IMPACT OF LEARNING ORGANIZATIONS ON SUSTAINABLE PERFORMANCE IN CHINESE PUBLIC IT COMPANIES: A CAUSAL MODEL WITH KNOWLEDGE MANAGEMENT AND INNOVATION CAPABILITY AS MEDIATORS

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DECLARATION

I, Qin Junjie (Student ID# 6319200019), hereby certify that the work embodied in this dissertation entitled "Impact of Learning Organizations on Sustainable Performance in Chinese Public IT Companies: A Causal Model with Knowledge Management and Innovation Capability as Mediators" is result of original research and has not been submitted for a higher degree to any other university or institution.

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ABSTRACT

Title : Impact of Learning Organizations on Sustainable Performance in Chinese Public IT Companies: A Causal Model with Knowledge Management and Innovation Capability as Mediators

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This research aims to (1) examine the factors within a learning organization that significantly influence sustainable performance in China's public IT companies, (2) analyze the mediating roles of knowledge management practices and innovation capability in enhancing sustainable organizational performance, and (3) propose a causal model demonstrating how learning organization practices impact sustainable performance.

A mixed-method approach was employed, comprising quantitative data from 546 valid responses to a survey distributed across 10 public IT companies in five regions of China. The qualitative component involved in-depth interviews with 20 middle managers to provide additional insights. Data were analyzed using quantitative methods as the primary approach, while qualitative findings offered supporting context. Ethical approval was obtained under certification number PIM-REC 037/2567.

The results indicate that Connection System is the most impactful learning organization factor, aligning learning initiatives with long-term objectives. In Knowledge Management Practices, Knowledge Application emerged as the highest influence, underscoring the importance of effectively applying knowledge to optimize outcomes. Process Innovation was the strongest factor in Innovation Capability, emphasizing its role in operational efficiency and product development. Finally, Environmental Performance displayed a critical dimension of sustainable organizational performance, stressing the importance of sustainability initiatives like energy efficiency and carbon reduction. These findings highlight the importance of strategic leadership, knowledge application, process innovation, and environmental performance in advancing the sustainable success of China's public IT sector.

Keyword: learning organization, knowledge management, innovation capability, sustainable performance

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CHAPTER 1

INTRODUCTION

1.1 Background of the Problem

The sustainability of public IT companies is increasingly dependent on their ability to adapt to dynamic environments through learning, knowledge management (KM), and innovation. However, significant challenges in fostering learning organizations, implementing effective KM practices, and enhancing innovation capacity hinder their progress (Hong et al., 2022; Ordóñez De Pablos & Lytras, 2018; Smuts & Van Der Merwe, 2022). This research explored the interrelationship between learning organizations, KM, and innovation in driving the sustainable performance of public IT companies in China.

(1) While widely endorsed, the learning organization concept faces significant implementation challenges. A primary issue is adapting to modern crises, such as the COVID-19 pandemic, which revealed gaps in technological infrastructure, content delivery, and evaluation systems. This underscored the need for new knowledge and resources to manage such disruptions effectively (Machado et al., 2023). Additionally, organizations often need to work on creating environments conducive to continuous learning, with a lack of self-directed learning structures and innovative leadership impeding employee development and organizational growth (Dobrzinskiene et al., 2022).

Structural and procedural barriers also hinder learning organizations. With clear guidelines and frameworks, organizations can foster a learning culture and fully utilize intellectual potential, limiting long-term development (Ostrovska, 2021). Digitalization further exacerbates these challenges, as many organizations need actionable strategies to evolve into learning organizations, resulting in stagnation (Hafit et al., 2022). Leadership plays a critical role, but resistance to change and insufficient collaborative support in educational settings make establishing learning organizations easier (Welsh et al., 2021).

Additionally, the complexity of organizational learning and the impatience of leaders hinder progress. Transforming into a learning organization requires time and a comprehensive strategy incorporating action learning and leadership development (Marquardt, 2019).

Additionally, the absence of organizational learning frameworks restricts continuous development, especially in smaller IT enterprises, where learning processes are essential for adaptation and innovation (Grützner, 2019). Overcoming these challenges requires strong leadership, clear procedural frameworks, and a commitment to fostering a culture of continuous learning across all organizational levels.

(2) Public IT companies' Knowledge management (KM) practices face numerous challenges that impede effective knowledge creation, transfer, and storage. Knowledge sharing remains a significant issue in IT companies, exemplified by the IT Operation Center at PT Citilink Indonesia, where difficulties in system design hinder efficient knowledge transfer (Banuaji et al., 2023). These challenges are further exacerbated in governmental organizations, where barriers to KM implementation reduce efficiency (Asadi et al., 2020). Jackson et al. (2020) emphasize that addressing these KM issues requires top-down support, a conducive organizational culture, and formal processes to ensure the success of KM systems.

Meanwhile, research on knowledge management (KM) practices in public IT companies reveals several critical challenges. A vital issue is integrating KM with organizational resilience and risk management strategies, limiting its role in enhancing long-term sustainability (Manab & Aziz, 2019). Additionally, the absence of structured KM systems hinders effective knowledge transfer, leading to low innovation and underdeveloped competencies, as seen in public IT enterprises in Ukraine (Koshelieva et al., 2023). Gaps in people, processes, technology, and governance further obstruct KM initiatives, particularly in government organizations (Hapsari, 2023). Thus, public IT

enterprises often need help integrating KM into their broader strategies, limiting innovation and resilience.

Public IT companies' low knowledge management culture significantly limits innovation and competency development. Research highlights that insufficient personnel competencies, combined with a focus on personalization rather than codification in knowledge management strategies, hampers the innovative capacity of these companies. This lack of structured KM systems impacts knowledge transfer and ultimately reduces the organization's ability to drive innovation (Koshelieva et al., 2023). Another study suggests that building knowledge absorptive capacity through effective human resource management and recruitment practices can mitigate challenges such as employee turnover and knowledge loss in public companies. This approach addresses KM issues in sectors with high staff mobility (Phaladi, 2023).

(3) Public IT companies face significant process and product innovation challenges, requiring systematic approaches and managerial support to overcome these barriers. According to Roberts et al. (2022), companies increasingly incorporate consumer co-creation into the product innovation process, necessitating significant changes to traditional innovation frameworks to facilitate collaboration and adaptability. Additionally, integrating system elements across company operations is essential for driving process and product innovation, as Babaeva and Grigorieva (2020) emphasized, underscoring the need for effective organizational structures to support innovation.

Behavioral innovation in public IT companies is often hindered by resistance to change and entrenched behaviors. Ryu (2022) emphasizes that an innovative culture, strong leadership, and clear goals are essential for overcoming these barriers and fostering employee innovation. Building a culture is critical to driving behavioral change and enhancing innovation capacity.

Integrating new technologies remains challenging due to managing resources and knowledge networks. Public IT companies often face difficulty transforming knowledge

into valuable technical innovations, essential for maintaining competitive advantage in a dynamic market (Yáñez-Valdés et al., 2021).

Companies also face difficulties in implementing market innovations, as highlighted by (Amesho et al., 2021). The need to continuously redesign innovation capacities to remain competitive often overwhelms public IT enterprises, especially regarding market positioning and client satisfaction.

These studies indicate that overcoming these innovation challenges requires aligning strategies across product, process, and technical innovations while addressing behavioral and market barriers.

(4) The problems of environmental performance in sustainable organizations stem from several factors. One issue is the need for more evaluation mechanisms for environmental performance, which complicates management and decision-making processes. A review emphasizes establishing clear performance indicators and methods to address ecological challenges (Jiang, 2023). Additionally, the relationship between economic development and environmental sustainability, particularly in energy use and CO2 emissions, underscores the need for more robust government policies (Boni et al., 2023). Institutional factors such as corruption control and innovation also play a significant role in national environmental performance (Rohov et al., 2021). Furthermore, companies with an ecological solid orientation tend to outperform their peers financially, indicating that sustainability strategies can enhance profitability (Gull et al., 2022).

Sustainable organizations need help in achieving solid economic performance. One key issue is the need to balance financial growth with sustainability goals. Vargas-Hernández (2022) stresses that organizations must shift from focusing solely on economic objectives to incorporating social inclusion and environmental sustainability. Additionally, sustainability reporting does not continually improve financial indicators like ROE and ROA, as Herdan et al.(2020) highlighted. While sustainable supply chain management can boost competitiveness, it poses financial challenges in the short term due to the required

investments (Adegoke et al., 2021). Economic viability remains challenging in sectors like agriculture-based enterprises, which correlate poorly with overall sustainability (Salvo, 2023).

Sustainable organizations need help in balancing social missions with financial sustainability. Social enterprises often need help with governance and business models to ensure social impact and economic viability (Gertner, 2023). Leadership and organizational culture are critical for building social sustainability, as effective leadership fosters collaboration and agility (D. Kim et al., 2024; Suaidy & Manurung, 2023). Prioritizing employee well-being and social involvement leads to better financial and community outcomes (X. Wang et al., 2022).

The problems in learning organization, knowledge management practices, innovation capability, and sustainable organizational performance highlight critical gaps in public IT companies. Issues such as inadequate learning environments, poor knowledge transfer, and limited innovation capacity hinder sustainability efforts. Therefore, the three research questions are designed to address these gaps: 1) Identifying the critical factors of a learning organization that influence sustainable performance, 2) Understanding the mediating roles of knowledge management and innovation capability in driving sustainability, and 3) Structuring an effective learning organization model to enhance sustainable organizational performance. The innovation of this research lies in its holistic approach, integrating these variables to provide a comprehensive framework that can guide public IT companies in China toward improved sustainability.

1.2 Significance of the Problem

Theoretical significance

The theoretical significance of learning organization, knowledge management practices, innovation capability, and sustainable organizational performance is evident in their interconnected roles in driving organizational success. A learning organization fosters continuous improvement and adaptability, providing the foundation for sustainable performance by leveraging intellectual potential and enhancing innovation (Prasetyo & Salabi, 2022; S. Zhou, 2023). Effective knowledge management practices are crucial for organizational learning, enabling knowledge sharing and driving innovation, which is vital for competitive advantage and sustainability (Deswira et al., 2022; Laily et al., 2023). Innovation capability mediates learning and performance, where enhanced innovation processes lead to improved operational and sustainable outcomes (Berndt et al., 2023; Gomes et al., 2022). These factors collectively contribute to sustainable organizational performance, as organizations that effectively integrate learning, knowledge management, and innovation are better positioned to achieve long-term sustainability and competitive advantage (Muñoz-Pascual & Galende, 2020; Nasution et al., 2021).

Practical significance

This paper takes improving the organizational sustainability performance of Internet enterprises as the primary motivation for research. Then, it proposes a corporate sustainability performance system for China's Public Internet industry according to the characteristics of China's Internet industry and theories related to learning organization, knowledge management practices, and organizational sustainability performance to facilitate the coordination between Internet enterprises and various stakeholders. To achieve the mutual benefit and win-win business objectives of Internet enterprises. This can not only deepen the understanding of the learning organization of Internet enterprises so that Internet enterprises can actively practice knowledge management but also put forward relevant measures according to the research conclusions to realize the long-term and healthy development of Internet enterprises.

Based on summarizing previous studies and combining them with an exploratory case study on learning organizations of public Internet companies, this paper constructs a mechanism model of the impact of knowledge management practices systems on organizational sustainable performance. It verifies the relationship between learning organizations, knowledge management practices, and organizational sustainable performance through empirical research. On this basis, it is proposed to optimize the management strategy of learning organizations of Public Internet companies in China, which has a reference role in human resource management for carrying out various knowledge management practices activities and improving organizational performance and is highly practical.

1.3 Research Question

The study, while finding theoretical support to the research question stated above, should also find possible answers to the following:

1. What are the factors of learning organization affecting sustainable organizational performance of Public IT companies in China?

2. What are the impacts of knowledge management practices and innovation capability as the mediating factors on sustainable organizational performance of Public IT companies in China?

3. How should the learning organization model impact the sustainable organizatio nal performance of Public IT companies in China?

1.4 Objective of the Study

This research project aimed to examine the impact of learning organizations on sustainable organizational performance, using the example of List Internet Company. This goal was accomplished by addressing the following research objectives:

1. To determine the factors of learning organizations that significantly impact the sustainable organizational performance of public IT companies in China.

2. To determine how knowledge management practices and innovation capability, as mediators, significantly impact the sustainable organizational performance of public IT companies in China.

3. To develop a model of Learning organization impacts for the sustainable organi zational performance of Public IT companies in China.

1.5 Recommendation for Future Study

Future research should expand on the following areas:

Longitudinal Studies: Future research could benefit from longitudinal studies to track the development of learning organizations and their impact on sustainable organizational performance over time. This would help identify how the dynamics between knowledge management practices, innovation capability, and performance evolve as public IT companies grow.

Cross-Industry Comparisons: While this study focuses on public IT companies in China, future research should compare these findings with other industries and sectors, both within and outside China, to assess whether the identified relationships hold in different organizational and cultural contexts.

Technological Advancements: Given the rapid pace of technological advancement, future studies could explore how emerging technologies, such as AI and big data analytics, impact knowledge management practices and innovation capability in public IT companies and how these technologies influence sustainable performance.

Broader Mediating Factors: While this study examines knowledge management practices and innovation capability as mediators, future research could explore other potential mediators, such as organizational culture, leadership style, or employee

engagement, to provide a more holistic view of the factors influencing sustainable performance.

Small and Medium-Sized Enterprises (SMEs): Public IT companies in China represent large organizations, but future research could explore whether the exact causal relationships apply to smaller enterprises, which may have different resource constraints and organizational structures.

Future research can address these areas and deepen our understanding of how learning organizations, knowledge management, and innovation drive sustainability across diverse organizational contexts.

1.6 Benefit of the Study

The expected result will be benefit to:

1) Further study is needed to develop sustainable organizational performance through knowledge management practices and to assess the impact of learning organizations' innovation capacity on IT companies.

2) Public IT company administrators should pay attention to Learning organizations, support employees, and recognize their knowledge management practices and innovation capacity. These represent intellectual capacity that improves organizations' Sustainable Organization Practices and increases their competitiveness.

3) Policies concerning the promotion of Learning Organizations to positions of management and leadership membership must adapt to new systems of Knowledge management practices and innovation capacity to deal flexibly with employees and recognize and motivate them.

4) Promote integrity and openness with Public IT Companies by sharing Knowledge management practices and innovation capacity that enhance sustainable organizational performance.

1.7 Definition

A Learning Organization (in a Public IT company) is an entity that continuously evolves by fostering a culture of ongoing learning, knowledge sharing, and adaptability. It comprises continuous learning, inquiry and dialogue, team learning, embedded systems, empowerment, system connection, and strategic leadership.

Knowledge Management Practices (in IT companies) involves systematically creating, storing, sharing, and applying knowledge to improve organizational performance and innovation. They are composed of knowledge transfer, knowledge application, knowledge creation, and knowledge storage.

Innovation Capability in IT companies means the organization's ability to continuously develop and implement new products, processes, and technologies that meet market demands and drive competitive advantage—composed of product innovation, process innovation, technological innovation, market innovation, and behavioral innovation.

Sustainable organizational performance in IT companies means integrating environmental, economic, and social practices into their operations to achieve long-term viability and positive societal impact. These practices are composed of environmental, economic, and social performance.

CHAPTER 2
LITERATURE REVIEW

This paper examined the role of learning organizations in enhancing sustainable organizational performance within China's IT sector. By integrating theoretical foundations with empirical evidence, the study explores how learning organizations, characterized by continuous adaptation, positively influence sustainability. Drawing from contemporary research and case studies, the paper offers a detailed analysis of the relationship between learning organizations and sustainable performance, providing strategic insights for practitioners and scholars in the IT industry.

Theoretical Foundations and Research Questions

The investigation is grounded in the theoretical framework of learning organization theory, which posits that organizations capable of adapting to changing environments through continuous learning are more likely to achieve long-term success. This study extends this theory into the context of the IT industry in China, a sector characterized by rapid technological advancements and intense competition. The research questions are formulated to explore how learning organization principles influence sustainable performance outcomes in this sector.

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

2.1 The foundation of theories (knowledge-based theory and dynamic capabilities theory

2.2 Learning organization theory

2.3 Knowledge organization practice theory

2.4 Innovation capability

2.5 Sustainable organizational performance theory

2.6 Related literature

2.1 The Impact of Learning Organization on Sustainable Organization Performance

Antunes & Pinheiro（2020) stress applying this knowledge to improve organizational capabilities. Calik et al. (2017) emphasize the role of external knowledge in learning organizations, while Saunila (2016) and Fanbasten (2014) focus on mobilizing organizational members to adapt to complex environments. Pereira and Bamel (2021) extend this, noting that learning occurs at individual, group, and organizational levels. Hamdani and Susilawati (2018) argue that learning organizations are tied to internal culture, knowledge acquisition, and application mechanisms. Park et al. (2014) and Anwar and Niode (2017) highlight the role of absorbing new knowledge to enhance organizational behavior. Despite varying approaches, all emphasize the role of learning organizations in improving knowledge transfer, sharing, and acquisition.

In learning organizations, two types of knowledge are critical: explicit and tacit (Mendoza-Silva, 2021). Explicit knowledge is easily shared through teaching, reading, and writing but is also easily imitated by competitors (Lei et al., 2020). Tacit knowledge, on the other hand, is accumulated through experience and is difficult to imitate, making it highly valuable to enterprises (Sawaean & Ali, 2020; Sun et al., 2020). This knowledge must be tested through practice to create organizational value (Waruwu et al., 2020).

Innovation begins with knowledge acquisition, which fuels the development of innovation capabilities (Yeşil et al., 2013). Innovation reflects the practical value of knowledge, and only knowledge that withstands the test of practice can fully realize its value (Le & Lei, 2019). As organizations increasingly rely on information, knowledge acquisition impacts decision-making and guides rational strategic choices (Chang et al., 2017). Innovation capability embodies the value of knowledge, providing a first-mover advantage that is irreplaceable by other resources (Hussein et al., 2016).

The knowledge-based theory offers a dynamic perspective on organizational performance, highlighting the importance of knowledge as a critical strategic resource

beyond financial and material assets (Caputo et al., 2019). It emphasizes the need for organizations to accumulate, manage, and share knowledge to adapt to changing markets and technologies (Sepúlveda-Rivillas et al., 2022; Akhavan et al., 2014). Effective knowledge management improves collaboration, prevents redundancy, and integrates knowledge into organizational processes, enhancing capabilities (Jordão et al., 2020; Pereira & Bamel, 2021). Knowledge, particularly tacit knowledge, is a unique and inimitable resource that forms the core of an organization's competitive advantage (Chowdhury et al., 2022; Gonzalez, 2022). The structure of this knowledge base is crucial for optimizing resource efficiency and driving productivity.

Dynamic Capabilities Theory

The Dynamic Capabilities Theory (DCT) links Innovation Capability with Learning Organization, Knowledge management practices, and Sustainable Organizational Performance, emphasizing adaptability and resource reconfiguration in dynamic environments. DCT highlights that organizations must continuously sense opportunities, acquire knowledge, and integrate them into processes to sustain innovation and performance (Caputo et al., 2019; Antunes & Pinheiro, 2020).

Learning organizations play a crucial role by continuously renewing knowledge and fostering organizational adaptability (Pattanasing et al., 2022). Dynamic capabilities facilitate effective knowledge management, allowing organizations to respond to external complexities and leverage knowledge for innovation (Ngah et al., 2016; Isa & Ar Rahmah, 2023). External knowledge also contributes significantly, with organizations absorbing, assimilating, and utilizing it to build dynamic capabilities and maintain sustainable growth (Calik et al., 2017).

Knowledge management practices are central to DCT, ensuring that knowledge is captured, shared, and applied across the organization (Saunila, 2016). These practices help firms reconfigure resources and respond rapidly to new challenges (Pereira & Bamel, 2021). By aligning dynamic capabilities with knowledge management, firms can enhance innovation and competitive advantage, leading to Sustainable Organizational Performance (Tran et al., 2020).

Ultimately, dynamic capabilities enable organizations to adapt, innovate, and thrive in changing environments, securing long-term sustainability and competitive advantage (Caputo et al., 2019; Cousins, 2018).

2.2 Learning Organization

The concept of a learning organization is vital for fostering continuous improvement and adaptability in dynamic business environments. Rooted in foundational theories from Revans, Argyris, and Schön, a learning organization emphasizes the importance of a supportive culture and structure for embedding learning into operations (Reese & Sidani, 2020)(S. et al., 2020; Bui, 2019; Örtenblad, 2022). Leadership plays a pivotal role, as visionary leaders must build organizational capabilities by integrating technology, diversity, and talent development (Doyle & Johnson,2019). Different interpretations continue to shape the concept of learning organization. For example, Жолонко (2020) expands on Senge's framework, while Örtenblad (2018) suggests the existence of multiple learning organization models tailored to different organizational aspects. Scholars (2020) have further linked the learning organization with responsible innovation, emphasizing its non-economic benefits, such as sustainability and ethical practices. Despite its strengths, the concept has faced criticism. Salaman (2001) and Coopey (1995) argue that traditional organizational structures often limit the learning organization's transformative potential, co-opting it to reinforce managerial control. Field (2019) extends this critique to educational institutions, arguing that rigid norms hinder their applicability in schools.

Moving forward, the future relevance of the learning organization lies in its adaptability. Örtenblad (2018) advocates for a contingency model that tailors learning organization principles to specific contexts, ensuring that the concept remains effective as organizations face increasingly complex and diverse challenges.

Table 2.1 Learning Organization Concepts

Author (s)	Concept	Advocacy/ Criticism
Simon Reese, Y. Sidani (2020)	LO focuses on climate, emphasizing tools for individual and group learning and the integration of technology and knowledge management.	Advocacy
Hong T. M. Bui (2019)	LO highlights individual learning, teamwork, organizational learning, transformation, behavior/actions, learning culture, technology, leadership, and systems.	Advocacy
Anders Örtenblad (2021)	LO is based on a set of "contextualized standards."	Advocacy
T.Zholonko (2020)	LO outlines five principles: personal mastery of staff, creation of a shared vision, team learning, utilization of mental models, and system thinking. It also emphasizes continuous learning, adaptability, and flexibility in response to market conditions.	Advocacy
Anders Örtenblad (2018)	LO is related to three organizational aspects—contextual approach to demarcating the concept.	Advocacy
Simon Reese & Sidani Yusuf (2018)	LO focuses on leadership, knowledge management, technology, external environment, and action learning.	Neutral
J. Hansen, Are Jensen & Nhien Nguyen (2020)	LO facilitates responsible innovation, focusing on ethical aspects and aligning with responsible research and innovation principles.	Advocacy
Alaina Doyle &Karen R. Johnson (2019)	LO is leader-orchestrated with a vision focused on the future of learning and intentionally building individual, team, and organizational capabilities by instituting a culture.	Advocacy
G. Salaman (2001)	LO is often at odds with conventional organizations' moral and structural foundations. It emphasizes the conflict between organizational learning and organizational structures, cultures, and external discourses.	Criticism
J. Coopey (1995)	The concept of LO provides the raw material for managerial ideology, potentially constraining the meanings and actions of other employees.	Criticism
Laurie Field (2019)	Critical analysis of the "schools as learning organizations" literature. Concludes that the notion of learning organization applied to schools is fundamentally flawed.	Criticism

(Source: Researcher, 2024)

2.2.1 Continuous Learning

Continuous earning (CL) is critical to organizational success, fostering individual and collective development in a rapidly changing environment. It facilitates the acquisition of new knowledge and cultivates a mindset of continuous improvement and innovation, which is essential for maintaining competitiveness and resilience. Studies by Goula et al. (2019) and Leal et al. (2020) underscore the importance of CL in improving information management, adopting new technologies, and enhancing organizational effectiveness. Alatawi et al. (2022) and Jallad (2021) further highlight the strong correlation between CL and improved employee performance and job satisfaction. However, research by Al-Qatamin and Batayneh (2015) indicates that the adoption of CL in Jordanian industrial organizations remains moderate, signaling room for growth. The COVID-19 pandemic highlighted the strategic importance of CL, as seen in Malaysian educational management, where it proved crucial for organizational resilience (Jamil et al., 2022). Additionally, Tabatabaei and Tabatabaei found CL to have the most significant impact on employee performance, underscoring its role as the backbone of a learning organization. By embedding lifelong learning, whole-person learning, whole-process learning, and team learning, organizations can sustain growth, adapt to environmental changes, and achieve long-term success.

2.2.2 Inquiry and Dialogue

Inquiry and Dialogue (ID) are critical in fostering environments that encourage questioning, feedback, and open communication, which are essential for organizational learning and growth. Nguyen-Duc et al. (2023) emphasize that the expression of ID is influenced by cultural contexts, making it a variable element in different learning organizations. Ju et al. (2021)further reinforce the positive relationship between ID and organizational performance, noting that it aligns with human resource development practices like leadership development and mentoring. During the pandemic, Jamil et al. (2022) highlighted how ID enabled educational leaders in Malaysia to navigate crises, demonstrating its strategic importance beyond daily operations. In their study of Bhutanese colleges, Chaudhuri et al. (2022) underscored the importance of ID in promoting collaborative learning environments, linking it to organizational culture.

Goula et al. (2019) similarly found that ID, facilitated by transformational leadership, drives continuous learning and team collaboration in healthcare settings.

In summary, ID is closely tied to leadership, particularly transformational leadership, which uses open communication to strengthen organizational learning and collaboration. Effective ID fosters continuous and team learning, pivotal in building adaptive and resilient organizations.

2.2.3 Team Learning

Team Learning (TL) is integral to developing collective capabilities and problem-solving within organizations, enhancing innovation and adaptability. Studies indicate transformational leadership significantly fosters TL by creating environments that encourage shared learning and strategic adaptation (Goula et al., 2019; Nasirabadi et al., 2014). Sector-specific research highlights TL's importance across industries, including IT and banking, where it supports human resource effectiveness and innovation (Atiku et al., 2022; Zubr, 2019). Critical drivers of TL include psychological safety, leadership, and organizational culture, as demonstrated in meta-analyses of professional environments (Nellen et al., 2020). However, challenges such as poor leadership and unclear roles can hinder TL processes, particularly in public service organizations (Lazarević & Lukić, 2018). Egalitarian team structures, where psychological safety is prioritized, are shown to facilitate effective TL through open idea generation and knowledge sharing (Batt-Rawden & Traavik, 2022). These findings underscore the importance of overcoming individual barriers to create collaborative, high-functioning teams.

2.2.4 Embedded System

Embedded Systems (ES) integrate learning into an organization’s infrastructure, embedding it within daily workflows and reducing hierarchical layers between decision-making and execution. Research consistently highlights the significant role of ES in fostering innovation and job satisfaction. Priyadarsini and Subha (2016) found that ES significantly contributes to process innovation in the renewable energy sector.

Meanwhile, Rusok et al. (2023) emphasized its role in promoting innovative work behaviors by aligning learning with organizational goals. Mehmet (2020) also explored how learning organization principles, including ES, influence innovative work behaviors in Turkey, reinforcing its critical role in promoting adaptability and creativity. Studies by Jamil et al. (2022) and Sarah Ruwayi et al. (2022) showed ES as the most integrated learning dimension in educational and healthcare settings. Additionally, Jallad (2021) and Joo & McLean (2020) identified the impact of ES on job satisfaction and core job characteristics, emphasizing its influence on organizational culture and employee engagement. Overall, ES streamlines communication enhances decision-making efficiency, and promotes autonomy, enabling employees to collaborate effectively and contribute to organizational growth.

2.2.5 Empowerment

Empowerment (EP) involves granting individuals and teams the authority to make decisions and take initiative, fostering innovation, accountability, and increased engagement. Studies emphasize that structural and psychological empowerment enhances employee motivation and performance (Sweis et al., 2013; Fernandez & Moldogaziev, 2015). Kristensen et al. (2022) highlight the integration of empowerment within continuous learning systems, while Ahmad et al. (2022) stress its role in driving entrepreneurship and adaptability in dynamic environments. and Ardiyanti (2018) show that empowerment and system connection significantly influence innovative behavior mediated by work engagement. Tabatabaei & Ghorbi (2014) found that learning empowerment substantially improves employee performance in the Economic Department of Iran Khodro Company, ranking third after continuous and team learning. Although Sarah Ruwayi et al. (2022) identify a gap in perceived empowerment in certain organizational cultures, the literature underscores empowerment as a critical dimension in learning organizations that stimulates creativity, self-management, and continuous improvement. Empowerment reflects a manager’s trust and fosters an environment where employees can exercise autonomy, contributing to organizational growth and innovation.

2.2.6 Connection System

Connection System (CS) emphasizes the importance of understanding and managing interdependencies within an organization and its external environment. As organizations consist of multiple teams, CS facilitates the coordination and integration of these groups, enabling cohesive learning and problem-solving. Jamil et al. (2022) demonstrated that vital SC helped educational organizations effectively navigate crises, leveraging interconnected systems to adapt to external challenges. Ahmad et al. (2022) highlighted the role of information systems, a component of SC, in enhancing entrepreneurship and organizational learning. Rupčić (2021) reinforced the critical role of SC, showing that organizations with robust system connections can dynamically respond to crises. Additionally, Goula et al. (2019) found a strong correlation between SC and transformational leadership in a private hospital setting, emphasizing SC's role in promoting organizational coherence and fostering a learning environment. Joo and McLean (2019) also noted the influence of SC on job characteristics among knowledge workers. Overall, SC promotes forward-thinking and system-wide analysis, enabling organizations to address core issues comprehensively and make informed, strategic decisions that support sustainable development and organizational learning.

2.2.7 Strategic Leadership

Strategic Leadership (SL) plays a critical role in guiding organizations toward long-term goals by aligning vision, culture, and strategy with the principles of a learning organization. Nasirabadi et al. (2014) demonstrated a strong relationship between transformational leadership and critical learning organization dimensions, such as continuous and team learning, influenced by strategic leadership. Ellinger and E. Ellinger (2021) highlighted the importance of managerial coaching within SL, emphasizing its positive impact on performance. Research by Ramli and Rasdi (2021) and Jamil et al. (2022) further underscored the role of SL in promoting learning organization practices during crises, showing its adaptability in challenging contexts. Ahmad et al. (2023) found that SL enhances self-efficacy in education, while Priyadarsini and Subha (2016) emphasized that SL shapes a culture of innovation and performance, steering organizations through transitions and ensuring alignment

between learning activities and strategic goals. In essence, SL is vital for embedding learning into the organization's strategic direction.

Table 2.2 Summary of researchers' variables of Learning organization affecting Sustai nable organizational performance

Theory: Learning organization theory							
Theory and academic conceptual reference	**Independent Variable**						
Authors(year)	**CL**	**ID**	**TL**	**ES**	**EP**	**SC**	**SL**
A. Goula et al. (2019)	√	√	√	√			√
Leal et al. (2020)	√	√	√	√	√	√	√
Alatawi et al. (2022)	√	√	√	√	√	√	√
Jallad (2021)	√	√	√	√	√	√	√
Al-Qatamin & Batayneh (2015)	√	√	√		√		√
Jamil et al. (2023)	√	√		√		√	
Tabatabaei, S. A. N., & Ghorbi, M. (2014)	√		√		√		
Nguyen-Duc et al. (2022)		√					
Ju et al. (2021)		√	√			√	√
Chaudhuri et al. (2022)		√					
Zarepour Nasirabadi and Vahedi (2014)	√	√	√	√			√
Atiku et al. (2021)			√				
Zubr (2021)			√				
Lydia C. Nellen, W. Gijselaers, Therese Grohnert (2020)			√				
S. Lazarević and J. Lukić (2018)			√				
V. H. Batt-Rawden and Laura E. M. Traavik (2022)			√				
Priyadarsini and Subha (2016)				√			
Rusok et al. (2023)				√			
Salem et al. (2022)				√			
B. Mehmet (2020)				√			
Joo and McLean (2019)				√		√	
Kristensen, T. B., Saabye, H., & Edmondson, A. (2022)	√	√	√	√	√		
Fernandez and Moldogaziev (2015)					√		
H. Ahmad et al. (2022)					√	√	
Sweis et al. (2013)					√		
Salem et al. (2022)					√		
Soetantyo, T. I., & Ardiyanti, N. (2018)					√		
Tabatabaei, S. A. N., & Ghorbi, M. (2014)					√		

Theory: Learning organization theory							
Theory and academic conceptual reference	**Independent Variable**						
Authors(year)	**CL**	**ID**	**TL**	**ES**	**EP**	**SC**	**SL**
Nataša Rupci (2021)	√	√	√			√	√
H. Ahmad et al. (2022)					√	√	
D. Ellinger & E. Ellinger (2021)							√
Ramli and Rasdi (2021)							√
Ahmad et al. (2023)						√	
Priyadarsini and Subha (2016)	√	√	√	√	√	√	√
Summary of my research	√	√	√	√	√	√	√

(Source: literature review database)

Figure 2.1 Learning organization of factors

(Source: Alatawi et al., 2022)

The relationship between the seven factors and the variable "learning organization" in public IT companies is interconnected, each playing a critical role in fostering sustainable organizational performance. Continuous learning encourages employees to stay up-to-date with industry trends, enabling adaptability and competitiveness in the dynamic IT sector (Goula et al., 2019). Inquiry and dialogue promote open communication, fostering a culture of collaboration and innovation essential for knowledge-intensive industries (Ju et al., 2021). Team learning ensures collective problem-solving and knowledge sharing, strengthening strategic adaptation

and operational performance (Atiku et al., 2022). Embedded systems integrate learning into organizational processes, improving innovation and decision-making efficiency (Jamil et al., 2022). Empowerment grants autonomy to employees, enhancing creativity, engagement, and performance (Tabatabaei & Ghorbi, 2014a). System connection ensures alignment across departments, promoting coherence and a holistic approach to problem-solving (Rupčić, 2021). Finally, strategic leadership guides the learning initiatives, aligning them with long-term goals and driving organizational success (Nasirabadi et al., 2014a). These factors support the learning organization framework, which is essential for sustainable growth and adaptability in public IT companies.

2.3 Knowledge Management Practices

Knowledge management practices (KMP) refer to systematic processes organizations employ to create, store, share, and apply knowledge to enhance performance and innovation. Enrique emphasizes the role of KMP in Agile Software Development, focusing on managing knowledge assets for competitiveness. Inkinen et al. (2015) and Valentim et al. (2016) highlight KMP's role in improving efficiency, particularly in SMEs, by fostering absorptive capacity. Myllärniemi et al. (2012) add that KMP integrates knowledge flows across networks to create value in healthcare. Kale and Karaman (2012) describe KMP as key in environments encouraging continuous knowledge creation and sharing. Abu-Shanab and Shehabat (2018) extend this idea to e-government, stressing KMP’s role in leveraging ICT for knowledge dissemination. Liu et al. (2019) emphasize KMP as activities fostering knowledge creation, organization, and personalization. Kordab et al. (2020a) identify four critical KMP activities—Knowledge Creation, Storage, Sharing, and Application—as central to managing organizational knowledge. Ibrahim and Salleh (2019) demonstrate that KM practices can also be applied in educational institutions, showing adaptability beyond the business context. Chierici et al. (2019) argue that KMP supports innovation by capturing collective expertise and fostering organizational learning. Sivagnanam et al. (2022) and Al Mansoori et al. (2021) frame KMP as a holistic approach involving people, technology, and processes, with people driving its success. Overall, KMP

supports the strategic management of knowledge, enabling organizations to adapt, innovate, and maintain a competitive advantage.

Table 2.3 Knowledge Management Practices Concepts:

Author(s)	Concept	Advocacy/Criticism
Ouriques et al. (2019)	KM manages an organization's workforce through technologies or creates a knowledge-sharing culture. KM strategies include codification and personalization, focusing on knowledge creation, storage/retrieval, transfer/sharing, and application.	It focuses on the strategic implementation of KMP and its importance in agile software development, stressing the need to understand how knowledge constructs interrelate to apply effective strategies.
Inkinen, Kianto, Vanhala (2015)	KM practices are management activities aimed at improving the effectiveness and efficiency of knowledge resources. They encompass human, organizational, technology, and management process-oriented aspects.	Highlights the broad spectrum of factors contributing to successful KMP, including human, organizational, technology, and management processes.
Valentim et al. (2016)	It considers KMP activities that allow firms to create value based on knowledge assets: acquisition, conversion, application, and protection of knowledge.	Advocates for KMP as a means of creating value and emphasizes the importance of acquiring, converting, and applying knowledge.
Myllärniemi et al. (2012)	KMP is a systematic basis for analyzing different knowledge needs and practices and emphasizes the importance of quality information for efficient decision-making.	Criticizes the excessive focus on patient data in healthcare and emphasizes the need for practices that refine data into useful information for decision-making—advocates for improved knowledge sharing and understanding of the human aspect of knowledge management in healthcare.
Serdar Kale & Erkan A. Karaman (2012)	KMP is a multifaceted concept that includes creating, sharing, learning, and organizing knowledge to benefit a firm.	Advocacy: Proposes a practical model for evaluating and improving KM in construction firms
Emad Abu-Shanab & Issa Shehabat (2018)	KMP is considered a strategic resource vital for organizational success in the face of informatics and technical evolution.	Advocacy: Highlights the importance of KM in enhancing e-government services
Fahmi Ibrahim et al. (2019)	KM is traditionally viewed as a business concept; its practices, such as knowledge creation, capture, sharing, and use, are applicable and beneficial across all organizations, including educational settings.	Advocacy: Suggests integrating KM practices into educational methodologies for better learning outcomes
Chierici, Mazzucchelli, Garcia-Perez, & Vrontis (2018)	KMP is a process that involves capturing the collective expertise and intelligence within an organization and using them to foster innovation through continued organizational learning. KMP includes practices like organizing knowledge repositories, adopting technologies for data collection from various sources, and developing competencies to enhance the firm's innovation and learning capabilities	Advocacy: Demonstrates how big data contributes to KM, innovation, and business performance

Author(s)	Concept	Advocacy/Criticism
Yi Liu, Christopher Chan, Chenhui Zhao, and Chao Liu (2018)	KM practices considering institutional, national, and organizational culture	Advocacy: Explores how various cultural and institutional forces shape KM in Chinese organizations
Sivagnanam et al. (2022)	KMPs enable individuals to share knowledge created, stored, and accessible when needed, thus improving performance. KMP is considered a "strategic asset," and its five dimensions help improve employee performance.	Advocacy for the effective use of KM strategies in educational institutions during crises like the COVID-19 pandemic to improve performance and employee commitment
Kordab et al. (2020)	KM is characterized by strategies and processes implemented within an organization to increase the effectiveness and efficiency of business processes, achieve knowledge strategy, and sustain organizational performance.	Advocacy for integrating the entire knowledge management cycle in enhancing sustainable organizational performance in knowledge-intensive sectors.
Al Mansoori et al. (2021)	KMP is used to identify, gather, and reinforce knowledge. It systematically enriches expertise and content to enhance an organization's competency, responsiveness, efficacy, and innovation. KM is primarily about managing the flow of information and ensuring that the right people receive the correct information at the right time.	It emphasizes the multifaceted nature of KMP, highlighting the integral role of human factors supported by processes and technology.

(Source: Researcher, 2024)

2.3.1 Knowledge Sharing/Transfer

Knowledge sharing, distinct from information sharing, involves the transfer of experience-based insights rather than raw data. Chugh and Bhadoria (2021) emphasize the critical role of knowledge transfer (KT) in the IT sector, where technology facilitates collaboration and innovation across teams. Papadimitriou (2015) highlights KT's effectiveness in policing through national information systems, while Chang and Lin (2015) note the influence of organizational culture on knowledge dissemination. Mingmitr (2016) underscores KT as key to decision-making and service delivery in public-sector organizations. For Mota Veiga et al. (2021), KT drives innovation in SMEs, and Borini et al. (2022) demonstrate that organizational innovation fosters KT, particularly in subsidiaries. Ultimately, knowledge sharing builds a learning organization by fostering collaboration, continuous learning, and innovation across all business functions.

2.3.2 Knowledge Application

Knowledge application (KA) refers to using available knowledge to make informed decisions and perform tasks through established processes. Chugh and Bhadoria (2021b) emphasize that KA is crucial in improving software processes and organizational practices in the IT sector. Papadimitriou (2015) highlights its role in enhancing the operational effectiveness of the Hellenic Police. Chang & Lin (2015b) found that KA is significantly influenced by organizational culture, affecting performance across different cultural settings. Mingmitr (2016b) underscores its importance in public-sector organizations, where KA enhances services and internal processes. Panahi et al. (2021) reveal that social media facilitates KA by promoting knowledge translation and teamwork. Finally, Kusuma and Priyandari (2017) illustrate how Nonaka's model and Alavi's cycle support knowledge creation and application through socialization and internalization. In today's competitive environment, KA is essential for applying validated knowledge to improve products, services, and organizational processes, ultimately enhancing effectiveness and maintaining a competitive edge.

2.3.3 Knowledge Creation

With the increasing importance of knowledge in economic activities, knowledge creation (KC) has expanded beyond technology to encompass humanities, social sciences, and business knowledge. Chugh and Bhadoria (2021b) emphasize that technology significantly enhances KC in the Indian IT sector, facilitating idea generation and process integration. In the Hellenic Police, Papadimitriou (2015) highlights that KC improves operational effectiveness, particularly in crime-solving. Chang & Lin (2015b) stress the critical role of organizational culture in fostering environments conducive to KC. Mingmitr (2016b) underlines the importance of KC in enhancing public-sector efficiency. Borini et al. (2021)) further suggest that balancing exploration and exploitation through organizational ambidexterity boosts KC and knowledge transfer. Additionally, Mota Veiga et al. (2021) show that SME characteristics significantly impact KC, particularly in the hotel sector. García-Fernández (2016) finds that companies excelling in quality management achieve higher

innovation results through effective KC. Ultimately, while knowledge management builds, updates, and applies knowledge, KC formalizes and utilizes knowledge to drive innovation, enhance performance, and increase value.

2.3.4 Knowledge Storage

Knowledge storage (KS) is a critical component of knowledge management, reflecting an organization's ability to systematically record, organize, and retrieve information for future use. Chugh and Bhadoria (2021a) highlight that advanced technology in the IT sector enhances KS, ensuring efficient access to knowledge. In the Hellenic Police, Papadimitriou (2015) emphasizes the role of the Police online system in improving operational efficiency through organized knowledge storage. Chang & Lin (2015a) underscore the influence of organizational culture on how knowledge is preserved, while Mingmitr (2016b) stresses KS's importance in maintaining efficiency within public-sector organizations. Qadri et al. (2021) demonstrate KS's pivotal role in improving performance during crises, particularly in software development, by mediating the link between learning and performance. De Bruyn et al. (2013) further discuss how Normalized Systems elements facilitate the integration of KS with creation, transfer, and application, particularly in managing software engineering knowledge. KS ensures that knowledge is preserved and readily available for future innovation and decision-making.

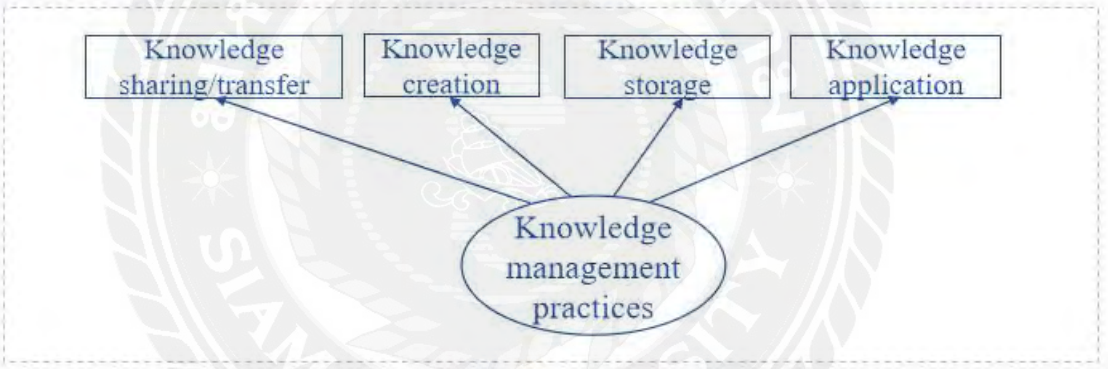
Table 2.4 Summary of researchers' variables of Knowledge management processes affecting sustainable organizational performance

Theory: Knowledge management theory				
Author & Year	**Knowledge Transfer (KT)**	**Knowledge Creation (KC)**	**Knowledge Application (KA)**	**Knowledge Storage (KS)**
Mitali Chugh, R. S. Bhadoria (2021)	√	√	√	√
N. Papadimitriou (2015)	√	√	√	√
C. Chang, Tung-Ching Lin (2015)	√	√	√	√

Pakpoom Mingmitr (2016)	√	√	√	√
Peter De Bruyn et al. (2013)	√	√	√	√
M. García-Fernandez (2016)	√	√	√	√
Hansen Kusuma, Yusuf Priyandari (2017)	√	√	√	√
P. Veiga et al. (2021)	√	√		
Sirous Panahi et al. (2021)			√	
Usman Qadri et al. (2021)	√			√
F. Borini et al. (2021)	√	√		
Summary of my research	√	√	√	√

(Ref: Literature Review Database)

Figure 2.2 Knowledge management practices of Factors



(Source: Borini et al., 2021)

The relationship between the four factors and knowledge management practices is essential for enhancing organizational efficiency and innovation. Knowledge sharing ensures the flow of information across departments, fostering collaboration and collective problem-solving, which enhances overall organizational performance (Li et al., 2020a). Knowledge application involves leveraging existing knowledge to improve decision-making and operational processes, enabling companies to remain competitive and innovative (Valacherry & Pakkeerappa, 2020). Knowledge creation drives innovation by encouraging employees to develop new ideas and solutions, which are critical for continuous improvement (Mann, 2020). Lastly, knowledge storage ensures that valuable information is systematically organized and easily accessible, supporting long-term learning and decision-making efficiency (Alavi & Leidner, 2001). These

factors strengthen knowledge management practices, enhancing organizational performance and adaptability.

