitating Knowledge Sharing. Although the direct impact of transformational leadership on innovation was modest, it implies that leadership alone is not adequate to spur innovation. Rather, cultivating a supportive environment where creativity and knowledge exchange are encouraged is pivotal for translating leadership into tangible and innovative outcomes. This is consistent with Jiang and Chen (2016) study, which emphasized that leadership fosters innovation by molding an atmosphere conducive to experimentation and collaboration. Additionally, Panyasupat et al. (2024) underscore the broader influence of transformational leadership on entrepreneurial intentions, suggesting that leaders play a key role in motivating employees to embrace innovative mindsets. The study also highlights the importance of investing in leadership development programs, particularly for organizations in innovation-driven sectors, such as the Chinese automotive industry, where leaders should focus on behaviors that promote trust, collaboration, and creativity. This agrees with Kassakorn et al. (2024), who argue that trust and perceived value are vital for organizational success, reinforcing the idea that transformational leadership must cultivate these elements to foster an environment conducive to innovation.

Implications for Leadership Development in R&D Teams

The findings of this study emphasize the importance of investing in leadership-training programs that develop transformational leadership qualities. Organizations in the Chinese automotive industry should prioritize leadership behaviors that foster innovation, trust, and collaboration to enhance their overall performance and competitiveness. Transformational leaders are critical for motivating employees, encouraging creativity, and establishing a positive organizational culture that supports long-term growth. Furthermore, Kassakorn et al. (2024) highlighted that trust, perceived value, and service quality significantly contribute to organizational success. This reinforces the idea that leaders must actively cultivate these elements in an innovation-driven work environment. Companies can strengthen their market position and drive sustainable success in an increasingly competitive business landscape by focusing on leadership strategies that enhance employee engagement and organizational trust.

Although this study provides valuable insights, further research is needed to explore additional mediators, such as team collaboration, psychological safety, and digital transformation tools. Muangmee et al. (2023) highlight the importance of digital marketing and technological advancements, suggesting that digital collaboration platforms and AI-driven knowledge management systems could further enhance leadership's impact on innovation. Future studies should examine these factors in different industries and cultural contexts.

CONCLUSION

Main Findings

This study highlights the significant role of Transformational Leadership in fostering innovation within R&D teams in the Chinese automotive industry, particularly through its influence on Organizational Creative Climate and Knowledge Sharing. The findings suggest that although Transformational Leadership does not directly impact Innovative Performance, it plays a critical role in shaping an environment that fosters creativity and knowledge exchange, which are essential drivers of innovation. Leaders who inspire vision, encourage collaboration, and create a culture of trust and openness enable their teams to think innovatively and develop new technological advancements. Organizations can significantly improve their R&D team performance and overall business competitiveness by nurturing a work environment that values experimentation and continuous learning. A strong creative climate encourages employees to engage in problem-solving, share insights, and collaborate on innovative projects. Simultaneously, effective knowledge-sharing mechanisms ensure that expertise is transferred efficiently across teams.

Managerial Implications

Companies must invest in leadership development programs, enhance employee engagement strategies, and refine their organizational structures to maximize the potential of their R&D teams. Moreover, leveraging

digital tools, AI-driven decision-making, and data-driven innovation management can enhance leaders influence on knowledge flow and inspire creative thinking within their teams.

Limitations & Strengths of the Study

However, this study is limited to the automotive sector, which may restrict the generalizability of the findings to other industries and contexts. Future research should extend the analysis to sectors such as renewable energy, high-tech manufacturing, pharmaceuticals, and artificial intelligence, where leadership styles and innovation dynamics may differ. Incorporating qualitative research methods, such as in-depth interviews and case studies, could provide a more comprehensive understanding of how leadership fosters innovation. Despite these limitations, this study provides valuable insights for business leaders, policymakers, and researchers seeking to enhance leadership strategies in innovation-driven industries in China. In an era of rapid technological advancements and intense global competition, the ability to develop transformational leaders who can cultivate an innovative culture and drive knowledge-sharing mechanisms will be a key differentiator for organizations aiming to sustain long-term innovation and maintain a competitive edge in an ever-evolving market.

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INFORMED CONSENT DECLARATION

To ensure the rights and dignity of individuals, all respondents provided informed consent to participate in the study. They were informed that the information they provided would not be used in any other way except for research purposes. The research was also conducted in compliance with the relevant ethical principles, and all respondents had the right to withdraw from the study whenever they wished without any form of consequence.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this study.

