INSTITUTO
UNIVERSITÁRIO
DE LISBOA

Too Much Ambidextrous Leadership? Uncovering Indirect Curvilinear Effects on Innovation

WANG Xiaosheng

Doctor of Management

Supervisors:
PhD Nelson Ramalho, Associate Professor,
ISCTE University Institute of Lisbon
PhD SHAO Yunfei, Professor,
University of Electronic Science and Technology of China

December, 2024

BUSINESS
SCHOOL

Marketing, Operations and General Management Department

Too Much Ambidextrous Leadership? Uncovering Indirect Curvilinear Effects on Innovation

WANG Xiaosheng

Doctor of Management

Supervisors:
PhD Nelson Ramalho, Associate Professor,
ISCTE University Institute of Lisbon
PhD SHAO Yunfei, Professor,
University of Electronic Science and Technology of China

December, 2024

BUSINESS
SCHOOL

Marketing, Operations and General Management Department

Too Much Ambidextrous Leadership? Uncovering Indirect Curvilinear Effects on Innovation

WANG Xiaosheng

Doctor of Management

Jury:

PhD Tânia Marques, Assistant Professor,
Instituto Politécnico de Leiria
PhD Wang Bingjie, Associate Professor,
UESTC - University of Electronic Science and Technology of China
PhD Renato Pereira, Assistant Professor with Habilitation,
ISCTE University Institute of Lisbon
PhD Nelson Ramalho, Associate Professor,
ISCTE University Institute of Lisbon
PhD Leandro Pereira, Associate Professor with Habilitation,
ISCTE University Institute of Lisbon

December, 2024

INSTITUTO UNIVERSITÁRIO DE LISBOA

Too Much Ambidextrous Leadership? Uncovering Indirect Curvilinear Effects on Innovation

WANG Xiaosheng

Declaration

I declare that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university and that to the best of my knowledge it does not contain any material previously published or written by another person except where due reference is made in the text.

Signed: 王晓圣 Wang Xiaosheng Date: 2024.12.30

Name: WANG Xiaosheng

作者申明

本人郑重申明：除了论文致谢中明确说明并致以谢意的部分外，所呈交的论文不包含任何他人或作者本人已用于获得任何教育机构的学位和证书而使用过的材料。同时尽我所知，除了文中特别加以标注引用的内容外，本论文不包含任何其他个人或集体已经发表或撰写的成果作品。

作者签名：王晓圣 Wang Xiaosheng 日期：2024.12.30

姓名(拼音)：WANG Xiaosheng

[This page is deliberately left blank.]

Abstract

China's recent strategic direction points to the strengthening of innovation capability, in which leadership plays a key role. In researching the most appropriate leadership for this purpose, ambidextrous leadership is receiving increasing attention on the basis that the challenge is to integrate the paradox, but once this is overcome, the more ambidexterity is shown, the stronger the innovation outcomes will be. However, ambidextrous leadership meets the conditions to sustain a plausible curvilinear effect with radical innovation, since too much paradox can be cognitively conflicting and hinder the processes that lead to innovation. This research is designed to test the nonlinear effects of ambidextrous leadership.

A first study, with a sample of 233 employees in innovation-prone industries, in China, was based on a time-lagged data collection deployed to test the indirect effects of ambidextrous leadership on both incremental and radical innovation through innovation climate, where the effects of ambidextrous leadership are conceived as depicting an inverted U-shape. A second study, of a qualitative nature, engaged 20 experts and professionals directly responsible for innovation, which were in-depth interviewed to critically evaluate findings from the first study.

The first study corroborated the curvilinear relationship between ambidextrous leadership exerting an inverted U-shaped effect upon radical innovation via innovation climate although a linear direct effect was found between ambidextrous leadership and incremental innovation. In the second study experts provided reasoning that partially validated these findings thus reinforcing the idea that ambidextrous leadership is positive up to a certain point, after which it becomes counterproductive.

Keywords: Ambidextrous leadership, innovation capability, radical innovation, incremental innovation, innovation climate

JEL: M10, O31

[This page is deliberately left blank.]

Resumo

A recente orientação estratégica da China aponta para o reforço da capacidade de inovação, na qual a liderança desempenha um papel fundamental. Nos estudos sobre a liderança mais adequada para este fim, a liderança ambidestra está a receber atenção crescente, partindo do pressuposto de que o desafio é integrar o paradoxo, mas, uma vez ultrapassado, quanto mais ambidestria for demonstrada, melhores serão os resultados de inovação. No entanto, a liderança ambidestra reúne as condições para sustentar um efeito curvilíneo com a inovação radical, uma vez que demasiado paradoxo pode ser cognitivamente conflituante e dificultar os processos que produzem a inovação. Esta investigação foi concebida para testar os efeitos não lineares da liderança ambidestra.