2.4 Innovation Capability

Innovation capability is a broad concept encompassing various dimensions of organizational innovation. Asad et al. (2018) describe it as the process by which new ideas are recognized, improved, and implemented. Meanwhile, Sawaean and Ali (2020) highlight the emergence of new organizational processes, products, or functions. Su et al. (2018) emphasize that innovation involves intentionally introducing new methods across individuals, groups, or organizations to benefit the organization and society. María Ruiz-Jiménez & del Mar Fuentes-Fuentes (2013) underscore that innovation leads to new products, services, or technologies, reflecting an organization's commitment to experimentation and development. Migdadi (2022) categorizes innovation into four types: market, product, process, and behavioral innovation, each critical for organizational success. Rahman et al. (2015)'s dual-core theory divides innovation into technological and management innovations, where technological innovation originates from the bottom-up and management innovation flows from the top-down. Huang et al. (2016) and Alshura et al. (2023) expand these dimensions, adding process, market, and behavioral innovations. Thus, innovation capability can be defined across five dimensions: product, process, technological, market, and behavioral innovation, all essential for driving organizational growth and competitiveness.

Table 2.5 Innovation Capability Concepts:

Author (s) and Year	Conception of Innovation Capability (IC)
Asad et al. (2018)	Organizational innovation capabilities into the following three points: new ideas are recognized, improved, and implemented by all members of the organization; the primary connotation is to produce new ideas; the process of integrating and redefining several concepts to generate creativity
Sawaean & Ali (2020)	IC refers to the emergence, recognition, and implementation of new processes, products, or functions within the organization.

Su et al. (2018)	IC refers to the purposeful introduction and application of new methods in the ideas, products, and procedures of individuals, groups, or organizations to benefit individuals, groups, and society.
María Ruiz-Jiménez & del Mar Fuentes-Fuentes (2013)	IC is to produce new products, services, or technologies, reflecting the organization's support for new concepts, experiments, and innovative processes. Based on this research, innovation capability is the capability that helps organizations achieve organizational innovations.
Rahman et al. (2015)	IC in the organization has two cores: technology and management.
Migdadi, 2022	IC contains various components that could be involved in all links in the organization's marketing and operation.
Huang et al. (2016)	Define organizational innovation from the perspective of creation and regard organizational innovation as a process, including the absorption and application of new knowledge, the connection of information, the transformation of services, and the reuse of resources.
Alshura et al. (2023)	Further divides management innovations into process, market, and behavioral innovations.

(Source: Researcher, 2024)

2.4.1 Product Innovation

Product innovation involves improving or developing existing products and enhancing quality and performance throughout production. Service innovation refers to continuously updating service experiences or solutions driven by customer needs and new ideas to improve service quality (Saunila & Ukko, 2012). Wang & Wu (2016) highlight that product innovation is technology-driven mainly, relying heavily on R&D, while service innovation adapts to customer needs, focusing on service concepts and processes. Calik, Calisir, and Cetinguc (2017) emphasize that product innovation extends from production lines, including new and similar products. Camps and Marques (2014) stress that service innovation involves rethinking abstract factors like service delivery systems. Saunila (2016) points out that product innovation primarily depends on technical expertise, while service innovation evolves according to customer demands. While product innovation enjoys stronger legal protections,

Belkahla and Triki (2011) note that service innovation still faces challenges in legal development. Product innovation is a core, technology-driven process central to an organization's growth, encompassing the entire cycle from R&D to market diffusion.

2.4.2 Process Innovation

Process innovation in enterprise management involves continuously improving business processes to enhance competitiveness and profitability. Janssen, Castaldi, and Alexiev (2016) emphasize that process innovation starts from the bottom up, with senior leaders evaluating opportunities for improvement and fostering cross-functional teamwork. Saunila (2016) highlights that solving these complex problems requires collaboration across different teams to optimize processes systematically. Mendoza-Silva (2021) underscores the importance of a strong innovation culture to sustain employee engagement in continuous innovation efforts. Calik, Calisir, and Cetinguc (2017) caution that innovation should follow structured, scientific methods rather than blind experimentation. While process innovation may be less visible than product innovation, it demands significant organizational restructuring and offers substantial benefits, particularly for large enterprises with complex structures.

2.4.3 Technological Innovation

Technological innovation refers to the scientific advancements organizations achieve to pursue competitive advantages and excess returns. Saunila (2020) emphasizes the need for breakthrough technological innovations that disrupt markets by altering existing economic and technological rules. Vries et al. (2016) note that few scholars clearly define technological innovation, though Su et al. (2022) see it as enhancing products, processes, and technologies. Migdadi (2022) outlines critical technological innovation characteristics, including originality, long development cycles, and high risk. Huang et al. (2016) further elaborate that technological innovation requires multiple stages, from idea generation to experimental verification and the realization of scientific achievements, leading to long innovation timelines. Despite the risks, Alshura et al. (2023) highlight that successful breakthrough innovations can quickly capture market demand, yielding substantial profitability. While technological

and organizational innovations can interact to enhance organizational effectiveness, their relationship is not absolute, and technological innovation must be carefully evaluated and controlled during implementation to ensure success.

2.4.4 Market Innovation

Market innovation refers to how organizations conduct business, complementing product, service, and process innovations. Asad et al. (2018) describe the innovation of key business processes and their interconnections, emphasizing external factors like the market environment. Su et al. (2018) found that market innovation is more likely to succeed with diverse experience outside the industry, while prior industry experience may hinder it. Alshura et al. (2023) differentiate between progressive innovation, aimed at existing markets, and breakthrough innovation, targeting emerging customer needs and transforming market consumption patterns. Huang et al. (2016) highlight that while breakthrough innovations may initially underperform compared to mainstream products, they eventually surpass existing offerings, gaining customer recognition. Ultimately, market innovation enables organizations to explore new opportunities and create competitive advantages, paving the way for sustainable market leadership through innovative strategies.

2.4.5 Behavioral Innovation

Behavioral innovation refers to the innovative behaviors exhibited by employees within organizations. This often involves cautious commodification, where incremental improvements are made to existing products, processes, and services to strengthen established systems. Saunila (2020) highlights the critical role of a willingness to change, which aligns with a shared organizational vision. Kanter (2017) adds that true innovators challenge conventions, rethinking problems from new perspectives. Employees first generate ideas individually and then communicate and collaborate with others to implement these innovations (Camps & Marques, 2014). Mendoza-Silva (2021) builds on this by emphasizing the importance of problem identification and the structured execution of new ideas. Ultimately, behavioral innovation fosters the development of fresh ideas that, while potentially small in the short term, can

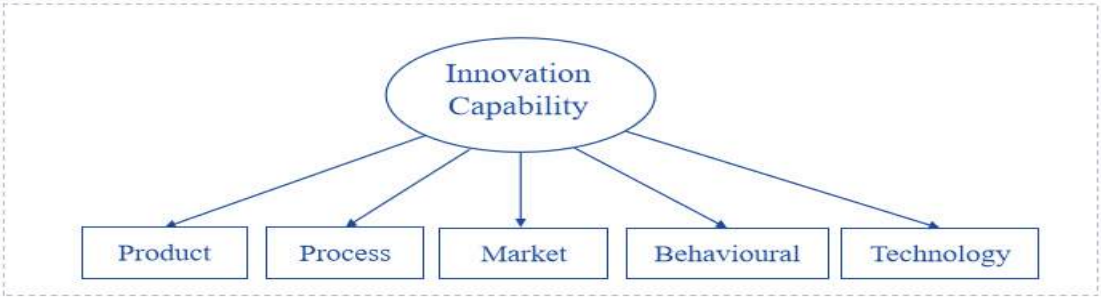
significantly contribute to long-term organizational growth by integrating individual creativity with the company's broader goals.

Table 2.6 Summary of researchers' variables of Innovation Capability

Theory: Organizational innovation theory					
Author & Year	**Product innovation**	**Process innovation**	**Technological innovation**	**Market innovation**	**Behavioral innovation**
Saunila & Ukko (2012)	√	√	√	√	
Saunila (2016)	√	√	√	√	
Asad et al. (2018)	√	√	√	√	
Sawaean & Ali (2020)	√	√	√	√	√
Su et al. (2018)	√	√	√	√	√
María Ruiz-Jiménez & del Mar Fuentes-Fuentes (2013)	√	√	√	√	
Rahman et al. (2015)	√	√	√	√	
Migdadi (2022)	√	√			√
Huang et al. (2016)			√		√
Alshura et al. (2023)	√			√	
Asad et al. (2018)	√	√			√
Karner (2017)			√	√	√
Camps & Marques (2014)	√	√		√	√
Summary of my research	√	√	√	√	√

(Ref: literature review database)

Figure 2.3 Innovation Capability of Factors



(Source: Sawaean & Ali, 2020)

The relationship between innovation capability and process, product, behavioral, market, and technological innovation factors is crucial for enhancing an organization's overall performance. Product innovation enables companies to develop or improve new products, directly enhancing competitiveness and innovation capability (Iddris,2019). Innovation capability and product innovation performance: Process innovation, on the other hand, focuses on improving internal operations, making organizations more efficient and responsive to changes in the market (Aydin, 2021). Technological innovation refers to adopting cutting-edge technologies that strengthen an organization's ability to innovate and maintain a competitive edge in dynamic environments (Dhliwayo & Chebo, 2024). Market innovation involves identifying new market opportunities and adapting to customer needs, enhancing innovation capability and market adaptability (Mendoza-Silva, 2021). Finally, behavioral innovation fosters a culture of creativity and openness within the organization, encouraging employees to contribute to the innovation process, thus driving long-term success and adaptability (Thongsri & Chang, 2019).

2.5 Sustainable Organizational Performance

Sustainable Organizational Performance (SOP) refers to an organization's ability to achieve long-term objectives while balancing financial, environmental, and social responsibilities. Al Hammadi & Hussain (2018), Holbeche (2018), and Zhou et al. (2017) define SOP as the result of continuous improvement efforts that enhance operational efficiency, customer satisfaction, and innovation. Pham et al. (2020) present a framework that integrates sustainability into business models, enabling manufacturing organizations to align with sustainable practices. Pollanen et al. (2017) emphasize that SOP involves efficient resource use, service quality, and social responsibility, while Tseng and Lee (2012) highlight the role of sustainability in influencing HR management and fostering innovation. Kim et al. (2016) and Longoni (2014) state that organizations must address environmental, social, and economic objectives to achieve SOP. Lee & Ha-Brookshire (2017) and Zaid et al. (2018) stress the importance of ecological, social, and economic metrics in managing SOP, linking sustainability to enhanced market performance and resource efficiency. Lopes et al.

(2016) argue that sustainability initiatives promote organizational innovation and development, aligning with human resource-focused business models. SOP is also characterized by reduced employee turnover, increased environmental performance, and sustained financial growth (Hossin et al., 2021). Kordab et al. (2020b) define SOP as meeting stakeholder needs while ensuring long-term profitability, social welfare, and environmental responsibility. Gomiero (2017) connects SOP with environmental and social outcomes, measured through energy efficiency, while Contini and Peruzzini (2022) emphasize evaluating sustainability across the entire value chain. Alsayegh et al. (2020) conclude that ESG disclosures strengthen corporate sustainability by linking environmental, social, and economic performance. In summary, SOP integrates financial, social, and ecological factors to drive organizational resilience, innovation, and long-term success.

Table2.7 Sustainable Organizational Performance Concepts

Author (s) and Year	Conception of Sustainable Organizational Performance (SOP)
Alhammadi et al. (2018)	SOP refers to integrating environmental, social, and economic factors to ensure long-term organizational success.
Holbeche (2018)	SOP is achieved through organizational agility and resilience, adapting to changes in the business environment, and focusing on employee engagement.
Zhou et al. (2017)	SOP is influenced by a firm's dynamic capabilities, such as sensing, integration, and reconfiguration capabilities, which facilitate innovation and improve firm performance.
Pollanen et al. (2017)	SOP involves strategic performance measures impacting both strategy implementation and assessment, encompassing efficiency and effectiveness measures in public organizations.
Lee and Ha-Brookshire (2017)	The ethical climate impacts SOPs in the fashion retail industry, affecting employees' job attitudes and turnover intentions. It encompasses the triple bottom lines of financial, social, and environmental performance.
Zaid et al. (2018)	Green human resource management and supply chain management practices enhance SOPs, which affect the triple bottom lines of environmental, social, and economic performance.

Author (s) and Year	Conception of Sustainable Organizational Performance (SOP)
Pham et al. (2020)	SOPs in construction focus on overcoming barriers to sustainable construction, including managerial competence, sustainable materials and technologies, government incentives, and implementing sustainable practices.
Lopes et al. (2016)	SOP focuses on managing new ideas and practices to expand business, with open innovation as critical. This involves using knowledge management as an asset to promote sustainable innovations that positively impact organizational sustainability.
Tseng & Lee (2012)	SOP influence of knowledge management capability and dynamic capability on organizational performance.
Hossin et al. (2021)	SOP is viewed as a combination of long-term financial and non-financial positive outcomes, measured by indicators like lower employee turnover, higher corporate and environmental performance, lower customer complaints, and sustained growth over a long period.
Kordab et al.（2020）	SOP can be achieved by efficiently implementing knowledge management processes, organizational strategies, and activities.
Kim et al.（2016）	SOP is an organization's ability to achieve economic, environmental, and human performance objectives. Employee engagement at work is seen as a critical component for achieving sustainable organizational success.
Longoni (2014)	SOP involves deploying sustainable operations strategies to pursue environmental, social, and economic performance simultaneously. This includes defining and implementing environmental and social programs that enhance the triple bottom line, focusing on organizational responsibility and worker commitment to sustainability.
Tiziano Gomiero (2017)	SOP is associated with the sustainability assessment of biophysical performance, accounting for agriculture's multifunctional nature and the complex relations between agroecosystems and socio-economic systems.

Author (s) and Year	Conception of Sustainable Organizational Performance (SOP)
Contini and Peruzzini (2022)	SOP is the ability to measure sustainability performance using proper indicators throughout the lifecycle and value chain, considering environmental, economic, and social impacts.
Alsayegh et al. (2020)	SOP involves a comprehensive approach to measuring and managing organizational performance through various dimensions, integrating both efficiency and effectiveness and considering the impact of strategic decision-making on these aspects.

(Source: Researcher, 2024)

2.5.1 Economic Performance

Economic performance (ECN) remains a crucial foundation for assessing enterprise performance, even as the sustainable business perspective broadens evaluation metrics beyond traditional financial indicators. Jitmaneeroj (2016) and Escrig-Olmedo et al. (2017) highlight that economic sustainability performance extends to non-financial factors such as shareholder loyalty, production process innovations, and client fidelity, reflecting a corporation's long-term capacity for value creation. Alsayegh et al. (2020b) further emphasize that sustainable economic performance ensures immediate financial health and fosters long-term shareholder value through superior management practices. (Abdul-Rashid, Sakundarini, Ghazilla, et al., 2017a) Abdul-Rashid et al.(2017) discuss the importance of operational efficiencies—such as reducing material costs, energy consumption, and waste treatment—complementing financial outcomes like ROI, ROE, and sales growth. Piwowar-Sulej and Iqbal (2023) assert that leadership styles are critical in influencing turnover and financial stability. Moreover, organizations investing in environmental innovation see enhanced economic health through improved efficiency and competitive advantage (Ahmad et al., 2021). Thus, while financial indicators remain central to ECN, they must be integrated with broader measures capturing long-term sustainability and business competitiveness.

2.5.2 Environment Performance

Environmental performance (ENV) is a crucial dimension of sustainable development, focusing on minimizing an organization's ecological footprint while aligning its growth with environmental sustainability. This performance is measured through emission reduction, resource conservation, and waste management, all aimed at reducing environmental risks and preserving natural ecosystems (Jitmaneeroj, 2016; Escrig-Olmedo et al.,2017). Indicators like water consumption and carbon emissions play a crucial role in assessing a company's environmental impact, with effective leadership fostering practices that mitigate these effects (Piwowar-Sulej & Iqbal, 2023; Alsayegh et al., 2020b). Adopting environmental innovations, such as eco-friendly production processes and waste recycling, enhances environmental performance and boosts organizational efficiency and competitiveness (N. Ahmad et al., 2021; Centobelli et al., 2019; Yildiz et al., 2019). Ultimately, integrating environmental sustainability within corporate strategies ensures a balanced relationship between business growth and ecological preservation, contributing to the long-term viability of enterprises.

2.5.3 Social Performance

Social performance (SOC) is a critical component of sustainable development, reflecting how an organization engages with society while achieving its business objectives. It encompasses corporate social responsibility (CSR) practices such as community engagement, human rights advocacy, diversity and inclusion, and employee health and safety (Jitmaneeroj, 2016b; Escrig-Olmedo et al., 2017). These practices are vital in fostering trust and loyalty among customers, employees, and the broader community, directly influencing long-term shareholder value (Alsayegh et al., 2020a; Abdul-Rashid et al., 2017b; J. Wang & Dai, 2018). Effective SOC initiatives enhance societal welfare and strengthen organizational reputation and competitiveness (Piwowar-Sulej & Iqbal, 2023). Research suggests a sustainable future is achievable when economic, social, and environmental objectives are balanced. SOC is pivotal in advancing responsible corporate behavior and broader social sustainability (Ahmad et al., 2021; Nordin et al.,2022). By integrating CSR into their core strategies,

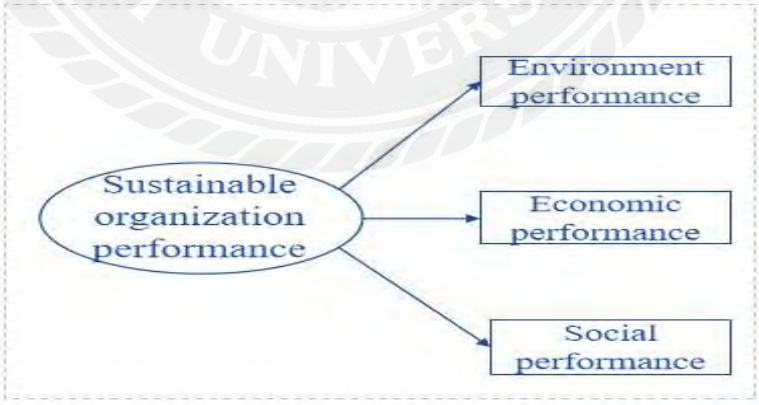
organizations can support social development while ensuring long-term, sustainable growth.

Table 2.8 Summary of researchers' variables of Sustainable organizational performance

Theory: Organizational performance theory			
Author (Year)	ENV	ECN	SOC
Jitmaneeroj (2016)	√	√	√
Olmedo et al. (2017)	√	√	√
Alsayegh et al. (2020)	√	√	√
Rashid et al. (2017)	√	√	√
Shashi et al. (2019)	√	√	
Çankaya & Sezen (2019)	√	√	√
Wang & Dai (2018)	√	√	√
Piwowar-Sulej & Iqbal (2023)	√	√	√
Nordin, Khatibi, & Azam (2022)			√
Ahmad et al. (2021)	√	√	
Summary of my research	√	√	√

(Ref: Literature review database)

Figure 2.4 Sustainable organizational performance of Factors



(Source: Piwowar-Sulej & Iqbal, 2023)

Sustainable organizational performance in public IT companies is influenced by three factors: economic performance, environmental performance, and social performance. Economic performance ensures that organizations remain competitive

and financially viable by efficiently managing resources and maximizing returns. This economic stability is crucial for funding innovations and supporting long-term strategic objectives (N. Ahmad et al., 2021). On the other hand, environmental performance focuses on reducing ecological impacts by adopting sustainable practices, which improve regulatory compliance and enhance corporate reputation and market differentiation (Schaltegger & Wagner, 2017). Finally, social performance emphasizes the importance of corporate social responsibility (CSR) and community engagement, which foster trust and goodwill with stakeholders, promoting a positive organizational image and long-term societal impact (Nordin et al., 2024b). Together, these factors align with the principles of sustainable organizational performance, balancing profit with responsibility to both the environment and society.

2.6 Related Literature

2.6.1 The Impact of Learning Organization on Knowledge Management Practices

The integration of learning organizations and knowledge management has been extensively examined across various studies, each revealing significant insights into organizational development. For instance, Loermans (2002) emphasizes the intrinsic connection between knowledge management at the enterprise level and the phenomenon of learning organizations, suggesting that these concepts must be analyzed together to enhance organizational performance. Similarly, Ageteam (2006) articulates the need for organizations to transition into learning organizations, highlighting the critical role of knowledge management as an enabler. The studies by Saied et al. (2021) and Chinowsky and Carrillo (2007) further elaborate on this interplay, demonstrating how the learning organization model mediates the relationship between knowledge management and organizational factors such as service quality. Moreover, empirical studies, like that of Shieh (2011), corroborate these theoretical insights, presenting evidence of the correlation between knowledge management, organizational learning, and performance. This empirical validation is reinforced by Song (2008), who investigates the effect of learning organizations on organizational knowledge creation, confirming that organizational learning is a determinant of innovative knowledge practices. Additionally, Berce, Lanfranco, and Vukovic (2008) extend the discussion to

the role of information technology in amplifying the synergies between knowledge management and learning organizations. The exploratory work of Acevedo and Diaz-Molina (2023) and Acevedo and Molina (2022) adds another dimension by examining the role of innovative culture within these frameworks, suggesting that the integration of knowledge management fosters innovation and organizational agility. Further contributing to this discourse, Hessami et al. (2012) identified critical success factors for knowledge management in learning organizations, emphasizing the importance of organizational culture and teamwork. Their findings indicate that elements such as a supportive culture, teamwork, performance measurement, and knowledge-sharing systems are critical for effective knowledge management implementation. This aligns with the broader literature, which collectively underscores the necessity of fostering learning organization attributes and robust knowledge management practices to enhance service quality, innovation, and overall organizational performance.

Table 2.9 Summary related literature reviewed of Learning organization on Knowledge management practices

Author (Year)	Research Finding		Studied Factors
Loermans (2002)	learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Learning organization, knowledge management
Aggestam (2006)	learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Learning organization, knowledge management

Author (Year)	Research Finding		Studied Factors
Saied et al. (2021)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Learning Organization, Knowledge Management, Service Quality
Chinowsky & Carrillo (2007)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Knowledge management, learning organization
Shieh (2011)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Knowledge management, learning organization, organizational performance
Song (2008)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Knowledge management 1. Knowledge creation	Learning organization, organization culture, knowledge creation
Berce, Lanfranco & Vehovar (2008)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Knowledge management, learning organization, information, and technological communication

Author (Year)	Research Finding		Studied Factors
Acevedo & Diaz-Molina (2023).	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Learning organization, innovative culture, knowledge management
Acevedo & Molina (2022)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Knowledge Management, Innovative Culture, Learning Organizations
Hessami et al. (2012)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Knowledge Management, Learning Organizations

(Ref: literature review database)

2.6.2 The Impact of Knowledge Management Practices on Sustainable Organizational Performance

The relationship between knowledge management (KM) practices and sustainable organizational performance has been extensively studied across various industries and geographies, revealing consistent themes and nuances in its implementation. Kordab et al. (2020e) underscore the positive influence of organizational learning on knowledge acquisition, sharing, and application in knowledge-intensive sectors, although they find its impact on knowledge creation minimal. Similarly, Luxmi (2014) identifies organizational learning as a partial mediator between KM and organizational performance in India's service and manufacturing sectors. In the Chinese context, Ma Kun (2022) highlights the significant influence of KM on corporate sustainability, further emphasizing that frugal innovation mediates the relationship between KM processes and sustainable corporate

performance in small and medium enterprises (SMEs). Expanding on this, Valmohammadi et al. (2019) assert the mediating role of innovation practices between KM and sustainable balanced performance, particularly in Iranian knowledge-based industrial companies, demonstrating the crucial connection between KM and innovation-driven outcomes. Abbas and Sağsan (2019) examine the link between KM and sustainable development, showing that KM significantly drives green innovation and sustainable development performance in Pakistani firms. Additionally, Shehabat (2020) stresses the role of KM as a strategic asset that fosters innovation, enhances competitive advantage, and improves organizational performance through effective knowledge-sharing mechanisms.

Building on these insights, Sapta et al. (2021b) examine the effects of organizational culture and leadership on KM, demonstrating that KM mediates the relationship between leadership styles and sustainable performance, reinforcing the knowledge-based theory's applicability to sustainability. S. Wang et al. (2022) take an environmental perspective by introducing Green Knowledge Management (GKM), revealing that GKM significantly enhances an organization’s capacity for green innovation, further supported by organizational green culture. This research suggests that integrating environmental considerations into KM practices is crucial for achieving sustainable development goals (SDGs). Li et al. (2020) focus on entrepreneurial performance, highlighting how KM practices influence dynamic capabilities, mediating the relationship between KM and both entrepreneurial and organizational performance, with opportunity recognition further enhancing this effect. In the banking sector, Jilani et al. (2020) identify employee ambidexterity as a mediator between knowledge sharing and sustainable performance, though surprisingly, knowledge hiding showed no significant impact in this relationship. In their study of SMEs, Gholami et al. (2013) further validate the significant positive impact of KM practices on various dimensions of organizational performance, including productivity, innovation, and customer satisfaction.

Finally, Sahoo et al. (2023) shift the focus to the role of green knowledge acquisition in driving green technology innovation, finding that such innovation is

crucial for translating KM into enhanced corporate environmental performance. Resource commitment also emerges as a moderating factor in this relationship, emphasizing the importance of aligning KM practices with broader organizational strategies and resource allocation. Collectively, these studies demonstrate that KM is not merely a set of isolated practices but a strategic tool that when effectively leveraged, drives innovation, performance, and sustainability across a wide array of sectors, including banking, manufacturing, and consulting. The consistent finding across these diverse contexts is that dynamic capabilities, opportunity recognition, and a supportive organizational culture are critical enablers that mediate and enhance the positive impacts of KM on sustainable performance.

Table 2.10 Summary related literature reviewed of Knowledge management practices on Sustainable organizational performance

Author (Year)	Research Findings		Studied Factors
Kordab et al. (2020)	Knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Sustainable organizational performance 1. Environment performance 2. Economic performance 3. Social performance	Organizational learning, knowledge management cycle, sustainable organizational performance
Luxmi (2014)	Knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Organizational performance	Organizational learning, knowledge management, organizational performance
Ma Kun (2022)	Knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Sustainable Corporate Performance	Knowledge Management Process, Sustainable Corporate Performance, Frugal Innovation
Valmohammadi et al. (2019)	Knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Performance	Knowledge Management Process, Organizational Innovation, Performance

Author (Year)	Research Findings		Studied Factors
Abbas & Sagsan (2019)	Knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Sustainable development	Green innovation, knowledge management practices, sustainable development
Shehabat (2020)	Knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Organizational performance	Knowledge management, organizational performance, innovation
Sapta et al. (2021)	Knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Sustainable performance 1. Environment performance 2. Economic performance 3. Social performance	Organizational culture, leadership styles, knowledge management, sustainable performance
Wang et al. (2022)	Green knowledge management	Sustainable development	Green knowledge management, sustainable development, green innovation, sustainable development
Cai Li et al. (2020)	Knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Organizational performance,	Knowledge management practices, organizational performance, dynamic capabilities, opportunity recognition.
Jilani et al. (2020)	Knowledge Sharing	Sustainable performance 1. Environmental performance 2. Economic performance 3. Social performance	Employees' Knowledge Sharing, Employees' Ambidexterity, Knowledge Hiding, Sustainable Performance
Gholami et al. (2013)	Knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Organizational performance,	Knowledge management practices, Organizational Performance

Author (Year)	Research Findings		Studied Factors
Sahoo et al. (2022)	Green Knowledge Management	Environmental Performance	Green Knowledge Acquisition, Green Knowledge Management, Green Technology Innovation, Corporate Environmental Performance, Resource Commitment
Qader et al. (2022)	Knowledge Sharing Behavior	Sustainable Entrepreneurship Performance, Organizational Performance	Knowledge Sharing Behavior, Innovative Capacity, Dynamic Capability, Opportunity Recognition, Sustainable Entrepreneurship Performance, Organizational Performance
Falc et al. (2023)	Knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Sustainable performance 1. Environmental performance 2. Economic performance 3. Social performance	Knowledge Management, Green Innovation, Collaborative Culture, Sustainable Performance
Payal et al. (2019)	Knowledge management 1. Knowledge creation 2. Knowledge application 3. Knowledge storage 4. Knowledge transfer	Organizational performance,	Knowledge Management Strategy, Enablers Processes, Organizational Performance

(Ref: literature review database)

2.6.3 The Impact of Learning Organization on Sustainable Organizational Performance

The relationship between a learning organization and sustainable organizational performance is well-documented across numerous studies, revealing how the learning organization model fosters innovation, adaptability, and long-term success—highlighting how learning organizations in Taiwan's ecology industry drive sustainable organizational performance by enhancing innovation and organizational performance.

Alipour & Karimi (2011) emphasizes that learning organizations enhance organizational performance by fostering innovation and facilitating knowledge transfer, which act as key mediators in this relationship. Ju et al. (2021) further support this by showing that learning organizations positively influence employee attitudes, organizational commitment, and innovative capabilities, all contributing to enhanced organizational outcomes. Additionally, Hussein et al. (2014) demonstrated that dimensions of inquiry and dialogue within a learning organization are critical drivers of organizational innovation and performance, emphasizing the role of organizational culture in reinforcing these effects. Kim et al. (2016) found that knowledge performance and adaptive performance in learning organizations directly impacted financial performance. Similarly, Kim et al. (2017) noted that learning organizations drive knowledge performance and enhance financial performance by influencing knowledge-sharing mechanisms.

The importance of this relationship is also reflected in other studies. Dekoulou & Trivellas (2014) revealed that learning organizations foster development and innovation, essential for financial sustainability in Greek manufacturing firms. Similarly, Davis & Daley (2008) established that learning organizations positively influence financial outcomes, particularly regarding return on investment (ROI) and other profitability metrics. Rays et al. (2022), while finding no direct effect of learning organizations on performance, emphasized the importance of organizational culture and reputation, suggesting that these factors indirectly contribute to sustainability. (Pokharel and Choi, 2015) also supported these claims by demonstrating the importance of learning organizations in enhancing the efficacy of public sector organizations.

Additionally, scholars like Kontoghiorghes et al. (2005) focused on the relationship between learning organizations and their ability to manage organizational change, revealing that risk-taking and open communication drive sustainable performance. This notion is further explored by Khunsoonthornkit and Panjakajornsak (2018), who emphasized the importance of developing policies aligned with learning organizations to improve sustainability in research organizations. Mrisha et al. (2017)

investigated how learning organizational culture fosters collaboration and teamwork, driving sustainable performance. (Sahaya, 2012) explored leadership styles, revealing that transformational leadership within learning organizations promotes innovation and financial sustainability. Weldy and Gillis (2010) expanded on this by demonstrating the role of learning organizations in improving knowledge performance and supporting overall organizational outcomes.

Table 2.11 Summary related literature review of learning organization on Sustainable organizational performance

Author (Year)	Research Finding		Studied Factors
Alipour & Karimi (2011)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Sustainable organizational performance 1. Environment performance 2. Economic performance 3. Social performance	Learning organization, organizational innovation, Sustainable organizational performance
Ju et al. (2021)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Organization performance	Learning organization, performance attitudes, organization performance
Dekoulou & Trivellas (2014)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Financial performance	Learning organization, development, and innovation, financial performance
Kim (2016)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Financial Performance	Learning Organization, Knowledge Performance, Adaptive Performance, Financial Performance

Author (Year)	Research Finding		Studied Factors
Hussein et al. (2014)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Organizational Performance,	Learning Organization, Organizational Performance, Organizational Innovativeness
Mrisha et al. (2017)	Learning Organization Culture	Organizational Performance,	Learning Organization Culture, Organizational Performance
Davis, D., & Daley, B. J. (2008)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Firm performance	Learning organization, firm performance
Pokharel & Choi (2015)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Organizational Performance	Learning organization, firm performance and efficacy, organization performance
Rays et al. (2022)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Performance	Learning Organization, Organizational Culture, Company Reputation, Performance
Kontoghiorghes, Awbre & Feurig (2005)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Organizational Performance	Learning organization, open communications information Sharing, risk-taking and new idea promotion, organizational performance.
Kim, W. & Lu (2017)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning	Financial performance	Learning organization, knowledge performance,

Author (Year)	Research Finding		Studied Factors
	4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership		Financial performance
Khunsoonthornkit & Panjakajornsak (2018)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Organizational Performance	Learning organization, organizational commitment, organizational performance.
Sahaya (2012)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Organization Performance	Leadership style, learning organization, organization performance, ROA
Weldy & Gillis (2010)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Organization Performance	Learning organization, knowledge performance, organization performance

Ref: literature review database

2.6.4 The impact of Learning Organization on Innovation Capability

The relationship between learning organizations and innovation capability has been extensively studied, with research showing that learning organizations foster environments conducive to innovation by enhancing knowledge sharing, promoting employee engagement, and utilizing information systems technology. Fanbasten (2014) demonstrated that learning organizations and knowledge-sharing capabilities significantly influence innovation capability and business performance, with innovation acting as a mediating factor. Hamdani and Susilawati (2018) found that information system technology positively impacts innovation ability but not necessarily product innovation. Calantone et al. (2002) highlighted that learning orientation within firms strengthens innovation and improves organizational performance.

Kontoghiorghes et al. (2005) emphasized the importance of open communication and team collaboration in fostering employee-driven innovation.

Ismail (2005) reported that a learning organization culture and an innovative climate explained 58.5% of the variance in innovation capability. Alipour underscored the role of learning organizations in facilitating knowledge creation and transfer, thus improving organizational performance. Alipour & Karimi (2011b) that learning organizations enhance innovation capability by promoting continuous learning, fostering knowledge transfer, and adapting to dynamic environments, which collectively improve organizational performance through increased innovation. Lam and Lundvall (2006) stressed that networked learning organizations positively influence innovation through collective communication and learning. Anwar and Niode (2017) and Liao (2006) confirmed that knowledge sharing and work engagement within learning organizations significantly impact employees' innovative behaviors. Park et al. (2014)further reinforced this, showing that learning organizations positively influence innovative work behaviors, with work engagement serving as a crucial mediating variable.

In conclusion, learning organizations enhance innovation capability by fostering knowledge sharing, employee engagement, and collaboration, leading to improved business performance and firm-level innovation.

Table 2.12 Summary related literature reviewed of Learning organization on Innovation capability

Author (Year)	Research Findings		Studied Factors
Fanbasten (2014)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Innovation Capability 1. Process innovation 2. Production innovation 3. Technological innovation 4. Behavioral innovation 5. Market innovation	Learning Organization, Knowledge Sharing Capability, Innovation Capability, Business Performance

Author (Year)	Research Findings		Studied Factors
Hamdani & Susilawati (2018)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Innovation Capability 1. Process innovation 2. Production innovation 3. Technological innovation 4. Behavioral innovation 5. Market innovation	Information System Technology, Learning Organization, Innovation Capability, Business Performance
Calantone, Cavusgil & Zhao (2002)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Firm innovation	Learning organization, firm innovation, firm performance
Kontoghiorghes, Awbre & Feurig (2005).	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Innovation	They are learning organization, change adaptation, innovation, and organizational performance.
Ismail (2005)	Learning organization culture	Innovation Capability 1. Process innovation 2. Production innovation 3. Technological innovation 4. Behavioral innovation 5. Market innovation	Learning organization culture, organizational, creative climate, innovation capability
Alipour & Karimi (2011)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Innovation	Learning organization, knowledge creation, innovation, organizational performance

Author (Year)	Research Findings		Studied Factors
Lam & Lundvall (2006)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Innovation	Learning organizations, innovation
Anwar & Niode (2017)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Innovation behaviour	Learning organization, work engagement, innovation behavior
Liao (2006)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Firm innovation	Learning organization, knowledge sharing, firm innovation
Park et al. (2014)	Learning organization 1. Continuous Learning 2. Dialogue & Inquiry 3. Team Learning 4. Embedded Systems 5. Empowered People 6. System Connection 7. Strategic Leadership	Innovative work behaviors	Learning organization, innovative work behaviors

Ref: literature review database

Numerous studies across various sectors have established the influence of innovation capability on sustainable organizational performance. Asad et al. (2018) demonstrated that innovation capabilities, including product, process, marketing, and organizational management innovations, significantly enhance performance based on the balanced scorecard model. Prajogo and Ahmed (2006) confirmed the strong relationships between innovation stimulus, innovation capacity, and performance in Australian companies. Sawaean and Ali (2020) identified innovation capability as a

critical mediator between entrepreneurial leadership, learning orientation, and organizational performance.

Su et al. (2018) explored the role of innovation capability in mediating the effects of perceived innovation requirements on organizational performance, particularly emphasizing the importance of process and product innovation. María Ruiz-Jiménez & del Mar Fuentes-Fuentes (2013) highlighted that product and process innovation mediate the relationship between knowledge combination capability and organizational performance. Similarly, Migdadi (2022) illustrated how knowledge management processes positively influence innovation capability, boosting organizational outcomes.

Huang et al. (2016) noted that innovation knowledge processing benefits firms with varying levels of diversification, improving their ability to address complex problems and performance outcomes. Alshura et al. (2023) found that organizational commitment mediates the relationship between innovation capabilities and sustainable performance in energy-related enterprises. Somwethee et al. (2023) emphasized that entrepreneurial capability, driven by leadership and active learning, contributes to innovation and value creation. Lastly, AlTaweel and Al-Hawary (2021) revealed that strategic agility significantly influences innovation capability and organizational performance.

These scholars collectively provide empirical and theoretical foundations showing that innovation capability is a critical mediator influencing sustainable organizational performance across various industries and contexts.

Table 2.13 Summary related literature reviewed of Innovation capability on sustainable organizational performance

Author (Year)	Research Findings		Studied Factors
Asad et al. (2018)	Innovation Capability 1. Process innovation 2. Production innovation 3. Technological innovation 4. Behavioral innovation 5.Market innovation	Sustainable performance 1. Environmental performance 2. Economic performance 3. Social performance	Innovation capability, sustainable organizational performance

Author (Year)	Research Findings		Studied Factors
Prajogo & Ahmed (2006)	Innovation Capability 1. Process innovation 2. Production innovation 3. Technological innovation 4. Behavioral innovation 5. Market innovation	Innovation performance	Innovation stimulus, innovation capacity, innovation performance
Sawaean & Ali (2020)	Innovation Capability 1. Process innovation 2. Production innovation 3. Technological innovation 4. Behavioral innovation 5. Market innovation	Organizational performance	Entrepreneurial leadership, learning orientation, innovation capacity, organizational performance
Su et al. (2018)	Innovation Capability 1. Process innovation 2. Production innovation 3. Technological innovation 4. Behavioral innovation 5. Market innovation	Organizational performance	Innovation capacity, organizational performance
María Ruiz-Jiménez & del Mar Fuentes-Fuentes (2013)	Innovation	Organizational performance 1.Economic performance	Knowledge combination capability, innovation, organizational performance
Migdadi (2022)	Innovation Capability 1. Process innovation 2. Production innovation 3. Technological innovation 4. Behavioral innovation 5. Market innovation	Organizational performance	Knowledge management process, innovation capability, organizational performance
Huang et al. (2016)	Innovation knowledge	Organizational performance 1. Economic performance 2. Social performance	Innovation knowledge, information management capabilities, organizational performance
Alshura et al. (2023)	Innovative organizational capabilities	Sustainable performance 1. Environmental performance 2. Economic performance 3. Social performance	Innovative organizational capabilities, sustainable performance

Author (Year)	Research Findings		Studied Factors
Somwethee, Aujirapongpan & Ru-Zhue (2023)	Innovation Capability 1. Process innovation 2. Production innovation 3. Technological innovation 4. Behavioral innovation 5. Market innovation	Sustainable organizational performance 1. Environmental performance 2. Economic performance 3. Social performance	Entrepreneurial capability, Innovation capability, Sustainable organizational performance
AlTaweel & Al-Hawary (2021).	Innovation Capability 1. Process innovation 2. Production innovation 3. Technological innovation 4. Behavioral innovation 5. Market innovation	Organizational performance 1. Economic performance 2. Social performance	Innovation capability, strategic agility, organizational performance

(Ref: literature review database)

2.6.5 The Impact of Innovation Capability on Sustainable Organizational Performance

Numerous studies across various sectors have established the influence of innovation capability on sustainable organizational performance. Asad et al. (2018) demonstrated that innovation capabilities, including product, process, marketing, and organizational management innovations, significantly enhance performance based on the balanced scorecard model. Prajogo and Ahmed (2006) confirmed the strong relationships between innovation stimulus, innovation capacity, and performance in Australian companies. Sawaean & Ali (2020) identified innovation capability as a critical mediator between entrepreneurial leadership, learning orientation, and organizational performance.

Su et al. (2018) explored the role of innovation capability in mediating the effects of perceived innovation requirements on organizational performance, particularly emphasizing the importance of process and product innovation. María Ruiz-Jiménez & del Mar Fuentes-Fuentes (2013) highlighted that product and process innovation mediate the relationship between knowledge combination capability and organizational performance. Similarly, Migdadi (2022) illustrated how knowledge management processes positively influence innovation capability, boosting organizational outcomes.

Huang et al. (2016) noted that innovation knowledge processing benefits firms with varying levels of diversification, improving their ability to address complex problems and performance outcomes. Alshura et al. (2023) found that organizational commitment mediates the relationship between innovation capabilities and sustainable performance in energy-related enterprises. Somwethee et al. (2023) emphasized that entrepreneurial capability, driven by leadership and active learning, contributes to innovation and value creation. Lastly, AlTaweel and Al-Hawary (2021) revealed that strategic agility significantly influences both innovation capability and organizational performance.

These scholars collectively provide empirical and theoretical foundations showing that innovation capability is a critical mediator influencing sustainable organizational performance across various industries and contexts.

Table 2.14 Summary related literature reviewed of Innovation capability on sustainable organizational performance

Author (Year)	Research Findings		Studied Factors
Asad et al. (2018)	Innovation Capability 1. Process innovation 2. Production innovation 3. Technological innovation 4. Behavioral innovation 5. Market innovation	Sustainable performance 1. Environmental performance 2. Economic performance 3. Social performance	Innovation capability, sustainable organizational performance
Prajogo & Ahmed (2006)	Innovation Capability 1. Process innovation 2. Production innovation 3. Technological innovation 4. Behavioral innovation 5. Market innovation	Innovation performance	Innovation stimulus, innovation capacity, innovation performance
Sawaean & Ali (2020)	Innovation Capability 1. Process innovation 2. Production innovation 3. Technological innovation 4. Behavioral innovation 5. Market innovation	Organizational performance	Entrepreneurial leadership, learning orientation, innovation capacity, organizational performance

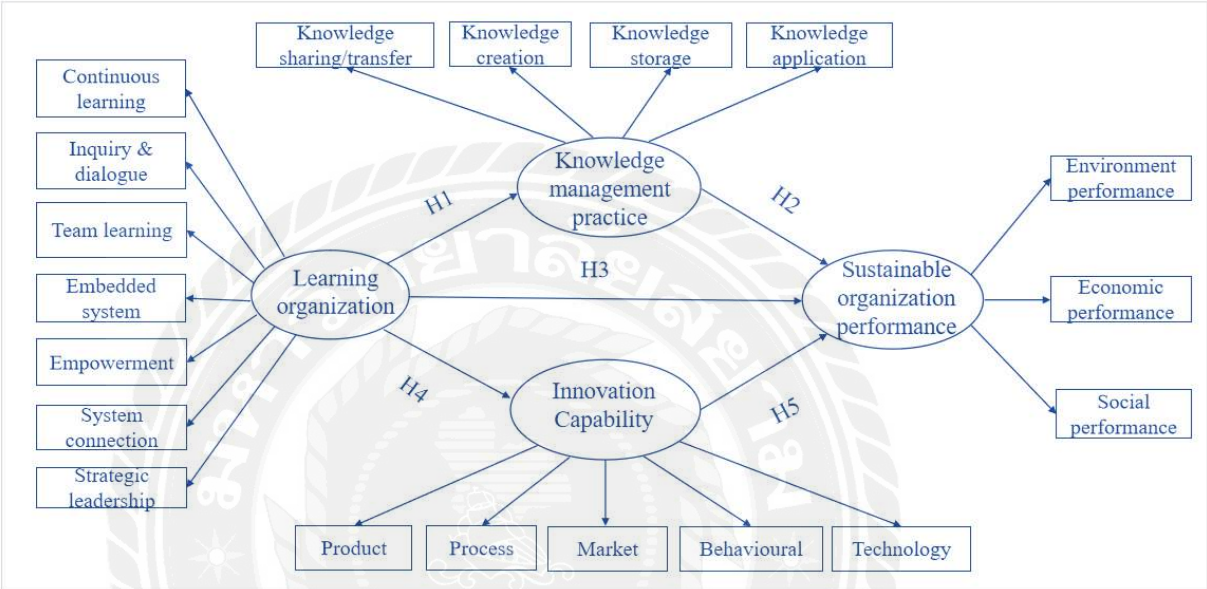
Author (Year)	Research Findings		Studied Factors
Su et al. (2018)	Innovation Capability 1. Process innovation 2. Production innovation 3. Technological innovation 4. Behavioral innovation 5. Market innovation	Organizational performance	Innovation capacity, organizational performance
María Ruiz-Jiménez & del Mar Fuentes-Fuentes (2013)	Innovation,	Organizational performance 1. Economic performance	Knowledge combination capability, innovation, organizational performance
Migdadi (2022)	Innovation Capability 1. Process innovation 2. Production innovation 3. Technological innovation 4. Behavioral innovation 5. Market innovation	Organizational performance	Knowledge management process, innovation capability, organizational performance
Huang et al. (2016).	Innovation knowledge	Organizational performance 1. Economic performance 2. Social performance	Innovation knowledge, information management capabilities, organizational performance
Alshura et al. (2023)	Innovative organizational capabilities	Sustainable performance 1. Environment performance 2. Economic performance 3. Social performance	Innovative organizational capabilities, sustainable performance
Somwethee, Aujirapongpan & Ru-Zhue (2023)	Innovation Capability 1. Process innovation 2. Production innovation 3. Technological innovation 4. Behavioral innovation 5. Market innovation	Sustainable organizational performance 1. Environmental performance 2. Economic performance 3. Social performance	Entrepreneurial capability, Innovation capability, Sustainable organizational performance
AlTaweel & Al-Hawary (2021).	Innovation Capability 1. Process innovation 2. Production innovation 3. Technological innovation 4. Behavioral innovation 5. Market innovation	Organizational performance 1. Economic performance 2. Social performance	Innovation capability, strategic agility, organizational performance

(Ref: literature review database)

2.7 Conceptual Framework, Operational Definition, Hypothesis, and Explanation of Hypothesis

2.7.1 Conceptual Framework

Figure 2.5 Independent variable, Mediator variable, and Dependent variable



Hypothesis

H1: Learning Organization significantly directly affects Knowledge management practices.