DATA AVAILABILITY

The study data are accessible to interested researchers who contact the corresponding author. This study has participant-related confidentiality terms that limit the sharing of some available data.

REFERENCES

1. Afsar, B., & Umrani, W. A. (2020). Transformational leadership and innovative work behavior. *European Journal of Innovation Management*, 23(3), 402-428. doi:10.1108/EJIM-12-2018-0257
2. Ahmad, N., & Harun, A. (2024). Reasons for tourist intention to use e-bike sharing services; an application behavioral reasoning theory (BRT). *Tourism Review*, 79(9), 1542-1559.
3. Al Maazmi, A., Piya, S., & Araci, Z. C. (2024). Exploring the Critical Success Factors Influencing the Outcome of Digital Transformation Initiatives in Government Organizations. *Systems*, 12(12). doi:10.3390/systems12120524
4. Barnes, J., & Morris, M. (2008). Staying alive in the global automotive industry: what can developing economies learn from South Africa about linking into global automotive value chains? *The European Journal of Development Research*, 20(1), 31-55. doi:10.1080/09578810701853157
5. Basit, A., & Hasan, M. (2022). The mediating role of work engagement in the relationship between transformational leadership and employee performance. *Leadership & Organization Development Journal*, 43(8), 1263-1281.
6. Bass, B. M., & Riggio, R. E. (2006). *Transformational leadership*. London: Lawrence Erlbaum Associates, Inc.
7. Bozola, P. M., Nunhes, T. V., Barbosa, L. C. F. M., Machado, M. C., & Oliveira, O. J. (2023). Overcoming the challenges of moving from ISO/TS 16949 to IATF 16949: recommendations for implementing a quality management system in automotive companies. *Benchmarking: An International Journal*, 30(9), 3699-3724. doi:10.1108/BIJ-04-2022-0215
8. Carmeli, A., Gelbard, R., & Reiter-Palmon, R. (2013). Leadership, creative problem-solving capacity, and creative performance: The importance of knowledge sharing. *Human resource management*, 52(1), 95-121. doi:https://doi.org/10.1002/hrm.21514
9. Chen, Y., Dai, X., Fu, P., Luo, G., & Shi, P. (2024). A review of China's automotive industry policy: Recent developments and future trends. *Journal of Traffic and Transportation Engineering (English Edition)*, 11(5), 867-895. doi:https://doi.org/10.1016/j.jtte.2024.09.001