Um primeiro estudo, com uma amostra de 233 trabalhadores de sectores propensos à inovação, na China, baseou-se numa recolha de dados com desfasamento temporal para testar os efeitos indirectos da liderança ambidestra na inovação incremental e radical através do clima de inovação, em que os efeitos da liderança ambidestra são concebidos como seguindo uma forma de U invertido. Um segundo estudo, de natureza qualitativa, envolveu 20 peritos e profissionais diretamente responsáveis pela inovação, que foram entrevistados para avaliar criticamente os resultados do primeiro estudo.

O primeiro estudo corroborou a relação curvilínea entre a liderança ambidestra e a inovação radical através do clima de inovação, embora tenha sido encontrado um efeito direto linear entre a liderança ambidestra e a inovação incremental. No segundo estudo, os peritos apresentaram um raciocínio que validou parcialmente estas conclusões, reforçando assim a ideia de que a liderança ambidestra é positiva até um certo ponto, após o qual se torna contraproducente.

Palavras-chave: liderança ambidestra, capacidade de inovação, inovação radical, inovação incremental, clima de inovação

JEL: M10, O31

[This page is deliberately left blank.]

摘要

中国最新的战略方向是加强创新能力，而领导力在其中发挥着关键作用。在研究什么才是最合适创新的领导力时，“双元领导力”这一名词受到越来越多的关注。“双元领导力”的挑战在于如何整合双元这个悖论，一旦克服悖论，“双元性”表现得越多，创新成果就会越强。然而，突破性创新可能与双元领导力存在非线性的曲线关系，因为过多的双元领导力会造成认知冲突，阻碍创新进程。本研究旨在检验双元领导力与创新结果之间的非线性效应。

第一项研究以中国 233 名创新行业的员工为样本，采用时滞数据收集法，通过创新氛围来检验双元领导力对渐进式创新和突破性创新的间接影响。第二项研究是定性研究，对 20 名直接负责创新的专家和专业人员进行了深入访谈，并对第一项研究的结论进行了批判性评估。

第一项研究证实了曲线关系的存在，即双元领导力通过创新氛围对突破性创新产生倒 U 型影响，然而双元领导力与渐进式创新之间存在线性的直接影响。在第二项研究中，专家们提供的推理部分验证了这些发现，从而强化了这样一种观点，即双元领导力在一定程度上是有积极推动作用的，但过度就会适得其反。

关键词：双元领导力，创新能力，突破性创新，渐进式创新，创新氛围

JEL: M10, O31

[This page is deliberately left blank.]

Acknowledgements

It is a significant and unforgettable experience for me to study the joint program of ISCTE and UESTC, and write this interesting thesis. Many kind-hearted people give me a great amount of help, professional advice and encouragement. Thus, I would like to express my sincere gratitude to them.

First of all, I would like to thank my dear Professor Nelson Ramalho for his invaluable guidance on this thesis. During the writing, he has always been very patient and generous to offer me guidance and answer my inquires. Professor Nelson Ramalho has profound knowledge and critical thinking on academic research and on life perspectives. His thoughts often give me in-depth insights towards many philosophical questions. I enjoy our discussion during the thesis writing and Professor Nelson Ramalho makes the writing process very interesting and much more beneficial to me.

Secondly, I would like to thank Professor Shao Yunfei for her encouragement and professional advice during the thesis writing. Without her kind encouragement, I will not set my determination to move forwards.

Thirdly, I thank Ms Li Xuan for her kind help with translation and questionnaire analysis. Her thoughts and translation have made this thesis much more fluent and enjoyable to read.

Then I extend my gratitude to all the teachers in this joint program for their wonderful lessons and to all the staff in this joint program for their hard work and warm support for all of us.

Last but not least, I give my special thanks to my family and my friends, particularly my daughter, for their understanding and great support since 2019. Without them, I would not be able to complete any achievement I have made today.

I would like to share with all above-mentioned people my appreciation for your companion in this wonderful journey!

[This page is deliberately left blank.]