H2: Learning Organization significantly indirectly affects sustainable organizational performance through Knowledge management practices.

H3: Learning Organization significantly directly affects sustainable organizational performance.

H4: Learning Organization has a significant direct effect on Innovation capability.

H5: Learning Organization significantly indirectly affects sustainable organizational performance through innovation capability.

2.7.2 Operational Definition

2.7.2.1 Learning Organization

A learning organization is quantitatively measured by assessing its performance across seven dimensions: continuous learning, inquiry and dialogue, team learning, embedded systems, empowerment, system connection, and strategic leadership. These dimensions reflect vital organizational behaviors and practices that promote learning and adaptability. For example, continuous learning focuses on how staff view mistakes as opportunities for growth, while inquiry and dialogue measure open communication and trust-building. Team learning evaluates collaboration and flexibility, and embedded systems capture how well knowledge is documented and shared. Empowerment assesses employees' control over work; system connection reflects external and internal alignment, and strategic leadership looks at how leadership fosters a learning culture. Organizations can use structured questionnaires to rate these dimensions on a Likert scale, generating data that provides insights into their learning capacity and identifying areas for improvement.

2.7.2.1.1 Continuous learning

The operational definition of continuous learning based on the five questionnaire items refers to specific behaviors and practices that encourage ongoing organizational development. These items define continuous learning as Open Discussion of Mistakes, Peer Support for Learning, Access to Learning Resources, Time for Learning, and Viewing Problems as Learning Opportunities. Collectively, these elements define continuous learning as an ongoing process where mistakes are learning tools, collaboration is encouraged, and resources and time are provided to support growth.

2.7.2.1.2 Inquiry and Dialogue

The operational definition of Inquiry and Dialogue is derived from specific behaviors that promote open communication, critical thinking, and trust-building within an organization. Based on the questionnaire items, this dimension is defined by Honest Feedback, Active Listening, Encouragement of Inquiry, Inclusive

Discussions, and Trust Building. These items are quantitatively measured on a Likert scale, where employees assess how often these behaviors are practiced, providing a numerical representation of the level of inquiry and dialogue in the Organization.

2.7.2.1.3 Team learning

The operational definition of Team Learning is based on behaviors that enhance collaboration, adaptability, and collective growth within teams. According to the questionnaire, team learning is defined by Goal Adaptation, Focus on Process and Task, Revising Thinking, Team Rewards, and Confidence in Organizational Action. Quantitatively, team learning is measured by how often these behaviors occur, typically rated on a Likert scale. This provides insight into the organization's support for team-based learning and adaptability

2.7.2.1.4 Embedded System

Based on the questionnaire items, the operational definition of Embedded Systems in a learning organization refers to the processes and structures that ensure knowledge is captured, stored, and made easily accessible to employees. Access to Information defines this dimension as an up-to-date employee skills database, performance measurement, knowledge sharing, and training evaluation. These items quantify how well the organization captures, stores, and shares knowledge through formal systems, typically measured using Likert scales to assess their frequency and effectiveness

2.7.2.1.5 Empowerment

The operational definition of Empowerment in a learning organization is based on specific behaviors that give employees the autonomy and support to take initiative and make decisions. According to the questionnaire items, empowerment is defined by Choice in Work Assignments, Contribution to Vision, Control Over Resources, Support for Risk-Taking, and Alignment Across Levels. These aspects of empowerment are measured quantitatively by asking employees to rate how frequently they experience these behaviors, typically

using a Likert scale. This provides data on how the organization empowers its staff to act with autonomy and influence.

2.7.2.1.6 System connection

The operational definition of System Connection in a learning organization focuses on how well the organization connects internal operations with broader external environments, encouraging holistic thinking and collaboration. According to the questionnaire items, system connection is defined by Holistic Thinking, Client-Centered Decision-Making, Employee Morale Impact, Community Collaboration, and Cross-Organizational Problem-Solving. These behaviors are quantitatively measured by asking employees to rate their occurrence using Likert scales, providing insight into how well the organization connects its internal and external systems

2.7.2.1.7 Strategic leadership

The operational definition of Strategic Leadership in a learning organization means leadership behaviors that guide, support, and align the organization's learning efforts with its overall mission and goals. The questionnaire items define strategic leadership as Support for Learning Opportunities, Information Sharing, Empowerment for Vision Execution, Mentoring and Coaching, and Consistency with Organizational Values. These leadership practices are quantitatively measured by asking employees to rate the frequency of these behaviors, often using Likert scales. This helps assess the effectiveness of leadership in aligning learning initiatives with broader strategic objectives.

2.7.2.2 Knowledge management practices

Knowledge management practices is quantitatively measured by assessing its performance across four dimensions: knowledge creation, knowledge storage, knowledge sharing/transfer, and knowledge application. These dimensions reflect the critical processes in capturing, managing, and utilizing organizational knowledge. For instance, knowledge creation focuses on generating new ideas and best

practices from projects to improve future outcomes. In contrast, knowledge storage measures how effectively the organization maintains accessible databases for employee and customer information. Knowledge sharing evaluates the willingness and systems in place for exchanging knowledge across teams and with stakeholders, ensuring that relevant information is transferred efficiently. Lastly, knowledge application assesses the processes for turning knowledge into actionable plans, ensuring that learning and insights are integrated into problem-solving and goal achievement. Organizations use structured questionnaires to rate these dimensions on Likert scales, providing quantitative insights into their knowledge management practices and areas for potential improvement.

2.7.2.2.1 Knowledge Creation

Knowledge Creation is operationally defined by evaluating how an organization generates and develops new ideas, processes, and solutions. According to the questionnaire items, this dimension is captured by Learning from Previous Projects, Using New Opportunities, Offering New Services, Cost-Reduction Ideas, and Market Expansion Ideas. These aspects of knowledge creation are typically measured through Likert scales, where employees assess the frequency and effectiveness of these behaviors. This quantitatively measures the organization's ability to innovate and respond to new challenges.

2.7.2.2.2 Knowledge Storage

Knowledge Storage is operationally defined by evaluating how effectively an organization captures, organizes, and maintains knowledge for easy access and future use. According to the questionnaire items, knowledge storage is defined by Customer Information Database, Knowledge Database, Personal Knowledge Accounts, Linking Individual Content, and System Upgrades. These aspects are measured using Likert scales to quantify how well the organization stores and manages knowledge, ensuring employees can easily retrieve and use it.

2.7.2.2.3 Knowledge Sharing

Knowledge Sharing is operationally defined by evaluating how effectively knowledge is exchanged between individuals and groups within and outside the organization. Based on the questionnaire items, knowledge sharing is defined as Project Knowledge Sharing, Stakeholder Knowledge Sharing, Cross-Business Unit Sharing, Willingness to Share Experiences, and Rewards for Knowledge Sharing. These behaviors are typically assessed through Likert scale ratings, providing a quantitative measure of how well the organization promotes and supports the flow of knowledge across different levels and stakeholders.

2.7.2.2.4 Knowledge Application

Knowledge Application is operationally defined by assessing how well an organization transforms knowledge into actionable strategies and solutions to achieve its goals. The questionnaire items are defined by Action Plans, Matching Knowledge to Problem-Solving, Efficiency in Knowledge Application, Innovation Implementation, and Rewarding Knowledge Application. These aspects are quantitatively measured through Likert scales, providing insights into how well the organization turns knowledge into real-world outcomes.

2.7.2.3 Innovation capability

Innovation capability is quantitatively measured by evaluating its performance across five key dimensions: production innovation, process innovation, technological innovation, market innovation, and behavioral innovation. These dimensions reflect the organization's ability to adapt, create, and implement new ideas and processes. For example, production innovation measures how well the organization develops new products or services in response to market demands. In contrast, process innovation focuses on aligning new product offerings with existing business processes and collaborating with external organizations to improve operations. Technological innovation assesses the organization's capacity to adopt and update technologies, and market innovation looks at the methods used to analyze and predict consumer demands

and explore new market opportunities. Lastly, behavioral innovation evaluates the organization’s willingness to embrace change, encourage new ideas, and foster a culture of innovation. These dimensions are typically assessed through structured questionnaires that use Likert scales, providing a quantitative measure of the organization's innovation capacity and highlighting areas for improvement.

2.7.2.3.1 Product innovation

Product innovation means how well an organization creates and promotes new products or services to meet market demands. Based on the questionnaire items, product innovation is defined as practical innovation based on consumer demand, promotion of new products, launch of new products according to market plans, investment in research and development, and identification of new development opportunities. Likert scales typically measure these elements, allowing the organization to gauge its capacity to innovate and respond to consumer needs through product development.

2.7.2.3.2 Process innovation

Process innovation means how well an organization improves or introduces new business processes to enhance efficiency and align with strategic goals. According to the questionnaire items, process innovation is defined as alignment with current business processes, collaboration with external organizations, coordination of service innovation, brand strategy consideration, and support for innovation development. These items are typically measured using Likert scales, providing a quantitative understanding of how well the organization integrates innovation into its processes.

2.7.2.3.3 Technological innovation

Technological innovation means how well an organization adopts and leverages new technologies to enhance its services, products, and market position. Based on the questionnaire items, technological innovation is defined as using Diverse Information Sources, Updating Production Technologies, Importance of Keeping Up

with Technology, Monitoring Competitors' Technology, and Exploring New Market Opportunities Through Technology. These aspects of technological innovation are typically assessed using Likert scales, providing a quantitative measure of how effectively an organization implements and adapts to technological changes.

2.7.2.3.4 Market innovation

Market innovation means how well an organization identifies and responds to new market trends and opportunities using innovative strategies. Based on the questionnaire items, market innovation is defined as discovering new marketing trends, innovative consumer demand analysis, market predictions, exploring new market opportunities, and using big data for consumer communication. These behaviors are measured using Likert scales to assess how frequently the organization engages in market innovation activities, providing a quantitative view of its ability to stay competitive and innovative in the marketplace.

2.7.2.3.5 Behavioral innovation

Behavioral innovation means how well an organization promotes a culture of openness to change, creativity, and new ways of doing things. According to the questionnaire items, behavioral innovation is defined as Careful Expansion, Willingness to Change, Encouragement of New Ideas, Regular Communication on Innovation, and Rewards for Innovative Behavior. These items are typically assessed using Likert scales to measure how often these behaviors occur, providing a quantitative understanding of how effectively the organization cultivates a culture of innovation.

2.7.2.4 Sustainable organizational performance

Sustainable organizational performance means how well the organization integrates environmental, economic, and social performance into its operations across different areas. Environmental performance focuses on how effectively the organization utilizes green practices, such as reducing energy consumption, adopting sustainable resources, and employing technologies that promote efficiency. Economic

performance evaluates the organization's market competitiveness, profitability, and cost management, such as decreasing material purchasing costs and improving market share. Social performance measures the organization's impact on social welfare, including improving relationships with the community, enhancing work safety, and improving the working environment and living quality for surrounding communities. These elements are assessed using Likert scales, where employees rate the organization's performance in each area, providing a quantitative understanding of how well it balances economic success with environmental and social responsibilities.

2.7.2.4.1 Environmental Performance

Environmental performance means evaluating how well an organization integrates sustainable practices into its operations to minimize its environmental impact. Based on the questionnaire items, environmental performance is measured by Green Office Practices, Use of Sustainable Resources, Energy Efficiency through Technology, Effective Use of Electricity, and Circular Economy Practices. These behaviors are measured quantitatively using Likert scales, providing insight into how effectively the organization manages its environmental responsibilities and sustainable operations.

2.7.2.4.2 Economic Performance

Economic performance means assessing how well an organization achieves financial and market-related outcomes. Market Share Improvement, Enhanced Market Position, Profitability Increase, Reduction in Material Costs, and Decrease in Utility Costs measure economic performance. These items are typically measured through Likert scales, which quantitatively analyze the organization's economic outcomes and efficiency.

2.7.2.4.3 Social Performance

Social performance means how effectively an organization contributes to societal well-being and fosters positive relationships with its stakeholders and community. It is defined by several key aspects: Community and Stakeholder

Relationships, Workplace Safety, Improved Work Environment, Quality of Life in Surrounding Communities, and Social Reputation. Likert scales typically measure these items to assess the organization's overall social responsibility and contributions.

2.7.3 Explanation of Hypothesis

2.7.3.1 Hypothesis 1: Learning Organization has a Significant Direct Effect on Knowledge Management Practices

Meaning of Hypothesis

The better the management of a Learning Organization, the greater its impact on Knowledge management practices.

Reason of Hypothesis

The hypothesis that a learning organization has a significant direct effect on knowledge management practices is supported by the idea that learning organizations promote continuous learning, collaboration, and information sharing, which are crucial for effective knowledge management. Learning organizations create environments where knowledge is generated, captured, stored, and applied effectively. Marsick Watkins (1996) states that a culture that fosters learning at all levels enhances an organization's ability to manage and utilize knowledge effectively.

Hypothesis's Supporting theory and research.

Organizational Learning Theory posits that an organization's learning ability is closely tied to its capacity to manage knowledge effectively. Learning organizations actively facilitate knowledge acquisition, dissemination, and application at all levels, making experiential learning, experimentation, and knowledge sharing essential for creating, retaining, and applying knowledge (Argyris & Schön, 1997).

The Knowledge-Based View (KBV) of the firm (Grant, 1996) builds on the Resource-Based View (RBV), emphasizing knowledge as the most strategically important resource. KBV argues that organizations that manage knowledge as a resource systematically gain a competitive advantage. Organizational Learning Theory

and KBV support the idea that learning organizations, by fostering continuous learning environments, directly improve knowledge management practices, leading to enhanced performance.

Research consistently supports the dynamic relationship between organizational learning and knowledge management. Kordab et al. (2020d) found that organizational learning enhances knowledge management and sustainable performance, while Stary and Fleischmann (2011) highlighted process memory and communication techniques as key to adaptability. Saied et al., 2021) demonstrated the mediating role of learning organizations in linking knowledge management to service quality. Abdullah et al. (2013) and Shanab et al. (2014) confirmed that organizational learning and knowledge management positively influence performance and competitive advantage through knowledge sharing. Johannessen et al. (1999) and Pun and Balkissoon (2015) emphasized the close integration of these concepts for performance improvement. Khan et al. (2015) and Acevedo and Molina (2022) underscored the role of knowledge sharing and management in fostering innovation. Finally, Hessami et al. (2012) identified teamwork and continuous learning as critical success factors in learning organizations. These studies collectively support the hypothesis that organizational learning drives effective knowledge management and vice versa, leading to enhanced performance.

2.7.3.2 Hypothesis 2: Learning organization significantly indirectly affects Sustainable organizational performance through Knowledge management practices.

Meaning of Hypothesis

More learning organizations are better managed through knowledge management practices, which will increase sustainable organizational performance.

Reason of Hypothesis

Learning organizations create environments that foster continuous learning and knowledge sharing, which strengthens knowledge management practices. Knowledge management, in turn, serves as a mediator, transforming the knowledge generated by

learning organizations into actionable strategies that enhance sustainable organizational performance. This indirect relationship shows that while learning organizations provide the foundation, it is through effective knowledge management that organizations can drive improvements in environmental, social, and economic outcomes, aligning their operations with long-term sustainability goals.

Hypothesis's Supporting theory and research

The Resource-Based View (RBV) argues that organizations gain sustainable competitive advantages by acquiring and utilizing valuable, rare, inimitable, and non-substitutable resources. Organizational learning, viewed as a critical resource, enhances human capital, builds unique capabilities, and integrates knowledge, becoming a key source of sustainable competitive advantage (Barney, 1991).

Several studies support the relationship between learning organizations and sustainable performance. Kordab et al. (2020) showed a positive link between organizational learning, knowledge management, and sustainable performance in the Middle East. Luxmi (2014) identified organizational learning as a mediator between knowledge management and performance in India, while Ma Kun (2022) highlighted knowledge management's role in corporate sustainability in Chinese SMEs. Valmohammadi et al. (2019) and Abbas & Sagsan (2019) found knowledge management to impact innovation and sustainable development in Iranian and Pakistani industries, respectively. Sapta et al. (2021) emphasized knowledge management's mediating role between organizational culture, leadership, and sustainable performance. Wang et al. (2022) and Cai Li et al. (2020) further highlighted the role of knowledge management in achieving sustainable goals and improving performance. Additionally, Jilani et al. (2020), Gholami et al. (2013), and Sahoo et al. (2022) confirmed knowledge management's significant impact on sustainable performance in various sectors. These studies collectively demonstrate the crucial role of knowledge management in driving sustainable organizational performance.

2.7.3.3 Hypothesis 3: Learning Organization Significantly Directly Affects Sustainable Organizational Performance.

Meaning of Hypothesis

The more a Learning organization is better managed, the more it affects sustainable organizational performance.

Reason of Hypothesis

Learning organizations promote continuous learning, innovation, and knowledge sharing, essential for improving processes and reducing waste. They foster better decision-making, aligning actions with long-term sustainability goals. Additionally, learning organizations are more adaptable to changes in environmental and social demands, enabling them to respond effectively to sustainability challenges. These qualities make learning organizations well-suited to drive sustainable performance directly through innovation, resource optimization, and strategic alignment.

Hypothesis's Supporting theory and research

The Dynamic Capabilities Theory (Teece et al.,1997) posits that an organization's ability to build, integrate, and reconfigure competencies is essential for sustained performance in changing environments. As a dynamic capability, learning helps organizations sense opportunities, seize them, and adapt resources, fostering long-term sustainability through innovation and competitiveness.

Recent studies have explored various aspects of how learning organizations impact sustainable performance. At the organizational level, Inthavong et al. (2023) and Kim et al. (2017) emphasize the role of innovation, networking, and knowledge management in enhancing sustainable and financial performance. Ziemak and Jankowska (2020) and Kim (2016) highlight the importance of business sustainability and adaptive performance, while Hussein et al. (2013) and Mrisha et al. (2017) focus on organizational culture's influence on innovation and performance. Chen & Zheng (2022) and Mollah et al. (2023) emphasize resource integration and IT capabilities as key performance drivers.

On the challenges side, Kim (2016) and Ziemak and Jankowska (2020) identify difficulties in linking learning organizations directly to financial performance and business sustainability. Rays et al. (2022) and Iqbal and Ahmad (2020) discuss the strong influence of organizational culture, reputation, and sustainable leadership on learning and performance. Faulks et al. (2021) and Morales et al. (2011) underscore the importance of innovative work behavior and transformational leadership in driving sustainable economic performance and learning. Lastly, Kordab et al. (2020) explore the mediating role of the knowledge management cycle between organizational learning and sustainable performance, providing a comprehensive view of learning organizations' impact on business outcomes.

2.7.3.4 Hypothesis 4: Learning Organization Significantly Directly Affects Innovation Capability.

Meaning of Hypothesis

More learning organization is better managed. It will increase sustainable organizational performance.

Reason of Hypothesis

Learning organizations foster continuous learning, collaboration, and knowledge sharing, stimulating creativity and idea generation. Their adaptability and flexibility allow for the quick integration of new technologies and processes, driving innovation. Additionally, by empowering employees and encouraging active participation, learning organizations create a culture that promotes innovative thinking. Applying knowledge gained through learning further enhances the organization’s ability to innovate effectively.

Hypothesis’s Supporting theory and research

Several vital theories support the relationship between learning organizations and innovation capability, particularly Dynamic Capabilities Theory, Organizational

Learning Theory, and Knowledge-Based View (KBV). These theories explain how learning within organizations fosters an environment that enhances innovation.

The Dynamic Capabilities Theory, advanced by Teece et al. (1997), argues that a firm's ability to innovate and adapt largely depends on its capacity to build, integrate, and reconfigure internal and external competencies. In the context of learning organizations, this theory suggests that continuous learning improves an organization's ability to innovate by rapidly sensing opportunities, seizing them, and adapting to environmental changes. Learning organizations can better reconfigure resources and processes to support innovation, enhancing their ability to generate new products, services, or business models.

Organizational Learning Theory, developed by Argyris & Schön (1997), posits that organizations improve their innovation capability through continuous learning and adapting to new knowledge. By fostering a culture that encourages learning, experimentation, and knowledge sharing, organizations become more capable of generating novel ideas and implementing innovative solutions.

The Knowledge-Based View (KBV) also supports the relationship between learning organizations and innovation capability. It emphasizes that knowledge is the most critical resource for innovation, and learning organizations are best equipped to manage and exploit knowledge effectively. By cultivating a knowledge-driven environment, learning organizations improve their innovation processes(Grant, 1996).

Asad et al. (2018) state that all four types of innovation- product, process, marketing, and organizational- significantly and positively impact financial performance, customer performance, internal business process performance, and learning and growth. Prajogo & Ahmed (2006) tested among 194 managers of Australian firms. The survey responses indicate that the relationships between innovation stimulus and innovation capacity and between innovation capacity and performance are significant and robust. Sawaean and Ali (2020) view entrepreneurial leadership, learning orientation, innovation capacity, and organizational performance. The outcomes of this study indicate that

entrepreneurial leadership and learning orientation had positive and significant implications on organizational performance. Moreover, innovation capacity is also a significant mediator in the relationships.

2.7.3.5 Hypothesis 5: Learning Organization Significantly Indirectly Affects Sustainable Organizational Performance Through Innovation Capability.

Meaning of Hypothesis

More learning organization is better managed through innovation capability, which will increase sustainable organizational performance.

Reason of Hypothesis

Learning organizations foster continuous learning and knowledge sharing, which drive innovation. Innovation, in turn, leads to sustainable outcomes by improving processes, reducing waste, and creating environmentally and socially responsible solutions. By promoting creativity and adaptability, learning organizations enable the development of innovations that enhance long-term sustainability and competitive advantage. Thus, innovation capability acts as a mediator between learning and sustainable organizational performance.

Hypothesis's Supporting theory and research

Absorptive Capacity Theory emphasizes an organization's ability to recognize the value of new external knowledge, assimilate it, and apply it to achieve its objectives. Absorptive capacity depends on prior knowledge and learning efforts. The theory explains that organizations with high absorptive capacity can better leverage external innovations and knowledge, enhancing their adaptability and sustained performance (Cohen & Levinthal, 1990).

Hamdani and Susilawati (2018) found that applying information system technology positively impacted innovation in leather tanning products while learning organizations had little effect on product innovation. Calantone, Cavusgil, and Zhao

(2002) argued that a strong learning orientation is essential for competitive advantage, identifying four components: commitment to learning, shared vision, open-mindedness, and knowledge sharing. Using data from US industries, their study confirmed the positive impact of learning orientation on firm innovativeness and performance. Kontoghiorghes, Awbre, and Feurig (2015) highlighted that learning organization characteristics like open communication, risk-taking, and resource availability are critical predictors of change adaptation, innovation, and overall organizational performance.

CHAPTER 3

RESEARCH METHODOLOGY

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

3.1 Introduction

In the comprehensive research study "A casual Model of Learning Organization Impact on Sustainable organizational performance in IT Companies in China," our primary objective is to delve into the dynamic interplay between adopting learning organization principles and the achievement of sustainable performance in the rapidly evolving IT sector.

Ultilie a mix method with Quantitative and Qualitative Research. This exploration is particularly pertinent given China's unique cultural, economic, and technological landscape, which presents both opportunities and challenges for implementing progressive organizational models.

3.2 Research Design

This mixed research method uses quantitative research as a significant methodology and Qualitative research to support the results from the significant research. Steps to do as the research will be as follows:

3.2.1 Documentary Research

This documentary explores the relationship between learning organization principles and sustainable performance in the Chinese IT sector. The study examines academic literature and investigates how continuous learning, adaptability, and knowledge sharing in learning organizations influence environmental, social, and governance (ESG) metrics. It emphasizes the cultural context of China and its impact on adopting learning organization models. A key focus is knowledge management practices and their role in fostering innovation, employee engagement, and customer satisfaction. The research also addresses Chinese IT companies' challenges in integrating learning organization principles with rapid technological change while maintaining continuous learning. Environmental sustainability is explored, assessing how IT companies implement sustainable practices and their impact on public image and performance. The study offers actionable insights for IT companies in China. It recommends best practices for implementing learning organization models that align with Chinese cultural nuances and global sustainability trends, ultimately promoting long-term resilience and success in the IT industry.

3.2.2 Empirical Research

This empirical study examines the impact of the learning organization model on the sustainable performance of 86 Chinese IT companies involving 122,369 employees. It focuses on how key factors such as continuous learning, team learning, and employee empowerment influence environmental, economic, and social performance. A mixed-methods approach combines quantitative survey data with qualitative insights from in-depth interviews with 20 executives and staff members. The study seeks to address the practical application of learning organization principles in China's competitive IT industry, aiming to provide valuable insights for future organizational strategies and sustainability efforts.

3.3 Quantitative Research

3.3.1 Population and Sample

Research Population and Institutions: The survey is conducted nationwide in China. These are China's Internet companies, run by investors, distributed in 20 provinces and five regions in China, with 86 companies in operation. Among them, 36 are in East China, 19 in South China, 5 in Southwest and Northwest China, and 23 in Northeast and North China. Central China is the central region of the 3. As shown in Table 3.1, there are 86 Public Internet companies in China, with a total number of employees of 122369.

Table 3.1 Total number of Internet-Public companies in China and employees Public in East, South, West, North, Middle region, Internet-Public companies (ILC), China.

Area	Province	Number of Companies		Employees
East	Anhui	1	36	3552
	Fujian	7		10158
	Jiangsu	6		6540
	Jiangxi	2		328
	Shandong	1		1088
	Shanghai	4		8178
	Zhejiang	15		32897
South	Guangdong	17	19	16659
	Guangxi	1		1683
	Guizhou	1		1269
West	Chongqing	1	5	1389
	Sichuan	2		841
	Shanxi（陕西）	2		1981
North	Jilin	1	23	650
	Liaoning	2		2055
	Beijing	15		20920
	Hubei	2		1293
	Shanxi（山西）	2		1403
	Tianjin	1		6481
Centre	Hunan	3	3	3004
Total		**86**		**122369**

(Source: China Merchants Securities Network, 2023)

Representative sample size selection: Eastern, southern, western, northern, and central regions were selected for this survey—provinces with the most and least registered public Internet companies. In the central region, the company represents 32,897 employees of 15 companies in eastern Zhejiang Province, and Shandong Province, with the least registered company, has 1,088 employees. The southern Guangdong province has 16,659 employees, and Guizhou province, the least registered company, has 1,269 employees. Western Shanxi Province has 2,981 employees and two companies; only one registered company in Chongqing has 1,389 employees. Twenty thousand nine hundred twenty

employees in Beijing have 15 companies, and 650 employees in Jilin province are the least, with only one registered company. Hunan has 3,004 employees in central China and only three companies. The last of them had only 387 people.

Table 3.2 The most significant and minor number of the province's public IT companies employees are distributed in China's eastern, southern, western, northern, and middle regions.

Area	Province	Number of Companies/Name		Employees	Total
East	Zhejiang	15	Perfect World Co., Ltd.	6061	32897
			Zhejiang Century Huatong Group Co., Ltd.	5915	
			Leo Group Co., Ltd.	5719	
			Yiwu Huading Nylon Co., Ltd.	3849	
			Hangzhou Onechance Tech Corp.	2174	
			Zhejiang Daily Digital Culture Group Co., Ltd.	1869	
			Hangzhou Shunwang Technology Co, Ltd	1227	
			Zhewen Interactive Group Co., Ltd.	1172	
			Zhejiang Jinke Tom Culture Industry Co., Ltd.	1067	
			Sunwave Communications Co.Ltd.	1065	
			Hangzhou Electronic Soul Network Technology Co., Ltd.	878	
			Merit Interactive Co., Ltd.	786	
			Zhejiang Netsun Co., Ltd.	587	
			Hangzhou Anysoft Information Technology Co., Ltd.	333	
			Zhejiang Furun Digital Technology Co., Ltd.	195	
East	Shandong	1	Sublime China Information Co., Ltd.	1088	1088
South	Guangdong	17	(Rastar Group) Rastar Interactive Entertainment Co., Ltd	2098	16659
			Qingmu Digital Technology Co., Ltd.	2046	
			Sailvan Times Co., Ltd.	1852	
			Shenzhen Bingchuan Network Co., Ltd.	1772	
			Guangdong Tloong Technology Group Co., Ltd.	1598	
			Shenzhen Mason Technologies Co., Ltd	1401	
			Kaiser (China)Culture Co., Ltd.	953	
			Guangzhou Ruoyuchen Technology Co., Ltd.	901	

Area	Province	Number of Companies/Name		Employees	Total
			Kaisa Jiayun Technology Inc.	604	
			Shenzhen Zqgame Co., Ltd.	525	
			Shenzhen Hifuture Information Technology Co., Ltd.	519	
			Genimous Technology Co., Ltd.	514	
			Dinglong Culture Co., Ltd.	499	
			Dasheng Times Cultural Investment Co., Ltd.	419	
			Nova Technology Corporation Limited.	407	
			Fengzhushou Co., Ltd.	351	
			Shen Zhen Shengxunda Technology Co., Ltd.	200	
South	Guizhou	1	Shijihengtong Technology Co., Ltd.	1269	1269
West	Shanxi	2	Three's Company Media Group Co., Ltd.	1163	1981
			Easy Click Worldwide Network Technology Co., Ltd.	818	
West	Chongqing	1	Giant Network Group Co., Ltd.	1389	1389
North	Beijing	15	Beijing Ultrapower Software Co., Ltd.	3329	20920
			People.Cn Co., Ltd.	3215	
			Hylink Digital Solutions Co., Ltd.	2253	
			Beijing Zhidemai Technology Co., Ltd.	1889	
			Xinhuanet Co.,Ltd.	1829	
			Kunlun Tech Co., Ltd.	1745	
			Beijing United Information Technology Co., Ltd.	1196	
			Net263 Ltd.	979	
			Ourpalm Co., Ltd.	963	
			Ireader Technology Co., Ltd.	846	
			Inly Media Co., Ltd.	800	
			Hcr Co., Ltd.	718	
			Beijing Quanshi World Online Network Information Co., Ltd.	693	
			Cloud Live Technology Group Co., Ltd.	266	
			Beijing Bewinner Communications Co., Ltd.	199	
North	Jilin	1	Tonghua Grape Wine Co., Ltd.	650	650
Centre	Hunan	3	Huakai Yibai Technology Co.,Ltd.	2180	3004
			Youkeshu Technology Co., Ltd.	437	
			Tangel Culture Co., Ltd.	387	

Representative selection of the total sample size: the Internet listed companies in the provinces with the most statistics obtained were in the eastern, southern, western, northern and central regions of China, The company's most significant employees registered in the east of Zhejiang province (6,061 employees) and only one company (1,088 employees) in Shandong Province as one of the survey samples, The company's largest employee in the southern part of Guangdong province (2,098 employees) and the company has only one in Guizhou (1,269 employees) as the second survey sample, The company with the most employees in the western region is in Shanxi (1, 163 employees) and only one registered company in Chongqing (1,389 employees) were selected as the third survey sample, Companies with the most significant number of employees in the northern part of Beijing (3,329 employees) and Jilin that registered only one company (650 employees) were selected as the fourth sample of the survey, And the company with the most significant number of employees in central Hunan province (2,180 employees) and the least number of employees in Hunan province (387 employees) were selected as the fifth part of the survey sample.19614 were the total number of employees in the sample that calculated the questionnaire.

Table 3.3 The largest number and the smallest number of Public IT company's employees

Area	Province	Number of Companies/Name		Employees
East	Zhejiang	1	Perfect World Co., Ltd.	6061
	Shandong	1	Sublime China Information Co., Ltd.	1088
South	Guangdong	1	(Rastar Group) Rastar Interactive Entertainment Co., Ltd	2098
	Guizhou	1	Shijihengtong Technology Co., Ltd.	1269
West	Shanxi	1	Three’s Company Media Group Co., Ltd.	1163
	Chongqing	1	Giant Network Group Co., Ltd.	1389
North	Beijing	1	Beijing Ultrapower Software Co., Ltd.	3329
	Jilin	1	Tonghua Grape Wine Co., Ltd.	650
Centre	Hunan	1	Huakai Yibai Technology Co., Ltd.	2180
	Hunan	1	Tangel Culture Co.,Ltd.	387
Total		**10**		**19614**

3.3.2 Research Tools

Utilizes research tools of SPSS27 and AMOS23 to analysis the questionnaire, the questionnaire designed for this study delves into the synchronization between knowledge management practices and the sustainable performance of organizations. Drawing from an extensive review of current academic literature, this tool is crafted to unravel and comprehend the nuances of how knowledge management systems operate within organizations and their impact on long-term performance success. This instrument explores knowledge management strategies' effectiveness and alignment with organizational sustainability and efficiency goals.

The questionnaire, informed by the seminal work of (Allen & Meyer, 1993), operates as a diagnostic tool to evaluate the congruence between an organization's learning capacity and sustainable performance, including knowledge management practices. The instrument is structured around a 5-point Likert scale, offering a spectrum of response options ranging from "Strongly Agree" to "Strongly Disagree."

There are five items. This part of the questionnaire is an estimation scale. Divided into five levels: Strongly agree - Strongly Disagree. The scoring criteria are as follows:

A Five score means Strongly agree

Four score means Agree

Three scores means Neither Agree nor Disagree

Two scores mean Disagree

One score means Strongly Disagree

The engagement score range is divided into five levels based on criteria for finding the breadth of class interactions. As follows:

Width of class interaction = （Highest score – Lowest score） / Number of floors

Width of class interaction = (5-1) / 5 = 0.8

The interpretation of the mean score for the importance of factors affecting learning organization to sustainable organizational performance Can be divided according to the concept of Allan and Meyer (1993) As follows:

Average score	The level of affecting factors
1.00 - 1.80	The lowest level
1.81 – 2.60	A low level
2.61 – 3.40	A medium level
3.41 – 4.20	A high level
4.21 – 5.00	The highest level

3.3.3 Data Collection Strategy and Procedures

When designing a questionnaire based on the outlined method, start by determining the number of free parameters in your model, such as factor loading or regression coefficients. This number will guide sample size requirements. For models where the data follows a normal or elliptical distribution and research has strong factor loading, the sample size population should be at least five times the number of free parameters. However, a more cautious approach is needed for data that does not adhere to a specific distribution, with the sample size being at least ten times the number of free parameters. Additionally, if research plans to perform significance tests or require precise model evaluation metrics, consider increasing your sample size beyond these fundamental ratios to ensure the reliability and robustness of your results. This approach will help ensure that the questionnaire is designed to produce trustworthy and accurate parameter estimates. In this study, the questionnaire test questions were 95, so the number of questionnaires issued was 95 * 5=475, and the questionnaire questions were 95. If the number of questionnaires is too small, the fit may be poor when fitting the questionnaire data with the model in the later stage. Therefore, increasing the number of questionnaires issued to 600 is better.

The researchers adjusted the number to 600 to improve reliability (Bentler & Chou, 1987). The sampling method was used. Purposive sampling is the selection of samples based on the researcher's decision. The characteristics of the enrolled group are in line with

the study objectives. Knowledge is required to select a specific sample—expertise and experience of researchers in this area. The sample is selected from the total number of employees in the General Management Department. Firstly, the distribution trend of the total number of Internet companies in China is as follows: 36 in the east, 19 in the South, 5 in the west, 23 in the north, and 3 in the middle. Secondly, the province with the most employees in each region was selected, and Zhejiang Province in the eastern region has 15 companies. There are 17 companies in Guangdong Province in the southern region, two companies in Shanxi Province in the western region, 15 companies in Beijing in the northern region, and three companies in Hunan Province in the central region. Ultimately, the total sample was obtained from the company with the most significant number of employees in these nine provinces (Zhejiang et al., Beijing, Jilin, and Hunan).

Perfect World Co., Ltd. in Zhejiang Province, located in the eastern region, has the most significant number of employees at 6,061, representing 31% of the total sample of 19,614 people, and 186 questionnaires should be distributed. Sublime China Information Co., Ltd. in Shandong Province, also in the eastern region, has 1,088 employees, accounting for 6% of the total sample, and 36 questionnaires should be distributed.

In the southern region, Rastar Interactive Entertainment Co., Ltd. (Rastar Group) in Guangdong Province employs 2,098 people, representing 11% of the total sample, with 66 questionnaires needing to be distributed. Shijihetong Technology Co., Ltd. in Guizhou Province, also in the southern region, has 1,269 employees, accounting for 6% of the total sample, requiring 36 questionnaires. In the western region, Three's Company Media Group Co., Ltd. in Shanxi Province has the most significant number of employees, 1,163, making up 6% of the total sample, requiring 36 questionnaires. In contrast, Giant Network Group Co., Ltd. in Chongqing has 1,389 employees, representing 7% of the total sample, and 42 questionnaires should be distributed. Beijing Ultrapower Software Co., Ltd. The northern region of Beijing has the most significant number of employees at 3,329, accounting for 17% of the total sample, with 102 questionnaires to be distributed. In contrast, Tonghua Grape Wine Co., Ltd. in Jilin Province, also in the northern region, has 650 employees,

accounting for 3% of the total sample, and 18 questionnaires should be distributed. In the central region, Huakai Yibai Technology Co., Ltd. in Hunan Province has 2,180 employees, representing 11% of the total sample, and 66 questionnaires should be distributed. In contrast, Tangel Culture Co., Ltd., also in Hunan Province, has 387 employees, accounting for 2% of the total sample, with 12 questionnaires needing to be distributed. As shown in Table 3.4.

Table 3.4 Population and specific sample using purposive sampling, classified by Public IT Companies in East, South, West, North, and Centre regions, China.

Area	Province	Companies Name	Employees	Percentage	Questionnaires
East	Zhejiang	Perfect World Co., Ltd.	6061	31%	186
	Shandong	Sublime China Information Co., Ltd.	1088	6%	36
South	Guangdong	(Rastar Group) Rastar Interactive Entertainment Co., Ltd	2098	11%	66
	Guizhou	Shijihengtong Technology Co., Ltd.	1269	6%	36
West	Shanxi	Three's Company Media Group Co., Ltd.	1163	6%	36
	Chongqing	Giant Network Group Co., Ltd.	1389	7%	42
North	Beijing	Beijing Ultrapower Software Co., Ltd.	3329	17%	102
	Jilin	Tonghua Grape Wine Co., Ltd.	650	3%	18
Centre	Hunan	Huakai Yibai Technology Co., Ltd.	2180	11%	66
	Hunan	Tangel Culture Co.,Ltd.	387	2%	12
Total	**5**	**10**	**19614**	**100%**	**600**

China has a large territory. In order to conduct a comprehensive investigation of the research topic, the sample companies' selection needs to cover various situations in Chinese learning organizations. China can be divided into five regions based on different economic development situations and dominated industries. Thus, it is necessary to select representative enterprises from various regions to show China's comprehensive

situation and ensure the research's reliability. Moreover, it is necessary to select the largest and the smallest enterprises in these five regions because the largest enterprise usually reflects the excellent situation of a region's organizational development, but in reality, there are problems. The most minor enterprise could show some problems. Therefore, selecting two companies from one region is crucial to show a comprehensive situation.

Moreover, because the researcher needs to communicate with these companies before the research, the researcher needs to confirm with these companies' contacting personnel about their essential learning organization, knowledge management, and innovation capability situations to ensure the questionnaire distribution's effectiveness.

The sampling method of this research in these ten companies is stratified sampling, also known as type sampling. The overall unit is divided into several types or layers according to its attribute characteristics, and then sample units are randomly selected in the types or layers (Zhao et al., 2019). The characteristic of stratified sampling is that the commonality between the units in each type is increased through classification and stratification, and it is easy to extract representative survey samples (Kim et al., 2013). This method is suitable for situations where the overall situation is complex, the difference between units is significant, and there are many units. The questionnaire distributed in 5 regions is shown in Table 3.4. In the same region, the questionnaire distribution is based on the employee number distribution of these two companies.

The research methodology for this study includes the instruments and data collection tools utilized. Additionally, the tools employed for data analysis and other tools for convenience are outlined as follows.

3.3.4 Questionnaire Structure and Data Analysis

The maturity scale was used in this study, the scale of items as follows:

Variable	Item Number	Scale Reference
Learning Organization	21	Pokharel, M. P., & Choi, S. O. (2015)
Knowledge Management Practices	11	Kordab et al. (2020)
Innovation Capability	25	Calik, E., Calisir & Cetinguc, (2017)
Sustainable Organizational Performance	23	Rashid et al. (2017)

This study utilizes a quantitative questionnaire to examine the impact of learning organization practices on sustainable performance. Cronbach's Alpha was applied to test internal consistency, with a value of 0.70 or higher indicating acceptable reliability. To ensure content validity, the Item-Objective Congruence (IOC) method was employed, where experts rated the alignment of items with research objectives. Items with an IOC score of 0.50 or higher were retained, ensuring the questionnaire's validity. These measures strengthen the reliability and validity of the data collected.

In pursuing quantitative data, the researcher developed specific tools to facilitate data collection. The questionnaire's construction was meticulously refined to align with the research goals and conform to the operational definitions and theoretical concepts of the variables under study. This process was conducted with the guidance and approval of the dissertation advisor. Additionally, the questionnaire was presented to experts to assess its content validity and the clarity of its language, ensuring that the research instruments were comprehensive and pertinent to the study's objectives.

For the assessment of content validity, the researcher employed the Index of Item-Objective Congruence (IOC) method. This involved a systematic evaluation process:

1） Experts specializing in IOC analysis first compared the question construction diagram with the questionnaire crafted by the researcher, ensuring alignment in their design and purpose.

2） The experts then evaluated each question about its specific measurement objectives, using the following rating scale:

A score of +1 indicated a high degree of confidence that the question aligns with the measurement objectives.

A score of 0 suggested uncertainty about the question's consistency with the measurement objectives.

A score of -1 signified certainty that the question did not align with the measurement objectives.

3） The scores provided by these experts were then utilized to calculate the IOC value for each questionnaire item using a prescribed formula. In this validation process, the researcher sought feedback from 5 specialists, employing the IOC method as a robust tool to verify the Content Validity of the research instruments.

(1) Dr. Liao Hao-Jie (China)

(2) Dr. Li Ying-Xia (China)

(3) Dr. Luo Xue-Mei(China)

(4) Dr. Liao Zhi-Gao (China)

(5) Dr. Li Chun-You (China)

Where IOC	=	Index of item-objective congruence value
R	=	Score from experts
	=	Total score from all experts
n	=	number of experts

The criteria to verify the score is

+1 means “the measurement item is congruent with the study's objective.”

0 means “the measurement item is undecided with the study objective.”

-1 means “the measurement item is inconsistent with the study objective.”

IOC needs to be between 0.5-1.00 for every question.

4) Find the mean of the IOC and use the following judgment:

Means between 0.5-1.00 means “the measurement is passing the criteria from experts.”

Means below 0.5 means “the measurement needs to make change or correction.”

Less than 0 means “the measurement fails the expert's qualify.”

5) 40 samples were tested, and 40 were selected as questionnaire respondents. Moreover, check on the reliability. The formula of Cronbach’s alpha coefficient is

where α = a coefficient of reliability

n = the number of informants

= the variance of the sum of informants

= the ratio of the variance of each informant

= the ratio of inter-informants’ variance

6）The questionnaire was initially presented to respondents for their valuable input. The primary demographic for this survey comprised college students employed in various enterprises. Utilizing the insights garnered from these respondents, the questionnaire underwent moderate revisions. Particular attention was given to modifying any sentences identified as challenging to comprehend or potentially biased.

The updated questionnaire was prepared for distribution in the study following these adjustments. In addition to content changes, the questionnaire's layout was also restructured. This comprehensive feedback incorporation and redesign process culminated in the questionnaire's finalization.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.927	.931	95

The reliability test of the 40-person questionnaire shows Cronbach's Alpha Based on Standardized Items at 0.927, which is more significant than 0.7. Thus, the reliability of the whole questionnaire is accepted.

No.	Variable	Cronbach's Alpha	N of Items
1	Continuous learning	0.897	5
2	Inquiry and Dialogue	0.736	5
3	Team Learning	0.729	5
4	Embedded System	0.950	5
5	Empowerment	0.749	5
6	System Connection	0.912	5
7	Strategic Leadership	0.877	5
8	Knowledge Creation	0.856	5
9	Knowledge Storage	0.850	5
10	Knowledge Sharing/Transfer	0.795	5
11	Knowledge Application	0.955	5
12	Product innovation	0.937	5
13	Process innovation	0.964	5
14	Technological innovation	0.729	5
15	Market innovation	0.905	5
16	Behavioral innovation	0.946	5
17	Economic Performance	0.949	5
18	Environment Performance	0.918	5
19	Social Performance	0.853	5

The techniques used for data analysis for this research are divided into four parts. As follows: Data analysis involves processing the collected data. To bring about answers to hypotheses and answer research questions. This stage involves selecting appropriate statistics and analyzing the results from the received data. With statistical programs SPSS Version 23.0 and statistical programs Amos Version 27.0, the researcher has laid out the data analysis guidelines as follows,

1) Analysis of general characteristics of respondents Using frequency and percentage statistics.

2) Analysis of opinions on various factors Using statistics, the arithmetic mean and standard deviation (Standard Deviation: SD)

3) Analysis to determine the relationship between factors that influence organizational effectiveness. Moreover, it examines the model's assumptions, relationships, structure, and causality. It is an analysis of advanced statistics. Is structural equation modeling (Structural Equation Modeling: SEM) by analyzing paths (Path analysis) with techniques using the principle of Maximum Likelihood (ML) to estimate path coefficients? To study the direct and indirect influence of a variable, how does it affect the dependent variable? It analyzes the causal relationship path influencing Organizational effectiveness with statistical programs Amos Version 23.0.