10. Cheung, A. K. L. (2021). Probability proportional sampling. In *Encyclopedia of quality of life and well-being research* (pp. 1-3): Springer.
11. China Briefing. (2024). China Regional Focus: Suzhou, Jiangsu Province. Retrieved from <https://www.china-briefing.com/news/china-regional-focus-suzhou-jiangsu-province/>. Accessed: 2 February 2024
12. Choi, S. L., Goh, C. F., Adam, M. B. H., & Tan, O. K. (2016). Transformational leadership, empowerment, and job satisfaction: the mediating role of employee empowerment. *Human Resources for Health*, 14(1), 73. doi:10.1186/s12960-016-0171-2
13. Chung, D. S., & Li, J. M. (2021). Curvilinear effect of transformational leadership on innovative behavior among R&D teams in South Korea. *Journal of Organizational Change Management*, 34(1), 252-270. doi:10.1108/JOCM-01-2017-0017
14. Chunhui, L., Azar, A. S., & Ahmad, A. (2023). Withdrawn: The Effects of Charismatic Aspects of Transformational Leadership on Personal Outcomes: An Empirical Literature Review. *Education Quarterly Reviews*, 6(2), 212-220.
15. Cook, K. S., Cheshire, C., Rice, E. R., & Nakagawa, S. (2013). *Social exchange theory*. Springer.
16. Cropanzano, R., & Mitchell, M. S. (2005). Social exchange theory: An interdisciplinary review. *Journal of management*, 31(6), 874-900.
17. Farida, L., & Setiawan, D. (2022). Business Strategies and Competitive Advantage: The Role of Performance and Innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, 8(3), 163. doi:https://doi.org/10.3390/joitmc8030163
18. George, A. S., & George, A. H. (2024). Riding the wave: an exploration of emerging technologies reshaping modern industry. *Partners Universal International Innovation Journal*, 2(1), 15-38.
19. Homans, G. C. (1958). Social behavior as exchange. *American journal of sociology*, 63(6), 597-606.
20. IEA. (2024). Trends in electric cars. Retrieved from International Energy Agency, Paris, France: <https://www.iea.org/reports/global-ev-outlook-2024/trends-in-electric-cars>. Accessed: 20 December 2024.
21. Issa, A. G., Fagbemi, A. S., Ogunbanjo, B., Omorinbola, T. O., Fagbemi, C. A., & Popoola, B. O. (2024). Transformational leadership politics in the twenty-first century: Implications for organizations and organizational policies. *Integral Research*, 1(8), 168-213.
22. Jiang, Y., & Chen, C. C. (2016). Integrating Knowledge Activities for Team Innovation: Effects of Transformational Leadership. *Journal of Management*, 44(5), 1819-1847. doi:10.1177/0149206316628641
23. Karimi, S., Ahmadi Malek, F., Yaghoubi Farani, A., & Liobikiene, G. (2023). The Role of Transformational Leadership in Developing Innovative Work Behaviors: The Mediating Role of Employees' Psychological Capital. *Sustainability*, 15(2). doi:10.3390/su15021267
24. Kassakorn, N., Chaitorn, T., Sawangcharoen, K., Jaima, S., Muangmee, C., & Saqib, S. E. (2024). Exploring post-purchase intentions in Thailand's tourism sector: a study on service quality, perceived value, trust, and satisfaction of customer. . *International Journal of Services Economics and Management*, 1(1), 1-15. doi:10.1504/IJSEM.2024.10064685
25. Khilari, R., Wali, O. P., & Singh, R. K. (2022). Identification and prioritisation of technology management practices for enhancing competitiveness of auto components manufacturing firms in India. *International Journal of Manufacturing Technology and Management*, 36(1), 65-94.
26. Kim, J.-G., & Lee, S.-Y. (2011). Effects of transformational and transactional leadership on employees' creative behaviour: mediating effects of work motivation and job satisfaction. *Asian Journal of Technology Innovation*, 19(2), 233-247. doi:10.1080/19761597.2011.632590
27. Leminen, S., Rajahonka, M., Wendelin, R., Westerlund, M., & Nyström, A.-G. (2022). Autonomous vehicle solutions and their digital servitization business models. *Technological Forecasting and Social Change*, 185, 122070. doi:https://doi.org/10.1016/j.techfore.2022.122070
28. Lindeman, R. H., Merenda, P. F., & Gold, R. Z. (1980). *Introduction to bivariate and multivariate analysis* (Vol. 4). Scott, Foresman Glenview, IL.
29. Madaram, V. G., Biswas, P. K., Sain, C., Thanikanti, S. B., & Balachandran, P. K. (2024). Advancement of electric vehicle technologies, classification of charging methodologies, and optimization strategies for sustainable development - A comprehensive review. *Heliyon*, 10(20), e39299. doi:https://doi.org/10.1016/j.heliyon.2024.e39299
30. Miller, R. (1994). Global R & D networks and large-scale innovations: The case of the automobile industry. *Research policy*, 23(1), 27-46.
31. Muangmee, C., Pongvatnanusorn, V., Sawangcharoen, K., Chaitorn, T., Kassakorn, N., & Saqib, S. E. (2024). Factors Influencing the Success of Processed Agricultural Products: An Empirical Study from Thailand. *Sarhad Journal of Agriculture*, 40(3). doi:https://dx.doi.org/10.17582/journal.sja/2024/40.3.1033.1045
32. Muangmee, C., Sawangcharoen, K., Pongvatnanusorn, V., Chaitorn, T., Kassakorn, N., & Saqib, S. E. (2023). Exploring the Factors Influencing Tourist Destination Loyalty: A Case Study of Homestay Entrepreneurs in Thailand. *Changing Societies & Personalities*, 7(4), 190-205. doi:https://doi.org/10.15826/csp.2023.7.4.258