Quantitative Data:

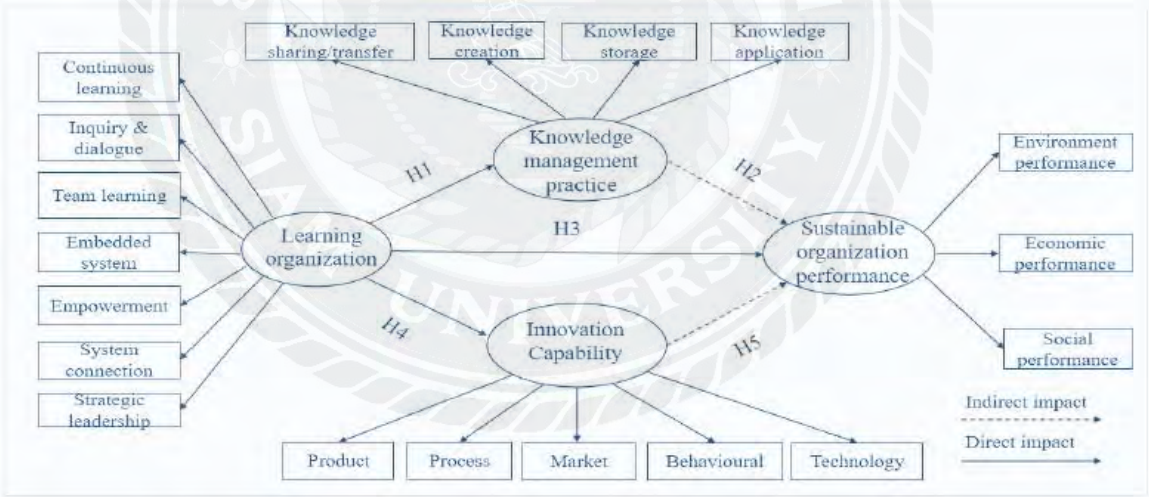
For data collection, the researchers will email the questionnaire to the human resources departments of selected companies, who will then distribute it to a purposive sample of employees in general management. The sample comprises 600 employees from public Internet companies from five regions (eastern, southern, western, northern, and central China). Data collection will span from January 2023 to January 2024. Once collected, the 600 questionnaires will be analyzed using statistical methods such as frequency, mean, percentage, and standard deviation. Structural Equation Modeling (SEM) and Path Analysis with Maximum Likelihood (ML) will be employed to examine variables'

direct and indirect effects on organizational efficiency and determine causal relationships within the model.

3.3.5 Guidelines for Testing Hypotheses

The dataset was subjected to a rigorous analytical process using Structural Equation Modeling (SEM). This statistical technique employs path analysis to discern various variables' direct and indirect impacts on a dependent variable. The path coefficients were estimated using the Maximum Likelihood (ML) estimation principle. This comprehensive analysis was facilitated by the software program Amos, as referenced by (Wanitbancha, 2006). The structural relationships between the variables were meticulously mapped out, as exemplified in the illustrative diagram labeled Figure 3.1.

Figure 3.1 Model of relationship path analysis of the studied variables



The equation model used to measure the external latent variable is the learning organization (LO), and the observed variable is a sub-variable in the latitude of the learning organization. They are sustainable learning, Inquiry and dialogue, Team learning, Embedded systems, Empowerment, system connection, and strategic leadership. Ten variable characteristics can be used to measure the learning organization of China's public IT companies. The equation models used to measure two internal latent variables are

Knowledge management practices (KMP) and Sustainable Organizational Performance (SOP) structural equation modeling or structural analysis of causal relationships between variables (Structural Equation Modeling: SEM), which is a test of hypotheses written in theory consisting of many significant and dependent variables. These variables are not independent and are more or less related. Moreover, theories are proposed to find causal coefficients that explain direct and indirect effects. This is done with controlled variance. Between the primary variable and the dependent variable In the process of the relationship between two variables in the theoretical form, the general form of the structural equation model is interrelated, and complex relationships are found when causality is considered in the study.

The development of a causal model is the precursor to the formulation of a structural equation model. (modeling: SEM) The equation form is When 1） Internal latent variables (Exogenous;) The variable serves as the dependent term within a solitary equation.

1) External latent variables (Endogenous; = ksi) Act as the independent variable in each equation.
2) B: Direct influence of variable for four on variables for four others.
3) : Direct influence of variables on variables for four.
4) = zeta: structural tolerances.

This analysis investigates the interrelationships among variables within the structural model, aligned with the formulated research hypotheses. It aims to juxtapose the empirical model under study with the theoretical framework. The research endeavors to validate each hypothesis, employing statistical metrics such as Standardized Regression Weights, t-value, and p-value. These are supplemented by standard regression coefficients, standard error (SE), Critical Ratio (CR), and Square Multiple Correlation values derived from the analysis.

The structural model thus developed illustrates the inter-variable influence. In assessing model fit (Evaluating the Data-Model Fit), specific statistical measures are used to gauge the congruence between the empirical and theoretical models. A pivotal criterion here is that the p-value should be non-significant (greater than 0.05), indicating a satisfactory alignment between the two models. The congruence evaluation encompasses various statistical indices, including the Chi-square Probability Level (CMIN-p), Relative Chi-square (CMIN/df), Goodness of Fit Index (GFI), and Root Mean Square Error of Approximation (RMSEA). The criteria employed in this congruence assessment are summarized in Table 3.7, providing a comprehensive overview of the model's alignment with the empirical data.

Table 3.5 Summarizes the criteria used to check the congruence of the model with the empirical data.

Goodness of Fit Index (Statistic Abbreviation)	Goodness of Fit Index	Objective	Level of Acceptance	Interpretation
CMIN-P	Chi-square Probability Level	1) To determine the chi-square probability value, which must not be statistically significant.	>0.05	Pass
CMIN/df	Relative Chi-square	2) To verify that the model is consistent with the empirical data.	<5	Pass
GFI	Goodness of Fit index	3) To measure the level of harmony compared to a value between 0-1.00.	>0.90	Pass
RMSEA	Root Mean Square Error of Approximation	4) To indicate the error value of the model in the form of the root of mean squares error by approximating.	<0.08	Pass
Fo	Population Discrepancy Function Value	5) Harmony function value when the model is consistent with the empirical data.	0.00-0.08	Pass

(Source: Sincharu, 2014)

Discrepancies between the theoretical and empirical models were identified during the structural equation model evaluation, as shown in Table 3.7. To address this, the researcher considered adjusting the model parameters to propose a revised version with improved statistical fit. Such modifications require thorough initial testing and careful selection of variables to ensure justification. These adjustments can enhance the model's statistical accuracy and reliability when done appropriately.

1）To streamline the model, the number of variables was reduced,
utilizing insights from the AMOS 23 program. This approach examined the error values associated with the dependent variables, guided by Modification Indices (MI).

2）The strategy also involved amalgamating certain variables to form new latent factors, thereby refining the model's structure.

3）Another critical step was establishing bidirectional relationships (indicated by double-headed arrows) between the dependent variables' tolerances. This adjustment was based on the recommendations of the AMOS program, which aimed to achieve a model that aligned more closely with the empirical data. This process considered the model's Modification Indices (MI) (Kris et al., 2011).

Generally, variable measurement can be categorized into four distinct levels:

1) Nominal level, which classifies variables or categories.
2) Ordinal level, where variables are ranked in a specific order.
3) Interval level, characterized by variables measured on a scale with equal intervals.
4) Ratio level, where variables possess a valid zero point, allowing for meaningful comparisons of ratios. This classification is crucial in determining the variables employed in analytical procedures.

In many instances, variables in social science research, particularly those related to attitudes or opinions, are measured at the ordinal level. This is often the case when

employing tools like the Likert scale. However, for more complex data analyses, such as multiple regression analysis, there is a preference for measuring variables at the ratio level, as suggested by Wanna Munin Plan (2000, p. 51). This desire stems from the ability of ratio scales to provide more comprehensive and detailed data since they include a valid zero point and allow for operations like addition and subtraction.

Although data from Likert scales and similar ordinal measures are respected and utilized in social science research, these cannot be elevated to ratio-level status due to the absence of a natural zero value. For instance, a zero score in attitude measurements does not accurately represent a complete lack of opinion. Despite these limitations, ordinal data can still be effectively used in analysis, especially when treated as interval data under the assumption of continuity from low to high responses.

Moreover, qualitative data gathered from interviews and observations serve as supplementary information. Researchers meticulously sift through this data, categorizing and performing content analysis to derive meaningful insights. This qualitative analysis is then integrated with quantitative findings, offering a more nuanced understanding and potentially elucidating the reasons behind specific trends observed in the quantitative data.

3.4 Qualitative Research

3.4.1 Key Informants

A Semi-Structured In-Depth Interview (SSI) format will gather expert insights from 20 senior employees, including managers and experienced staff from the Human Resources Management department (Creswell, 1998). Four interviewees will be selected in each region, two from large and two from small companies. The sample includes a manager and another employee from different positions in each company. Purposive sampling selects participants based on specific criteria, while convenience sampling focuses on ease of access and willingness to participate. The practices were mainly chosen in the top three

because most interviewees agreed that these measures are valid and valuable for application in public IT companies.

Table 3.6 The Interview of Specialist List

Area	Province	Position/Companies Name	Specialist
East	Zhejiang	Perfect World Co., Ltd.	HR manager, Supervisor, and Department head.
		Zhejiang Century Huatong Group Co., Ltd.	
	Jiangxi	Fanli Digital Technology Co., Ltd.	
	Jiangxi	Jiangxi Tianli Technology, Inc.	
South	Guangdong	(Rastar Group) Rastar Interactive Entertainment Co., Ltd	HR manager, Supervisor, and Department head.
		Qingmu Digital Technology Co., Ltd.	
	Guangxi	Inmyshow Digital Technology (Group)Co., Ltd.	
	Guizhou	Shijihengtong Technology Co., Ltd.	
West	Shanxi	Three's Company Media Group Co., Ltd.	HR manager, Supervisor, and Department head.
		Easy Click Worldwide Network Technology Co., Ltd.	
	Sichuan	Sichuan Xunyou Network Technology Co., Ltd.	
	Sichuan	Sichuan Newsnet Media (Group) Co., Ltd.	
North	Beijing	Beijing Ultrapower Software Co., Ltd.	HR manager, Supervisor, and Department head.
		People.Cn Co., Ltd.	
	Jilin	Tonghua Grape Wine Co., Ltd.	
	Hubei	Hubei Century Network Technology Inc.	
Centre	Hunan	Huakai Yibai Technology Co., Ltd.	HR manager, Supervisor, and Department head.
		Huakai Yibai Technology Co., Ltd.	
	Hunan	Youkeshu Technology Co., Ltd.	
	Hunan	Tangel Culture Co., Ltd.	
Total		20	20

3.4.2 Interview Questions

Constructs	Items
Learning Organization (LO)	LO1: Staff members openly discuss mistakes to learn from them. LO2: Staff members generally help each other learn. LO3: Staff members can get money and other resources to support their learning. LO4: Staff members are generally given time to support learning. LO5: Staff members generally view problems in their work as an opportunity to learn.
Inquiry and Dialogue (ID)	ID1: Staff members generally give open and honest feedback to each other. ID2: Staff members generally listen to others' views before speaking. ID3: Staff members are generally encouraged to ask "why", regardless of rank. ID4: Whenever staff members state their views, they also ask what others think. ID5: Staff members usually spend time building trust with each other.
Team Learning (TL)	TL1: Teams/groups generally have the freedom to adapt their goals as needed. TL2: Teams/groups generally focus both on the group's task and on how well the group is working. TL3: Teams/groups revise their thinking as a result of group discussion or information collected. TL4: Teams/groups are generally rewarded for their achievements as a team/group. TL5: Teams/groups are confident that the organization will act on their recommendations.
Embedded Systems (ES)	ES1: My organization enables staff members to get needed information at any time quickly and easily. ES2: My organization maintains an up-to-date database of employee skills. ES3: My organization has a system to measure gaps between current and expected performance. ES4: My organization generally makes its lessons learned available to all staff members. ES5: My organization measures the results of time and resources spent on training.
Empowerment (ET)	ET1: My organization gives staff members choices in their work assignments. ET2: My organization invites staff members to contribute to the organization's vision. ET3: My organization gives staff members control over the resources they need to accomplish their work. ET4: My organization generally supports staff members who take calculated risks. ET5: My organization builds alignment of vision across different levels and work groups.
Systems Connections (SC)	SC1: My organization generally encourages staff members to think from a state's perspective. SC2: My organization encourages everyone to bring the clients' views into the decision-making process. SC3: My organization generally considers the impact of decisions on employees' morale. SC4: My organization works together with the outside community to meet mutual needs. SC5: My organization encourages staff members to get answers from across the organization when solving problems.

Constructs	Items
Strategic Leadership (SL)	SL1: The director/supervisor generally supports requests for learning opportunities and training. SL2: The director/supervisor shares up-to-date information with staff members about federal and state guidelines and organizational directions. SL3: The director/supervisor empowers others to help carry out the organization's vision. SL4: The director/supervisor mentors and coaches subordinates. SL5: The director/supervisor pays attention to the organization's actions to ensure that they are consistent with its value/mission.
Knowledge Creation (KC)	KC1: Generating best practices from previous projects to improve future projects. KC2: Using new opportunities to serve our clients. KC3: Providing new services depending on the market demands. KC4: Provides ideas for reducing costs. KC5: Providing new notions for expanding markets.
Knowledge Storage (KS)	KS1: Keeping a customer information database that is easy to access. KS2: Having a knowledge database that is easy to access. KS3: Having personal knowledge storage accounts for learning. KS4: Having knowledge storage system linking individual contents. KS5: The knowledge storage system has upgrading functions.
Knowledge Transfer (KT)	KT1: Sharing with our colleagues the knowledge necessary for projects on hand. KT2: Sharing knowledge with the stakeholders. KT3: Having the capability to share relevant knowledge among business units. KT4: People in the organization have willingness to share their working experiences. KT5: There is rewards for knowledge sharing behavior in my organization.
Knowledge Application (KA)	KA1: Having processes for converting knowledge into action plans. KA2: Having processes for matching sources of knowledge to problem-solving. KA3: Applying knowledge efficiently to reach our goals. KA4: There is a unit in my organization to apply new ideas in production and management. KA5: There is reward for feasible knowledge application outcome.
Production Innovation (PTI)	PTI1: We can make effective production innovation based on target consumers' demands. PTI2: Our organization actively promotes new products and services. PTI3: We launch new products and services according to market plans. PTI4: We have invested a lot for the production and service innovative research and development. PTI5: We are good at distinguishing user groups and market segments to identify new innovative development opportunities.
Process Innovation (PSI)	PSI1: We align our new product and service offerings with our current business and processes. PSI2: Collaboration with other organizations can help us improve or introduce new business. PSI3: Our organization has a strong ability to coordinate service innovation activities. PSI4: We consider our brand strategy in order to develop new business in the operational process. PSI5: We are good at provide suitable operational process for helping innovative products and service development.

Constructs	Items
Technological Innovation (TI)	TI1: We use different sources of information to determine the possibilities of new services. TI2: We always update our production technologies. TI3: We always update our production technologies. TI4: We keep an eye on what technologies our competitors are using and keep us updated on our own technological developments. TI5: We discover new market rules and opportunities through technological progress.
Market Innovation (MI)	MI1: We have new methods for discovering new marketing tendencies. MI2: We have innovative methods for analyzing consumers' demands. MI3: We make sophisticated predictions in market. MI4: We adopt new methods for creating new demands in exploring blue ocean markets. MI5: We use big data to have marketing communications with consumers.
Behavior Innovation (BI)	BI1: We have cautious commodification in expansion. BI2: We have willingness to change. BI3: We have commitment to encourage new ways of doing things as well as foster new idea and technology. BI4: We have regularly innovation communications. BI5: We have rewards for innovation behavior in my organization.
Environmental Performance (ELP)	ELP1: Using green office mode ELP2: Using sustainable resources. ELP3: Using technologies to help decreasing energy consumption like cloud computing. ELP4: Increasing the effectiveness of electricity using. ELP5: Adopting a circular economy approach to dealing with office waste.
Economic Performance (ECP)	ECP1: Improved market share. ECP2: Improved the company's position in the marketplace. ECP3: Increase in profitability. ECP4: Decrease in material purchasing cost. ECP5: Decrease in utility bills.
Social Performance (SP)	SP1: Improved relationships with the community and stakeholders. SP2: Improved work safety. SP3: Improved work environment. SP4: Improved the living quality of the surrounding community. SP5: Improving social reputation of my organization.

3.4.3 Interview Collection

In-depth interviews will serve as the primary tool for qualitative data collection. The researcher will carry out these interviews, focusing on the convenience and appropriateness of the informants, who will be chosen from the specified sample group.

Various methods will be employed to conduct these interviews, encompassing online interviews via email and direct, face-to-face conversations with selected informants.

An in-depth interview format will be provided to the chosen participants to facilitate the gathering of detailed information. This approach elicits insights the researcher deems most valuable for analyzing and elucidating the phenomena under study. The questionnaire's results are for the essential quantitative relationship among these four variables, but how these variables' diverse dimensions make practical effects needs to be supported by detailed qualitative results. Therefore, it is necessary to have an in-depth interview to give the supplement. The purpose of in-depth interviews is to understand the interviewee's perspectives and motivations and explore their experiences, beliefs, emotions, attitudes, and relationship to a specific topic or issue. Researchers can obtain rich, in-depth, and diverse data that reveal underlying motivations, conflicts, needs, and expectations through deep listening and probing.

3.4.4 Contents Analysis

The study utilized a content analysis method to examine qualitative data. According to Hyun (2014), content analysis is a powerful technique for studying human behavior through the analysis of individuals' or groups' beliefs, attitudes, and values as revealed in their communications. This method is especially valuable in analyzing interview data. This study use conceptual analysis, After interviewing 20 human resources managers of IT companies, texts are collected and analyzed. Some important concepts were selected by three-level coding for research, and the frequency of concepts in the text was counted by quantitative methods.

(1) Identify research questions and constructs

The primary research question focuses on understanding the causal relationship between learning organizations and sustainable organizational performance in Chinese public IT companies, with knowledge management practices and innovation capability acting as mediators. The key constructs include Learning Organization, Knowledge

Management Practices, Innovation Capability, and Sustainable Organizational Performance. As table follow:

Constructs	Research Questions	Data Collection	Data Analysis
Learning Organization	1. Do you think that learning organizations include the necessary components of continuous learning, dialogue and inquiry, team learning, embedded systems, empowerment, connected systems, and strategic leadership?	Interview	Content Analysis
	1.1 What are the practices of continuous learning?	Interview	Content Analysis
	1.2 What are the practices of dialogue and inquiry?	Interview	Content Analysis

These constructs guide the coding framework, ensuring alignment between theoretical concepts and data.

(2) Identify the source of document

This study employs in-depth interviews and observations to gather qualitative data from middle and senior managers in the general management departments of Chinese Public Internet companies across five regions: Eastern, Western, Southern, Northern, and Central. Two companies from each region were selected, with 20 managers participating. The online or face-to-face interviews followed a semi-structured format to allow flexibility. Content analysis will be used to interpret the qualitative data, complement the quantitative findings, and provide deeper insights into the study's discussion and analysis.(3) Specify Sampling and the Unit of Analysis

Sampling: Purposive sampling is employed to select documents that directly relate to the constructs under study. This includes documents from a representative range of public IT companies, with a focus on departments that actively engage in knowledge management and innovation.

Unit of Analysis: The unit of analysis is the specific practice or initiative mentioned in each document that reflects learning organization principles, knowledge management, innovation processes, or outcomes related to sustainability.

(3) Identify the Coding Framework

The coding framework is developed based on established theories and constructs:

Category	Subcategory	Code	Freq.per code	Freq. per subcategory	Freq.per Category
LO	CS	1. ERP Systems Integrated with Financial and HR Tools.	19	54	450
		2. Integration with Performance Management and Learning Management Systems.	18		
		3. CI/CD Pipelines Integrated with Version Control Systems	17		
	SL	1. Adaptive leadership	19	86	
		2. Visionary Leadership	18		
		3. Transformational Leadership	17		
		4. Data-Driven Decision Making	16		
		5. Collaborative Leadership	16		
	ET	1. External learning opportunities	18	67	
		2. Dedicated learning time	17		
		3. Autonomy in Learning Choices	16		
		4. Encourage Cross-Functional Learning	16		
	ID	1. Hold Regular Team Meetings and Retrospectives	20	75	
		2. Transparent Communication Channels	20		
		3. Anonymous Feedback Channels	18		
		4. Cross-Departmental Collaboration	17		
	TL	1. knowledge management system	18	67	

Category	Subcategory	Code	Freq.per code	Freq. per subcategory	Freq.per Category
		2. Collaborative Learning Culture	17		
		3. Continuous Learning Initiatives	16		
		4. Peer Learning and Mentorship	16		
	ES	1. Collaborative Learning Environments	17	49	
		2. Embedded AI-driven (learning) systems	16		
		3. Performance Tracking and Skill Development,	16		
	CL	1. Mentor Program	18	52	
		2. Access to Online Learning Platforms	18		
		3. Ongoing Training Programs	16		
KMP	KA	1. Knowledge-Driven Product Design	20	99	388
		2. Customer Knowledge Application	20		
		3.: Regularly update t Employ	20		
		4. Technology Adoption Frameworks	20		
		5. Knowledge-Driven Product Design	19		
	KC	1. research and development labs	18	120	
		2. Employee Rotation Programs	18		
		3. Reflective Practices	18		
		4. partner with universities, research institutions, and other companies	17		
		5. Internal Conferences and Seminars	17		
		6. Online learning platforms	16		
		7. internal or external crowd-sourcing	16		
	KT	1. After-Action Reviews	20	86	
		2. Mentoring and Coaching Programs	18		
		3. Internal Workshops and Training Sessions	16		

Category	Subcategory	Code	Freq.per code	Freq. per subcategory	Freq.per Category
		4. Cross-Functional Team Projects	16		
		5. Job Rotation and Shadowing Programs	16		
	KS	1. Cloud Storage Solutions	18	83	
		2. Database Management:	17		
		3. Digital Knowledge Bases	16		
		4. Document Management Systems (DMS)	16		
		5. Content Management Systems (CMS)	16		
IC	PSI	1. Business Process Management Software (BPMS)	20	93	451
		2. Training and Development	20		
		3. Lean Methodologies	18		
		4.Continuous Integration/Continuous Deployment (CI/CD)	18		
		5. Automation Tools	17		
	BI	1. Cultural Change Initiatives	18	85	
		2.Diversity and Inclusion Programs	18		
		3.Employee Empowerment Programs	17		
		4. Incentive and Reward Systems	16		
		5. Flexible Working Conditions	16		
	TI	1. Technology Scouting Teams	18	84	
		2. Advanced Prototyping Tools	18		
		3. Partnerships with Tech Startups and Academia	16		
		4. Patent Development	16		
		5. Investment in Talent and Skills Development	16		
	PTI	1. Prototyping and Rapid Testing	20	94	
		2. Open Innovation Platforms	20		
		3. Technology Scouting	19		

Category	Subcategory	Code	Freq.per code	Freq. per subcategory	Freq.per Category
		4. Intellectual Property Management	19		
		5. Co-Creation Workshops	16		
	MI	1. Customer Insight Gathering	20	95	
		2. Segmentation and Niche Marketing	20		
		3. Blue Ocean Strategy	20		
		4. Cross-Industry Partnerships	18		
		5. Digital Transformation Initiatives	17		
SOP	ELP	1. Green IT Policies	18	85	319
		2. Sustainable Sourcing	18		
		3. Renewable Energy Investments	17		
		4. Remote Work Initiatives	16		
		5. Energy-Efficient Infrastructure	16		
	ECP	1. Innovation Investment	20	95	
		2. Financial Planning and Analysis	20		
		3. Employee Training and Development	20		
		4. Customer Relationship Management Systems	18		
		5. Strategic Partnerships and Alliances	17		
	SP	1. Health and Wellness Programs	19	139	
		2. Ethical Business Practices	18		
		3. Sustainable Practices	18		
		4. Employee Development	18		
		5. Community Engagement	17		
		6.Diversity and Inclusion Initiatives	17		
		7. Stakeholder Communication	16		
		8. Work-Life Balance Policies	16		

These codes are aligned with the theoretical constructs, ensuring that each data segment is categorized according to the research framework.

(4) Devise the Coding Scheme

Based on the pilot study results, a finalized coding scheme is created: Each code is clearly defined, with examples for how it applies to different document types.Rules are established to handle overlapping codes, ensuring each text segment is categorized according to the primary construct it represents. Codes are organized hierarchically, where appropriate, to reflect the relationship between broader constructs (e.g., learning organization practices) and specific actions or outcomes (e.g., leadership styles, knowledge sharing).

(5) Analyze the Data

The main analysis involves applying the coding scheme to all documents:

Quantitative Analysis: The frequency and distribution of each code are analyzed to identify patterns in the prevalence of learning organization practices, knowledge management activities, and innovation initiatives across companies.

Qualitative Analysis: Thematic analysis is performed on the coded data to identify underlying conceptual and insights regarding how learning organizations influence sustainable performance through knowledge management and innovation.

Causal Pathways: Using the codes and conceptual analysis, possible causal pathways are mapped to illustrate how learning organization practices indirectly enhance sustainable organizational performance.

This comprehensive content analysis approach enables a nuanced understanding of the mechanisms through which learning organization practices impact sustainable organizational performance, mediated by knowledge management practices and innovation capability in the context of Chinese public IT companies.

3.5 Research Ethics

In management research, particularly at the Ph.D. level, the ethical compass must guide every step of the dissertation process. According to Rubin and Babbie (, it is vital to navigate the complexities of research with a clear understanding of ethical imperatives. Paramount among these is the protection of confidential information provided by participants. Such safeguarding is the bedrock of trust and ensures that participants feel secure enough to divulge information that is both truthful and pertinent.

The research participants are entrusted with a significant responsibility: to treat all data with the utmost discretion, ensuring that it remains strictly within the confines of the research entity. The language chosen for disseminating questionnaires and surveys was universally recognized and official, eliminating barriers to comprehension and enhancing the inclusivity of the research.

Sensitive topics that could potentially lead to discomfort or discrimination were deliberately omitted. Questions were framed to solicit demographic information, such as age and professional experience, in a manner that respected the privacy of the respondents. Personal identifiers without bearing on the research objectives, such as religious affiliation or ethnic background, were consciously excluded from the inquiry. This approach not only adhered to ethical standards but also created a non-threatening environment, encouraging candid and valuable responses essential for the integrity of the research.

3.5.1 Ethical Considerations in Research Design and Methodology

Ethical considerations are central to the design and methodology of this dissertation. In conducting both quantitative and qualitative research, informed consent was obtained from all participants, ensuring they fully understood the purpose of the study and their right to withdraw at any time. Confidentiality and anonymity were maintained, particularly in handling sensitive data from in-depth interviews and company surveys. Additionally, the study adhered to ethical standards by avoiding any form of coercion or bias in participant selection, using purposive and convenience sampling appropriately. The research process

was designed to ensure transparency and integrity, with all data being securely stored and used solely for academic purposes.

3.5.2 Ethical Considerations in Data Analysis and Reporting

In this dissertation, ethical considerations in data analysis and reporting were rigorously observed to ensure the integrity of the research findings. Data was analyzed objectively without manipulating or misrepresenting results to fit preconceived hypotheses. Statistical methods were applied accurately, and all limitations of the data and methodology were transparently reported. The confidentiality of participants was strictly protected, particularly in the reporting of qualitative interview data, ensuring that no identifying information was disclosed. Furthermore, the research adhered to ethical guidelines by providing honest, unbiased interpretations of the data, avoiding selective reporting, and ensuring that all findings were presented truthfully and responsibly. Moreover, the Ethics certificate number is PIM- REC 037/2567.

3.6 Research Reporting

Reporting the findings of a PhD dissertation in management typically follows a structured five-chapter format:

1. **Introduction**: This section introduces the research problem, background, objectives, and expected outcomes, setting the stage for the study.

2. **Literature Review**: Synthesizes relevant theories and research, identifying gaps the current study addresses.

3. **Research Methodology**: This section details the research design, sample, data collection tools, and analytical methods.

4. **Analysis of Results**: Presents empirical findings using charts, graphs, and tables, providing an objective data analysis.

5. **Summary, Discussion, and Recommendations**: This section summarizes findings, discusses their implications, offers recommendations, and suggests areas for future research.

This structure ensures a logical progression from the research question to final recommendations and scholarly contributions.

CHAPTER 4

RESEARCH RESULT

This Chapter Mainly Includes Three Parts:

4.1 Quantitative Analysis

4.1.1 Descriptive Statistical Analysis

4.1.2 Mean and SD of Factors

4.1.3 Reliability, Validity, and Confirmatory Factor Analysis

4.1.4 Correlation Analysis

4.1.5 Structural Equation Model Fitting And Hypothesis Testing

4.2 Qualitative Analysis

4.2.1 In-Depth Interviews

4.2.2 Content Analysis

4.3 Conclusion

This chapter investigates the factors influencing the impact of learning organizations on sustainable organizational performance and presents a model depicting this relationship. It comprises three sections: The first section conducts a quantitative analysis using questionnaires and structural equation modeling to evaluate the influence of learning organizations. The second section employs qualitative research through in-depth interviews with managers from Chinese public IT companies, complemented by content analysis. In the final section, quantitative data (70%) is integrated with qualitative data (30%) to construct a model illustrating the impact of learning organizations on sustainable performance, emphasizing the roles of knowledge management and innovation.

To ensure data integrity, participants were strategically selected, focusing on managers and department heads from listed Chinese IT companies, while general staff were excluded to enhance data validity. The survey was administered via the Questionnaire Star website (https://www.wjx.cn/). Of the 600 questionnaires distributed, 561 were returned, and 546 were deemed valid, resulting in a validity rate of 91%.

4.1 Quantitative Analysis

4.1.1 Descriptive Statistical Analysis

The demographic data offers insightful trends within the workforce composition. Gender distribution is nearly equal, with males representing 51.28% and females 48.72%, reflecting a relatively gender-diverse sample. The age distribution reveals a significant proportion of younger employees, with 61.36% aged between 18 and 35, suggesting a youthful and potentially dynamic workforce. Educational attainment is predominantly at the undergraduate level (40.84%), followed by a substantial segment with a master's degree (29.3%), indicating a highly educated employee base.

The data on job roles indicates a notable emphasis on technical expertise, with programmers comprising 25.64% of the sample, highlighting a strong focus on technical and digital competencies. Other key roles include marketing operations (21.06%) and human resources management (20.51%), suggesting balanced representation across core functional areas. Regarding work experience, the majority of the workforce is at an early career stage, with 39.56% having less than 2 years of experience and 33.15% with 2 to 5 years. This distribution suggests an early-career workforce, potentially marked by high enthusiasm and innovation, but also underscores the importance of structured training and development programs to support career growth.

Table 4.1 Basic Information of Questionnaire Respondents

Demographic Characteristic	Category	Frequency	Percentage (%)
Gender	Male	280	51.28
	Female	266	48.72
Age	18-35	335	61.36
	36-55	189	34.62
	Over 55	22	4.03
Education level	Junior college	57	10.44
	Undergraduate	223	40.84
	Master	160	29.3
	PH.D.	40	7.33
	Others	66	12.09
Position in the company	Marketing operations	115	21.06
	Programmer	140	25.64
	Product Manager	110	20.15
	Graphic Designer	69	12.64
	Human Resources manager	112	20.51
Work experience	Less than 2 years	216	39.56
	2 years - ≥5 years	181	33.15
	＞5years - <7 years	69	12.64
	7 years or more	80	14.65

Overall, the demographic composition of this sample aligns well with the study's research requirements, ensuring robustness and relevance in the findings drawn from these essential workforce characteristics.

4.1.2 Mean and SD of Factors

The analysis of Table 4.2 reveals that the mean values for various factors range from 3.15 to 3.76, indicating generally positive perceptions across these dimensions. The highest mean is found for Embedded Systems (3.76), suggesting a robust implementation of this factor within the surveyed organizations. Conversely, Inquiry and Dialogue show the lowest mean (3.15), pointing to potential areas for enhancing open communication practices.

Regarding the Standard Deviation (SD), values range from 0.61 to 0.78, reflecting moderate response variability. The lowest variability is observed in Environmental

Performance (SD = 0.61), suggesting more consistent perceptions among respondents regarding this dimension. In contrast, System Connection exhibits the highest variability (SD = 0.78), indicating a broader range of perceptions in this area.

Table 4.2 Mean and SD of Factors

Factor	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
CL (1)	3.15	0.76	1																		
ID(2)	3.15	0.8	0.375**	1																	
TL(3)	3.38	0.75	0.342**	0.397**	1																
ES(4)	3.46	0.77	0.318**	0.360**	0.401**	1															
ET (5)	3.76	0.75	0.360**	0.390**	0.383**	0.388**	1														
CS(6)	3.28	0.73	0.359**	0.461**	0.455**	0.419**	0.409**	1													
SL (7)	3.44	0.77	0.395**	0.415**	0.409**	0.389**	0.426**	0.470**	1												
KC (8)	3.43	0.68	0.286**	0.374**	0.319**	0.291**	0.416**	0.375**	0.385**	1											
KS(9)	3.39	0.84	0.112**	0.093*	0.108*	0.073	0.071	0.092*	0.046	0.096*	1										
KT (10)	3.47	0.75	0.248**	0.274**	0.290**	0.395**	0.345**	0.346**	0.372**	0.391**	0.107*	1									
KA (11)	3.30	0.69	0.295**	0.294**	0.327**	0.355**	0.358**	0.345**	0.364**	0.389**	0.075	0.406**	1								
PTI (12)	3.30	0.63	0.258**	0.193**	0.207**	0.135**	0.167**	0.185**	0.193**	0.143**	0.334**	0.132**	0.108*	1							
PSI(13)	3.34	0.61	0.215**	0.140**	0.169**	0.142**	0.153**	0.197**	0.185**	0.164**	0.527**	0.124**	0.122**	0.563**	1						
TI (14)	3.36	0.65	0.249**	0.179**	0.187**	0.146**	0.128**	0.196**	0.169**	0.141**	0.509**	0.107*	0.104*	0.558**	0.718**	1					
MI(15)	3.31	0.78	0.146**	0.163**	0.043	0.081	0.073	0.122**	0.077	0.142**	0.317**	0.072	0.109*	0.272**	0.417**	0.407**	1				
BI(16)	3.43	0.66	0.185**	0.103*	0.148**	0.135**	0.114**	0.136**	0.118**	0.120**	0.634**	0.077	0.065	0.532**	0.749**	0.707**	0.421**	1			
ELP (17)	3.43	0.64	0.323**	0.404**	0.366**	0.382**	0.346**	0.431**	0.457**	0.394**	0.133**	0.400**	0.345**	0.231**	0.257**	0.230**	0.144**	0.216**	1		
ECP(18)	3.44	0.64	0.363**	0.329**	0.361**	0.335**	0.401**	0.360**	0.347**	0.370**	0.169**	0.348**	0.416**	0.228**	0.249**	0.237**	0.213**	0.224**	0.318**	1	
SP (19)	3.47	0.70	0.363**	0.333**	0.333**	0.338**	0.380**	0.298**	0.335**	0.339**	0.144**	0.291**	0.374**	0.206**	0.265**	0.246**	0.170**	0.227**	0.295**	0.310**	1

CL=Continuous learning,ID=Inquiry& Dialogue,TL=Team learning,ES=Embedded System,ET=Empowerment, CS=Connection System ,SL=Strategic leadership, KC=Knowledge creation,KS=Knowledge storage,KT=Knowledge Transfer, KA=Knowledge Application, PTI=Production Innovation, PSI=Process Innovation, TI=Technological Innovation, MI=Market Innovation,BI=Behaviour Innovation,ELP=Environmental performance, ECP=Economic performance, SP=Social performance.

*$P \leq 0.05$;**$P \leq 0.01$.

4.1.3 Reliability, Validity, and Confirmatory Factor Analysis

This study conducted reliability and validity tests, along with confirmatory factor analysis, on 546 validated questionnaires using SPSS 27.0 and AMOS 23.0. The initial step involved testing the reliability and validity of the questionnaire data, followed by structural equation modeling based on the data that met the reliability and validity criteria.

4.1.3.1 Reliability Analysis

Reliability testing is crucial in data analysis to ensure the consistency and stability of measurement instruments. Cronbach's alpha coefficient, one of the most widely used indicators of reliability, assesses the internal consistency of the items within a

questionnaire or measurement tool. Typically, a Cronbach's alpha coefficient between 0.70 and 0.90 or higher signifies strong internal consistency within the scale.

Table 4.3 Reliability Test

Reliability Statistics

Cronbach's Alpha	N of Items
.963	95

The variables in this study were measured through questionnaire data, necessitating reliability testing of the collected data. Reliability analysis for each variable was conducted using SPSS 27.0, with Cronbach's alpha applied to determine the overall reliability of the questionnaire. The questionnaire comprised 95 items, yielding an overall Cronbach's alpha of 0.963, which indicates high reliability and satisfies the required standards, as shown in Table 4.4.

Table 4.4 Learning organization, Knowledge management practices, Innovation capability, and Sustainable organizational performance Scale Reliability Analysis

Variables	Items	Corrected Item-Total Correlation (CITC)	Cronbach Alpha if Item Deleted	Cronbach α
Continuous Learning	CL1	0.68	0.84	0.87
	CL2	0.72	0.83	
	CL3	0.70	0.84	
	CL4	0.74	0.83	
	CL5	0.60	0.86	
Inquiry and Dialogue	ID1	0.70	0.85	0.88
	ID2	0.71	0.85	
	ID3	0.71	0.85	
	ID4	0.71	0.85	
	ID5	0.73	0.85	
Team Learning	TL1	0.64	0.83	0.86
	TL2	0.69	0.82	
	TL3	0.65	0.83	
	TL4	0.69	0.82	
	TL5	0.66	0.83	
Empowerment System	ES1	0.71	0.84	0.87
	ES2	0.65	0.85	

Variables	Items	Corrected Item-Total Correlation (CITC)	Cronbach Alpha if Item Deleted	Cronbach α
	ES3	0.71	0.84	
	ES4	0.74	0.83	
	ES5	0.66	0.85	
System Connection	SC1	0.67	0.81	0.85
	SC2	0.67	0.81	
	SC3	0.66	0.81	
	SC4	0.63	0.82	
	SC5	0.63	0.82	
Strategic Leadership	SL1	0.69	0.86	0.88
	SL2	0.76	0.84	
	SL3	0.72	0.85	
	SL4	0.71	0.85	
	SL5	0.69	0.86	
Knowledge Creation	KC1	0.71	0.85	0.88
	KC2	0.71	0.85	
	KC3	0.68	0.86	
	KC4	0.68	0.85	
	KC5	0.73	0.84	
Knowledge Storage	KS1	0.82	0.92	0.93
	KS2	0.81	0.92	
	KS3	0.81	0.92	
	KS4	0.84	0.92	
	KS5	0.85	0.91	
Knowledge Sharing Transfer	KT1	0.65	0.82	0.85
	KT2	0.65	0.82	
	KT3	0.69	0.81	
	KT4	0.63	0.83	
	KT5	0.68	0.82	
Knowledge Application	KA1	0.70	0.85	0.87
	KA2	0.71	0.84	
	KA3	0.67	0.85	
	KA4	0.69	0.85	
	KA5	0.73	0.84	
Production Innovation	PTI1	0.56	0.71	0.76
	PTI2	0.65	0.68	
	PTI3	0.45	0.75	
	PTI4	0.54	0.72	
	PTI5	0.48	0.74	
Process Innovation	PSI1	0.76	0.85	0.89
	PSI2	0.69	0.87	
	PSI3	0.77	0.85	
	PSI4	0.72	0.86	
	PSI5	0.69	0.87	

Variables	Items	Corrected Item-Total Correlation (CITC)	Cronbach Alpha if Item Deleted	Cronbach α
Technological Innovation	TI1	0.77	0.86	0.89
	TI2	0.73	0.87	
	TI3	0.70	0.87	
	TI4	0.72	0.87	
	TI5	0.74	0.86	
Market Innovation	MI1	0.64	0.82	0.85
	MI2	0.60	0.84	
	MI3	0.68	0.81	
	MI4	0.68	0.81	
	MI5	0.70	0.81	
Behavior Innovation	BI1	0.80	0.91	0.92
	BI2	0.77	0.91	
	BI3	0.80	0.90	
	BI4	0.82	0.90	
	BI5	0.81	0.90	
Environmental Performance	ELP1	0.65	0.81	0.84
	ELP2	0.66	0.80	
	ELP3	0.66	0.81	
	ELP4	0.60	0.82	
	ELP5	0.65	0.81	
Economic Performance	ECP1	0.74	0.83	0.87
	ECP2	0.66	0.85	
	ECP3	0.66	0.85	
	ECP4	0.72	0.84	
	ECP5	0.69	0.84	
Social Performance	SP1	0.68	0.82	0.85
	SP2	0.66	0.82	
	SP3	0.63	0.83	
	SP4	0.67	0.82	
	SP5	0.68	0.82	

This study analyzed 546 responses across 19 dimensions, including Continuous Learning, Team Learning, Empowerment Systems, Knowledge Creation, Innovation, and various performance outcomes (environmental, economic, and social). Cronbach's alpha coefficients ranged from 0.76 to 0.93, reflecting strong internal consistency across all scales. For instance, the Continuous Learning dimension reported a Cronbach's alpha of 0.87, while Knowledge Storage showed a value of 0.93, indicating high reliability. These results confirm that the scales utilized in this study were consistent and reliable for

assessing variables associated with learning organizations, knowledge management, innovation, and sustainable performance.

4.1.3.2 Validity Analysis

Before conducting factor analyses, the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity were performed to confirm the data's suitability for factor analysis.

Table 4.5 KMO and Bartlett test

KMO		0.914
Bartlett Test	**Approx. Chi-Square**	33456.180
	df	4465
	p-value	0.000

The KMO test yielded a value of 0.914, which falls between 0.9 and 1.0, indicating that the sample is highly suitable for factor analysis. Additionally, the p-value of Bartlett's test of sphericity was well below 0.05, confirming sufficient correlation among the variables for factor analysis. The results of the KMO and Bartlett's tests demonstrate that the data are appropriate for factor analysis, thus supporting its application in this study.

Table 4.6 Fit Indices for Structural Equation Model Variables

Variables	**χ^2/df**	**GFI**	**RMSEA**	**CFI**	**NFI**	**NNFI**
	< 5	**>0.8**	**<0.10**	**>0.8**	**>0.8**	**>0.8**
Learning Organization	1.71	0.911	0.036	0.959	0.907	0.956
Knowledge Management Practices	1.209	0.966	0.02	0.994	0.968	0.993
Innovation Capability	4.334	0.825	0.078	0.897	0.871	0.886
Sustainable Organizational Performance	2.652	0.943	0.055	0.954	0.928	0.945

This study then applied confirmatory factor analysis (CFA) to the structural models of Learning Organization, Knowledge Management Practices, Innovation Capability, and Sustainable Organizational Performance. The results indicated a good model fit across these variables. Based on the criteria outlined by Hu and Bentler (1999), a satisfactory model fit requires a chi-square ratio (χ^2/df) of less than 5, a goodness-of-fit index (GFI) exceeding 0.8, a root-mean-square-error of approximation (RMSEA) below 0.10, and values for the comparative fit index (CFI), normed fit index (NFI), and non-normed fit index (NNFI) all above 0.8.

The fit indices for each model meet the established criteria, confirming the structural validity of the constructs examined in this study. For the Learning Organization model, the chi-square ratio (χ^2/df) is 1.71, with a GFI of 0.911, RMSEA of 0.036, CFI of 0.959, NFI of 0.907, and NNFI of 0.956—all within acceptable thresholds. The Knowledge Management Practices model demonstrates an excellent fit, with a chi-square ratio (χ^2/df) of 1.209, GFI of 0.966, RMSEA of 0.02, CFI of 0.994, NFI of 0.968, and NNFI of 0.993. For Innovation Capability, the model fit is also satisfactory, showing a chi-square ratio (χ^2/df) of 4.334, GFI of 0.825, RMSEA of 0.078, CFI of 0.897, NFI of 0.871, and NNFI of 0.886. Lastly, the Sustainable Organizational Performance model has a chi-square ratio (χ^2/df) of 2.652, GFI of 0.943, RMSEA of 0.055, CFI of 0.954, NFI of 0.928, and NNFI of 0.945, all of which meet the specified standards. Together, these results indicate that all four models exhibit a good fit, affirming the rationality and applicability of their structures.4.1.4 Correlation test.

4.1.4 Correlation Test

Table 4.7 Fit Indices for Evaluating Model Variables

Factor	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Continuous Learning (1)	1																		
Inquiry& Dialogue (2)	0.375**	1																	
Team Learning (3)	0.342**	0.397**	1																
Embedded System (4)	0.318**	0.360**	0.401**	1															
Empowerment System (5)	0.360**	0.390**	0.383**	0.388**	1														
System Connection (6)	0.359**	0.461**	0.455**	0.419**	0.409**	1													
Strategic Leadership (7)	0.395**	0.415**	0.409**	0.389**	0.426**	0.470**	1												
Knowledge Creation (8)	0.286**	0.374**	0.319**	0.291**	0.416**	0.375**	0.385**	1											
Knowledge Storage (9)	0.112**	0.093*	0.108*	0.073	0.071	0.092*	0.046	0.096*	1										
Knowledge Sharing/Transfer (10)	0.248**	0.274**	0.290**	0.395**	0.345**	0.346**	0.372**	0.391**	0.107*	1									
Knowledge Application (11)	0.295**	0.294**	0.327**	0.355**	0.358**	0.345**	0.364**	0.389**	0.075	0.406**	1								
Production Innovation (12)	0.258**	0.193**	0.207**	0.135**	0.167**	0.185**	0.193**	0.143**	0.334**	0.132**	0.108*	1							

Factor	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Process Innovation (13)	0.215**	0.140**	0.169**	0.142**	0.153**	0.197**	0.185**	0.164**	0.527**	0.124**	0.122**	0.563**	1						
Technological Innovation (14)	0.249**	0.179**	0.187**	0.146**	0.128**	0.196**	0.169**	0.141**	0.509**	0.107*	0.104*	0.558**	0.718**	1					
Market Innovation (15)	0.146**	0.163**	0.043	0.081	0.073	0.122**	0.077	0.142**	0.317**	0.072	0.109*	0.272**	0.417**	0.407**	1				
Behavior Innovation (16)	0.185**	0.103*	0.148**	0.135**	0.114**	0.136**	0.118**	0.120**	0.634**	0.077	0.065	0.532**	0.749**	0.707**	0.421**	1			
Environmental Performance (17)	0.323**	0.404**	0.366**	0.382**	0.346**	0.431**	0.457**	0.394**	0.133**	0.400**	0.345**	0.231**	0.257**	0.230**	0.144**	0.216**	1		
Economic Performance (18)	0.363**	0.329**	0.361**	0.335**	0.401**	0.360**	0.347**	0.370**	0.169**	0.348**	0.416**	0.228**	0.249**	0.237**	0.213**	0.224**	0.318**	1	
Social Performance (19)	0.363**	0.333**	0.333**	0.338**	0.380**	0.298**	0.335**	0.339**	0.144**	0.291**	0.374**	0.206**	0.265**	0.246**	0.170**	0.227**	0.295**	0.310**	1

The Pearson correlation analysis reveals significant positive relationships between Continuous Learning and 18 other variables, including Inquiry and Dialogue, Team Learning, Empowerment Systems, Knowledge Creation, Knowledge Application, and various forms of Innovation (technological, process, market, and behavioral), as well as Environmental, Economic, and Social Performance. Correlation coefficients range from 0.112 to 0.395, indicating meaningful associations among these variables. Importantly, none of the correlations exceed 0.7, suggesting that multicollinearity is not an issue, reinforcing the validity of the observed relationships within the study.

4.1.5 Structural Equation Model Fitting and Hypothesis Testing

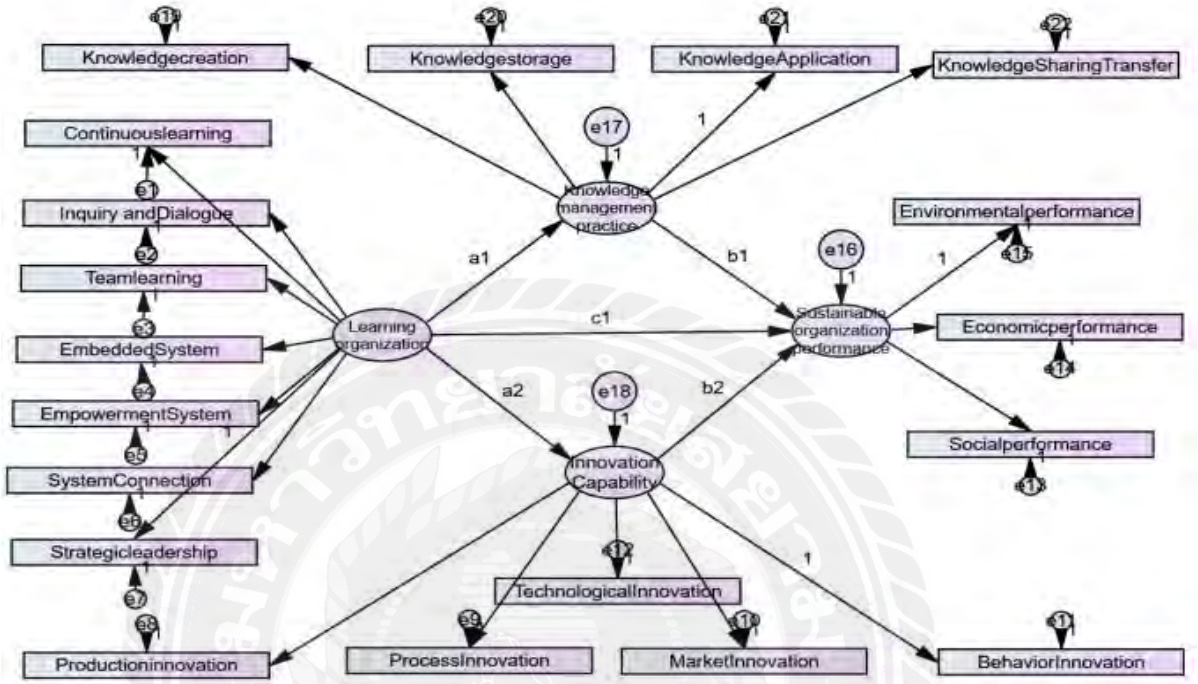
The structural equation model illustrates the relationships between Learning Organization, Knowledge Management Practices, Innovation Capability, and Sustainable

Organizational Performance. The observed endogenous variables and their explanations are outlined below:

Table 4.8 The expression of the Model of factor

No.	Factor		Meaning
1	CL	→	Continuous learning
2	ID	→	Inquiry and Dialogue
3	TL	→	Team learning
4	ES	→	Embedded System
5	ET	→	Empowerment System
6	SC	→	System Connection
7	SL	→	Strategic leadership
8	KC	→	Knowledge creation
9	KS	→	Knowledge storage
10	KT	→	Knowledge Sharing/Transfer
11	KA	→	Knowledge Application
12	PTI	→	Production Innovation
13	PSI	→	Process Innovation
14	TI	→	Technological Innovation
15	MI	→	Market Innovation
16	BI	→	Behavior Innovation
17	ELP	→	Environmental performance
18	ECP	→	Economic performance
19	SP	→	Social performance

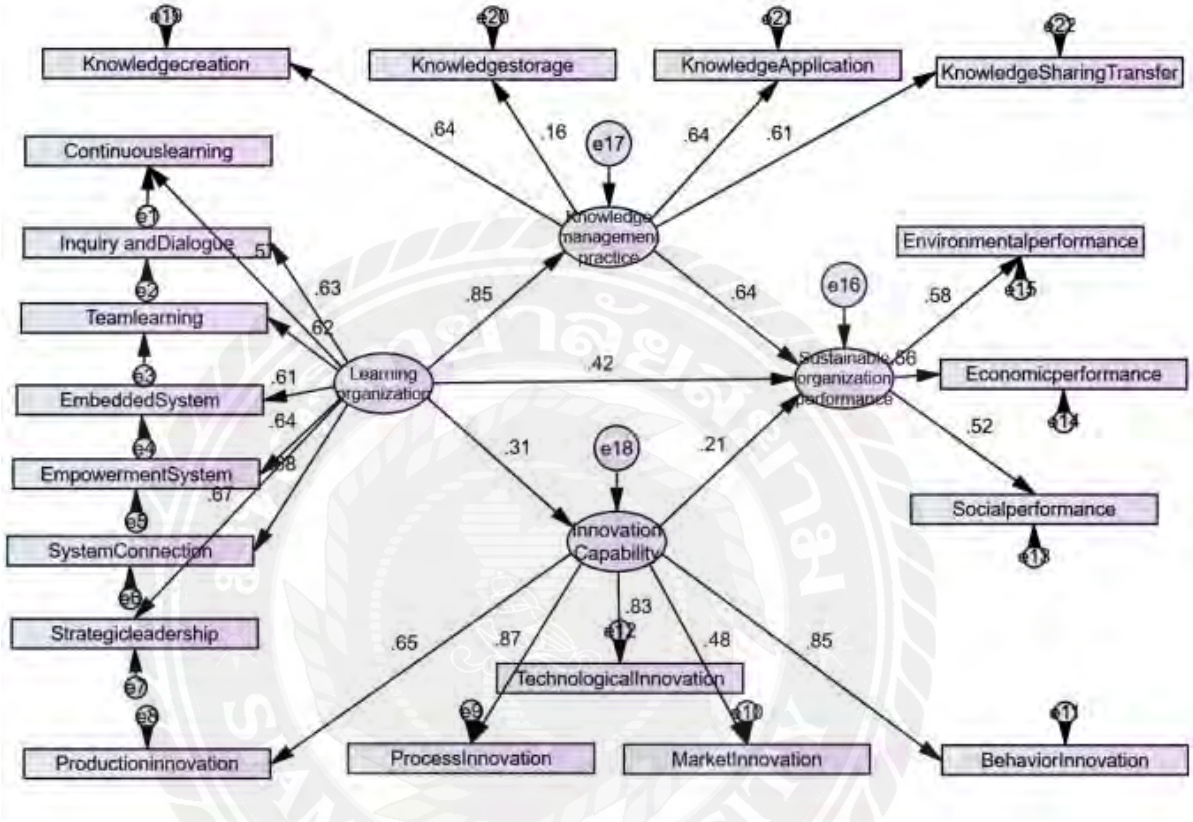
Figure 4.1 Structural Equation Model



The structural equation model underscores the critical role of a learning organization in advancing knowledge management practices and fostering innovation capability, both of which significantly contribute to sustainable organizational performance. The model reveals positive and substantial path coefficients, demonstrating that cultivating a learning-oriented culture enhances an organization's capacity for effective knowledge management and innovation. These enhanced capabilities, in turn, positively affect the organization's sustainable performance, which includes environmental, economic, and social dimensions. The model's strong fit indices (GFI, RMSEA, CFI, NFI, NNFI) affirm the validity of these relationships, highlighting the significance of a learning-oriented culture as a foundation for achieving long-term sustainability and innovation objectives.

4.1.5.1 Uncorrected Model

Figure 4.2 Uncorrected Model



The structural equation model (SEM) diagram outlines the relationships among several constructs, including Learning Organization Practices, Knowledge Management Practices, Innovation Capability, and Sustainable Organizational Performance. Below are potential issues and areas for improvement:

1. Path Coefficients

Learning Organization to Innovation Capability (0.31): The path coefficient is relatively low, suggesting a weaker relationship. This may indicate that the model does not fully account for other factors influencing innovation capability.

Knowledge Management Practices to Sustainable Organizational Performance (0.64): This path exhibits a strong positive relationship; however, the model could benefit

from a more detailed examination of the specific elements of knowledge management that most significantly impact performance.

2. Measurement Model

Loading Values: The loading values of certain indicators on their corresponding latent variables are below the desired threshold. For example, Inquiry and Dialogue (0.58) and Knowledge Storage (0.16) exhibit relatively low loading values, suggesting they may not serve as robust indicators of their respective constructs. Ideally, loading values should exceed 0.70 to signify strong relationships.

Knowledge Storage (0.16): This particularly low loading value indicates that knowledge storage may not adequately encapsulate the essence of the Knowledge Management Practices construct.

3. Model Fit Indices

Evaluation of Fit Indices: Although fit indices such as GFI, RMSEA, CFI, NFI, and NNFI are not explicitly presented in this diagram, their evaluation remains critical. Poor fit indices would signify the necessity for model re-specification.

4. Structural Paths

Direct Effects: The model posits direct effects from Learning Organization to Knowledge Management Practices (0.85) and Sustainable Organizational Performance (0.42). However, there may be omitted mediators or moderators influencing these relationships.

Indirect Effects: The path from Learning Organization to Sustainable Organizational Performance via Innovation Capability (0.21) is weak, indicating that Innovation Capability may not be a significant mediator within this model.

5. Conceptual Issues

Variable Relationships: Verifying the theoretical rationale for all paths is essential. For instance, while Learning Organization practices should theoretically impact Innovation

Capability, the weak path (0.31) suggests the presence of additional influencing factors that may not be included in this model.

Redundant Paths: Consider the necessity of all paths within the model. For example, the direct paths from Learning Organization to both Sustainable Organizational Performance and Innovation Capability may warrant reevaluation.

4.1.5.2 Recommendations for Improvement

1. Re-examine Indicator Loading: Raise the loading threshold to confirm that indicators robustly measure their constructs. Remove or re-specify indicators with low loadings to strengthen construct validity.

2. Incorporate Additional Constructs: Identify and integrate potential mediators or moderators, such as organizational culture or external environmental factors, which may further explain the observed relationships.

3. Reassess Theoretical Basis: Ensure each path is grounded in strong theoretical justification. Eliminate or adjust paths lacking empirical support to maintain conceptual rigor.

4. Evaluate Model Fit: Assess fit indices against recognized thresholds (e.g., RMSEA < 0.08, CFI > 0.90). Adjust the model where necessary to improve overall fit and alignment with the data.

5. Refine Constructs: For constructs with weak loadings, consider dividing them into more precise sub-constructs. For instance, Knowledge Management Practices might be separated into specific domains like tacit and explicit knowledge management for greater clarity and precision.

The analysis of this uncorrected structural equation model underscores critical areas for improvement to enhance its precision and relevance. Several weaknesses, notably the low path coefficients, are apparent, such as the modest link between the learning organization construct and innovation capability (0.31). This weaker association

might indicate that the model lacks additional factors influencing innovation capability. Similarly, low indicator loading values, particularly for “Inquiry and Dialogue” (0.58) and “Knowledge Storage” (0.16), suggest that these indicators might not effectively capture the constructs they’re meant to represent, potentially undermining the robustness of the model’s constructs.

Additionally, the model lacks a thorough assessment of fit indices, which are essential to evaluate how well the model aligns with the empirical data. Without a strong fit, the model’s findings could be less reliable. To strengthen conceptual clarity, adding mediators or moderators could deepen the analysis, and validating all paths against theoretical frameworks could clarify any assumptions and justify the relationships posited.

Enhancing the model’s structure through a re-evaluation of indicators, a reassessment of theoretical underpinnings, and a detailed examination of fit indices will improve its validity. This refined approach will allow a more nuanced interpretation of how learning organization practices, knowledge management, and innovation capability influence sustainable organizational performance.

Table 4.9 Uncorrected Model of Fit Indices for Structural Equation Model Evaluation

Indicator Category	Indicator Name	Adaptation Standards	Test Results	Acceptability
Absolute Fitness Parameter	GFI	>0.9	0.93	Acceptance
	AGFI	>0.9	0.91	Acceptance
	RMSEA	<0.06	0.061	Acceptance
Value-added Fitness Parameters	NFI	>0.9	0.888	Acceptance
	IFI	>0.9	0.922	Acceptance
	CFI	>0.9	0.922	Acceptance
	RFI	>0.9	0.87	Acceptance
Simple Fitness Parameter	CMIN/DF	<3	3.001	Non-acceptance
	P	>0.05	0.000	Non-acceptance

When checking the consistency of a model or the relationship between variables, it is essential to consider the specific test results and compliance with the criteria for each fitness parameter. If these results are consistent, further analyses can be carried out; adjustments must be made if the variables are inconsistent. According to Vijya's principles, a model must be complete, accepted, and reliable to be consistent with empirical data, i.e., model fit.

GFI (Goodness of Fit Index): The fit criterion is >0.9, and the actual test result is 0.93, which meets the fit criterion, so it is accepted. GFI shows that the model has a better overall fit and is consistent with the theoretical model. AGFI (Adjusted Goodness of Fit Index): The fit criterion is >0.9, and the actual test result is 0.91, which meets the fit criterion, so it is accepted. AGFI adjusts the model complexity to validate the model fit further. AGFI (Adjusted Goodness of Fit Index): The fit criterion is >0.9, and the actual test result is 0.91, which meets the fit criterion and is therefore accepted. AGFI adjusts the complexity of the model and further verifies its fitness. RMSEA (Root et al. of Approximation): The fit criterion is <0.06, and the actual test result is 0.061, which is slightly above the criterion but acceptable. RMSEA indicates that the estimation error of the model is slightly high, and attention needs to be paid to model adjustment. NFI (Normed et al.): The fitness criterion is >0.9, and the actual test result is 0.888, which is close to the criterion but still acceptable. NFI reflects the degree of improvement of the model compared to the invalid model, and further optimization is needed. IFI (Incremental et al.): The fitness criterion is >0.9, and the actual test result is 0.888, which is close to the criterion but still acceptable. IFI (Incremental et al.): The fitness criterion is >0.9, and the actual test result is 0.922, which meets the fitness criterion and is therefore accepted. IFI indicates that the model has improved significantly and has a better fit. CFI (Comparative et al.): The fitness criterion is >0.9, and the actual test result is 0.922, which meets the fitness criterion and is therefore accepted. CFI (Comparative et al.): The fit criterion is >0.9, and the actual test result is 0.87, which is close to the criterion but still acceptable. RFI needs to be further optimized to improve the model's fit. CMIN/df (Chi-Square/Degrees of Freedom): The fitness criterion is <3, and the actual test result is 3.001,

slightly higher than the criterion, so it is not accepted. CMIN/df indicates that the model complexity is high in proportion to the fit, so the model needs to be simplified. However, According to Wen et al.(2004)'s opinion, 3<CMIN/df<5 is acceptable, the p-value: the fitness criterion is >0.05, and the actual test result is 0.000, which is not accepted. The P-value indicates that the model is statistically significant, and the theoretical model does not fully agree with the empirical data. Empirical data are not entirely consistent since there are 95 items. According to Bentley Bentler & Chou 1987b Bentler & Chou, 1987b, the 5 to 10x method with a significant sample size results in a P-value of 0.000, considered acceptable if the P-value is positively significant.

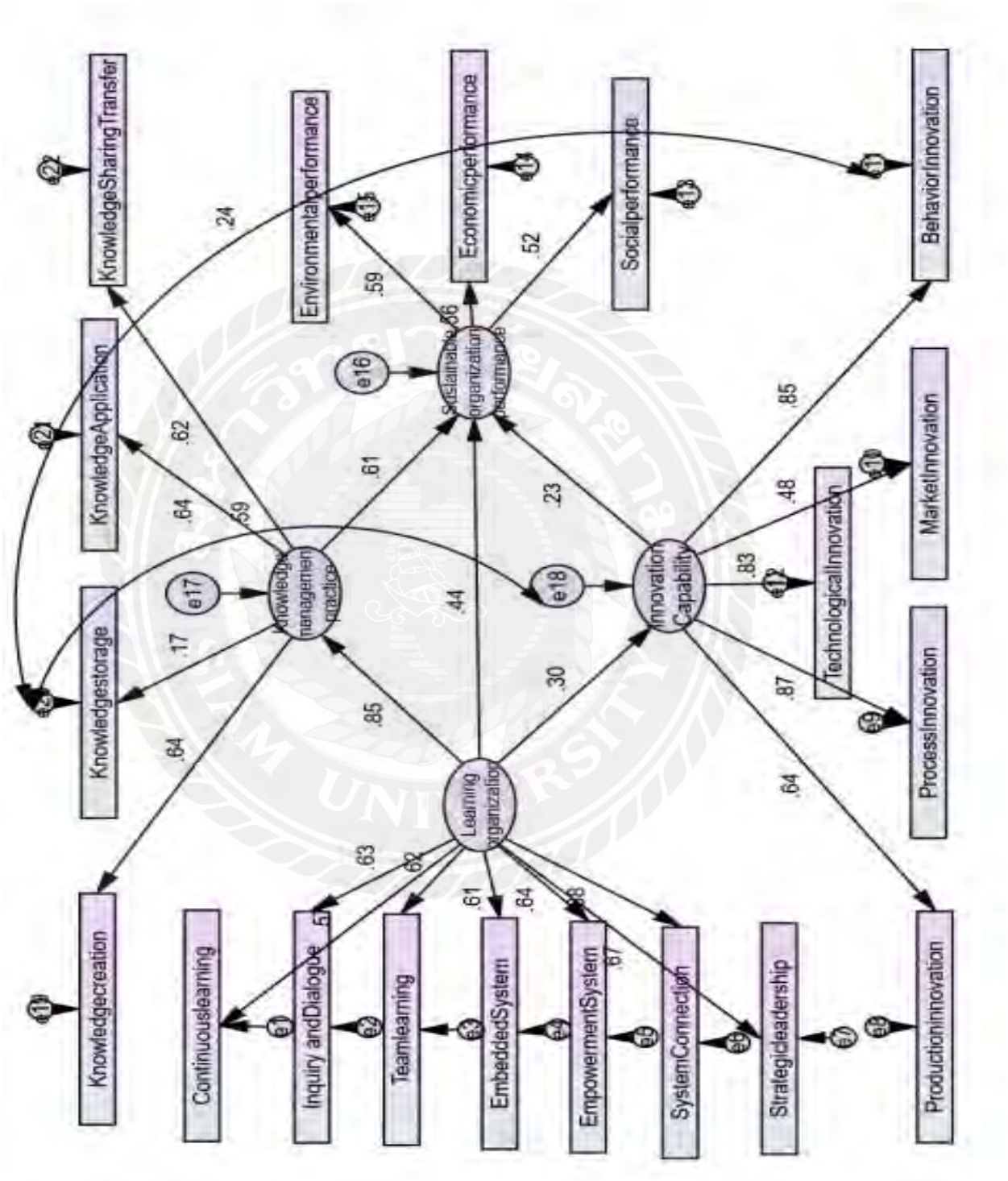
In summary, while several fitness parameters of the current model align with the expected criteria, suggesting a certain consistency between the theoretical model and the empirical data, other indicators still fall short of the desired standards. To enhance this alignment, researchers may consider adjustments based on statistical principles. Following Thanin Sincharu's (2014) recommendations, one approach is to exclude observational variables with low factor weights, as these may weaken the model's accuracy. Additionally, applying the modification index (MI) to connect error terms of dependent variables can improve the model's overall fit. Such refinements are expected to strengthen the model's representation of empirical data, thereby increasing the reliability and validity of the study's findings.

4.1.5.3 Revised Model

The results of the adjusted model analysis are shown in the figure. By adjusting the structure of the model, the researcher can exclude some components from the observed variables to provide better statistical values. According to statistical principles, the criteria for excluding certain observed variables, especially those with lower weights, are used (Thanin Sincharu, 2014). Next, the researcher ensured that the model was consistent with the empirical data by connecting the double-headed arrows between the error values of the dependent variable (Modification Index: MI) and suggesting the use of

statistical packages to view the error values of the dependent variable (Modification Index: MI). Below are the results of the corrected model parameters.

Figure 4.3 Revised Model



Chi-square = 161.81， DF=145， Chi-square/DF=1.116， GFI=0.970, IFI=1.0, AGFI=0.96, TLI=0.99, NFI= 0.865, CFI=1.00, P=0.16,*p> 0.05, RMSEA=0.01

Table 4.10 The data of the Revised Model

Path			Estimate	S.E	T （CR）	P	Std. Estimate
Knowledge management practices	<---	Learning organization	0.785	0.068	11.594	***	0.846
Innovation Capability	<---	Learning organization	0.405	0.065	6.233	***	0.304
Sustainable organizational performance	<---	Knowledge management practices	0.541	0.127	4.262	***	0.610
Sustainable organizational performance	<---	Innovation Capability	0.143	0.026	5.504	***	0.232
Sustainable organizational performance	<---	Learning organization	0.364	0.109	3.342	***	0.443
System Connection	<---	Learning organization	0.953	0.069	13.811	***	0.676
Strategic leadership	<---	Learning organization	1				0.675
Empowerment	<---	Learning organization	0.927	0.071	13.133	***	0.638
Inquiry &Dialogue	<---	Learning organization	0.929	0.072	12.904	***	0.626
Team learning	<---	Learning organization	0.91	0.071	12.845	***	0.623
Embedded System	<---	Learning organization	0.922	0.073	12.579	***	0.608
Continuous learning	<---	Learning organization	0.817	0.069	11.789	***	0.566
Knowledge Application	<---	Knowledge management practices	1				0.639
Knowledge creation	<---	Knowledge management practices	1.02	0.086	11.913	***	0.637
Knowledge Transfer	<---	Knowledge management practices	0.951	0.082	11.603	***	0.615
Knowledge Storage	<---	Knowledge management practices	0.303	0.079	3.821	***	0.175
Process Innovation	<---	Innovation Capability	1.007	0.041	24.668	***	0.873
Behavior Innovation	<---	Innovation Capability	1				0.85
Technological Innovation	<---	Innovation Capability	0.868	0.037	23.185	***	0.832
Production Innovation	<---	Innovation Capability	0.636	0.039	16.249	***	0.644
Market Innovation	<---	Innovation Capability	0.556	0.048	11.525	***	0.485
Environmental performance	<---	Sustainable organizational performance	1				0.585

Path			Estimate	S.E	T (CR)	P	Std. Estimate
Economic performance	<---	Sustainable organizational performance	0.996	0.085	11.78	***	0.558
Social performance	<---	Sustainable organizational performance	0.907	0.081	11.158	***	0.521

This study's Structural Equation Model (SEM) analysis incorporated data from both Figure 4.3 and Table 4.10. For clarity, the values in Figure 4.3 were rounded to two decimal places, while Table 4.10 provided more precise measurements using three decimal places. This approach allows for a more nuanced interpretation of the SEM data, with the table offering a higher level of precision for detailed analysis.

The Learning Organization has significant direct effects on several key variables, strongly influencing Knowledge management practices (Std. Estimate = 0.846, $p < 0.001$), Innovation Capability (Std. Estimate = 0.304, $p < 0.001$), and Sustainable Organizational Performance (Std. Estimate = 0.443, $p < 0.001$). These results support Hypotheses H1, H3, and H4, confirming the crucial role of learning organizations in enhancing knowledge management, innovation, and sustainability. Among the most significant factors influenced by the learning organization are System Connection (Std. Estimate = 0.676, $p < 0.001$), Strategic Leadership (Std. Estimate = 0.675, $p < 0.001$), Empowerment (Std. Estimate = 0.638, $p < 0.001$), Inquiry and Dialogue (Std. Estimate = 0.626, $p < 0.001$), Team Learning (Std. Estimate = 0.623, $p < 0.001$), Embedded System (Std. Estimate = 0.608, $p < 0.001$), and Continuous Learning (Std. Estimate = 0.566, $p < 0.001$), all of which have substantial effects on organizational learning and development. Among these factors, system connection is the most significant factor in a learning organization.

Knowledge management practices significantly indirectly affect sustainable organizational performance (Std. Estimate = 0.610, $p < 0.001$). These results support Hypotheses H2. Knowledge management practices strongly influencing Knowledge Application (Std. Estimate = 0.639, $p < 0.001$), Knowledge Creation (Std. Estimate = 0.637, $p < 0.001$), Knowledge Transfer (Std. Estimate = 0.615, $p < 0.001$), and Knowledge

Storage (Std. Estimate = 0.175, $p < 0.001$). These results support Hypothesis H2, confirming the essential role of knowledge management practices in driving innovation, knowledge dissemination, and organizational performance. Among the most significant factors influenced by knowledge management practices are Knowledge Creation (Std. Estimate = 0.637, $p < 0.001$), Knowledge Application (Std. Estimate = 0.639, $p < 0.001$), Knowledge Transfer (Std. Estimate = 0.615, $p < 0.001$), and Knowledge Storage (Std. Estimate = 0.175, $p < 0.001$), all of which contribute to effective knowledge management and utilization within the organization. Among these, Knowledge Application is the most significant, highlighting its pivotal role in ensuring that knowledge is efficiently applied to enhance performance and innovation.

Innovation Capability has significant direct effects on two key variables, strongly influenced by learning organization (Std. Estimate = 0.304, $p < 0.001$) and innovation capability affecting sustainable organizational performance (Std. Estimate = 0.232, $p < 0.001$). These results support Hypotheses H4 and H5, confirming innovation capability's critical role in driving various learning organization forms and contributing to sustainable performance. Among the most significant factors influenced by innovation capability are Process Innovation (Std. Estimate = 0.873, $p < 0.001$), Behavioral Innovation (Std. Estimate = 0.850, $p < 0.001$), Technological Innovation (Std. Estimate = 0.832, $p < 0.001$), Production Innovation (Std. Estimate = 0.644, $p < 0.001$), and Market Innovation (Std. Estimate = 0.485, $p < 0.001$). All these factors demonstrate strong effects on organizational innovation and performance. Among these, Behavioral Innovation is the most significant factor in innovation capability, underscoring the importance of adaptability and innovative behavior in achieving sustainable organizational outcomes.

Sustainable Organizational Performance is influenced by several key variables, with significant direct effects from Knowledge management practices (Std. Estimate = 0.610, $p < 0.001$), Innovation Capability (Std. Estimate = 0.232, $p < 0.001$), and Learning Organization (Std. Estimate = 0.443, $p < 0.001$). These results confirm Hypotheses H2,

H3, and H5, demonstrating that sustainable organizational performance is enhanced through knowledge management, innovation, and learning culture within the organization.

The Learning Organization has a notable impact on sustainable performance, directly and indirectly, through its influence on Knowledge management practices and Innovation Capability. Among the factors contributing to sustainable performance, Environmental Performance (Std. Estimate = 0.585, $p < 0.001$) is the most significant, followed by Economic Performance (Std. Estimate = 0.558, $p < 0.001$) and Social Performance (Std. Estimate = 0.521, $p < 0.001$). These findings suggest that fostering a learning organization and enhancing knowledge management and innovation capabilities are critical for improving environmental, economic, and social sustainability.

Sustainable Organizational Performance is primarily influenced by integrating learning organization principles, robust knowledge management practices, and strong innovation capabilities. Among the performance dimensions, Environmental Performance is the most impactful area for organizations emphasizing sustainability. This suggests that fostering a learning culture, efficiently managing knowledge, and driving innovation contribute to general organizational success and significantly enhance environmental outcomes, highlighting the value of sustainability-oriented practices.

Table 4.11 Revised Model of Fit Indices for Structural Equation Model Evaluation

Indicator Category	Indicator Name	Adaptation Standards	Test Results	Acceptability
Absolute fitness parameter	GFI	>0.9	0.969	Take up
	AGFI	>0.9	0.96	Acceptance
	RMSEA	<0.06	0.015	Acceptance
Value-added fitness parameters	NFI	>0.9	0.959	Acceptance
	IF	>0.9	0.996	Acceptance
	CFI	>0.9	0.996	Acceptance
	RFI	>0.9	0.952	Acceptance
Simple fitness parameter	CMIN/DF	<3	1.116	Acceptance
	P	>0.05	0.161	Acceptance

When analyzing the fit of structural equation models, the results of the tests of the various fitness indicators need to be considered together. These indicators are analyzed in detail below:

GFI (Goodness of Fit Index): The fit criterion is >0.9, and the actual test result is 0.969, which meets the criterion, indicating that the overall fit of the model is perfect, and the GFI is higher than the standard value, which means that the model fits the data better. AGFI (Adjusted Goodness of Fit Index): The fit criterion is >0.9, and the actual test result is 0.96, which meets the criterion, indicating that the model has a higher fit and the result is good after adjustment. AGFI (Adjusted Goodness of Fit Index): The fitness criterion is >0.9, and the actual test result is 0.96, which aligns with the standard. AGFI adjusts the complexity of the model, which indicates that the model fits the data well and that the result after adjustment is reasonable. RMSEA (Root et al. of Approximation): The fitness criterion is <0.06, and the actual test result is 0.015, far below the standard. RMSEA: The fit criterion is <0.06, and the actual test result is 0.015, which is much lower than the standard; the RMSEA value indicates that the estimation error of the model is tiny, and the model's fit is excellent. NFI (Normed et al.): The fit criterion is >0.9, and the actual test result is 0.959, which is in line with the standard; the NFI indicates that the model has a significant improvement compared with the ineffective model, and the fit of the model is better. IFI (Incremental et al.): The fitness criterion is >0.9, and the actual test result is 0.996, which meets the criterion. The high value of IFI indicates that the model has significant improvement and the fit is perfect. CFI (Comparative et al.): The fit criterion is >0.9, and the actual test result is 0.952, which meets the criterion, and the high value of CFI indicates that the model fits the theoretical data very well. CMIN/df: The fitness criterion is < 3, and the actual test result is 1.116, which meets the criterion. CMIN/df shows an excellent ratio between the complexity and fit of the model, indicating that the model is parsimonious and fit. P-value: The fitness criterion is >0.05, and the actual test result is 0.161, which meets the criterion. The P-value indicates that the chi-square statistic is insignificant, further supporting the model's goodness of fit.

All the fitness parameters of the model meet the expected criteria, indicating that the model fits the empirical data very well and can effectively reflect the consistency between the theoretical model and the empirical data. There is no need to adjust the model further; the current model already has high reliability and validity.

4.1.5.4 Hypothesis Testing

AMOS23 was used to establish the structural equation model with Learning organization as the independent variable, Knowledge management practices and innovation Capability as the mediator variable, and Sustainable organizational performance as the Dependent variable of structural equation modeling to explore the relationship between the variables. The following is the specific testing process and results:

Table 4.12 Path Coefficients and Significance Tests for Structural Equation Model

Path			Estimate	S.E.	T	P	Std. Estimate
Learning Organization	---->	Knowledge Management Practices	0.785	0.068	11.594	***	0.846
Learning Organization	---->	Innovation Capability	0.405	0.065	6.233	***	0.304
Knowledge Management Practices	---->	Sustainable Organizational Performance	0.541	0.127	4.262	***	0.61
Innovation Capability	---->	Sustainable Organization Performance	0.143	0.026	5.504	***	0.232
Learning Organization	---->	Sustainable Organizational Performance	0.364	0.109	3.342	***	0.443

1. Learning Organization → Knowledge Management Practices (0.846)

The strong relationship (0.846) between learning organization principles and knowledge management (KM) practices highlights that learning-oriented organizations

significantly promote KM initiatives. These organizations foster knowledge acquisition, sharing, and application, which are central to KM processes. This alignment often drives successful learning organizations to leverage KM as a tool to boost innovation and maintain competitiveness. The high path coefficient reflects the extent to which effective KM is foundational in learning organizations, underscoring KM's role in organizational success.

2. Learning Organization → Innovation Capability (0.304)

While a learning organization's culture positively affects innovation capability, the impact is more indirect (0.304) than directly influencing KM practices. Other variables—resource allocation, market dynamics, and employee creativity—also play crucial roles in enhancing innovation. Consequently, while learning organizations foster an environment that supports innovation, this relationship is weaker than KM's. This lower path coefficient suggests that innovation capability depends on additional factors beyond the influence of a learning organization's culture alone.

3. Knowledge Management Practices → Sustainable Organizational Performance (0.610)

The robust relationship (0.610) between KM practices and sustainable organizational performance suggests that effective KM drives sustainability outcomes. Strong KM practices enable organizations to adapt to environmental changes, sustain innovation, and support ongoing improvement. By enhancing efficiency and resource utilization, KM practices optimize organizational performance. This significant path coefficient emphasizes KM's vital role in promoting sustainability and resilience, which contributes to achieving long-term performance objectives.

4. Innovation Capability → Sustainable Organizational Performance (0.232)

Although innovation capability positively influences sustainable performance, its direct impact (0.232) is relatively modest compared to KM practices. This is likely due to

the complexity of converting innovative ideas into tangible performance gains, which often require time and are influenced by external factors, such as market readiness, resources, and effective implementation. Consequently, while innovation capability remains valuable, its impact on sustainable performance is more indirect and may vary based on these additional contingencies.

5. Learning Organization → Sustainable Organizational Performance (0.443)

The moderate relationship (0.443) between learning organizations and sustainable performance reflects the direct, yet somewhat limited, influence of learning organizations on long-term outcomes. Learning organizations excel in adapting to environmental shifts and enhancing operational efficiency through continuous learning. However, this influence may be more pronounced when mediated by other factors like knowledge management and innovation capability, which can more directly drive sustainable results. This path coefficient indicates that while learning organizations contribute positively to performance, much of this effect is channeled through other organizational supporting mechanisms.

The above table demonstrates the relationship between the paths, as can be seen: there is a significant positive relationship between Learning organization and Knowledge management practices ($\beta=0.846, p<0.05$), so hypothesis 1 is valid, there is a significant positive relationship between Learning organization on Innovation Capability there is a significant positive relationship ($\beta=0.304, p<0.05$), Knowledge management practices there is a significant positive relationship on Sustainable organizational performance ($\beta=0.61, p<0.05$). Therefore, Hypothesis 2 is valid; Innovation Capability has a significant positive relationship on Sustainable organizational performance ($\beta=0.232, p<0.05$); Learning organization has a significant positive relationship on Sustainable organizational performance there is a significant positive relationship ($\beta=0.443, p<0.05$), so hypothesis 3 is valid.

This study applied the bootstrapping technique to examine mediation effects, utilizing 5,000 resamples to enhance the precision of the mediation effect estimates. By

resampling and calculating these effects repeatedly, Bootstrapping provided confidence intervals (95%) for the estimates, giving a robust measure of their stability. This approach allowed for the precise evaluation of indirect effects within the structural model, helping determine the strength and significance of mediating variables between constructs like Learning Organization, Knowledge Management Practices, Innovation Capability, and Sustainable Organizational Performance.

The specific test results outline the significance and direction of these mediation pathways, which adds depth to the interpretation of how indirect influences contribute to organizational performance outcomes.

Table 4.13 Test for Mediating Effects

Paths	Parameter	Estimate	Lower	Upper	P
Learning Organization→Knowledge Management Practices→Sustainable Organizational Performance	Indirect Effect	0.424	0.203	0.844	0.001
	Direct Effect	0.364	-0.04	0.652	0.076
	Aggregate Effect	0.788	0.671	0.936	0.001
	Intermediary Effect	0.462	0.052	0.749	0.076
Learning Organization→Innovation Capability→Sustainable Organizational Performance	Indirect Effect	0.058	0.034	0.087	0.001
	Direct Effect	0.364	-0.04	0.652	0.076
	Aggregate Effect	0.422	0.016	0.712	0.045
	Intermediary Effect	0.863	0.315	0.954	0.031

In the path relationship with Learning organization as the independent variable, Knowledge management practices as the mediator variable, and Sustainable organizational performance as the dependent variable. Firstly, Learning organization has a significant indirect effect (a×b) on Sustainable organizational performance (β=0.424, p=0.001). Secondly, Learning organization significantly directly affects (c) Sustainable organizational performance. Direct effect (c) was not significant (β=0.364, p=0.076). Third, the direct and indirect effects worked similarly (a×b×c >0). Therefore, it was judged to be a complementary type of complete mediation, i.e., the effect of Learning organization

on Sustainable organizational performance will be fully mediated by Knowledge management practices, so hypothesis 2 is valid.

In the path relationship with Learning organization as the independent variable, Innovation Capability as the mediator variable, and Sustainable organizational performance as the dependent variable, first, Learning organization has a significant effect on Sustainable organizational performance indirect effect (a×b) is significant (β=0.058, P=0.001) Secondly, the direct effect of Learning organization on Sustainable organization_performance (c) is not significant (β=0.364,p=0.076); thirdly, the direct and indirect effects work in the same direction (a×b×c>0) Therefore, it is judged to be a complementary type of complete mediation, i.e., Innovation Capability will fully mediate the Learning organization on Sustainable organizational performance effect. Therefore, hypothesis 5 is valid.

The mediating effect exists in both paths because learning organizations indirectly influence sustainable organizational performance through knowledge management practices and innovation capabilities. These mediating variables explain how learning organizations can improve performance through improved internal management practices and enhanced innovation capabilities. In organizational management and performance research, complex causal relationships are often better represented through mediating variables. For example, learning organizations affect performance directly and indirectly through improved knowledge management and enhanced innovation capabilities.

Summarized the Outcome:

The analysis of the two paths, Learning Organization → Knowledge management practices → Sustainable Organizational Performance and Learning Organization → Innovation Capability → Sustainable Organizational Performance, highlights the differing strengths of the mediating effects of Knowledge management practices and Innovation Capability on Sustainable Organizational Performance.

Learning Organization → Knowledge management practices → Sustainable Organizational Performance:

In this path, Knowledge management practices play a significant mediating role. The indirect effect is large (β = 0.424, p = 0.001), and the total effect reaches 0.788. This demonstrates the vital capacity of Learning Organizations to drive Sustainable Organizational Performance by enhancing knowledge management practices. This strong effect is because Knowledge Management directly improves operational efficiency and organizational performance by promoting effective use, creation, and sharing of knowledge. Therefore, knowledge management practices are a powerful mechanism by which learning organizations impact performance.

Learning Organization → Innovation Capability → Sustainable Organizational Performance:

In this path, Innovation Capability also mediates the relationship between Learning Organization and Sustainable Organizational Performance, but its effect size is smaller (β = 0.058, p = 0.001). While Learning Organizations improve innovation capabilities, transforming this capability into organizational performance is more complex and influenced by external factors like market conditions and resource availability. As a result, the indirect effect of innovation capability is less pronounced than knowledge management practices.

Outcome Emphasis:

The indirect effect of knowledge management practices is significantly more pronounced than innovation capabilities. This observation arises from knowledge management serving as a more direct and immediate mechanism for enhancing organizational performance, facilitating the efficient utilization and dissemination of knowledge to bolster operational effectiveness. Conversely, the influence of innovation capability is characterized by greater complexity and long-term implications, necessitating external support and resources for its full translation into organizational performance.

Consequently, the total effect of learning organizations on sustainable performance is more robustly mediated by knowledge management than by innovation capability, thereby underscoring the pivotal role of knowledge management in driving organizational success.

The importance of SEM finding

In certain contexts, an organization's innovation capability may be less significant than knowledge management practices for several reasons. Below are potential explanations for why innovation capability exhibits a lesser indirect effect on sustainable organizational performance compared to knowledge management practices:

1. Complexity of Innovation Processes:

Innovation capability generally encompasses intricate, long-term processes that necessitate internal organizational support and external resources, such as advanced technology, funding, and favorable market conditions. The transformation of innovative ideas into tangible products, services, or improvements often proves to be slower and more resource-intensive than implementing knowledge management initiatives. In contrast, knowledge management is more directly linked to the daily decision-making processes, information sharing, and problem-solving, thus exerting a more immediate influence on organizational performance.

2. Dependency on External Factors:

Innovation capability frequently strongly depends on external factors, including the availability of cutting-edge technology, access to specialized skills, and appropriate market conditions. For instance, successful innovation may require costly software or hardware, skilled labor, or research and development resources that are not always readily accessible. This reliance on external factors can hinder or delay the impact of innovation on performance. In contrast, knowledge management predominantly relies on internal processes such as communication systems, collaboration, and organizational learning, which are more controllable and scalable.

3. Long-Term vs. Immediate Impact:

Innovation capability often results in delayed performance outcomes, as developing new products, processes, or business models requires considerable time to yield measurable results. The advantages of innovation—such as new product launches and process enhancements—may take years to materialize, resulting in a less pronounced immediate impact on sustainable performance. In contrast, knowledge management practices can deliver more immediate results by enhancing operational efficiency, facilitating decision-making, and fostering collaboration, leading to quicker organizational performance and sustainability improvements.

Conversely, knowledge management practices can yield more immediate results by improving operational efficiency, decision-making, and collaboration, leading to quicker gains in organizational performance and sustainability.

4. Organizational Focus:

Organizations may emphasize knowledge management more than innovation capability due to the former's ease of implementation and the immediate, measurable benefits it offers. Many organizations have already established knowledge management systems, including databases, document-sharing platforms, and collaboration tools, which can seamlessly integrate into their daily operations. Conversely, cultivating a robust innovation capability often necessitates significant investments in research and development (R&D), experimentation, and risk-taking. Such requirements can pose challenges for organizations that lack the necessary resources or infrastructure to support these endeavors.

5. Innovation Requires Cultural and Structural Change:

Developing innovation capability necessitates a culture that promotes creativity, experimentation, and risk-taking. However, many organizations encounter challenges in establishing such a culture, often facing structural barriers such as rigid hierarchies, insufficient cross-functional collaboration, or risk-averse leadership that impede

innovation efforts. In contrast, knowledge management is frequently perceived as a more structured and formalized process, requiring fewer cultural or structural transformations for implementation. This relative ease of adoption makes knowledge management practices more accessible for organizations than cultivating an innovative culture.

6. Availability of Tools and Resources:

Innovation capability often hinges on access to advanced tools, such as software for product design, data analytics, or artificial intelligence. When organizations lack these tools or encounter difficulties acquiring them—whether due to cost, technical expertise, or market availability—their innovation efforts may be significantly hampered. Conversely, knowledge management tools, including cloud storage systems, knowledge-sharing platforms, and communication tools, tend to be more widely available, cost-effective, and easier to implement across organizations.

The comparatively minor impact of innovation capability, as opposed to knowledge management practices, can be attributed to several factors: the complexity of innovation processes, reliance on external factors, the long-term nature of innovation outcomes, and varying levels of organizational readiness. Nonetheless, innovation capability remains essential for long-term competitiveness and sustainability. While knowledge management delivers more immediate and actionable benefits, making it a more influential driver of sustainable organizational performance in the short term, organizations should consider investing further in developing their innovation infrastructure, culture, and resources to fully realize the potential of their innovation capabilities and achieve sustained performance improvements.

4.2 Qualitative Analysis

4.2.1 In-Depth Interviews

In-depth interviews are widely employed to gain insights into participants' perspectives, experiences, and conceptualizations through dialogues with specific groups. This study examines the influence of learning organizations on the sustainable organizational performance of the IT industry in China based on in-depth interviews conducted with managers of listed IT companies. Twenty leaders and managers, aged between 35 and 55 years, participated in this research. The cohort included three females and seventeen males, all with over ten years of professional experience in their respective fields. To facilitate the analysis of the interview content, respondents were assigned numerical identifiers ranging from No.1 to No.20. The following provides an overview of the situation:

Table 4.14 List of 20 interviewees from 10 companies in the east, south, north, west, and central regions of China

No	Area	Province	Number of Companies/Name	Employees	Location	Length of Work
1	East	Zhejiang	1 Perfect World Co., Ltd.	6061	Manager	10
2					Supervisor	13
3		Shandong	1 Sublime China Information Co., Ltd.	1088	HR manager	23
4					Supervisor	14
5	South	Guangdong	1 (Rastar Group) Rastar Interactive Entertainment Co., Ltd	2098	Department head	10
6					Department head	12
7		Guizhou	1 Shijihengtong Technology Co., Ltd.	1269	Supervisor	11
8					HR manager	16
9	West	Shanxi	1 Three's Company Media Group Co., Ltd.	1163	Department head	19
10					Department head	20
11		Chongqing	1 Giant Network Group Co., Ltd.	1389	Department head	20
12					Department head	23
13	North	Beijing	1 Beijing Ultrapower Software Co., Ltd.	3329	HR manager	18
14					Department head	25
15		Jilin	1 Tonghua Grape Wine Co., Ltd.	650	Supervisor	17
16					Department head	15

No	Area	Province		Number of Companies/Name	Employees	Location	Length of Work
17	Centre	Hunan	1	Huakai Yibai Technology Co., Ltd.	2180	Supervisor	14
18						HR manager	22
19		Hunan	1	Tangel Culture Co., Ltd.	387	Supervisor	10
20						HR manager	16
20	**5**	**9**	**10**		**19614**	**20**	

(Source: Researcher, 2024)

All interviewees are senior managers, selected through stratified sampling to ensure a comprehensive representation of company size and regional diversity. This sampling included the largest and smallest companies from each of the five regions of China—east, south, west, north, and central—resulting in a total of ten companies. Two managers from each company were chosen for interviews to avoid biased perspectives from a single individual and ensure each company's viewpoint was well-represented. Two managers from each company were chosen for interviews. This approach enriched the research content, providing detailed and well-rounded insights into the influence of learning organizations on sustainable performance within China's IT industry.

4.2.2 Content Analysis

In this study, the purpose of the interview, how the data collected will be used, and confidentiality will be explained to the respondents before the interview. Secondly, their personal information was collected and then introduced to the main content of the interview. The interview process of this study is to introduce the current development of listed IT companies and then an in-depth understanding of the four aspects of listed IT companies, respectively, the relationship between learning organization, knowledge management practices, innovation ability, and organizational sustainable performance.