33. Muhammed, S., & Zaim, H. (2020). Peer knowledge sharing and organizational performance: The role of perceived supervisor support and knowledge management success. *Journal of Knowledge Management* 24(4), 31–751. doi:10.1108/JKM-03-2020-0227
34. Mutonyi, B. R., Slåtten, T., & Lien, G. (2022). Organizational climate and creative performance in the public sector. *Creativity and Innovation Management*, 31, 1, 25–40. doi:10.1108/EBR-02-2019-0021
35. Nguyen, D. (2020). Mediating the role of psychological empowerment between transformational leadership and employee engagement. *Management Science Letters*, 10(16), 4039–4044.
36. Panyasupat, R., Muangmee, C., & Soonsawud, N. (2024). An Entrepreneurship Intention Model of University Students Under Rajabhat University in The Era of Thailand 4.0. *Journal of Graduate Studies Network in Northern Rajabhat Universities*, 14(1), 52–70.
37. Sadaf, M., Iqbal, Z., Javed, A. R., Saba, I., Krichen, M., Majeed, S., & Raza, A. (2023). Connected and Automated Vehicles: Infrastructure, Applications, Security, Critical Challenges, and Future Aspects. *Technologies*, 11(5). doi:10.3390/technologies11050117
38. Shin, S. J., Yuan, F., & Zhou, J. (2017). When perceived innovation job requirement increases employee innovative behavior: A sensemaking perspective. *Journal of Organizational Behavior*, 38(1), 68–86. doi:https://doi.org/10.1002/job.2111
39. Spherical Insights. (2024). Automotive & Transportation. Retrieved from Spherical Insights, Ohio, USA: <https://www.sphericalinsights.com/reports/automotive-components-market>. Accessed: 22 December 2024.
40. Sreen, N., Dhir, A., Talwar, S., Tan, T. M., & Alharbi, F. (2021). Behavioral reasoning perspectives to brand love toward natural products: Moderating role of environmental concern and household size. *Journal of Retailing and Consumer Services*, 61, 102549. doi:https://doi.org/10.1016/j.jretconser.2021.102549
41. Sudibjo, N., & Prameswari, R. K. (2021). The effects of knowledge sharing and person–organization fit on the relationship between transformational leadership on innovative work behavior. *Heliyon*, 7(6), 93–104. doi:10.1016/j.heliyon.2021.e07334
42. Xerri, M. J., & Brunetto, Y. (2013). Fostering innovative behavior: The importance of employee commitment and organizational citizenship behavior. *The International Journal of Human Resource Management*, 24(16), 3163–3177. doi:https://doi.org/10.1080/09585192.2013.775033
43. Zhang, G., Zhang, X., & Wang, Y. (2024). Perceived insider status and employees' innovative behavior: the role of knowledge sharing and organizational innovation climate. *European Journal of Innovation Management*, 27(2), 589–607. doi:10.1108/EJIM-03-2022-0123
44. Zhang, J., Riaz, M., Boumah, F. A., & Ali, S. (2023). Harnessing technological innovation capabilities by the mediating effect of willingness to share tacit knowledge: a case from Pakistani software SMEs. *Kybernetes*, 52(12), 6590–6616.
45. Zywiolak, J., Tucmeanu, E. R., Tucmeanu, A. I., Isac, N., & Yousaf, Z. (2022). Nexus of Transformational Leadership, Employee Adaptiveness, Knowledge Sharing, and Employee Creativity. *Sustainability*, 14(18). doi:10.3390/su141811607

Appendix G

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Research Profile

Name-Surname: Zhu Aijun

Educational background:

- Doctor of Business Administration, Bansomdejchaopraya Rajabhat University, 2022
- Master of Quality Management, Hong Kong Polytechnic University, Enrolled in 2020.
- Economic Law, Zhongnan University of Economics and Politics, Enrolled in 1997.

Work experience:

- From 2008 to 2025, I have been running my own business at Kunshan Yizhidao Consulting Co., Ltd., where I am currently in charge of the company's operation and management as well as management consulting services.
- The clients I directly served include BOE, Supor, Haixing Co., Ltd., China Tobacco, etc. The services provided help enterprises improve business performance, enhance operational efficiency, improve quality, and reduce costs, etc.
- From 2005 to 2008, I served as a management consultant at A+ Management Consulting Company in Kunshan.

Current Contact Location:

- Room 305, Building 5, Zhongda Future City, No. 10, Tangning Street, Kunshan City, Suzhou City, Jiangsu Province, China.