4.2.2.1 Development of Learning Organization in Public IT Companies

The 20 selected managers from public IT companies described a learning organization as one that evolves by embedding seven core principles—Continuous Learning (CL), Inquiry and Dialogue (ID), Team Learning (TL), Empowerment of Shared Vision

(ES), Establishing Personal Mastery (EP), Systems Connections (SC), and Strategic Leadership (SL)—into all aspects of its operations. This approach encourages growth at both individual and team levels through shared knowledge and experiences, ultimately fostering innovation, adaptability, and sustainable organizational performance.

A connected system within these IT companies integrates tools, platforms, processes, and technologies to support the organization's objectives, facilitating seamless communication, data sharing, and collaboration across departments and functions. Nineteen managers confirmed adopting ERP systems integrated with financial and human resource management tools (e.g., SAP), providing a cohesive view of business operations. Eighteen managers noted that their organizations integrated Learning Management Systems (LMS) with performance management frameworks, allowing tracking of employee learning activities—such as cybersecurity certifications and workshop participation—directly linked to performance evaluations and career growth.

Additionally, seventeen managers highlighted the use of continuous integration/continuous deployment (CI/CD) pipelines, integrated with version control systems like GitHub or GitLab, to automate software testing, building, and deployment processes. By aligning learning initiatives with performance management, fostering cross-departmental collaboration, and enabling real-time application, these IT companies strengthened skill development, spurred innovation, enhanced organizational resilience, and reinforced their competitive position in the market.

In Strategic Leadership, IT company managers underscore the importance of adaptive, visionary, transformational, data-driven, and collaborative leadership styles. Nineteen managers identified Adaptive Leadership as critical, emphasizing leaders' abilities to quickly respond to external changes, such as market dynamics or technological advancements. Eighteen managers pointed to Visionary Leadership, with leaders focused on articulating a clear, future-oriented vision aligned with industry trends and the company's long-term goals. This vision is consistently communicated across all organizational levels to ensure alignment in purpose and direction. Seventeen managers

noted the implementation of Transformational Leadership, where leaders prioritize continuous improvement and innovation across all levels, empowering employees to take initiative, experiment, and challenge norms, often with mentorship and coaching to cultivate emerging leaders.

Sixteen managers reported a focus on Data-Driven Decision-Making, where leaders employ advanced analytics and business intelligence to shape strategic choices based on market trends, customer insights, and performance metrics. Collaborative leadership is also prominent, with sixteen managers stating that IT leaders seek input from diverse teams and stakeholders before making key decisions. Cross-functional collaboration is integral to this approach, fostering an open-door policy for continuous feedback and flexibility in strategic execution.

Empowering employees in their professional development is a cultural cornerstone within these companies. Eighteen leaders provide financial and logistical support for employees to pursue external learning opportunities, such as certifications, advanced degrees, and conference attendance. Seventeen managers reported that employees are granted Dedicated Learning Time—for instance, “Learning Fridays” or specific weekly hours—focused solely on skill development. Sixteen managers highlighted Autonomy in Learning Choices, where employees select learning paths that best align with their career goals and roles. Sixteen managers also encourage cross-functional learning, allowing employees to explore opportunities beyond their immediate roles and promoting a broader understanding of the organization and diverse skill acquisition.

Within Inquiry and Dialogue, transparent and open communication is essential. All 20 managers reported holding regular team meetings and project retrospectives to foster an environment where team members can openly share insights and feedback, facilitating continuous improvement. Transparent communication channels, such as WeChat, DingTalk, and internal forums (e.g., OA systems), encourage open discussion and knowledge-sharing. Eighteen managers noted the establishment of anonymous feedback channels to allow employees to express ideas and concerns without

fear, enhancing psychological safety. Seventeen managers emphasized the role of Cross-Departmental Collaboration, facilitating regular interdepartmental communication (e.g., between IT, marketing, and sales) to foster idea-sharing and innovative solutions beyond departmental silos. This collaborative approach promotes diverse perspectives, enhancing problem-solving and innovation across the organization.

In team learning, 18 people said they maintain a centralized knowledge management system where all project documentation, best practices, and learning materials are stored and easily accessible. Seventeen people denote fostering a collaborative learning culture where learning is a shared responsibility. Team members are encouraged to learn from each other through pair programming, peer reviews, and knowledge-sharing sessions. Sixteen people represent Continuous Learning Initiatives with a structured learning and development program that includes workshops, certifications, and seminars in which the entire team can participate. They also encourage team members to present what they have learned in these sessions to the rest of the team. Sixteen people signify that they set up Peer Learning and Mentorship, where team members are encouraged to share their expertise with others. This includes regular peer code reviews, knowledge-sharing sessions, and a formal mentorship program.

In the embedded system aspect, embedded systems play a crucial role in enhancing employee learning processes and ensuring that continuous education is seamlessly integrated into daily operations. Here is how IT managers leverage embedded systems and specific examples from public companies: 17 people say IT companies create collaborative learning environments. Embedded systems support collaborative learning by integrating learning platforms with team communication tools. This allows real-time collaboration on learning tasks, such as group projects, discussions, and peer feedback sessions. Sixteen people expressed that they have Embedded AI-driven (learning) systems within our Learning Management System (LMS) that analyze employee performance data and automatically recommend relevant learning materials or courses. This system integrates directly with our project management and communication tools. Sixteen people

say companies enable Performance Tracking and Skill Development. They use embedded analytic tools that track individual and team performance over time. These systems are connected to LMS and HR platforms, providing insights into skills gaps and progress on learning goals. Embedded systems in organizations are integral to how employees facilitate and enhance learning. These systems ensure that team members constantly learn and improve their daily workflows by automating learning recommendations, providing real-time feedback, integrating knowledge management, and supporting collaborative learning. These practices enhance individual skills and contribute to our company's efficiency and innovation.

In continuing learning,16 people think IT companies offer Ongoing Training Programs that cover technical skills (e.g., new programming languages, cybersecurity) and soft skills (e.g., leadership, communication). These programs are accessible online, allowing employees to learn independently. Eighteen people consider that carrying out a Mentor Program, which pairs less experienced employees with seasoned mentors, encourages knowledge transfer and helps new employees quickly get up to speed with company practices and industry trends. Eighteen people realized Access to Online Learning Platforms where Employees are given subscriptions to platforms like Coursera, Udemy, or LinkedIn Learning, where they can take courses relevant to their roles.

4.2.2.2 Development of Knowledge management practices in Public IT companies

In the context of fostering knowledge creation within an IT company, cultivating an environment that encourages the generation of new ideas and innovations is essential. Specific practices and activities that IT managers can implement to support knowledge creation include:

1. Establishing Dedicated Research and Development (R&D) Labs: Eighteen respondents emphasized the importance of dedicated R&D labs, where teams can

explore new technologies, experiment with diverse approaches, and develop prototypes. These labs facilitate the transformation of theoretical knowledge into practical applications.

2. Investing in Online Learning Platforms: Sixteen respondents recognized the value of online learning platforms that provide courses on emerging technologies and innovative methodologies. By promoting continuous learning, companies foster the development of new knowledge within their teams.

3. Collaborating with External Institutions: Seventeen respondents highlighted partnerships with universities, research institutions, and other companies to co-develop new technologies and solutions. Such external collaborations introduce fresh perspectives and specialized knowledge, enhancing the company's internal expertise.

4. Organizing Internal Conferences and Seminars: Seventeen participants supported internal conferences and seminars, which featured presentations by employees or guest speakers who shared insights on recent advancements and ongoing projects. These events disseminate new knowledge and inspire employees to explore emerging areas of interest.

5. Utilizing Crowdsourcing for Problem-Solving: Sixteen respondents indicated that companies often use internal or external crowdsourcing to gather ideas and solutions from a broader audience. Crowdsourcing is particularly valuable for addressing complex issues, as it brings diverse input and creativity to problem-solving.

6. Implementing Employee Rotation Programs: Eighteen respondents noted that employee rotation programs, where staff members rotate through various departments or roles, expose them to new challenges and environments. Such programs broaden employees' skill sets and understanding of the company, supporting a holistic approach to innovation.

7. Encouraging Reflective Practices: Eighteen respondents supported using reflective practices, encouraging employees to routinely assess their projects and

experiences to extract lessons and insights. This reflection is often facilitated through journals, blogs, or discussion groups.

Implementing these practices requires a strategic approach aligned with the company's overarching goals and culture. This creates an ecosystem that supports continuous knowledge sharing and generation.

Regarding knowledge storage, effective management and accessibility of valuable information and insights are critical for sustaining an IT company's growth. Here are several methods an IT manager might use to store and manage organizational knowledge efficiently:

Table 4.15 The Practices and Methods of Knowledge Storage

Dimension	Practices and Methods	Key Informants
Knowledge Storage	**Digital Knowledge Bases:** Utilize platforms like Confluence, SharePoint, or a custom-built internal knowledge base to store documents, procedures, and best practices in a searchable, centralized repository.	16
	Document Management Systems (DMS): Implement systems like Microsoft SharePoint or Google Drive that support version control, access permissions, and metadata tagging to enhance the organization and retrieval of documents.	16
	Cloud Storage Solutions: Cloud-based services like AWS S3, Google Cloud Storage, or Microsoft Azure are used to ensure data redundancy, security, and scalability. This facilitates the storage of large datasets and documents securely.	18
	Database Management: Maintain structured databases for storing structured data that can be easily queried and analyzed. This includes using relational databases like MySQL and PostgreSQL or more complex solutions like NoSQL for varied data types.	17
	Content Management Systems (CMS): Implement systems like WordPress or Drupal to manage and store digital content, which is beneficial for handling web-based knowledge articles and user manuals.	16

(Remark: Number of key informants who underlined the importance of the issues)

By deploying these strategies, an IT company can create a robust framework for knowledge storage that supports ongoing access to valuable information and facilitates organizational learning and decision-making.

In the context of knowledge sharing and transfer within an IT company, facilitating the flow of information and expertise across the organization is crucial. Here are several effective practices that an IT company manager might adopt to enhance knowledge sharing and transfer:

Table 4.16 The practices and methods of Knowledge sharing and transfer

Dimension	Practices and Method	Key Informants
Knowledge Sharing and Transfer	**Internal Workshops and Training Sessions:** Regularly organize workshops, seminars, and training sessions where employees can share expertise and skills with their colleagues. This not only spreads knowledge but also encourages collaborative learning.	16
	Mentoring and Coaching Programs: Establish formal mentoring programs where experienced employees guide newer or less experienced staff. This one-on-one interaction is a highly effective way of transferring tacit knowledge.	18
	Cross-Functional Team Projects: Encourage the formation of project teams that include members from different departments or areas of expertise. This diversity fosters innovation and the cross-pollination of ideas and knowledge.	16
	After-Action Reviews: After completing a project, hold a review session to discuss what was learned, what could have been done better, and how this knowledge can be applied in future projects. Documenting and sharing these insights can be invaluable.	20
	Job Rotation and Shadowing Programs: Implement programs where employees can rotate through different departments or shadow other roles. This exposure to different parts of the company helps spread understanding and appreciation of various functions and operations.	16

(Remark: Number of key informants who underlined the importance of the issues)

Integrating these practices into the organizational culture allows an IT company manager to create an environment where knowledge is preserved and actively disseminated, leading to continuous improvement and innovation.

Knowledge application within an IT company ensures that the knowledge acquired and stored is actively used to improve processes, products, and decision-making. Here are some practices an IT company manager might implement to promote practical knowledge application:

Table 4.17 The practices and methods of Knowledge Application

Dimension	Practices and Method	Key Informants
Knowledge Application	**Knowledge-Driven Product Design:** Apply knowledge from customer feedback, market research, and internal R&D to drive product design and innovation. This ensures that products align with current technology trends and customer needs.	20
	Scenario Planning and Simulation: Use simulations to apply knowledge in hypothetical scenarios. This helps teams anticipate potential problems and develop solutions before implementing changes in real-world environments.	19
	Customer Knowledge Application: Leverage customer data and insights gathered through CRM systems to tailor services and products to specific needs, enhancing customer satisfaction and loyalty.	20
	Employee Training Platforms: Regularly update training content to reflect the latest knowledge and ensure that all employees have the skills to apply it effectively in their roles.	20
	Technology Adoption Frameworks: Create frameworks for assessing and adopting new technologies based on accumulated organizational knowledge, ensuring that new tools are integrated smoothly and effectively.	20

(Remark: Number of key informants who underlined the importance of the issues)

Fostering an environment where knowledge is shared, stored, and actively applied can help an IT company enhance its innovation capabilities, streamline operations, and maintain a competitive edge.

4.2.2.3 Development of Innovation Capability in Public IT Companies

Product innovation within an IT company involves continually enhancing or developing new products that meet changing market demands and technology

advancements. Here are several practices an IT company manager might adopt to ensure robust product innovation:

Table 4.18 The practices and methods of Production innovation

Dimension	Practices and Method	Key Informants
Production Innovation	**Co-Creation Workshops:** Engage customers and stakeholders in co-creation workshops where they can contribute ideas and feedback during the product development process. This collaborative approach can lead to more innovative products closely aligned with market needs.	16
	Technology Scouting: Regularly scan the market and technology landscape to identify emerging technologies that could be incorporated into new or existing products. Keeping abreast of technological trends helps maintain a competitive edge.	19
	Prototyping and Rapid Testing: Use prototyping tools and techniques to bring ideas to tangible forms quickly. Rapid testing with real users can then be used to gather feedback and iterate on the design before finalizing the product.	20
	Intellectual Property Management: Develop a strong IP management strategy to protect innovations and leverage existing patents and trademarks to foster product development.	19
	Open Innovation Platforms: Engage with external ecosystems, such as universities, startups, and research institutions, to incorporate external knowledge and technologies into product innovation efforts.	20

(Remark: Number of key informants who underlined the importance of the issues)

By integrating these practices, an IT company can cultivate a culture of continuous innovation that keeps pace with technological advancements and evolving customer expectations, ensuring that new products are innovative and market-relevant.

Process innovation in an IT company involves revising or creating new processes to improve efficiency, quality, and productivity. Here are several practices an IT company manager employs to foster practical process innovation:

Table 4.19 The Practices and Methods of Process Innovation

Dimension	Practices and Method	Key Informants
Process Innovation	**Lean Methodologies:** Implement Lean principles to minimize waste and optimize workflows. This can involve techniques such as value stream mapping, just-in-time production, and 5S for workplace organization.	18
	Automation Tools: Utilize automation technologies such as robotic process automation (RPA), machine learning algorithms, and AI to streamline repetitive tasks and reduce the likelihood of human error.	17
	Continuous Integration/Continuous Deployment (CI/CD): Adopt CI/CD pipelines to automate the testing and deployment of software updates. This ensures rapid and reliable delivery of applications, enhancing the development process.	18
	Business Process Management Software (BPMS): Implement BPMS to design, model, execute, and monitor business processes. This helps identify bottlenecks and inefficiencies, allowing for more informed decision-making regarding process improvements.	20
	Training and Development: Invest in training programs that equip employees with the latest skills and knowledge related to process improvement methodologies, such as Six Sigma or Total Quality Management (TQM).	20

(Remark: Number of key informants who underlined the importance of the issues)

By integrating these practices, an IT company can enhance its process innovation efforts, significantly improving operational efficiency and overall productivity.

Technological innovation in an IT company involves adopting, developing, and integrating new technologies to create value and gain a competitive advantage. As IT company managers, they foster technological innovation through a series of strategic practices and activities:

Table 4.20 The Practices and Methods of Technological Innovation

Dimension	Practices and Method	Key Informants
Technological Innovation	**Partnerships with Tech Startups and Academia:** Form strategic alliances with universities, research institutions, and tech startups. These partnerships can provide access to cutting-edge research, fresh ideas, and innovative technologies that can be leveraged for your company's products and services.	16
	Patent Development: Encourage and support the development of patents for new technologies and inventions. This protects your innovations and contributes to establishing your company as a leader in technological advancements.	16
	Technology Scouting Teams: Deploy dedicated teams to identify and evaluate emerging technologies that could impact the IT industry. This proactive approach ensures that IT companies remain at the forefront of technological trends.	18
	Advanced Prototyping Tools: Utilize advanced prototyping tools like 3D printing, virtual reality (VR), and augmented reality (AR) to visualize and test new technologies and product concepts more quickly and cost-effectively.	18
	Investment in Talent and Skills Development: Continuously train and develop the IT industry workforce to handle new technologies. This includes specialized training in AI, machine learning, blockchain, and other disruptive technologies.	16

(Remark: Number of key informants who underlined the importance of the issues)

Through these practices, they create a dynamic environment in IT companies that not only keeps up with technological trends but also sets the pace for innovation in the IT industry.

Market innovation involves creating new markets or radically changing existing ones through innovative strategies, products, or business models. Here are several practices and activities IT companies undertake to drive market innovation:

Table 4.21 The Practices and Methods of Market Innovation

Dimension	Practices and Method	Key Informants
Market Innovation	**Customer Insight Gathering:** Use advanced analytics and customer relationship management (CRM) tools to understand customer needs, preferences, and behaviors deeply. This data can drive the development of new products or services that meet untapped market needs.	20
	Segmentation and Niche Marketing: Identify and target specific market segments or underserved niches. Develop specialized products or marketing strategies tailored to these groups.	20
	Blue Ocean Strategy: Apply the Blue Ocean Strategy to explore uncontested new market spaces. This involves creating demand in an innovative way, which in turn makes the competition irrelevant.	20
	Cross-Industry Partnerships: Form alliances with companies from different industries to combine expertise and technology. This can lead to creating hybrid products or services that open up new market opportunities.	18
	Digital Transformation Initiatives: Lead digital transformation efforts to create new value propositions. This could involve digitizing traditional processes, creating digital-only products, or enhancing customer experiences through technology.	17

(Remark: Number of key informants who underlined the importance of the issues)

By embracing these strategies, leaders and managers position IT companies as leaders in market innovation, continually finding new ways to capture value and expand the IT industry's market presence.

Behavioral innovation in an IT company focuses on changing organizational behaviors and practices to foster a more innovative culture and improve productivity and employee satisfaction. As managers of IT companies, they initiate various practices and activities to drive behavioral innovation:

Table 4.22 The Practices and Methods of Behavioral Innovation

Dimension	Practices and Methods	Key Informants
Behavioral Innovation	**Cultural Change Initiatives:** Launch initiatives aimed at reshaping the company culture to be more open, inclusive, and innovative. This might include promoting values such as transparency, agility, and collaboration.	18
	Employee Empowerment Programs: Implement programs that empower employees to make decisions and take ownership of their work. This can include flat management structures, open-door policies, and empowering teams to self-organize.	17
	Incentive and Reward Systems: Develop incentive programs that reward innovative behaviors, such as risk-taking, problem-solving, and initiative. These rewards can be monetary, recognition-based, or involve career advancement opportunities.	16
	Flexible Working Conditions: Introduce flexible working conditions that allow employees to choose when and where they work, which can lead to increased creativity and productivity.	16
	Diversity and Inclusion Programs: Foster a diverse and inclusive workplace where all employees feel valued and respected, which can enhance creativity and innovation by bringing various perspectives and ideas.	18

(Remark: Number of key informants who underlined the importance of the issues)

By implementing these practices, leaders cultivate a workplace that values and encourages behavioral innovation, leading to a more dynamic, agile, and productive organization.

4.2.2.4 Development of Sustainable Organizational Performance in Public IT Companies

Integrating sustainable practices into your operations is crucial as IT company leaders and managers focus on improving environmental performance. Here is how IT companies can manage and implement practices that promote environmental sustainability:

Table 4.23 The Practices and Methods of Environmental Performance

Dimension	Practices and Method	Key Informants
Environmental Performance	**Energy-Efficient Infrastructure:** Upgrade to energy-efficient hardware and infrastructure in your data centers and offices. This includes using Energy Star-rated equipment, optimizing HVAC systems, and implementing server virtualization to reduce power consumption.	16
	Green IT Policies: Develop and enforce policies that promote green practices, such as responsible e-waste disposal, recycling programs, and reducing paper usage by moving to digital workflows.	18
	Sustainable Sourcing: Commit to purchasing from suppliers who adhere to environmental standards. This could involve sourcing recycled materials for manufacturing or choosing vendors based on their sustainability practices.	18
	Remote Work Initiatives: Encourage remote work to reduce carbon emissions associated with daily commutes. This not only contributes to environmental performance but can also increase employee satisfaction and productivity.	16
	Renewable Energy Investments: Invest in renewable energy sources such as solar panels or wind turbines for the IT company's facilities or purchase green energy credits to offset its carbon footprint.	17

(Remark: Number of key informants who underlined the importance of the issues)

By implementing these practices, IT companies can enhance your company's environmental performance, contribute positively to global sustainability efforts, and potentially realize cost savings from more efficient resource use. Improving economic performance in an IT company involves optimizing operational efficiency, reducing costs, and maximizing revenue opportunities. IT companies implement various practices to enhance their economic performance:

Table 4.24 The Practices and Methods of Economic Performance

Dimension	Practices and Method	Key Informants
Economic Performance	**Customer Relationship Management (CRM) Systems:** Implement robust CRM systems to understand customer needs and behaviors better, leading to more effective marketing strategies, improved customer retention, and increased sales.	18
	Innovation Investment: Continuously invest in innovation to develop new products and improve existing ones, ensuring the company stays competitive and can command premium prices in the market.	20
	Financial Planning and Analysis: Use sophisticated financial planning and analysis tools to forecast future financial scenarios and prepare for various market conditions. This proactive approach helps manage financial risks and capitalize on opportunities.	20
	Strategic Partnerships and Alliances: Form strategic partnerships and alliances with other companies to share resources, tap into new customer bases, and enter new markets, all of which can enhance revenue potential.	17
	Employee Training and Development: Invest in training and development programs to enhance skills and efficiency. A highly skilled workforce can improve operational efficiency, increase innovation, and contribute to better economic performance.	20

(Remark: Number of key informants who underlined the importance of the issues)

By focusing on these areas, managers can drive significant improvements in the IT company's economic performance, ensuring long-term growth and sustainability. Enhancing social performance involves improving employee engagement and satisfaction, contributing positively to the community, and adhering to ethical standards. Here are several practices and activities IT companies implement to enhance social performance in the company:

Table 4.25 The Practices and Methods of Social Performance

Dimension	Practices and Methods	Key Informants
Social Performance	**Diversity and Inclusion Initiatives:** Promote diversity and inclusion in the workplace by implementing policies that ensure fair treatment and equal opportunities for all employees, regardless of their background. Enhance these efforts through diversity training and multicultural celebrations.	17
	Ethical Business Practices: Maintain high standards of integrity by enforcing ethical business practices and compliance. This includes adhering to laws and regulations, ensuring privacy and data protection, and implementing anti-corruption measures.	18
	Work-Life Balance Policies: Support work-life balance through flexible working hours, remote work options, and policies that allow employees to take time off for personal matters without penalty.	16
	Community Engagement: Engage with local communities through volunteerism, sponsorships, and partnerships with local businesses or non-profits. Encourage employees to participate in these activities by offering paid volunteer days.	17
	Health and Wellness Programs: Implement health and wellness programs that support employee well-being, including fitness challenges, wellness workshops, and access to mental health resources.	19
	Sustainable Practices: Adopt environmentally sustainable practices within the workplace, such as reducing waste, recycling, and using energy-efficient appliances and systems. This demonstrates a commitment to social responsibility beyond the company.	18
	Stakeholder Communication: Maintain transparent and open communication with all stakeholders, including employees, customers, investors, and the community. This could involve regular updates, reports, and forums to discuss company policies and performance.	16
	Employee Development: Invest in the continuous development of employees through training, mentoring, and education support. Focusing on personal and professional growth can improve job satisfaction and retention.	18

(Remark: Number of key informants who underlined the importance of the issues)

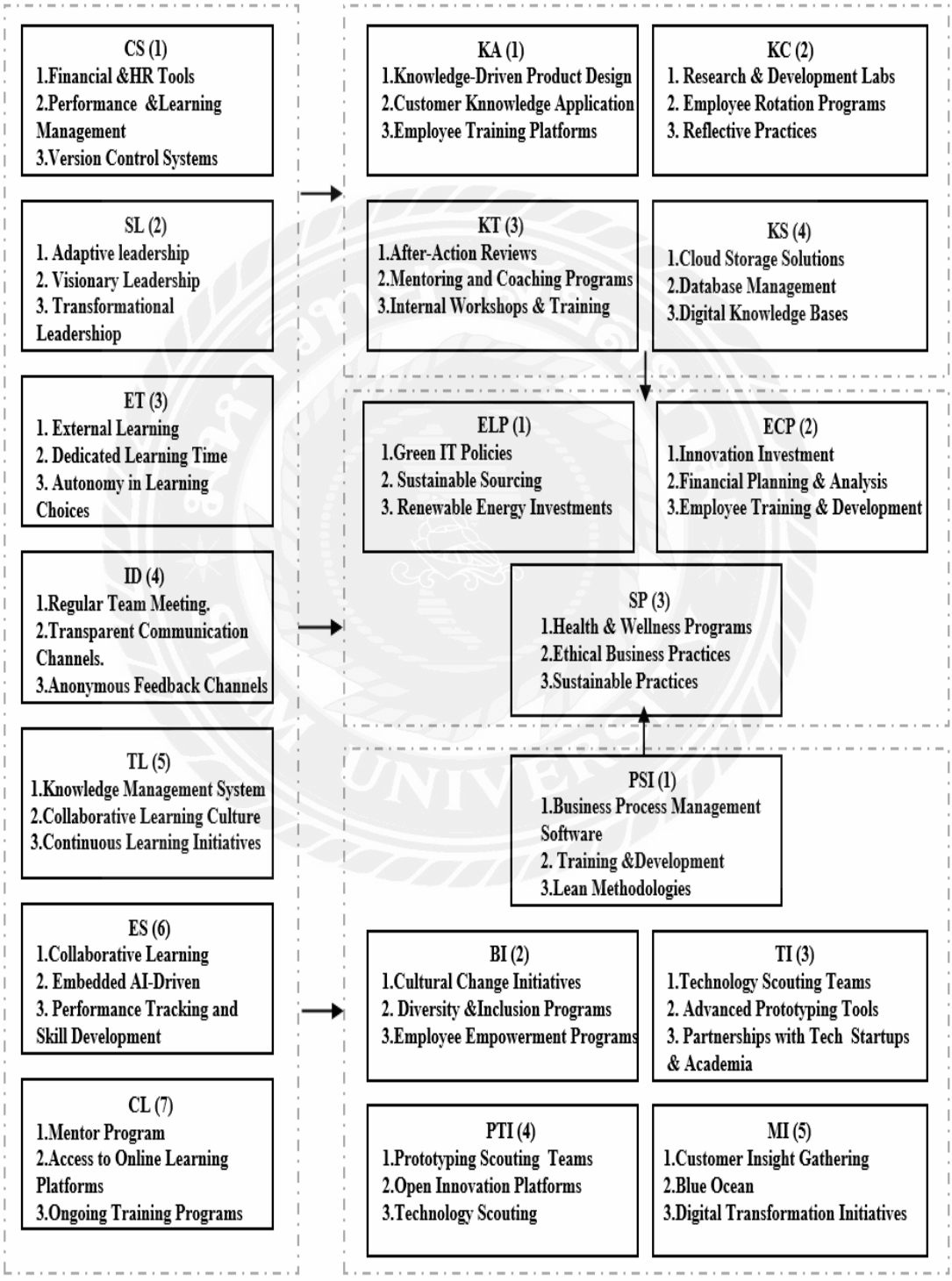
Implementing these practices will enhance your IT Company's social performance, positively impact your business, and improve its overall sustainability.

4.3 Conclusion

In the quantitative research stage, this study adopted scientific and practical research methods, proposed five hypotheses according to the requirements of the research content, and divided and analyzed the dimensions of related variables. Data from 546 questionnaires verified this study's conceptual model and study hypotheses. Then, the conceptual model and quantitative research hypothesis were further verified through qualitative analysis.

This study combines quantitative research with qualitative research scientifically and effectively. Each hypothesis was validated based on the indicators of the analyzed data. The practices chose the Top three as the main activities. See Figure 4.4

Figure 4.4 The learning organization model impacts the sustainable organizational performance of Public IT companies in China.



Based on the quantitative and qualitative research results combined with the practices IT companies provided, this is a breakdown of the most to least significant factors affecting the four variables (LO, KMP, IC, SOP) and how IT companies can apply specific practices or measures to each factor. The practices are also listed according to the percentage of people who agree with the idea—the result check-in Appendix Table of interview code.

Learning Organization

1. Connected Systems

Connected systems are the most influential factor in fostering a learning organization within IT companies, as they promote seamless information flow and alignment with business objectives. Key practices include:

ERP Systems Integrated with Financial and HR Tools: ERP systems integrated with financial and HR functionalities facilitate seamless interdepartmental communication and data sharing, essential for aligning learning initiatives with company-wide goals.

Integration with Performance Management and Learning Management Systems (LMS): By integrating LMS with performance management systems, companies can track

employee learning progress concerning performance objectives, directly connecting learning activities to business outcomes.

CI/CD Pipelines Integrated with Version Control Systems: Continuous Integration/Continuous Deployment (CI/CD) pipelines connected with version control systems automate development processes, enabling the real-time implementation of new skills and practices and fostering ongoing innovation.

2. Strategic Leadership

Strategic leadership ranks the second most significant factor for cultivating a learning organization, as it drives IT companies' vision, adaptability, and transformational culture. Recommended leadership practices include:

Adaptive Leadership: Leaders in learning organizations must demonstrate agility in responding to technological and market shifts, quickly adjusting learning objectives to remain aligned with evolving industry demands.

Visionary Leadership: Leaders who create and communicate a compelling, long-term vision that aligns with industry trends ensure that all employees understand and work toward shared company goals.

Transformational Leadership: Transformational leaders stimulate innovation by encouraging continuous improvement and fostering an environment where employees are empowered to experiment and question existing practices. Through mentoring and coaching, leaders support employee development and nurture future leaders within the organization.

3. Empowerment

Empowerment is the third key factor in building a learning organization, as it encourages employees to take ownership of their development, driving innovation and adaptability. IT companies can facilitate empowerment through:

External Learning Opportunities: Providing financial support for employees to pursue certifications, attend industry workshops, and enroll in external courses fosters continuous learning and skill enhancement.

Dedicated Learning Time: Setting aside specific times (such as “Learning Fridays”) dedicated to learning allows employees to focus on professional development without competing with daily responsibilities.

Autonomy in Learning Choices: Allowing employees to choose learning paths that align with their personal career aspirations and role requirements increases motivation and fosters a self-directed learning culture.

4. Inquiry and Dialogue

As the fourth critical factor, inquiry and dialogue cultivate a learning culture through open communication and constructive feedback. IT companies can encourage this through:

Regular Team Meetings and Retrospectives: Team meetings and project retrospectives provide opportunities for employees to reflect on successes and areas for improvement, fostering an environment of continuous learning and adaptation.

Transparent Communication Channels: Platforms like WeChat, Ding Talk, or internal forums support open dialogue, enabling employees to ask questions, share insights, and discuss ideas freely, Reinforcing collective knowledge-sharing.

Anonymous Feedback Channels: Establishing anonymous channels allows employees to voice concerns or propose ideas safely, encouraging honesty and fostering a transparent communication culture.

5. Team Learning

The fifth critical factor, team learning, emphasizes collaborative learning as a foundation for adaptability and resilience. IT companies can implement the following practices to support team learning:

Knowledge Management Systems: A centralized system for accessing documentation, best practices, and learning resources ensures knowledge is readily available, promoting consistency and efficiency across teams.

Collaborative Learning Culture: Practices like pair programming, peer reviews, and knowledge-sharing sessions help embed a collaborative approach to problem-solving and continuous learning.

Continuous Learning Initiatives: Structured programs offering certifications, workshops, and seminars encourage employees to engage in ongoing skill development, fostering a culture of constant improvement.

6. Embedded Systems

Integrating learning systems into daily operations fosters an environment of continuous improvement. IT companies can support this integration through:

Collaborative Learning Environments: Embedding learning platforms within communication tools enables real-time knowledge sharing and collaboration, facilitating immediate application of new skills.

AI-Driven Learning Systems: Leveraging AI in learning management systems (LMS) allows for personalized learning paths, recommending resources based on individual performance and learning progress.

Performance Tracking: Embedding systems that connect HR tools with learning platforms enable tracking employee progress toward learning objectives, aligning development with organizational goals.

7. Continuous Learning

A sustained commitment to continuous learning is essential for organizational adaptability. IT companies can promote this commitment through:

Mentorship Programs: Pairing junior employees with experienced mentors facilitates knowledge transfer, fostering professional development and organizational continuity.

Access to Online Learning Platforms: Providing subscriptions to resources like Coursera or LinkedIn Learning enables self-paced learning, allowing employees to build relevant skills as needed.

Ongoing Training Programs: Regularly updated technical and soft skills programs ensure employees remain competent and competitive in an evolving field.

By aligning these strategies with key factors for learning organizations, IT companies can drive performance, enhance innovation, and ensure sustainability.

Knowledge Management Practices

1. Knowledge Application (KA) – The most significant factor

Practice 1: Knowledge-Driven Product Design – Leverage organizational insights to create products that align closely with customer needs and expectations, enhancing market relevance.

Practice 2: Customer Knowledge Application – Integrate customer insights and feedback into refining product offerings and optimizing internal processes, ensuring a customer-focused approach.

Practice 3: Regular Knowledge Updates for Employees – Consistently update employees with the latest industry knowledge and tools to improve skills and performance.

2. Knowledge Creation (KC) – The second significant factor

Practice 1: Research & Development Labs – Establish dedicated R&D spaces to support innovation and foster knowledge creation within the organization.

Practice 2: Employee Rotation Programs – Rotate employees across various roles and departments to facilitate idea exchange and the generation of new knowledge.

Practice 3: Reflective Practices – Encourage regular reflection on projects to derive valuable insights and foster knowledge creation from past experiences.

3. Knowledge Transfer (KT) – The third significant factor

Practice 1: After-Action Reviews – Conduct structured reviews following projects to document lessons learned and ensure knowledge transfer across teams.

Practice 2: Mentorship and Coaching Programs – Engage seasoned employees in mentoring to pass on critical knowledge and skills to newer team members.

Practice 3: Internal Workshops and Training—Organize internal workshops and seminars to share skills and transfer knowledge within the organization.

4. Knowledge Storage (KS) – The fourth significant factor

Practice 1: Cloud Storage Solutions – Employ secure, cloud-based storage for accessible and organized knowledge assets across the organization.

Practice 2: Database Management Systems – Implement database systems to organize and store critical knowledge for efficient retrieval and application.

Practice 3: Digital Knowledge Bases – Develop centralized digital repositories containing organizational knowledge, best practices, and lessons learned for easy employee access.

These knowledge management practices ensure that the learning organization effectively utilizes, creates, transfers, and stores knowledge, enhancing its ability to innovate and sustain performance in a competitive market environment.

Innovation Capability

1. Process Innovation (PSI) – The most significant factor

Business Process Management Software (BPMS) – Implement BPMS to effectively design, model, execute, and monitor business processes. This approach aids in identifying inefficiencies and facilitates data-driven decision-making, enhancing workflow efficiency.

Training and Development – Consistently update employees on the latest tools and techniques in business process management to ensure their capacity for driving continuous process improvement.

Lean Methodologies – Apply lean principles to minimize waste, enhance process efficiency, and maximize customer value.

2. Behavior Innovation (BI) – The second significant factor

Cultural Change Initiatives – Propel organizational transformation by cultivating an environment encouraging creativity and innovative thinking.

Diversity and Inclusion Programs – Foster team diversity to harness various perspectives, which can lead to innovative solutions and approaches.

Employee Empowerment Programs – Provide employees with autonomy and decision-making authority, promoting a sense of ownership over innovation initiatives.

3. Technological Innovation (TI) – The third significant factor

Technology Scouting Teams – Establish dedicated teams tasked with identifying and evaluating emerging technologies that can be integrated into the company's operations or product offerings.

Advanced Prototyping Tools—Use state-of-the-art rapid prototyping tools to experiment with new concepts and expedite the time to market.

Partnerships with Tech Startups and Academia – Collaborate with technology startups and academic institutions to leverage cutting-edge research and emerging technological advancements.

4. Prototyping Innovation (PTI) – The fourth significant factor

Prototyping Scouting Teams – Establish dedicated teams to identify and evaluate advanced prototyping tools and methodologies.

Open Innovation Platforms—Use open platforms that facilitate external innovators' and partners' contributions to the company's prototyping and product development processes.

Technology Scouting – Systematically identify new technologies and tools to enhance the company's prototyping and product development capabilities.

5. Market Innovation (MI) – The fifth significant factor

Customer Insight Gathering – Implement structured programs to obtain in-depth customer insights to inform innovation strategies and address emerging market demands.

Blue Ocean Strategy – Apply this strategic approach to uncover untapped markets and create new demand, thereby minimizing competition.

Digital Transformation Initiatives – Adopt digital technologies that disrupt traditional market strategies, fostering product and process innovation.

Sustainable Organizational Performance

1. Environmental Performance (ELP) – The most significant factor

Green IT Policies – Implement environmentally sustainable IT policies, including energy-efficient data centers, paperless processes, and recycling initiatives, to mitigate the organization's environmental footprint.

Sustainable Sourcing – Procure materials and services from suppliers that comply with environmental standards and sustainability principles, reducing the overall carbon footprint.

Renewable Energy Investments – Invest in renewable energy sources such as solar, wind, and hydroelectric power to decrease dependence on fossil fuels and minimize the environmental impact of the organization's operations.

2. Economic Performance (ECP) – The second significant factor

Innovation Investment – Allocate financial resources toward innovation initiatives that promote long-term economic growth and sustain the organization's competitive edge in the market.

Financial Planning and Analysis – Conduct regular financial planning and analysis to optimize resource allocation, minimize costs, and enhance profitability, ensuring long-term economic sustainability.

Employee Training and Development – Invest in ongoing training and development programs to enhance employee skills and productivity, directly contributing to the organization's economic growth.

3. Social Performance (SP) – The third significant factor

Health and Wellness Programs – Implement comprehensive health and wellness initiatives to enhance employees' well-being, fostering increased job satisfaction and retention.

Ethical Business Practices — Cultivate a corporate culture prioritizing ethical decision-making, transparency, and social responsibility to establish trust with stakeholders and the broader community.

Sustainable Practices – Adopt sustainable operational practices and consider long-term societal impacts, including fair labor policies, diversity and inclusion initiatives, and community engagement programs.

CHAPTER 5

RESEARCH CONCLUSION, DISCUSSION & RECOMMENDATION

The conclusion of this research synthesizes key findings and presents strategic recommendations based on the data analysis and interview insights from Chapter 4. The results elucidate the interrelationships among the study variables, outline the practical application of these findings, and suggest measures for enhancing the sustainable organizational performance of public IT companies. This chapter is organized into four distinct sections, each addressing specific aspects as follows:

5.1 Research Conclusion

5.2 Discussion of Findings

5.2.1 Discussion of the Significance Effect Between Learning Organization and Knowledge Management Practices

5.2.2 Discussion of the Indirect Effects of Learning Organizations and Sustainable Organizational Performance through Knowledge Management Practices

5.2.3 Discussion of the Significance Effect Between Learning Organization and Sustainable Organizational Performance

5.2.4 Discussion of the Significance Effect Between Learning Organization and Innovation Capability

5.2.5 Discussion of the Indirect Effects of Learning Organizations and Sustainable Organizational Performance through Innovation Capability

5.3 Recommendations

5.3.1 Policy Recommendations

5.3.2 Management Recommendations

5.1 Research Conclusion

This study effectively addresses the three primary research objectives, offering comprehensive insights into the dynamics of learning organizations, knowledge management practices, innovation capabilities, and sustainable organizational performance within China's publicly listed Internet companies.

1. To identify the factors within learning organizations that significantly influence the sustainable organizational performance of public IT companies in China:

The research findings clarify the factors within a learning organization that critically impact the sustainable performance of China's public IT companies. Results from the structural equation model indicate that several key factors substantially enhance organizational performance by cultivating a learning-centric culture. Notably, System Connection yields the highest standardized estimate (0.676), underscoring the importance of integration and synergy among various organizational subsystems for maintaining sustainable performance. Likewise, Strategic Leadership (0.675) underscores the role of effective leadership in steering the organization's learning initiatives and aligning these with long-term performance objectives.

The Empowerment System (0.638) also plays a significant role in sustainable performance, indicating that empowering employees with decision-making authority and necessary resources promotes innovation and a learning culture. Inquiry and Dialogue (0.626) and Team Learning (0.623) are moderately influential, highlighting the importance of open communication and collaborative learning environments in driving organizational success. Embedded Systems (0.608) further underscore the importance of structured

procedures and supportive infrastructures that facilitate continuous learning. Finally, Continuous Learning (0.566), though comparatively less impactful, remains a vital component, reinforcing the importance of ongoing skill development and learning commitment.

In summary, these findings indicate that fostering a learning organization through strategic leadership, system integration, empowerment, and a collaborative learning environment is essential for achieving sustainable organizational performance for China's public IT companies. Together, these elements cultivate an adaptable and resilient organization capable of thriving within the competitive IT industry.

2. The research findings indicate that learning organizations significantly enhance sustainable organizational performance both directly and, more prominently, indirectly through knowledge management practices and innovation capability. The indirect influence of Learning Organizations on Sustainable Organizational Performance through Knowledge Management Practices is substantial, with an estimated effect of 0.424 ($p = 0.001$). Although the direct effect is positive, it is not statistically significant, with an estimated 0.364 ($p = 0.076$). However, the combined effect reaches a considerable 0.788 ($p = 0.001$), underscoring the powerful potential of Learning Organizations to drive sustainable performance when coupled with effective Knowledge Management Practices. The intermediary role of Knowledge Management Practices is also noteworthy, with an estimated impact of 0.462, though it is only marginally significant ($p = 0.076$).

Similarly, learning organizations impact sustainable organizational performance through innovation capability, albeit to a lesser degree, with an indirect effect estimated at 0.058 ($p = 0.001$). The direct effect in this pathway mirrors that observed in the Knowledge Management pathway, with an estimate of 0.364 ($p = 0.076$), resulting in a combined effect of 0.422 ($p = 0.045$). As an intermediary factor, innovation capability demonstrates significant influence with an effect estimate of 0.863 ($p = 0.031$).

These findings highlight the essential role of knowledge management practices and innovation capability as mediating factors, amplifying the impact of learning organizations on sustainable organizational performance within China’s public IT sector.

3. To develop a model of Learning organization impacts for the sustainable organizational performance of Public IT companies in China.

Research findings showed that a new model can further optimize and improve the relationship between learning organizations, knowledge management practices, innovation ability, and organizational sustainability performance among China's public IT companies.

To enhance sustainable organizational performance in Chinese listed enterprises, it is essential first to improve learning organization practices through innovative models. This involves fostering strategic leadership, promoting empowerment systems, and encouraging team learning and continuous learning. Organizations can effectively embed a culture of learning and adaptability by leveraging tools such as cross-departmental collaboration, AI-driven performance tracking, and mentorship programs.

Next, the focus should shift to enhancing knowledge management practices. This can be achieved by fostering knowledge creation through R&D initiatives, facilitating knowledge sharing across the organization via mentoring programs and collaborative platforms, and ensuring efficient knowledge storage with advanced digital knowledge bases and document management systems. These practices will enhance the organization's capacity to manage and apply knowledge effectively, directly influencing sustainable performance.

Organizations should adopt an integrated technological and process innovation approach to enhance innovation capabilities and substantially improve outcomes. This strategy encompasses investments in R&D labs, advanced prototyping tools, and agile development methodologies. Organizations can drive sustainable and impactful performance improvements by aligning these innovation initiatives with both market demands and the skillsets of their workforce. Regular strategic evaluations, cross-

functional collaboration, and the utilization of data analysis and business intelligence tools will help ensure that these innovation practices are closely aligned with the corporate strategy, ultimately enhancing efficiency and performance through teamwork and information sharing.

The overarching objective is to advance sustainable organizational performance, assessed through environmental, economic, and social dimensions. Environmental performance improvements can be achieved by adopting energy-efficient infrastructure, implementing sustainable sourcing, and tracking carbon emissions. Economic performance is bolstered through cost-management strategies, revenue diversification, and technology optimization, ensuring long-term financial stability. Social performance is strengthened by investing in employee engagement initiatives, corporate social responsibility, and transparent stakeholder communication. Routine strategic assessments, interdepartmental cooperation, and sophisticated data analysis tools ensure that these practices are tightly integrated with corporate objectives, optimizing efficiency, collaboration, and organizational performance.

Implementing an integrated model ensures that a learning organization, knowledge management practices, and innovation capability are strategically aligned with sustainable organizational performance. First, the effectiveness and adaptability of these interrelated components must be continually assessed through strategic review and recalibration. Establishing a cross-functional cooperation framework is crucial for facilitating information flow and collaboration across learning initiatives, knowledge management systems, and innovation functions, thereby enhancing organizational effectiveness.

Second, leveraging data analysis and business intelligence tools is essential for comprehensive evaluations of learning outcomes, knowledge management practices, and innovation processes. These tools provide critical decision support, enabling the optimization of strategies through real-time data and performance metrics. By embedding these insights into daily operations, organizations can ensure that learning, knowledge management, and innovation consistently support sustainable performance.

Finally, fostering a collaborative culture is vital for improving efficiency and achieving sustainable organizational performance. Encouraging teamwork, open communication, and sharing knowledge and innovations across departments enhances the organization's adaptability, resilience, and competitiveness within a dynamic business environment.

Therefore, this model offers valuable insights into how integrating learning organizations, knowledge management practices, and innovation capability can drive sustainable organizational performance, particularly in fast-paced IT industries.

Based on the analysis and research in the previous four chapters, a structural equation model is constructed, the data is analyzed, and the hypothesis verifying the results is generated. By analyzing the results, this study answers three main questions:

1. Key Factors of Learning Organizations Affecting Sustainable Organizational Performance in China's Public IT Companies

System connectivity significantly enhances learning organizations due to its practical applications within China's Public IT companies. Examples include integrating ERP systems with financial and HR tools, aligning performance and learning management systems, and using CI/CD pipelines connected to version control systems. These implementations are vital for boosting sustainable organizational performance, as they streamline operations and foster a cohesive learning environment.

2. Influential Factors in Knowledge Management Practices and Innovation Capability as Mediators for Sustainable Performance.

Knowledge creation is critical in knowledge management practices that significantly influence sustainable organizational performance. It is implemented effectively within Public IT companies, including R&D labs, employee rotation programs, reflective practices, and strategic partnerships with universities, research institutions, and other organizations. Additional methods include internal conferences, seminars, online

learning platforms, and crowdsourcing initiatives, both internal and external. These targeted practices are crucial for bolstering the sustainable performance of organizations.

Within the domain of innovation capability, process innovation stands out as a substantial factor impacting sustainable performance. Its application is evident in IT companies' go-to-market strategies, which employ business process management software (BPMS), comprehensive training and development, lean methodologies, CI/CD pipelines, and automation tools. These methods are essential for driving sustainable organizational performance by streamlining operations and fostering continuous process improvement.

3. Impact of the Learning Organization Model on Sustainable Organizational Performance in China's Public IT Companies

Learning organizations contribute positively to sustainable organizational performance, with the model's seven dimensions—continuous learning, inquiry and dialogue, team learning, embedded systems, empowerment, system connection, and strategic leadership—all positively influencing performance outcomes. These dimensions underscore distinct strengths within Public IT companies, with system connectivity, strategic leadership, empowerment, inquiry and dialogue, team learning, embedded systems, and continuous learning ranked by their degree of impact.

Second, learning organizations also indirectly enhance sustainable organizational performance through the intermediary role of knowledge management practices. Knowledge management contributes positively to the three sub-dimensions of sustainable performance: environmental, economic, and social. Key knowledge management components—knowledge application, innovation, transformation, and storage—are vital to these areas. Within Public IT companies, each sub-dimension of sustainable performance reflects unique characteristics in its specific application, reinforcing the strategic role of knowledge management in driving overall organizational sustainability.

Third, learning organizations indirectly influence sustainable organizational performance through their impact on innovation capability. Innovation capability

positively affects the three sub-dimensions of sustainable performance, with varying degrees of influence across innovation process, innovation behavior, technological innovation, product innovation, and market innovation. In the context of Public IT companies, each sub-dimension demonstrates unique characteristics and tailored applications, underscoring the distinct ways innovation supports sustainability.

Fourth, learning organizations directly impact sustainable organizational performance, positively influencing sustainability's environmental, economic, and social aspects. This direct influence is especially evident in the performance outcomes of listed IT companies, where these three dimensions are prominently reflected.

The findings indicate that learning organizations substantially contribute to sustainable organizational performance, both directly and indirectly, through knowledge management practices and innovation capability. These insights highlight the strategic value of learning organizations in enhancing sustainability, illustrating a causal mechanism and dynamic model that underscore their effectiveness in the sustainable performance of Public IT companies.

5.2 Discussion of Findings

5.2.1 Discussion of the Significance Effect Between Learning Organization and Knowledge Management Practices

The covariance relationship between Learning Organization (LO) and Knowledge Management Practices (KMP) reveals a significant positive correlation, as evidenced by the standardized path coefficient value of 0.785 (greater than 0) and an R^2 of 0.846. This indicates a robust positive association between LO and KMP. The statistical significance of this relationship is confirmed at the 0.001 level ($z = 11.594$, $p < 0.001$), highlighting that Learning Organizations have a substantial positive impact on Knowledge Management Practices. This further underscores the connection between cultivating a learning culture and implementing effective knowledge management systems within organizations.

Organizational Learning Theory posits that an organization's learning ability is intrinsically linked to its capacity for effective knowledge management. Argyris and Schön (1997) noted that learning organizations actively facilitate knowledge acquisition, dissemination, and application across all levels. This process, which encompasses experiential learning, experimentation, and knowledge sharing, is fundamental to creating, retaining, and applying knowledge within the organization. In parallel, the Knowledge-Based View (KBV) of the firm, as articulated by Grant (1996), builds upon the Resource-Based View (RBV) by positioning knowledge as the firm's most valuable resource. KBV asserts that organizations that strategically manage knowledge can gain a competitive advantage, particularly when knowledge is regarded as a critical organizational asset.

Organizational Learning Theory and the Knowledge-Based View (KBV) both emphasize that fostering continuous learning environments enhances knowledge management practices and improves organizational performance. Empirical research consistently supports the interdependence of these concepts. Integrating learning organizations and knowledge management has been widely recognized as essential for driving organizational performance and innovation. Loermans (2002) and Ageteam (2006) underscore the intrinsic link between these constructs, highlighting that knowledge management is a key enabler for organizations evolving into learning organizations.

Empirical evidence, such as that presented by Saied et al. (2021) and Shieh (2011), further supports the mediating role of learning organizations in enhancing knowledge management, which results in improved service quality and innovation. Song (2008) also affirms that learning organizations are pivotal in influencing knowledge creation and fostering innovative practices. Research by Berce et al. (2008) and Acevedo and Diaz-Molina (2023) builds on these findings by exploring how knowledge management contributes to organizational agility and innovation.

The literature highlights the synergistic relationship between learning organizations and knowledge management, with a supportive culture, teamwork, and knowledge-sharing systems identified as critical elements for their successful integration (Hessami et al., 2012).

This study provides new insights into the relationship between learning organizations and knowledge management practices, contributing to the existing body of knowledge on this topic.

The quantitative analysis reveals a strong and statistically significant direct effect of Learning Organization on Knowledge Management Practices ($\beta = 0.785$, $p < 0.001$), confirming that learning initiatives substantially enhance knowledge management processes. Qualitative data corroborate this finding, with interviewees frequently citing collaborative learning environments, peer mentorship, and cross-departmental initiatives as key practices facilitating knowledge sharing and retention. For instance, Interviewee No. 1 (ID) stated, "Cross-departmental collaboration and team learning significantly improved knowledge management by allowing for better knowledge exchange and skill development." This sentiment is echoed by 17 other interviewees, who identified collaborative learning environments as critical for promoting knowledge management practices through enhanced communication and shared learning experiences across departments.

Similarly, Interviewee No. 2 (ID) emphasized, "Regular team meetings and retrospectives, which were key learning organization practices, helped employees share insights and refine processes, thereby enhancing overall knowledge management systems." This perspective is supported by 20 interviewees, all of whom identified collaborative learning environments (20 out of 20) and peer learning and mentorship (18 out of 20) as essential for fostering knowledge management practices through improved communication and shared learning experiences.

Additionally, Interviewee No. 4 (CS, ID) noted that tools such as ERP systems integrated with financial and HR tools (supported by 19 participants) and transparent communication channels (endorsed by 20 participants) were considered vital for ensuring adequate knowledge storage and transfer across the organization. This interview underscores the significant impact of learning organizations and knowledge management practices on generating new knowledge within public IT companies.

The findings highlight that a robust learning organization is crucial for fostering essential knowledge management practices, a conclusion supported by quantitative metrics and participant experiences.

5.2.2 Discussion of the Indirect Effects of Learning Organizations and Sustainable Organizational Performance through Knowledge Management Practices

The Learning Organization indirectly influenced Sustainable Organizational Performance through Knowledge Management Practices ($\beta = 0.424$, $p = 0.001$). Although the direct effect of Learning Organization on Sustainable Performance ($\beta = 0.364$, $p = 0.076$) was not statistically significant, both the direct and indirect effects were aligned ($a \times b \times c > 0$), indicating complementary mediation. This suggests that Knowledge Management Practices fully mediate the impact of Learning Organization on Sustainable Performance.

The Resource-Based View (RBV) supports the principles of sustainable competitive advantage, where organizations achieve long-term success by leveraging resources that are valuable, rare, inimitable, and non-substitutable (Barney, 1991). In this context, organizational learning is recognized as a crucial resource that enhances human capital, develops unique capabilities, and facilitates the integration of knowledge. This perspective is further supported by various studies linking learning organizations, knowledge management, and sustainable performance. For instance, Kordab et al. (2020) highlighted the positive relationship between organizational learning and sustainable performance in the Middle East. Luxmi (2014) identified organizational learning as a mediator between knowledge management and performance in India. Similarly, Ma Kun (2022) emphasized the role of knowledge management in corporate sustainability within Chinese SMEs, with Valmohammadi et al. (2019) and Abbas & Sagsan (2019) reinforcing this connection in the Iranian and Pakistani industries, respectively.

Moreover, Sapta et al. (2021) demonstrated the mediating role of knowledge management between organizational culture, leadership, and sustainable outcomes. Wang et al. (2022) and Cai Li et al. (2020) underscored the critical role of knowledge management in driving sustainability goals across various sectors. Finally, Jilani et al.

(2020), Gholami et al. (2013), and Sahoo et al. (2022) confirmed the significant impact of knowledge management on sustainable performance, further reinforcing the pivotal role of knowledge in organizational growth and long-term success.

Quantitative mediation analysis indicates that Knowledge Management Practices significantly mediate the relationship between Learning Organization and Sustainable Organizational Performance, with an indirect effect ($\beta = 0.424$, $p < 0.001$). The direct effect was comparatively weaker, underscoring the mediating role of knowledge management. Qualitative feedback further reinforces this pathway. Over 16 interviewees noted that sustainable performance is primarily achieved through systematic knowledge management practices enabled by learning organization strategies, such as ERP systems, ongoing training programs, and more. Interviewee No. 7 (KT) stated, "Mentoring and coaching programs significantly improved knowledge management practices by promoting effective knowledge transfer, which directly contributed to sustainable organizational performance." This sentiment was shared by 18 interviewees who identified mentoring as a critical practice that enhances knowledge management, leading to long-term performance improvements.

Similarly, Interviewee No. 5 (KC) emphasized that "internal conferences and seminars provided opportunities for knowledge sharing, which enhanced our ability to innovate and sustain performance." This view was echoed by 17 interviewees who agreed that collaboration with universities and the organization of internal conferences were crucial for sustaining performance. Interviewee No. 12 (KS) also noted, "Cloud storage solutions allowed for easier access to essential data, improving our knowledge management systems and supporting long-term organizational sustainability." This perspective was supported by 18 interviewees who identified cloud storage and digital knowledge repositories as essential tools for promoting sustainable organizational performance by ensuring that knowledge is stored and applied effectively across teams.

These insights illustrate that mentoring programs, internal seminars, and digital storage solutions significantly enhance sustainable organizational performance by improving knowledge management practices. The discovery of new knowledge from this

study suggests that Learning Organizations drive sustainable performance indirectly through effective knowledge management systems—a relationship substantiated by both statistical evidence and qualitative insights.

5.2.3 Discussion of the Significance Effect Between Learning Organization and Sustainable Organizational Performance

The analysis of the covariance relationship between Learning Organization and Sustainable Organizational Performance reveals a standardized path coefficient of 0.364, with R^2 = 0.443, indicating a significant positive effect of Learning Organization on Sustainable Organizational Performance. This relationship is statistically significant at the 0.001 level ($z = 3.342$, $p < 0.001$), underscoring that cultivating a Learning Organization markedly enhances Sustainable Organizational Performance. These findings emphasize the critical role of fostering an environment that supports continuous learning, innovation, and knowledge sharing as a foundation for achieving long-term sustainability outcomes.

Dynamic Capabilities Theory (Teece et al., 1997) further validates this perspective, proposing that an organization's capacity to continuously develop, integrate, and adapt its competencies is essential for sustained performance within changing environments, thus facilitating long-term sustainability through innovation and competitive advantage. Existing literature on the connection between learning organizations and sustainable performance reveals several fundamental themes. Studies consistently demonstrate that learning organizations drive innovation, adaptability, and sustained success through enhanced knowledge-sharing practices and organizational commitment (Alipour & Karimi, 2011; Ju et al., 2021). Dimensions such as inquiry, dialogue, and risk-taking emerge as key drivers of performance and innovation, with organizational culture acting as a vital enabler (Hussein et al., 2014; Kontoghiorghes et al., 2005).

Moreover, research links learning organizations with improved financial outcomes, particularly in financial sustainability and return on investment (Davis & Daley, 2008; Kim et al., 2016). Transformational leadership and collaboration within learning organizations

further support sustainable performance (Sahaya, 2012; Mrisha et al., 2017), while policies that nurture a learning culture enhance long-term competitiveness and sustainability (Khunsoonthornkit & Panjakajornsak, 2018). This study contributes to the field by specifically exploring the relationship between Learning Organizations and Sustainable Organizational Performance, a connection supported in prior research yet not exhaustively examined with a direct focus on these two variables.

Quantitative findings reveal a limited direct effect of Learning Organization on Sustainable Organizational Performance ($\beta = 0.364$, $p = 0.076$), indicating a relatively modest direct impact. Qualitative responses support this outcome, with participants often associating sustainable performance more strongly with structured knowledge management and innovation practices than with direct Learning Organization initiatives alone. For instance, Interviewee No. 3 (SL) commented that "transformational leadership helped align the organization's goals with sustainable initiatives, significantly improving long-term organizational performance." This view is echoed by 18 interviewees, who emphasized that visionary and collaborative leadership fosters sustainable performance through effective change management and strategic alignment.

Similarly, Interviewee No. 6 (ET) remarked that "encouraging cross-functional learning empowered employees to innovate and contribute to sustainable performance," a sentiment shared by 18 interviewees who identified external learning opportunities and dedicated development time as critical sustainability drivers. Notably, such initiatives may not immediately improve sustainable performance outcomes. The influence of Learning Organization practices on sustainability appears modest when assessed directly yet becomes more substantial when mediated by factors like knowledge management.

5.2.4 Discussion of the Significance Effect Between Learning Organization and Innovation Capability

In examining the covariance relationship between Learning Organization and Innovation Capability, the standardized path coefficient of 0.405 (= 0.304) signifies a

substantial positive effect of Learning Organization on Innovation Capability. This path achieves statistical significance at the 0.001 level ($z = 6.233$, $p < 0.001$), indicating that cultivating a Learning Organization enhances an organization's capacity for innovation. This relationship underscores the importance of continuous learning, inquiry, and knowledge sharing—core principles of a Learning Organization—as essential drivers of organizational innovation.

Theories such as Dynamic Capabilities (Teece et al., 1997), Organizational Learning Theory (Argyris & Schön, 1997), and the Knowledge-Based View (Grant, 1996) collectively suggest that learning organizations enhance their innovation capabilities by fostering adaptability, knowledge sharing, and continuous learning. These factors enable organizations to manage knowledge effectively, reconfigure resources, and capitalize on new opportunities, strengthening innovation processes. The link between learning organizations and innovation capability has been widely studied, with various scholars emphasizing diverse aspects. For example, Fanbasten (2014) showed that knowledge-sharing practices within learning organizations significantly impact both innovation and business performance. Hamdani and Susilawati (2018) highlighted the role of information technology in enhancing innovation capability, while Calantone et al. (2002) emphasized learning orientation as a key driver of innovation. Kontoghiorghes et al. (2005) underscored the role of communication and collaboration in fostering innovation, and Ismail (2005) reported that a learning organization culture explains 58.5% of the variance in innovation capability.

Alipour and Karimi (2011) demonstrated that continuous learning and knowledge transfer bolster innovation within learning organizations. Similarly, studies by Anwar and Niode (2017) and Liao (2006) affirmed that work engagement and knowledge sharing are essential contributors to innovative behaviors. Collectively, these findings underscore how learning organizations foster innovation through knowledge sharing, employee engagement, and collaborative learning, thereby enhancing business performance and innovation capability.

Statistical analysis further corroborates these insights, showing a significant positive effect of Learning Organization on Innovation Capability ($\beta = 0.405$, $p < 0.001$). This suggests that a learning-centered environment is instrumental in cultivating innovation. Qualitative data strongly supports this, with 18 of 20 participants identifying adaptive leadership, empowerment, and team learning as key practices that promote an innovative culture. Interviewees described these practices as fostering openness to new ideas and encouraging experimentation—both crucial for driving innovation. This aligns with Interviewee No. 14 (SL), who observed that "transformational leadership helped build an innovative culture within the organization, directly enhancing innovation capability." This perspective was endorsed by 18 interviewees who emphasized the role of visionary leadership and by 16 interviewees who highlighted collaborative leadership as a critical factor in advancing innovation capability. Likewise, Interviewee No. 5 (ET) noted that "external learning opportunities provided employees with the exposure needed to adopt new ideas and apply them creatively, which boosted our organization's innovation potential"—a view shared by 18 interviewees.

5.2.5 Discussion of the Indirect Effects of Learning Organizations and Sustainable Organizational Performance through Innovation Capability

The Learning Organization indirectly influences Sustainable Organizational Performance via Innovation Capability ($\beta = 0.058$, $p = 0.001$). However, the direct effect of Learning Organization on Sustainable Performance ($\beta = 0.364$, $p = 0.076$) lacks statistical significance. With direct and indirect effects moving in the same direction ($a \times b \times c > 0$), this denotes complementary mediation. Consequently, Innovation Capability fully mediates the relationship between Learning Organization and Sustainable Organizational Performance, confirming complete mediation.

The Absorptive Capacity Theory (Cohen & Levinthal, 1990) elucidates that learning organizations enhance innovation capability by identifying, assimilating, and deploying external knowledge, strengthening adaptability and fostering sustainable organizational performance through long-term competitiveness. The interconnectedness of

learning organizations, innovation capability, and sustainable performance is well-substantiated in the literature. For example, Asad et al. (2018) and Prajogo & Ahmed (2006) identified that innovation capabilities, particularly in product and process innovation, significantly boost organizational performance by utilizing the knowledge created within learning organizations. Sawaean & Ali (2020) emphasized Innovation Capability as a mediator between leadership and performance, a finding supported by Su et al. (2018) and Ruiz-Jiménez & Fuentes-Fuentes (2013), who demonstrated how learning organizations cultivate an innovation-friendly environment that supports sustainable outcomes. Furthermore, Migdadi (2022) and Huang et al. (2016) demonstrated that knowledge management processes elevate innovation capability, enhancing adaptability and organizational effectiveness—critical elements of sustainability. Additionally, Alshura et al. (2023) underscored the importance of organizational commitment in bolstering innovation and achieving sustained performance, while Somwethee et al. (2023) connected entrepreneurial capability fostered through learning to value creation. Finally, AlTaweel & Al-Hawary (2021) highlighted strategic agility's role in enhancing innovation and performance, completing the cycle wherein learning organizations drive innovation, which fuels sustainable performance. These studies underscore that learning organizations enable innovation capability, a vital factor in achieving long-term sustainability.

The mediation analysis reveals that Innovation Capability is a crucial conduit through which Learning Organization practices influence Sustainable Organizational Performance (indirect effect $\beta = 0.058$, $p < 0.001$). This finding is supported by Interviewee No. 17 (PSI), who highlighted the role of "integrating continuous integration/continuous deployment (CI/CD) pipelines in accelerating innovation cycles, thereby significantly enhancing sustainable organizational performance." This perspective is echoed by 18 interviewees who pointed to automation tools and lean methodologies as essential in strengthening innovation capability and fostering sustainable performance.

Similarly, Interviewee No. 11 (TI) observed that "investment in talent and skills development was essential in driving innovation and supporting competitive performance,"

endorsed by 16 participants who identified talent development as a critical factor in achieving sustainable performance. Interviewee No. 17 (BI) also emphasized the importance of "cultural change initiatives in cultivating an innovative mindset across departments, which directly supports long-term sustainability." This sentiment was shared by 18 interviewees, who acknowledged that cultural change and employee empowerment initiatives are instrumental in promoting innovation and sustaining performance. Additionally, Interviewee No. 12 (PTI) noted the role of rapid prototyping and co-creation workshops in expediting the testing and implementation of innovative ideas, with 16 respondents concurring that these practices contributed to enhanced sustainability.

These insights represent new knowledge in the context of Public IT companies, underscoring that Innovation Capability is a vital intermediary that enables learning organizations to achieve sustained performance. Practices such as CI/CD pipelines, talent and skills development, and cultural change initiatives significantly enhance Innovation Capability, which, in turn, bolsters sustainable organizational performance through continuous improvement and adaptability.

Summarized the New Findings of the Study:

This study constructs a structural equation model to examine the impact of learning organizations on sustainable organizational performance, with mediating variables including knowledge management practices and innovation capabilities. By formulating five hypotheses to explore the relationships among these variables, the results derived from Hypotheses 2 and 5 lead to the following new findings:

1. Hypothesis 2: Learning Organization's Indirect Effect on Sustainable Organizational Performance via Knowledge Management Practices

Empirical analysis confirms that learning organizations influence sustainable organizational performance through knowledge management practices. Notably, the existing literature on this relationship is sparse, and this study contributes to filling this gap. The findings suggest that while the direct impact of learning organizations on sustainable performance may not be particularly strong, the introduction of knowledge management

practices, without mediating other variables, significantly improves sustainable organizational performance in a relatively short period. Notably, practices such as encouraging cross-functional learning, holding regular team meetings and retrospectives, and establishing mentorship programs substantially affect performance.

A thorough literature review reveals that specific knowledge management practices, including cross-departmental team projects, job rotation, and knowledge-driven product design, profoundly impact organizational sustainability. Cross-functional team projects, which involve collaboration across departments to achieve shared objectives, harness diverse expertise to address complex challenges, drive innovation, and enhance decision-making, have been highlighted as particularly impactful. Wiedemann et al. (2019) underscore the role of cross-functional teams in the IT and DevOps (Development and Operations) model, noting their contribution to integrated project success. Ju & Ning (2023) further demonstrate that formal and organic coordination within these teams enhances performance under time constraints. These teams foster knowledge-sharing networks in the public sector, as shown by Badawi et al. (2019). Kalabina and Belyak (2020) emphasize their significance in sustaining corporate development, while Zhang and Guo (2019) highlight the importance of knowledge leadership in leveraging cognitive diversity within these teams. Collectively, these studies reinforce the critical role of cross-functional teams in advancing organizational knowledge and innovation.

Job rotation and shadowing programs effectively promote sustainable organizational performance by fostering skill diversification and facilitating knowledge sharing among employees. Job rotation involves systematically moving employees across different roles, thereby building a broad range of competencies that enhance adaptability and resilience within the organization. On the other hand, shadowing programs allow employees to learn directly from experienced professionals, providing valuable insights that align individual growth with organizational needs. Danijela (2021) demonstrates that shadowing enhances confidence and preparedness in training environments. Zin (2015) highlights how job rotation contributes to career management by enhancing skills, while Abe et al. (2023) find that shadowing increases motivation and interest in various career

fields. Idris and Wahyudi (2021) underscore that job rotation boosts motivation, improving overall performance. Warlenda and Marlina (2023) emphasize the significant role of shadowing in skill development, particularly in midwifery training, which is crucial for sustainable performance. Collectively, these programs foster alignment between employee development and organizational sustainability goals, contributing to long-term performance.

Knowledge-driven product design integrates data and structured insights to align product development with sustainability objectives, enhancing the organization's environmental, economic, and social impacts. Shahzad et al. (2020) reveal that knowledge management supports green innovation, directly influencing corporate sustainability through environmental and social improvements. Kordab et al. (2020) find that a robust knowledge management cycle facilitates sustainable performance by promoting continuous organizational learning. Sapta et al. (2021) highlight the mediating role of knowledge management in the relationship between organizational culture and sustainability, emphasizing the critical importance of knowledge practices. Idrees et al. (2022) show that knowledge management capabilities significantly enhance sustainable new product development, with agility and innovation as essential mediators. Finally, Relich (2023) proposes a data-driven approach to product design, leveraging predictive analytics to foster sustainable development across product lifecycles. These studies underscore the synergy between knowledge-driven design and sustainable organizational performance.

2. Hypothesis 2 posits that learning organizations significantly influence sustainable organizational performance through knowledge management practices, a relationship that has been underrepresented in existing literature. This study confirms that knowledge management practices are a critical pathway through which learning organizations achieve sustainability. Three key practices—cross-functional team projects, job rotation and shadowing programs, and knowledge-driven product design—are instrumental in promoting sustainable performance. Cross-functional team projects enable collaboration across departments, leveraging diverse expertise to address complex

challenges, fostering innovation, and improving decision-making capabilities. Job rotation and shadowing programs contribute to skill diversification, aligning individual development with organizational needs while enhancing motivation and fostering a resilient workforce. Finally, knowledge-driven product design integrates data insights with sustainability goals, advancing the organization's environmental, economic, and social impacts through innovation. Collectively, these practices highlight the role of targeted knowledge management in accelerating sustainable organizational outcomes, thereby addressing a notable gap in the academic understanding of this relationship.

Hypothesis 5 posits that learning organizations indirectly affect sustainable organizational performance through innovation capability. Empirical research supports that learning organizations influence sustainable performance via innovation capabilities. However, there is limited literature specifically addressing the construction of this relationship. This study affirms, through a review of existing research, that while learning organizations contribute to sustainable performance, their direct impact is not overwhelmingly strong. Innovation capability, however, is a long-term driver of sustainable organizational performance. Structural adjustments within the learning organization cannot rapidly improve sustainable performance within the desired timeframe without mediating variables. Additionally, practices such as cross-departmental learning, encouraging cross-functional collaboration, and holding regular team meetings, retrospectives, and mentorship programs do not substantially impact sustainable organizational performance.

A review of the literature reveals that certain innovation activities—such as using automation tools, investment in talent and skills development, segmentation and niche marketing, Blue Ocean Strategy, and Digital Transformation initiatives—profoundly influence sustainable organizational performance. Automation tools are increasingly viewed within frameworks designed to streamline processes and enhance sustainability. These frameworks emphasize the integration of digital technologies, such as Robotic Process Automation (RPA), Artificial Intelligence (AI), and Machine Learning (ML), to drive efficiency and foster sustainable outcomes. For instance, Rahardjo et al. (2023)

proposes a Smart Sustainable Manufacturing System that utilizes Industry 4.0 technologies to optimize production processes while minimizing environmental impacts. Similarly, Sithole et al. (2023) demonstrate that RPA in manufacturing improves quality performance and reduces costs, illustrating how automation directly contributes to organizational sustainability.

The relationship between automation frameworks and sustainable performance is rooted in automation's capacity to drive efficiency and minimize resource waste. Several key studies support this connection:

Nawaz & Koç (2019) describe sustainability practices enhanced by automation, emphasizing resource optimization and operational excellence as central themes.

Tasdemir et al. (2020) present a benchmarking tool based on lean and Six Sigma principles, demonstrating that automation contributes to improved environmental and economic outcomes across various sectors.

Grecu et al. (2020) propose a software-based framework for sustainability assessment, utilizing automation to evaluate and enhance organizational performance across environmental and social metrics.

Luque Sendra et al. (2020) introduce the ADAPTS framework, which applies machine learning to optimize engineering projects for environmental sustainability, positioning automation as a pivotal element in sustainable engineering practices.

Ridha (2020) finds that IT tools positively influence organizational performance and sustainability when aligned with sustainability goals, further highlighting automation's role in supporting efficient management.

Additionally, the conceptual framework for investing in talent and skills development, particularly in disruptive technologies such as AI, machine learning, and blockchain, emphasizes integrating skills to enhance organizational competitiveness, market value, and innovation. Research indicates that AI talent directly enhances financial outcomes, while incorporating blockchain into AI systems facilitates transparency, data security, and regulatory compliance, especially in sensitive applications (Aleisa et al., 2022; Rock, 2019). Moreover, essential innovation and technical management competencies

enable organizations to navigate digital disruptions effectively (Sousa & Rocha, 2019). Integrating blockchain with machine learning further strengthens data reliability and cybersecurity, empowering organizations to make informed decisions (Maheshwari et al., 2023). In this context, continuous reskilling is crucial to align talent with technological advancements, ensuring an adaptable and engaged workforce (Demaci, 2022). This framework presents a strategic pathway for sustained organizational growth and resilience in rapidly evolving technological environments.

The conceptual foundation of segmentation and niche marketing is vital for effectively targeting specific consumer groups, enhancing competitiveness, and fostering sustainable strategies within distinct market segments.

Segmentation as a Key Marketing Tool: Zatsarynin (2021) explored the role of genetic algorithms in segmenting innovative product markets, emphasizing that segmentation is foundational for developing niche markets, particularly in saturated industries such as medical equipment. The application of clustering techniques helps identify consumer characteristics, making segmentation an essential tool for niche market identification.

B2B Market Segmentation Framework: Cortez et al. (2021) introduced a systematic framework for B2B market segmentation, highlighting the importance of a multi-layered approach that includes pre-segmentation, implementation, and evaluation stages. They argue that segmentation is an ongoing process critical for understanding business-to-business markets comprehensively.

Competitive Advantage through Niche Marketing: El-Sayed (2022) underscored the significance of niche marketing as a strategy for smaller businesses, particularly in highly competitive environments where agility allows for the targeting of underserved segments. This approach provides a competitive advantage by tailoring offerings to meet the unique demands of specific market niches.

Digital Solutions in Market Segmentation: Somosi & Hajdú (2023) examined how digital platforms, particularly Google Ads, enable marketers to reach niche markets more effectively. Their study revealed that digital segmentation techniques significantly improve

the understanding of consumer behavior, allowing for targeted and efficient advertising aimed at niche markets.

Innovation in Niche Marketing for Startups: Choi et al. (2020) applied disruptive innovation theory to niche markets, suggesting that niche strategies can lead to profitable market entries for startups, particularly when dominant mainstream competitors occupy broader market spaces.

Dynamic Capabilities and Niche Strategy: Farhana & Swietlicki (2020) discussed how startups leverage niche markets and dynamic capabilities to foster breakthrough innovations. This approach is critical for small businesses aiming to scale within specialized markets and compete effectively in their chosen niches.

The research consistently underscores that segmentation and niche marketing enable businesses to create unique market advantages, tailor their offerings, and enhance their competitiveness by targeting specialized market segments.

The Blue Ocean Strategy (BOS) is a business approach designed to create uncontested market space, generate new demand, and make competition irrelevant.

Core Concept of BOS:

Madsen (2019) explores the BOS framework as a means for companies to escape the competitive "red oceans" by reconstructing industry boundaries. By merging cost leadership and differentiation, BOS enables businesses to redefine market space and overcome traditional trade-offs between value and cost (Sharma et al., 2012).

Value Innovation and Market Expansion:

Meléndez Araya et al. (2022) highlight that BOS emphasizes innovation-driven competition, where businesses seek to explore "blue oceans" — markets characterized by few competitors, untapped potential, and high growth prospects. This shift encourages companies to develop novel products and services that capture new consumer segments and meet unmet needs (Araya et al., 2022).

Blue Economy and Sustainable Innovation:

Mesut (2021) connects BOS with the concept of the "Blue Economy," asserting that blue oceans can be created through both radical and frugal innovation. This approach

aligns with sustainable business practices and fosters positive interactions within ecosystems, promoting long-term, sustainable growth.

Digital transformation refers to comprehensive efforts that leverage digital technologies to alter business processes, models, and value creation.

Key Components of Digital Transformation:

Verina and Titko (2019) propose a framework that divides digital transformation into three key components: technology, processes and management, and people. These elements must be harmonized to drive successful digital initiatives and foster transformative business processes (Verina & Titko, 2019).

Value-Adding Framework:

Rautenbach et al. (2023) introduce a structured framework focusing on identifying industry disruptions, assessing digital capabilities, and emphasizing customer value as the foundational steps for digital transformation. This framework is particularly relevant in value-driven sectors, where digital adaptation can unlock new business opportunities.

Organizational Challenges and Strategic Responses:

Vial (2021) reviews literature identifying digital transformation as a disruptive process that requires strategic adaptation. To maintain competitive positioning, organizations must manage structural changes effectively and adapt their business models to align with the evolving digital landscape.

Digital Transformation and Business Model Innovation:

Mahboub & Sadok (2023) emphasize the integration of digital transformation with business model innovation. They propose that organizations should focus on adapting existing systems rather than overhauling them entirely. Aligning digital strategy with incremental technological updates enables businesses to remain competitive while navigating digital change.

Leadership and Culture as Success Factors:

Philippart (2021) underscores the importance of governance and cultural alignment in successful digital transformation initiatives. He suggests that these efforts are most effective when organizations cultivate a supportive corporate culture and leadership fosters

continuous improvement.

Socio-Technical Systems and Industrial Applications:

Imran et al. (2021) investigate the enablers of digital transformation in industrial settings, highlighting the critical role of leadership, structural adaptability, and cultural evolution in driving operational improvements and delivering customer-centric outcomes.

The conceptual foundations of digital transformation emphasize the interplay between technological integration, organizational culture, strategic alignment, and a focus on continuous innovation to create sustained value in evolving markets.

Hypothesis 5 posits that Learning Organizations indirectly enhance sustainable organizational performance by leveraging Innovation Capability, an area that has received limited academic attention. This hypothesis introduces a novel perspective by suggesting that sustainable organizational outcomes are not solely achieved through organizational learning. Instead, these outcomes are significantly amplified when innovation capabilities effectively channel learning. Empirical findings suggest that learning organizations face challenges in quickly enhancing sustainable performance within the expected timelines without innovation acting as a mediating factor.

The five critical practices supporting this framework include automation tools, talent and skills development investment, segmentation and niche marketing, Blue Ocean Strategy, and digital transformation initiatives.

1. Automation tools streamline processes and reduce resource waste, driving sustainability by enhancing operational efficiency.

2. Investment in talent and skills development equips organizations with the necessary expertise to innovate, adapt to technological advancements, and maintain resilience in dynamic environments.

3. Segmentation and niche marketing enable companies to tailor their offerings to specific markets, enhancing competitiveness and fostering sustainable growth by meeting the unique needs of targeted customer segments.

4. Blue Ocean Strategy encourages businesses to create new, uncontested market spaces, aligning with sustainable innovation by enabling firms to move away from

saturated, highly competitive markets.

5. Digital transformation empowers companies to leverage digital technologies, transforming their business models and processes, thus generating long-term value and contributing to sustainability.

Together, these practices form a robust framework that integrates innovation capability with organizational learning, significantly enhancing sustaina

5.3 Recommendations

5.3.1 Policy Recommendations

Policy recommendations are proposed based on the findings from this study, which explored the causal relationship between learning organizations and sustainable organizational performance in China's public IT companies. These recommendations are aimed at the Chinese government, commercial organizations, and the China Ministry of Industry and Information Technology (MIIT) to foster innovation, improve knowledge management practices, and promote sustainability across the IT sector.

1. For the Chinese Government: Promoting Learning Organizations through National Innovation Policies

The Chinese government should prioritize policies that encourage continuous learning and innovation in public IT companies. Government initiatives could include:

Tax Incentives for R&D and Learning Systems: Provide tax incentives and grants for IT companies that invest in research and development (R&D), knowledge management systems, and employee training programs. This would encourage companies to implement learning organization practices, which, as demonstrated, directly lead to improved sustainable performance.

Public-Private Partnerships (PPP) in Innovation: The government could foster partnerships between public IT companies and academic institutions or global tech firms to accelerate the transfer of cutting-edge technologies and knowledge. By creating shared

research platforms and innovation hubs, these collaborations would facilitate knowledge-sharing and the development of sustainable technologies.

Environmental Regulations with Innovation Funding: Introduce stricter environmental regulations while providing innovation grants to encourage IT companies to invest in green technologies, such as renewable energy and sustainable sourcing, to meet environmental performance goals.

2. For Commercial Organizations: Enhancing Knowledge Management and Innovation Capabilities

Commercial IT organizations in China must prioritize embedding the principles of learning organizations into their core operations. These initiatives should be driven by leadership and a supportive organizational culture:

Strategic Investment in Knowledge Management Systems (KMS): Companies should invest in advanced knowledge management systems to facilitate the effective sharing, storage, and application of knowledge across departments. Companies can enhance their innovation capabilities and improve organizational performance by providing employees with access to crucial resources and enabling the real-time application of insights.

Employee Empowerment Programs: IT organizations should foster employee-driven learning and innovation by offering programs that provide autonomy in learning, financial support for certifications, and opportunities for participation in external R&D collaborations. Empowering employees in this manner will promote a culture of inquiry and experimentation, aligning with findings that link empowerment to organizational growth and resilience.

Long-Term Sustainability Planning: Commercial IT organizations should incorporate sustainability planning into their business strategies, embracing environmentally friendly practices such as investments in renewable energy and sustainable sourcing. Additionally, companies should regularly assess their social

performance, ensuring alignment with ethical standards and social responsibilities, thereby advancing their commitment to long-term sustainability.

3. For the Ministry of Industry and Information Technology (MIIT): Regulatory and Training Frameworks

The Ministry of Industry and Information Technology (MIIT) should establish regulatory frameworks that promote the development of learning organizations and advance sustainability within the public IT sector:

National Framework for Learning Organizations: MIIT could develop a national framework or guidelines to help IT companies transition into learning organizations. This initiative would provide companies with the tools, resources, and standards to implement learning-driven practices. The framework could include metrics for knowledge management, innovation capabilities, and continuous learning to enhance organizational performance.

Sector-Specific Training Programs: MIIT could partner with academic institutions to offer specialized training programs focusing on innovation, leadership development, and sustainable practices specific to the IT sector. By offering government-certified programs, MIIT could ensure that public IT companies have the latest skills and knowledge to foster learning cultures and drive innovation effectively.

Sustainability Reporting Standards: MIIT could introduce mandatory reporting standards for IT companies, encouraging them to measure and publicly disclose their environmental, economic, and social performance. To further motivate the sector, the ministry could introduce annual awards to recognize companies excelling in sustainability, fostering a competitive drive toward sustainable practice.

Conclusion

These policy recommendations are derived from the empirical findings of this dissertation, which highlight the pivotal role of learning organizations in driving

sustainable performance in China's public IT sector. By fostering knowledge management, innovation, and sustainability at both the organizational and governmental levels, China can enhance its position as a global leader in technology, ensuring long-term economic, environmental, and social sustainability.

5.3.2 Management Recommendations

Based on research findings that demonstrate the significant impact of learning organizations on sustainable organizational performance, the following recommendations are proposed to guide the management and strategic actions of the Chinese government, commercial IT organizations, and the Ministry of Industry and Information Technology (MIIT). These recommendations emphasize actionable practices grounded in the key components of learning organizations, knowledge management, and innovation capabilities, all of which can drive sustainable performance in the IT sector.

1. For the Chinese Government: Managing Innovation and Sustainability in IT Companies

The Chinese government can take several key steps to enhance support for learning organizations and sustainable performance within the IT sector, ensuring alignment with national development goals.

Establish National Learning and Innovation Programs: The government should create national initiatives encouraging the integration of learning organization principles into IT companies. These programs could be policy-driven and promote continuous learning, inquiry, dialogue, and innovation-oriented leadership strategies. Government support could include:

Grants and Funding for R&D: Provide financial incentives to IT companies investing in research and development (R&D) and internal training programs that cultivate a culture of continuous learning and innovation.

Green Technology Funding: Government-backed funding, tax incentives, or subsidies would support IT companies in adopting green technologies and environmentally sustainable business practices. These measures would help reduce carbon footprints and encourage sustainable sourcing.

Promote Knowledge and Innovation Hubs: The government could establish innovation hubs or digital knowledge centers that bring together IT companies, academic institutions, and startups for collaborative R&D initiatives. These hubs would foster knowledge sharing, technological experimentation, and collaborative learning, essential elements of learning organizations.

Implement Sustainability Performance Standards: Introduce sustainability performance standards across the IT sector, requiring companies to meet specific environmental, social, and governance (ESG) criteria. Mandating sustainability reporting for public IT companies and government audits would ensure compliance. Companies exceeding sustainability benchmarks could be rewarded, further motivating the sector to prioritize sustainable practices.

2. For Commercial Organizations or Businesses: Operationalizing Learning Organization Practices

To fully leverage the advantages of a learning organization, commercial IT companies should prioritize integrating knowledge management practices and innovation capabilities into their daily operations. Practical steps for achieving this include:

Institutionalizing Knowledge Management Systems (KMS)

Knowledge-Sharing Platforms: Develop internal platforms that facilitate the sharing of expertise and ideas across departments. These platforms could include an ERP system, a learning management system (LMS), or internal communication tools, such as DingTalk or WeChat, designed to encourage seamless information exchange and collaboration.

Continuous Learning Opportunities: Ensure employees can access ongoing educational programs, such as online courses or workshops, aligned with the company's innovation objectives. These learning activities should be integrated into performance evaluations, linking knowledge acquisition directly to employee rewards and career advancement.

Enhancing Innovation Capabilities

Technology Scouting Teams: Establish specialized teams dedicated to technology scouting. These teams should identify emerging trends and technologies that can provide a competitive edge and form partnerships with academic institutions and global tech leaders to stay at the forefront of technological advancements.

Prototyping and Open Innovation Platforms: Promote prototyping tools and open innovation platforms, enabling employees to experiment with new ideas, develop innovative solutions, and collaborate with customers or third parties in the co-creation process. These platforms should foster a culture of creativity and collaboration.

Empowering Leadership and Employees

Empowerment and Autonomy: Grant Employees greater autonomy in choosing their learning pathways and innovation projects. Managers should adopt adaptive leadership models, serving as mentors and coaches to help employees take ownership of their learning and performance outcomes, fostering a culture of responsibility and innovation.

3. For China Ministry of Industry and Information Technology (MIIT): Regulating Knowledge Management and Innovation Practices

As the regulatory authority for the IT sector, the Ministry of Industry and Information Technology (MIIT) can initiate programs that align with research findings to support companies in optimizing learning organization practices and achieving sustainable performance. Recommended actions include:

Regulating Knowledge Management Best Practices

Establish Sector-Wide Standards: MIIT should set standardized best practices for knowledge management in IT companies, outlining protocols for the storage, transfer, and application of knowledge. This may involve recommending specific knowledge-sharing tools, digital knowledge repositories, and guidelines for cross-departmental collaboration.

Audit and Certification of KMS Systems: MIIT could introduce a certification process recognizing companies that effectively implement knowledge management systems (KMS). This certification would acknowledge high levels of knowledge application and sharing, offer incentives, and raise industry benchmarks.

Supporting Innovation through Policy

Establishment of Innovation Incubators: MIIT could support the creation of innovation incubators to facilitate collaborative research and development. These spaces would encourage IT companies to experiment with prototyping, establish technology scouting teams, and work on joint projects, fostering a competitive yet collaborative environment for cutting-edge solutions.

Public-Private R&D Partnerships: Facilitating partnerships between public IT companies and academic institutions can enable the development of emerging technologies, including artificial intelligence, blockchain, and 5G. These partnerships align with the study's findings, showing that innovation capability significantly enhances sustainable organizational performance when combined with practical knowledge management.

Encouraging Alignment with Sustainable Development Goals (SDGs)

MIIT can require IT companies to embed sustainability objectives into their core business strategies, ensuring alignment with the United Nations Sustainable Development Goals (SDGs). Companies should be mandated to demonstrate how their innovation efforts contribute to environmental sustainability, ethical business practices, and social equity, thus supporting broader national and global sustainability agendas.

Conclusion

This dissertation highlights actionable strategies for the Chinese government, commercial IT organizations, and MIIT to cultivate learning organizations, foster innovation, and promote sustainable organizational performance. IT companies can strengthen their competitive edge by implementing robust knowledge management systems, empowering leadership, and enhancing innovation capabilities while contributing to societal and environmental objectives. These integrated practices will ensure the long-term economic resilience of China's IT sector and reinforce sustainable business practices essential for sustainable growth.

5.3.3 Future Study

1. For the Chinese Government: Advancing Research on Emerging Technologies and Sustainability

Impact of AI and Automation on Learning Organizations: Future research could examine their effects on learning organizations as AI and automation increasingly transform industry practices. Studies should explore how AI-driven tools may enhance knowledge management, learning processes, and innovation within organizations, thus providing government insights on areas where regulatory support and targeted incentives may bolster development.

Green Technology and Environmental Performance: The government could promote research focused on integrating green technologies within IT companies and assessing the long-term environmental benefits. Investigations should address the cost-effectiveness and sustainability outcomes of adopting renewable energy sources, energy-efficient IT infrastructure, and other eco-friendly innovations.

Future Strategy

National Innovation Hubs and Research Centers: The Chinese government could enhance existing innovation hubs by establishing dedicated research centers for green

technologies and sustainable practices within the IT sector. These centers would serve as collaborative environments for industry leaders, academic institutions, and tech startups, fostering the co-development of sustainable, innovative solutions.

Incentivizing R&D in Sustainability and Innovation: Tax incentives and grants could continue to support IT companies that prioritize sustainable innovation. Specifically, R&D investments focused on green IT solutions, smart city infrastructure, and energy-efficient technologies would align with China's broader environmental objectives, reinforcing long-term national sustainability goals.

2. For Commercial Organizations or Businesses: Expanding Learning and Innovation Practices

Longitudinal Studies on Learning Organizations: Future research should prioritize longitudinal studies to assess the sustained impact of learning organization practices. Such research could provide comprehensive insights into how continuous learning, innovation, and knowledge management practices contribute to long-term organizational sustainability and resilience.

Exploring Cross-Industry Learning: Investigating cross-industry learning—where firms from different sectors engage in collaborative knowledge-sharing—can reveal pathways for enhancing innovation in IT organizations. This research could identify effective methods for cross-pollinating ideas across industries, leading to transformative improvements in innovation capabilities.

Future Strategy

Adoption of Adaptive Learning Platforms: IT firms should consider strategic investments in AI-powered learning platforms that adapt dynamically to employee development needs and evolving industry trends. By facilitating personalized learning experiences, these platforms can drive continuous skill development and increase organizational agility.

Fostering a Culture of Innovation: Commercial IT companies should cultivate an environment that embraces experimentation and calculated risk-taking. Initiatives such as hackathons, R&D projects, and cross-functional innovation programs can engage employees in creative problem-solving, ensuring the organization remains adaptive to emerging market demands.

3. For the Ministry of Industry and Information Technology (MIIT): Advancing Sustainable IT Development

Comprehensive Knowledge Management Audits: Future studies could focus on creating a comprehensive audit framework to evaluate the effectiveness of knowledge management systems (KMS) within public IT companies. This research would examine the relationship between robust KMS practices, enhanced innovation capacity, and overall organizational sustainability, providing actionable insights into optimizing knowledge-based resources.

The Role of Cybersecurity in Sustainable IT Systems: As digital integration within IT firms expands, cybersecurity emerges as a critical factor in sustainable performance. Future studies should explore how cybersecurity frameworks can be aligned with sustainability objectives, securing intellectual property and protecting organizational knowledge in ways that contribute to long-term resilience.

Future Strategy

Development of Cybersecurity and Sustainability Guidelines: MIIT could introduce cybersecurity standards that harmonize with sustainability goals, allowing IT companies to safeguard knowledge assets while fostering sustainable innovation. These guidelines would support the dual objectives of securing critical information and advancing the national digital infrastructure.

Establishing Industry-Wide Knowledge-Sharing Platforms: To foster collective progress, MIIT could develop national platforms for knowledge-sharing, where public IT organizations can exchange best practices, discuss challenges, and share insights on

learning organization models and sustainability efforts. Such platforms would function as comprehensive industry knowledge repositories, enhancing collaborative efforts and innovation across the sector.

Conclusion

By encouraging further research in these areas, the Chinese government, commercial entities, and MIIT can significantly advance the growth and integration of learning organizations within the IT sector. Through initiatives such as adaptive learning platforms, national innovation hubs, and robust cybersecurity frameworks, the IT industry can achieve sustainable organizational performance, positioning itself as a global leader in green technology, knowledge management, and innovation. These strategic, forward-looking measures will ensure that China's IT companies remain competitive on the world stage and actively contribute to broader global sustainability obje

5.3.4 Future Study

In light of this research's findings, several potential avenues for future study and strategy development could benefit the Chinese government, commercial organizations, and the China Ministry of Industry and Information Technology (MIIT). These recommendations will help further enhance the adoption of learning organizations, strengthen innovation capabilities, and promote sustainable performance across China's public IT sector.

1. For the Chinese Government: Supporting Research on Emerging Technologies and Sustainability

Impact of AI and Automation on Learning Organizations: As AI and automation continue to reshape industries, future studies could investigate the impact of these technologies on learning organizations. How AI-driven tools can enhance knowledge management, learning systems, and innovation should be explored to provide government insight into areas where regulatory support and incentives may be needed.

Green Technology and Environmental Performance: The government should encourage future research on integrating green technologies in IT companies and their long-term impact on environmental performance. Studies could assess the cost-effectiveness and sustainability outcomes of adopting renewable energy, energy-efficient IT infrastructure, and other environmentally friendly technologies.

Future Strategy:

National Innovation Hubs and Research Centers: The Chinese government should expand on existing innovation hubs by creating dedicated research centers for green technologies and sustainability within the IT sector. These centers can serve as collaboration spaces for industry leaders, academic institutions, and tech startups to co-develop solutions that drive sustainability and innovation.

Incentivize R&D in Sustainability and Innovation: The government should continue offering tax incentives and grants for IT companies prioritizing sustainable innovation. This could include investments in R&D for green IT solutions, smart cities, and energy-efficient technologies that align with China's long-term environmental goals.

2. For Commercial Organizations or Businesses: Expanding Learning and Innovation Practices

Longitudinal Studies on Learning Organizations: Future studies should focus on longitudinal research that tracks the impact of learning organization practices over time. This would provide deeper insights into how continuous learning, innovation, and knowledge management evolve and contribute to long-term organizational sustainability.

Exploring Cross-Industry Learning: Future studies should investigate how cross-industry learning—where companies from different sectors collaborate and share knowledge—can enhance innovation capabilities in IT firms. This research can uncover new methods for cross-pollinating ideas across industries.

Future Strategy:

Adoption of Adaptive Learning Platforms: IT companies should strategically invest in AI-driven learning platforms that adapt to employee needs and industry trends. These platforms would allow for personalized learning experiences, driving continuous improvement and agility within organizations.

Fostering a Culture of Innovation: Commercial IT firms should establish a culture of experimentation and risk-taking by encouraging employees to participate in hackathons, R&D projects, and cross-departmental innovation initiatives. This strategy would ensure that the company continuously evolves with emerging market needs.

3. For the Ministry of Industry and Information Technology (MIIT): Leading the Future of Sustainable IT Development

Comprehensive Knowledge Management Audits: Future research can focus on developing an audit system to assess the efficacy of knowledge management systems (KMS) across public IT companies. The study would look at the correlation between effective KMS and the innovation capacity of companies, as well as their overall sustainability performance.

The Role of Cybersecurity in Sustainable IT Systems: As IT companies increasingly depend on digital tools, cybersecurity becomes integral to sustainable organizational performance. Future research should investigate how cybersecurity frameworks can be integrated with sustainability goals to protect intellectual property and organizational knowledge.

Future Strategy:

Development of Cybersecurity and Sustainability Guidelines: MIIT should develop cybersecurity frameworks that align with IT companies' sustainability objectives. These guidelines could ensure companies innovate and secure their knowledge assets while contributing to the national digital infrastructure.

Establish Industry-Wide Knowledge Sharing Platforms: MIIT could implement national knowledge-sharing platforms where public IT companies can share best practices, challenges, and innovations related to learning organizations and sustainability. Such platforms would serve as a knowledge repository for the entire industry and encourage sector-wide collaboration.

Conclusion

By fostering future research in these areas, the Chinese government, commercial organizations, and MIIT can further enhance the adoption and development of learning organizations across the IT sector. With the introduction of adaptive learning platforms, national innovation hubs, and comprehensive cybersecurity frameworks, the IT industry will achieve sustainable organizational performance and lead the world in green technology, knowledge management, and innovation. These forward-looking strategies will ensure that China's IT companies remain competitive while contributing to global sustainability goals.

5.4 Research Limitations and Contribute to the Study

5.4.1 Research Limitations

1. Methodological Limitation: This study's cross-sectional design restricts its ability to capture evolving trends and dynamic changes in how learning organizations influence sustainable organizational performance. Future research might employ a longitudinal approach to observe the progression and shifts in these relationships over time.

2. Sample Size and Composition: This study's sample comprises public IT companies in China, which could limit the generalizability of the findings to other industries or regions. While the sample size supports statistical analysis, it may not capture the diversity in smaller or emerging organizations. Expanding the sample to include varied

industry sectors and organizational scales in future research could improve the external validity of the results.

3. Measurement Constraints: Self-reported survey data used in this study can be subject to biases like social desirability and respondent fatigue, potentially impacting the accuracy of responses, especially for sensitive performance indicators. Future studies could address this limitation by incorporating objective performance metrics and external validation methods.

4. Exclusion of External Variables: The study focuses on knowledge management and innovation capabilities as mediating factors yet excludes external variables such as organizational culture, market conditions, and leadership styles. These elements may significantly influence the relationship between learning organization practices and sustainable performance, presenting an avenue for further investigation.

5. Temporal Constraints: Conducted over the years, this study may not fully capture the long-term effects of learning organization practices on sustainable performance. Extending the research timeframe could enable a more thorough examination of sustained impacts and periodic fluctuations in performance outcomes.

5.4.2 Contribute to the Study

1. Expanding the Research Scope: Future studies may broaden the analysis to encompass diverse industries and geographical regions beyond public IT companies in China. This expansion would enhance the generalizability of findings and provide richer insights into the effects of learning organizations on sustainable organizational performance across various sectors.

2. Longitudinal Studies: Future studies might adopt a longitudinal approach to address the limitations of the cross-sectional design employed in this research. Such an approach would allow for a deeper examination of the long-term impact of learning organization practices on sustainable organizational performance, capturing how

relationships between learning organizations, innovation capability, and knowledge management evolve.

3. Inclusion of Additional Variables: While this study centered on the mediating roles of innovation capability and knowledge management, future research could consider additional mediating or moderating variables, such as organizational culture, leadership styles, and external environmental factors. Including these variables could offer a more comprehensive understanding of the dynamics that drive sustainable performance within organizations.

4. Mixed-Method Approaches: Future research could benefit from a mixed-methods approach to mitigate potential biases inherent in self-reported data. Combining quantitative data with qualitative insights, such as those from interviews, case studies, or observations, would facilitate a more robust analysis and deeper understanding of the findings.

5. Broader Application of Technology: Given the critical role of technology in supporting knowledge management and innovation, future research could explore the influence of emerging technologies, including artificial intelligence and data analytics, on the effectiveness of learning organizations. Examining these technologies would yield valuable insights into technology's role in fostering sustainable organizational performance.

The contribution of the paper can be summarized as follows:

Theoretical Contribution: This study synthesizes learning organization theory, knowledge management practices theory, and innovation capability theory to develop a robust model. By offering a novel conceptual framework, it delineates the direct and mediated effects of learning organization practices on sustainable organizational performance within China's public IT sector. Building on existing literature, this research highlights the mediating roles of knowledge management practices and innovation

capability, providing insights into their influence on sustainable performance in the IT industry.

Empirical Contribution: This study examines public IT companies in China to investigate the impact of learning organization dimensions on economic, environmental, and social performance, with knowledge management practices and innovation capability serving as mediators. Structural equation modeling (SEM) enhances the rigor of the analysis, validating the impact pathways and relationship strengths between variables.

Practical Implications: The findings deliver actionable recommendations for IT companies in China, underscoring the value of cultivating learning organizations to achieve sustainable performance. The study advises firms to enhance long-term competitiveness and sustainability by implementing robust knowledge management practices and strengthening innovation capabilities. Managers can leverage these insights to refine human resource strategies, fostering continuous learning and innovation.

Addressing Research Gaps: This research addresses a critical gap in the literature by focusing on public IT companies in China, a context frequently overlooked in global discussions on learning organizations and sustainability. The study highlights sector-specific challenges and opportunities and provides significant value to scholars and practitioners working in similar industries and geographic regions.

Summary: This paper contributes to both academia and management practice, advancing the understanding of how learning organizations, knowledge management, and innovation capability interact to promote sustainable organizational performance. (Abu-Shanab & Shehabat, 2018)

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APPENDIX

Questionnaire

Service quality evaluation:

The moderating effect of Airbnb owner satisfaction in Thailand

Item-objective Congruence of Index (IOC) & Reliability Test

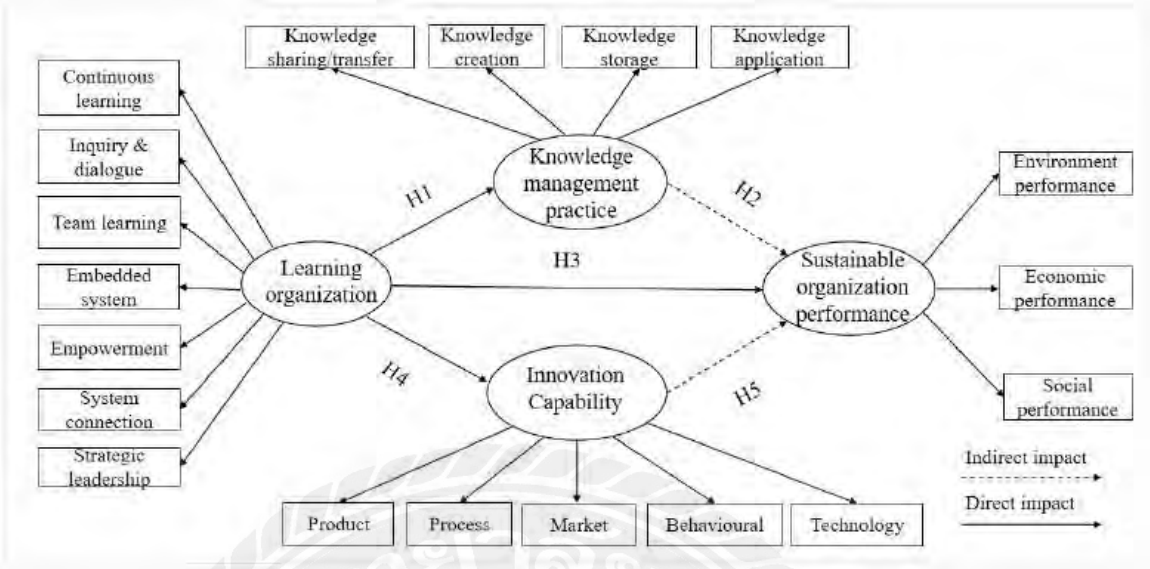
Dissertation Topic: IMPACT OF LEARNING ORGANIZATIONS ON SUSTAINABLE PERFORMANCE IN CHINESE PUBLIC IT COMPANIES: A CAUSAL MODEL WITH KNOWLEDGE MANAGEMENT AND INNOVATION CAPABILITY AS MEDIATORS

Explanation: In the investigation process, the researcher took the survey to have 5 academic specialists examine it. The following name list appears below:

IOC No. 1: LI CHUN YOU (CHINA)
IOC No. 2: LIAO HAO JIE (CHINA)
IOC No. 3: LIAO ZHI GAO (CHINA)
IOC No. 4: LI YING XIA (CHINA)
IOC No. 5: LUO XUE MEI (CHINA)

Questionnaire Content Validity
Item-objective Congruence of Index (IOC)
This research aims to understand the relationship among learning organization, knowledge management practices, innovation capability, and sustainable organizational performance. the organization summarizes the number of items in each section of the questionnaire as follows:

1. Measurement of learning organization = 35items
2. Knowledge management practices=20 items
3. Innovation capability = 25 items
4. Sustainable organizational performance=15
5. Total number of questions = 95



Content-based Item-objective Congruence of Index (IOC)

1. Learning Organization Pokharel, M. P., & Choi, S.O. (2015)	**IOC Specialist's Opinions (+1, 0, -1)**						
	1	**2**	**3**	**4**	**5**	**Total**	**Avg.**
1.1 Continuous Learning							
1. Staff members openly discuss mistakes to learn from them.	1	1	0	1	0	3	0.6
2. Staff members generally help each other learn.	0	1	1	0	1	3	0.6
3. Staff members can get money and other resources to support their learning.	1	1	1	0	0	3	0.6
4. Staff members are generally given time to support learning.	1	1	1	1	0	4	0.8
5. Staff members generally view problems in their work as an opportunity to learn.	1	0	0	1	1	3	0.6
1.2 Dialogue and Inquiry							
6. Staff members generally give open and honest feedback to each other.	0	1	1	1	1	4	0.8
7. Staff members generally listen to others' views before speaking.	1	1	1	1	1	5	1
8. Staff members are generally encouraged to ask "why", regardless of rank.	1	1	1	1	0	4	0.8
9. Whenever staff members state their views, they also ask what others think.	1	1	1	0	1	4	0.8
10. Staff members usually spend time building trust with each other.	1	0	1	0	1	3	0.6
1.3 Team Learning							
11. Teams/groups generally have the freedom to adapt their goals as needed.	0	1	1	1	1	4	0.8
12. Teams/groups generally focus both on the group's task and on how well the group is working.	1	1	0	1	1	4	0.8

1. Learning Organization Pokharel, M. P., & Choi, S.O. (2015)	IOC Specialist's Opinions (+1, 0, -1)						
	1	2	3	4	5	Total	Avg.
13. Teams/groups revise their thinking as a result of group discussion or information collected.	1	1	0	0	1	3	0.6
14. Teams/groups are generally rewarded for their achievements as a team/group.	0	1	1	1	1	4	0.8
15. Teams/groups are confident that the organization will act on their recommendations.	0	1	1	1	1	4	0.8
1.4 Embedded Systems							
16. My organization enables staff members to get needed information at any time quickly and easily.	0	1	1	1	1	4	0.8
17. My organization maintains an up-to-date database of employee skills.	1	1	1	0	0	3	0.6
18. My organization has a system to measure gaps between current and expected performance.	1	1	1	0	1	4	0.8
19. My organization generally makes its lessons learned available to all staff members.	0	1	1	1	0	3	0.6
20. My organization measures the results of time and resources spent on training.	0	0	1	1	1	3	0.6
1.5 Empowerment							
21. My organization gives staff members choices in their work assignments.	0	1	1	1	0	3	0.6
22.My organization invites staff members to contribute to the organization's vision.	0	1	1	1	0	3	0.6
23. My organization gives staff members control over the resources they need to accomplish their work.	1	1	0	1	1	4	0.8
24. My organization generally supports staff members who take calculated risks.	0	0	1	1	1	3	0.6
25. My organization builds alignment of vision across different levels and work groups.	1	1	1	1	1	5	1
1.6 Systems Connections							
26. My organization generally encourages staff members to think from a state's perspective.	0	1	1	0	1	3	0.6
27. My organization encourages everyone to bring the clients' views into the decision-making process.	0	0	1	1	1	3	0.6
28. My organization generally considers the impact of decisions on employees' morale.	1	1	0	1	1	4	0.8
29. My organization works together with the outside community to meet mutual needs.	1	1	1	1	1	5	1
30. My organization encourages staff members to get answers from across the organization when solving problems.	0	0	1	1	1	3	0.6

1. Learning Organization Pokharel, M. P., & Choi, S.O. (2015)	IOC Specialist's Opinions (+1, 0, -1)						
	1	2	3	4	5	Total	Avg.
1.7 Strategic Leadership							
31. The director/supervisor generally supports requests for learning opportunities and training.	1	1	0	1	1	4	0.8
32. The director/supervisor shares up-to-date information with staff members about federal and state guidelines and organizational directions.	0	0	1	1	1	3	0.6
33. The director/supervisor empowers others to help carry out the organization's vision.	1	1	0	1	1	4	0.8
34. The director/supervisor mentors and coaches subordinates.	0	1	0	1	1	3	0.6
35. The director/supervisor pays attention to the organization's actions to ensure that they are consistent with its value/mission.	1	1	1	1	1	5	1

2. Knowledge management practices Kordab et al. (2020)	IOC Specialist's Opinions (+1, 0, -1)						
	1	2	3	4	5	Total	Avg.
2.1 Knowledge Creation							
36. Generating best practices from previous projects to improve future projects.	1	1	1	1	1	5	1
37. Using new opportunities to serve our clients.	1	1	0	1	1	4	0.8
38. Providing new services depending on the market demands.	1	0	0	1	1	3	0.6
39. Provides ideas for reducing costs.	1	1	1	1	0	4	0.8
40. Providing new notions for expanding markets.	1	0	0	1	1	3	0.6
2.2 Knowledge Storage							
41. Keeping a customer information database that is easy to access.	0	1	1	0	1	3	0.6
42. Having a knowledge database that is easy to access.	1	1	1	1	1	5	1
43. Having personal knowledge storage accounts for learning.	1	1	0	1	0	3	0.6
44. Having knowledge storage system linking individual contents.	1	1	1	1	1	5	1
45. The knowledge storage system has upgrading functions.	1	1	0	1	1	4	0.8
2.3 Knowledge Sharing							
46. Sharing with our colleagues the knowledge necessary for projects on hand.	1	0	1	1	1	4	0.8
47. Sharing knowledge with the stakeholders.	1	1	1	0	1	4	0.8
48. Having the capability to share relevant knowledge among business units.	1	0	1	1	1	4	0.8

2. Knowledge management practices Kordab et al. (2020)	IOC Specialist's Opinions (+1, 0, -1)						
	1	2	3	4	5	Total	Avg.
49. People in the organization have willingness to share their working experiences.	1	0	1	1	1	4	0.8
50. There is rewards for knowledge sharing behavior in my organization.	1	0	1	1	1	4	0.8
2.4 Knowledge Application							
51. Having processes for converting knowledge into action plans.	1	1	1	1	0	4	0.8
52. Having processes for matching sources of knowledge to problem-solving.	1	1	0	1	0	3	0.6
53. Applying knowledge efficiently to reach our goals.	1	1	1	1	1	5	1
54.There is a unit in my organization to apply new ideas in production and management.	0	1	1	1	1	4	0.8
55. There is a reward for feasible knowledge application outcomes.	1	1	1	1	1	5	1

3. Innovation Capability Calik, E., Calisir & Cetinguc (2017)	IOC Specialist's Opinions (+1, 0, -1)						
	1	2	3	4	5	Total	Avg.
3.1 Production Innovation							
56. We can make effective production innovation based on target consumers' demands.	1	1	1	1	1	5	1
57. Our organization actively promotes new products and services.	1	0	1	0	1	3	0.6
58. We launch new products and services according to market plans.	0	1	1	1	1	4	0.8
59. We have invested a lot for the production and service innovative research and development.	1	1	1	1	1	5	1
60. We are good at distinguishing user groups and market segments to identify new innovative development opportunities.	1	1	0	1	1	4	0.8
3.2 Process Innovation							
61. We align our new product and service offerings with our current business and processes.	0	1	1	1	1	4	0.8
62. Collaboration with other organizations can help us improve or introduce new business.	1	1	1	1	1	5	1
63. Our organization has a strong ability to coordinate service innovation activities.	1	1	4	1	1	5	1
64. We consider our brand strategy in order to develop new business in the operational process.	1	1	0	1	1	4	0.8
65. We are good at providing suitable operational processes for helping innovative products and service development.	1	1	0	1	1	4	0.8
3.3 Technological Innovation							
66. We use different sources of information to determine the possibilities of new services.	0	1	1	1	1	4	0.8

3. Innovation Capability Calik, E., Calisir & Cetinguc (2017)	IOC Specialist's Opinions (+1, 0, -1)						
	1	2	3	4	5	Total	Avg.
67. We always update our production technologies.	1	1	1	1	1	5	1
68. We think it is important for companies to keep up to date with promising new services and technologies.	0	1	1	1	1	4	0.8
69. We keep an eye on what technologies our competitors are using and keep us updated on our own technological developments.	1	1	1	1	0	4	0.8
70. We discover new market rules and opportunities through technological progress.	1	1	1	1	1	5	1
3.4 Market Innovation							
71. We have new methods for discovering new marketing tendencies.	1	1	1	1	1	5	1
72. We have innovative methods for analyzing consumers' demands.	1	1	1	1	1	5	1
73. We make sophisticated predictions in market.	1	1	1	1	1	5	1
74. We adopt new methods for creating new demands in exploring blue ocean markets.	1	1	0	1	1	4	0.8
75. We use big data to have marketing communications with consumers.	1	1	1	1	1	5	1
3.5 Behavior Innovation							
76. We have cautious commodification in expansion.	1	1	1	1	1	5	1
77. We have willingness to change.	1	1	1	1	1	5	1
78. We have commitment to encourage new ways of doing things as well as foster new idea and technology.	1	1	1	1	1	5	1
79. We have regularly innovation communications.	0	1	1	1	1	4	0.8
80. We have rewards for innovation behavior in my organization.	1	0	1	1	1	4	0.8

4. Sustainable Organizational Performance (Rashid et al. 2017)	IOC Specialist's Opinions (+1, 0, -1)						
	1	2	3	4	5	Total	Avg.
4.1 Environmental Performance							
81. Using green office mode	1	1	1	1	1	5	1
82. Using sustainable resources.	1	1	0	1	1	4	0.8
83. Using technologies to help decreasing energy consumption like cloud computing.	1	1	1	1	1	5	1
84.Increasing the effectiveness of electricity using.	1	1	1	1	1	5	1
85. Adopting a circular economy approach to dealing with office waste.	0	1	1	1	1	4	0.8
4.2 Economic Performance							
86. Improved market share.	1	1	1	1	1	5	1
87. Improved the company's position in the marketplace.	1	1	1	1	0	4	0.8
88. Increase in profitability.	0	1	1	1	1	4	0.8

4. Sustainable Organizational Performance (Rashid et al. 2017)	**IOC Specialist's Opinions (+1, 0, -1)**						
	1	**2**	**3**	**4**	**5**	**Total**	**Avg.**
89. Decrease in material purchasing cost.	1	1	1	1	1	5	1
90. Decrease in utility bills.	1	1	1	1	0	4	0.8
4.3 Social Performance							
91. Improved relationships with the community and stakeholders.	1	1	1	1	1	5	1
92. Improved work safety.	1	1	1	1	0	4	0.8
93. Improved work environment.	1	1	1	1	1	5	1
94. Improved the living quality of the surrounding community.	0	1	1	1	1	4	0.8
95. Improving the social reputation of my organization.	1	1	0	1	1	4	0.8

Questionnaire for Dissertation

IMPACT OF LEARNING ORGANIZATIONS ON SUSTAINABLE PERFORMANCE IN CHINESE PUBLIC IT COMPANIES: A CAUSAL MODEL WITH KNOWLEDGE MANAGEMENT AND INNOVATION CAPABILITY AS MEDIATORS

The study conducted by Ms. Qin JunJie
PhD student,
Doctor of Philosophy Program in Management,
Siam University

Notice: We would like to cooperate with you to complete the questionnaire. The information will be analyzed and done in an overall manner. The information will be kept confidential and will not be disclosed for business gain. It will only be used for educational purposes.

Part 1 : General information

1. Your gender
   ☐ Male ☐ Female

2. Your age
   ☐ Under 18 ☐ 18-35 ☐ 36-55 ☐ Over 55

3. Your education level
   ☐ Junior college ☐ Undergraduate ☐Master ☐ PH.D.
   ☐ Others

4. Your Position in the company
   ☐ Marketing operations ☐ Programmer ☐ Product manager
   ☐ Graphic designer ☐ Human resources manager

5. Work experience after graduation
   ☐ Less than 2 years ☐ ≥ 2 years - ≤ 5 years
   ☐ ＞5years - ＜7 years ☐ 7 years or more

<u>Part 2</u> : Learning organization (Total 7 Dimensions)

Explanation: The adaptability of question items is used to measure seven aspects of the learning organization: Continuous learning, Inquiry and Dialogue, Team learning, Embedded System, Empowerment, System Connection, and Strategic Leadership.

Please review your organization's learning organization in light of the following statements that are consistent with behavior over the identified 1-year period (January 2024 to December 2024), based on the levels in the right box

Question	levels of Learning organization				
	Strongly Agree	**Agree**	**Neither Agree nor Disagree**	**Disagree**	**Strongly Disagree**
Dimension 1 : Continuous Learning					
1. Staff members openly discuss mistakes to learn from them.					
2. Staff members generally help each other learn.					
3. Staff members can get money and other resources to support their learning.					
4. Staff members are generally given time to support learning.					
5. Staff members generally view problems in their work as an opportunity to learn.					
Dimension 2 : Inquiry and Dialogue					
6. Staff members generally give open and honest feedback to each other.					
7. Staff members generally listen to others' views before speaking.					
8. Staff members are generally encouraged to ask "why", regardless of rank.					
9. Whenever staff members state their views, they also ask what others think.					
10. Staff members usually spend time building trust with each other.					
Dimension 3 : Team Learning					
11. Teams/groups generally have the freedom to adapt their goals as needed.					
12. Teams/groups generally focus both on the group's task and on how well the group is working.					

Question	levels of Learning organization				
	Strongly Agree	**Agree**	**Neither Agree nor Disagree**	**Disagree**	**Strongly Disagree**
13. Teams/groups revise their thinking as a result of group discussion or information collected.					
14. Teams/groups are generally rewarded for their achievements as a team/group.					
15. Teams/groups are confident that the organization will act on their recommendations.					
Dimension 4 : Embedded System					
16. My organization enables staff members to get needed information at any time quickly and easily.					
17. My organization maintains an up-to-date database of employee skills.					
18. My organization has a system to measure gaps between current and expected performance.					
19. My organization generally makes its lessons learned available to all staff members.					
20. My organization measures the results of time and resources spent on training.					
Dimension 5 : Empowerment System					
21. My organization gives staff members choices in their work assignments.					
22. My organization invites staff members to contribute to the organization’s vision.					
23. My organization gives staff members control over the resources they need to accomplish their work.					
24. My organization generally supports staff members who take calculated risks.					
25. My organization builds alignment of vision across different levels and work groups.					

Question	levels of Learning organization				
	Strongly Agree	**Agree**	**Neither Agree nor Disagree**	**Disagree**	**Strongly Disagree**
Dimension 6 : System Connection					
26. My organization generally encourages staff members to think from a state's perspective.					
27. My organization encourages everyone to bring the clients' views into the decision-making process.					
28. My organization generally considers the impact of decisions on employees' morale.					
29. My organization works together with the outside community to meet mutual needs.					
30. My organization encourages staff members to get answers from across the organization when solving problems.					
Dimension 7 : Strategic Leadership					
31. The director/supervisor generally supports requests for learning opportunities and training.					
32. The director/supervisor shares up-to-date information with staff members about federal and state guidelines and organizational directions.					
33.The director/supervisor empowers others to help carry out the organization's vision.					
34.The director/supervisor mentors and coaches subordinates.					
35. The director/supervisor pays attention to the organization's actions to ensure that they are consistent with its value/mission.					

<u>Part 3</u> : Knowledge management practices (Total 4 Dimensions)

Explanation: Using adaptation of question items of questions to measure Knowledge management in four areas: Knowledge creation, Knowledge storage, Knowledge sharing/transfer, Knowledge application.

Please review your Knowledge management practices according to the statements below that are consistent with the behavior for 1 year period (January to December 2024) identified, based on the level in the right box.

Question	Level of Knowledge management practices				
	Strongly Agree	**Agree**	**Neither Agree nor Disagree**	**Disagree**	**Strongly disagree**
Dimension 1 : Knowledge Creation					
36. Generating best practices from previous projects to improve future projects.					
37. Using new opportunities to serve our clients.					
38. Providing new services depending on the market demands.					
39. Provides ideas for reducing costs.					
40. Providing new notions for expanding markets.					
Dimension 2 : Knowledge Storage					
41. Keeping a customer information database that is easy to access.					
42. Having a knowledge database that is easy to access.					
43. Having personal knowledge storage accounts for learning.					
44. Having knowledge storage system linking individual contents.					
45. The knowledge storage system has upgrading functions.					
Dimension 3 : Knowledge Sharing/Transfer					
46. Sharing with our colleagues the knowledge necessary for projects on hand.					
47. Sharing knowledge with the stakeholders.					

Question	Level of Knowledge management practices				
	Strongly Agree	**Agree**	**Neither Agree nor Disagree**	**Disagree**	**Strongly disagree**
48. Having the capability to share relevant knowledge among business units.					
49. People in the organization have willingness to share their working experiences.					
50. There is rewards for knowledge sharing behavior in my organization.					
Dimension 4 : Knowledge Application					
51. Having processes for converting knowledge into action plans.					
52. Having processes for matching sources of knowledge to problem-solving.					
53. Applying knowledge efficiently to reach our goals.					
54. There is a unit in my organization to apply new ideas in production and management.					
55. There is the reward for feasible knowledge application outcomes.					

<u>Part 4</u> : Innovation Capability (Total 5 Dimensions)

Explanation: The adaptability of question items is used to measure five aspects of the Innovation capability: Production innovation, Process innovation, Technological innovation, Market innovation, Behavior innovation.

Please review your organization's Innovation Capability in light of the following statements that are consistent with behavior over the identified 1-year period (January 2024 to December 2024), based on the levels in the right box

Question	Level of innovation Capability				
	Strongly Agree	**Agree**	**Neither Agree nor Disagree**	**Disagree**	**Strongly disagree**
Dimension 1 : Production Innovation					
56. We can make effective production innovation based on target consumers' demands					
57. Our organization actively promotes new products and services.					
58. We launch new products and services according to market plans.					
59. We have invested a lot for the production and service innovative research and development.					
60. We are good at distinguishing user groups and market segments to identify new innovative development opportunities.					
Dimension 2 : Process Innovation					
61. We align our new product and service offerings with our current business and processes.					
62. Collaboration with other organizations can help us improve or introduce new business.					
63. Our organization has a strong ability to coordinate service innovation activities.					
64. We consider our brand strategy in order to develop new business in the operational process.					

Question	Level of innovation Capability				
	Strongly Agree	**Agree**	**Neither Agree nor Disagree**	**Disagree**	**Strongly disagree**
65. We are good at provide suitable operational process for helping innovative products and service development.					
Dimension 3 : Technological Innovation					
66. We use different sources of information to determine the possibilities of new services.					
67. We always update our production technologies.					
68. We think it is important for companies to keep up to date with promising new services and technologies.					
69. We keep an eye on what technologies our competitors are using and keep us updated on our own technological developments.					
70. We discover new market rules and opportunities through technological progress.					
Dimension 4 : Market Innovation					
71. We have new methods for discovering new marketing tendencies.					
72. We have innovative methods for analyzing consumers' demands.					
73. We make sophisticated predictions in the market.					
74. We adopt new methods for creating new demands in exploring blue ocean markets.					
75. We use big data to have marketing communications with consumers.					
Dimension 5 : Behavior Innovation					
76. We have cautious commodification in expansion.					
77. We have willingness to change.					

Question	Level of innovation Capability				
	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly disagree
78. We have commitment to encourage new ways of doing things as well as foster new idea and technology.					
79. We have regularly innovation communications.					
80. We have rewards for innovative behavior in my organization.					

Part 5 : Sustainable organizational performance (Total 3 Dimensions)

Explanation: The adaptability of question items is used to measure three aspects of the sustainable organizational performance: Environmental performance, Economic performance, Social performance.

Please review your organization's learning organization in light of the following statements that are consistent with behavior over the identified 1-year period (January 2024 to December 2024), based on the levels in the right box.

Question	Level of Sustainable organizational performance				
	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly disagree
Dimension 1 : Environmental Performance					
81. Using green office mode.					
82. Using sustainable resources.					
83. Using technologies to help decrease energy consumption like cloud computing.					
84. Increasing the effectiveness of electricity using.					
85. Adopting a circular economy approach to dealing with office waste.					
Dimension 2 : Economic Performance					
86. Improved market share.					
87. Improved the company's position in the marketplace.					
88. Increase in profitability.					
89. Decrease in material purchasing cost.					
90. Decrease in utility bills.					

Question	Level of Sustainable organizational performance				
	Strongly Agree	**Agree**	**Neither Agree nor Disagree**	**Disagree**	**Strongly disagree**
Dimension 3 : Social Performance					
91. Improved relationships with the community and stakeholders.					
92. Improved work safety.					
93. Improved work environment.					
94. Improved the living quality of the surrounding community.					
95.Improving social reputation of my organization.					

Section 5 : Other Suggestions (If any)

Thank you so much for completing the questionnaire.

In-depth Interview (in-depth Interview) for dissertation

A CAUSAL MODEL OF LEARNING ORGANIZATION ON SUSTAINABLE ORGANIZATIONAL PERFORMANCE OF PUBLIC IT COMPANIES IN CHINA WITH KNOWLEDGE MANAGEMENT PRACTICES AND INNOVATION CAPABILITY AS MULTIPLE MEDIATOR

A study conducted by Ms. Qin JunJie
PhD student,
Doctor of Philosophy Program in Management,
Siam University

Explanation: This interview part uses related Key - informants selected only

1. The interviewees are employees working in Public IT companies in China.

2. This interview mainly discusses the impact of learning organizations on the organizational sustainable performance of listed Internet companies in China. The investigators hope that the interview officer will fully answer these questions. Please take some time to fill it in.

3. The researcher will only use this information for research purposes and will keep your interview confidential. It will not affect you, but it will be very important and conducive to in-depth academic research and discussion and innovation in the field of competitiveness.

Interview Date : _____

Part 1 : General Information

1.1 Name of the interviewer _____

1.2 No _____ **Moo** _____

2. Personal Information

2.1 Gender

☐ Male ☐ Female

2.2 Years Old_____Year

☐ 20-30 ☐ 31-40

☐ 41-50 ☐ 50 Years or more

2.3 Study Level

☐ Undergraduate ☐ Bachelor

☐ Master ☐ Doctorate

2.4 Level of Position in General Administration

☐ Executive ☐ General Manager

☐ Manager ☐ Operator

2.5 Working Time_____Years

☐ Within 1 Year ☐ 1-3 Years

☐ 4-6 Years ☐ 7-9 Years

☐ 10 Years or more

<u>Part 2</u> : A description of the influence factors of learning organization on Sustainable organizational performance in Public IT companies of China.

1. Do you think that learning organizations include the necessary components of continuous learning, dialogue and inquiry, team learning, embedded systems, empowerment, connected systems, and strategic leadership?

1.1 What are the practices of continuous learning?

1.2 What are the practices of dialogue and inquiry?

1.3 What are the practices of team learning?

1.4 What are the practices of embedded systems?

1.5 What are the practices of empowerment?

1.6 What are the practices of connected systems?

1.7 What are the practices of strategic leadership?

1.8 Do you think Learning Organization significantly directly affects Knowledge management practices? What are the practices could affects knowledge management practices?

1.9 Do you think Learning Organization significantly directly affects sustainable organizational performance? What are the practices of Learning organization promote Sustainable organizational performance in your company?

2. Do you think that Knowledge management practices include the necessary components of knowledge creation, knowledge sharing, knowledge application, and knowledge storage?

2.1 What are the practices of knowledge creation?

2.2 What are the practices of knowledge sharing?

2.3 What are the practices of knowledge application?

2.4 What are the practices of knowledge storage?

2.5 Do you think Learning Organization significantly indirectly affects sustainable organizational performance through Knowledge management practices? What are the practices of promote Knowledge management practices in your company?

3. Innovation Capability: Do you think that Innovation capability includes the necessary components of product innovation, process innovation, and technological innovation, market innovation, behavior innovation?

3.1 What are the practices of product innovation?

3.2 What are the practices of process innovation?

3.3 What are the practices of technological innovation?

3.4 What are the practices of market innovation?

3.5 What are the practices of behavior innovation?

3.6 Do you think Learning Organization has a significant direct effect on Innovation capability? What are the practices of Learning organization promote Innovation capability in your company?

3.7 Do you think Learning Organization significantly indirectly affects sustainable organizational performance through innovation capability? What are the practices of Innovation capability promote sustainable organizational performance in your company?

4. Do you think that Sustainable organizational performance includes the necessary components of environmental performance, economic performance, and social performance?

4.1 What are the practices of environmental performance?

4.2 What are the practices of economic performance?

4.3 What are the practices of social performance?

Thank you so much for your kindness of time for completing the interview.

The Analysis of Interviewees' Keywords

Factor	Practices	No.1	No.2	No.3	No.4	No.5	No.6	No.7	No.8	No.9	No.10	No.11	No.12	No.13	No.14	No.15	No.16	No.17	No.18	No.19	No.20	Total
CS	1. ERP Systems Integrated with Financial and HR Tools.	√	√		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	19
	2. Integration with Performance Management and Learning Management Systems.			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	18
	3. CI/CD Pipelines Integrated with Version Control Systems	√	√	√	√	√	√	√	√	√		√	√	√	√			√	√	√	√	17
SL	1. Adaptive leadership	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√		√	√	√	19
	2. Visionary Leadership	√	√	√	√	√	√	√	√	√	√			√	√	√	√	√	√	√	√	18
	3. Transformational Leadership	√	√	√	√	√	√	√	√	√	√	√	√	√	√			√	√		√	17
	4. Data-Driven Decision Making	√	√	√	√			√	√	√	√			√	√	√	√	√	√	√	√	16
	5. Collaborative Leadership	√	√	√	√	√	√	√	√			√	√	√	√	√	√	√	√			16
ET	1. External learning opportunities	√	√	√	√	√	√			√	√	√	√	√	√	√	√	√	√	√	√	18
	2. Dedicated learning time	√	√	√	√	√	√	√	√	√	√			√	√	√	√	√	√	√		17
	3. Autonomy in Learning Choices	√	√			√	√	√	√	√	√	√	√	√	√	√	√			√	√	16
	4. Encourage Cross-Functional Learning	√	√	√	√	√	√			√	√	√	√			√	√	√	√	√	√	16
ID	1. Hold Regular Team Meetings and Retrospectives	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	20
	2. Transparent Communication Channels	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	20
	3. Anonymous Feedback Channels	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√			√	√	18
	4. Cross-Departmental Collaboration	√	√	√	√	√	√	√	√	√		√	√			√	√	√	√	√	√	17
TL	1. knowledge management system	√	√			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	18
	2. Collaborative Learning Culture	√	√	√	√	√	√	√	√	√		√	√	√	√			√	√	√	√	17
	3. Continuous Learning Initiatives	√	√	√	√	√	√			√	√	√	√			√	√	√	√	√	√	16
	4. Peer Learning and Mentorship	√	√	√	√			√	√	√	√	√	√	√	√	√	√			√	√	16
ES	1. Collaborative Learning Environments	√	√	√	√	√	√	√	√	√	√			√	√	√	√	√	√	√		17
	2. Embedded AI-driven (learning) systems			√	√	√	√	√	√			√	√	√	√	√	√	√	√	√	√	16
	3. Performance Tracking and Skill Development.	√	√	√	√			√	√	√	√	√	√	√	√	√	√	√	√			16

Factor	Practices	No.1	No.2	No.3	No.4	No.5	No.6	No.7	No.8	No.9	No.10	No.11	No.12	No.13	No.14	No.15	No.16	No.17	No.18	No.19	No.20	Total
CL	1. Mentor Program	√	√	√	√	√	√	√	√	√	√	√	√			√	√	√	√	√	√	18
	2. Access to Online Learning Platforms			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	18
	3. Ongoing Training Programs			√	√	√	√			√	√	√	√	√	√	√	√	√	√	√	√	16
KA	1. Knowledge-Driven Product Design	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	20
	2. Customer Knowledge Application	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	20
	3.: Regularly update t Employ	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	20
	4. Technology Adoption Frameworks	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	20
	5. Knowledge-Driven Product Design	√	√	√		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	19
KC	1. research and development labs	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√			√	√	18
	2. Employee Rotation Programs	√	√	√	√			√	√	√	√	√	√	√	√	√	√	√	√	√	√	18
	3. Reflective Practices	√	√	√	√	√	√	√	√	√	√			√	√	√	√	√	√	√	√	18
	4. partner with universities, research institutions, and other companies	√	√			√	√	√	√	√	√	√	√	√	√	√	√	√		√	√	17
	5. Internal Conferences and Seminars	√	√	√	√	√	√	√	√	√		√	√	√	√			√	√	√	√	17
	6. Online learning platforms	√	√	√	√	√	√			√	√	√	√	√	√	√	√	√	√			16
	7. internal or external crowd-sourcing	√	√	√	√	√	√	√	√	√	√	√	√			√	√			√	√	16
KT	1. After-Action Reviews	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	20
	2. Mentoring and Coaching Programs	√	√	√	√			√	√	√	√	√	√	√	√	√	√	√	√	√	√	18
	3. Internal Workshops and Training Sessions			√	√	√	√	√	√	√	√			√	√	√	√	√	√	√	√	16
	4. Cross-Functional Team Projects	√	√	√	√	√	√	√	√			√	√	√	√			√	√	√	√	16
	5. Job Rotation and Shadowing Programs	√	√			√	√	√	√	√	√	√	√	√	√	√	√			√	√	16
KS	1. Cloud Storage Solutions	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√			18
	2. Database Management:	√	√	√	√	√	√	√	√		√			√	√	√	√	√	√	√	√	17
	3. Digital Knowledge Bases	√	√	√	√			√	√	√	√	√	√	√	√			√	√	√	√	16
	4. Document Management Systems (DMS)	√	√	√	√	√	√			√	√	√	√			√	√	√	√	√	√	16
	5. Content Management Systems (CMS)			√	√	√	√	√	√			√	√	√	√	√	√	√	√	√	√	16

Factor	Practices	No.1	No.2	No.3	No.4	No.5	No.6	No.7	No.8	No.9	No.10	No.11	No.12	No.13	No.14	No.15	No.16	No.17	No.18	No.19	No.20	Total
PSI	1. Business Process Management Software (BPMS)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	20
	2. Training and Development	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	20
	3. Lean Methodologies	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√			√	√	18
	4. Continuous Integration/Continuous Deployment (CI/CD)	√	√			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	18
	5. Automation Tools	√	√	√	√	√	√	√	√			√	√	√	√	√		√	√	√	√	17
BI	1. Cultural Change Initiatives	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√			18
	2. Diversity and Inclusion Programs	√	√	√	√	√	√	√	√	√	√	√	√	√	√			√	√	√	√	18
	3. Employee Empowerment Programs	√	√	√	√			√	√	√	√	√		√	√	√	√	√	√	√	√	17
	4. Incentive and Reward Systems	√	√	√	√	√	√			√	√	√	√			√	√	√	√	√	√	16
	5. Flexible Working Conditions	√	√			√	√	√	√	√	√	√	√	√	√	√	√			√	√	16
TI	1. Technology Scouting Teams	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√			18
	2. Advanced Prototyping Tools			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	18
	3. Partnerships with Tech Startups and Academia	√	√	√	√	√	√	√	√			√	√	√	√			√	√	√	√	16
	4. Patent Development			√	√	√	√			√	√	√	√	√	√	√	√	√	√	√	√	16
	5. Investment in Talent and Skills Development	√	√			√	√	√	√	√	√			√	√	√	√	√	√	√	√	16
PTI	1. Prototyping and Rapid Testing	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	20
	2. Open Innovation Platforms	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	20
	3. Technology Scouting	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√		19
	4. Intellectual Property Management	√		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	19
	5. Co-Creation Workshops	√	√	√	√			√	√	√	√	√	√	√	√	√	√			√	√	16
MI	1. Customer Insight Gathering	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	20
	2. Segmentation and Niche Marketing	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	20
	3. Blue Ocean Strategy	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	20
	4. Cross-Industry Partnerships	√	√	√	√	√	√	√	√	√	√	√	√			√	√	√	√	√	√	18
	5. Digital Transformation Initiatives	√	√			√	√	√	√		√	√	√	√	√	√	√	√	√	√	√	17

Factor	Practices	No.1	No.2	No.3	No.4	No.5	No.6	No.7	No.8	No.9	No.10	No.11	No.12	No.13	No.14	No.15	No.16	No.17	No.18	No.19	No.20	Total
ELP	1. Green IT Policies	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√			18
	2. Sustainable Sourcing	√	√	√	√			√	√	√	√	√	√	√	√	√	√	√	√	√	√	18
	3. Renewable Energy Investments	√	√		√	√	√	√	√	√	√	√	√	√	√			√	√	√	√	17
	4. Remote Work Initiatives	√	√	√	√	√	√			√	√			√	√	√	√	√	√	√	√	16
	5. Energy-Efficient Infrastructure	√	√	√	√	√	√	√	√	√	√	√	√			√	√			√	√	16
ECP	1. Innovation Investment	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	20
	2. Financial Planning and Analysis	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	20
	3. Employee Training and Development	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	20
	4. Customer Relationship Management Systems	√	√	√	√	√	√	√	√			√	√	√	√	√	√	√	√	√	√	18
	5. Strategic Partnerships and Alliances			√	√	√	√	√	√	√	√	√		√	√	√	√	√	√	√	√	17
SP	1. Health and Wellness Programs	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√		√	√	19
	2. Ethical Business Practices	√	√	√	√	√	√	√	√	√	√	√	√			√	√	√	√	√	√	18
	3. Sustainable Practices	√	√	√	√			√	√	√	√	√	√	√	√	√	√	√	√	√	√	18
	4. Employee Development	√	√			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	18
	5. Community Engagement	√	√	√	√	√	√	√	√	√		√	√	√	√			√	√	√	√	17
	6. Diversity and Inclusion Initiatives	√		√	√	√	√	√	√	√	√			√	√	√	√	√	√	√	√	17
	7. Stakeholder Communication	√	√	√	√			√	√	√	√	√	√	√	√	√	√			√	√	16
	8. Work-Life Balance Policies			√	√	√	√	√	√	√	√	√	√			√	√	√	√	√	√	16

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