致谢

对我来说，学习里斯本大学（ISCTE）和电子科技大学（UESTC）的联合课程，并撰写这篇有意思的论文是一次重要而难忘的经历。许多好心人给予我诸多帮助、专业建议和行为鼓励。我在此，向他们表示衷心的感谢。

首先，感谢我亲爱的 Nelson Ramalho 教授，感谢他对这篇论文的宝贵指导。在我的写作过程中，Nelson Ramalho 教授总是非常耐心和慷慨地为我提供指导，并回答我的问题。Nelson Ramalho 教授在学术研究和人生观方面有着渊博的知识和批判性思维，他的观点常常让我对许多哲学问题有着深入的见解。我很享受在论文写作过程中与教授的讨论，Nelson Ramalho 教授让我的整个论文写作过程变得非常有意思，也让我受益匪浅。

其次，我要感谢邵云飞教授在论文写作过程中给予我的鼓励和专业建议。没有她的鼓励，我可能不会坚持到底。

第三，感谢李璇女士在翻译和问卷分析方面给予的帮助。她的思考和翻译让这篇论文读起来更流畅、更愉悦。

第四，我还要感谢本联合培养项目中所有老师的精彩授课，感谢本联合培养项目中所有工作人员的辛勤工作和热情支持。

最后，我要特别感谢我的家人、我的朋友，尤其感谢我的女儿，感谢他们自 2019 年以来对我的理解和大力支持。没有他们，我就无法取得今天的成就。

我想与上述所有人表达我的感激之情，感谢你们在这段美妙旅程中的陪伴！

[This page is deliberately left blank.]

Contents

[This page is deliberately left blank.]

List of Tables

[This page is deliberately left blank.]

List of Figures

[This page is deliberately left blank.]

List of Acronyms

GCI	Global Competitiveness Index
NDRC	National Development and Reform Commission

[This page is deliberately left blank.]

Chapter 1: Introduction

1.1 Background

1.1.1 Chinese innovation culture and ambidexterity

In the past two centuries, the global economy has experienced unimaginable growth. During 1820-1992, the world population had increased five times while per capital GDP increased eight times and global economy aggregate increased 40 times. Particularly, average per capital revenue in USA and the western Europe was approximately 50-300 times compared to that of 200 years ago. The substantial growth of world economy cannot be explained merely by increased investment. Innovation has surely played a fundamental role in driving the global economy development.

In Chinese history, innovation had been the key driver to make the country one of the largest economies. For example, China had produced the “four greats” inventions: the compass, gunpowder, paper-making, and printing. Innovation spirit even sprouted during the most difficult war period. China conducted its first atomic bomb test successfully in 1964 despite of embargo by western nations and the severe plague and poverty then. After implementing “the reform and opening up” policy in 1979, China has made significant progresses on technical advancements as well. For example, China became the third country to launch a man into space in 2003, following Russia and the USA. And China was the third nation with super-computing ability in 2004 and had the fastest supercomputers since 2010. Recently China became the third country who can independently design, produce, launch and maintain a space station. These innovation achievements across centuries are not the result of certain policies or periodical technological drives, but the result of embedded innovation culture in China.

Chinese “the Book of Rites: The Great Learning”, which was recommended to every student in ancient China, had a famous saying: “If you can in one day renovate yourself; do so from day to day. Let there be daily renovation.”. Innovation spirit is not only the force for technology advancements and economic growth, but rather an important component of Chinese philosophy for thousand years in Chinese history.

In Taoism, there is a concept known as "wu-wei," which translates to "effortless action". This idea suggests that individuals should strive to act in a way that is natural and effortless,

rather than forcing their will or trying to control every aspect of their lives. This can include being open to new ideas and allowing them to naturally unfold without resistance or judgment.

Additionally, Taoism teaches that change is an inherent part of life and that individuals should embrace it rather than resist it. This includes being open to new ideas and perspectives, even if they are different from one's own. By accepting new ideas and concepts, individuals can expand their understanding of the world and grow spiritually. Overall, Taoism encourages acceptance of new ideas and concepts as a means of living in harmony with the natural flow of life.

1.1.2 Chinese innovation capability

In present China, it is crucial to understand Chinese innovation capability in order to understand the present innovation compared with that of the past and the comparison of innovation developments among different countries.

British economist Freeman (1992) was the first person to raise the concept of National Innovation System. While Freeman's national innovation system basically concerned technological progress, OECD (2005) made more comprehensive definition of innovation in its Oslo Manual publication as "the implementation of a new or significantly improved product (good or service) or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations.". According to the same source, the implementation of innovation entails activities that involve scientific knowledge, technology, organizational arrangements, financing, and commercialization.

There are several methods to measure a nation's innovation capability. For example, the World Economic Forum (WEF) publishes the Global Competitiveness Index (GCI) annually. Innovation Ecosystem is one of four sub-indexes. The European Innovation Scoreboard (EIS), is a commonly used measurement of innovation capability system in the world. In 2007, the World Intellectual Property Organization and INSEAD launched the Global Innovation Index (GII). The Chinese Department of National Bureau of Statistics released China Innovation Index to assess Chinese innovation performance year-on-year. Meanwhile, the Chinese Academy of Science and Technology published the Regional Evaluation Report of Scientific, Technology and Innovation Capabilities in China to compare the innovation performance of 31 provinces (municipalities and districts) across the country.

Due to complex nature of measuring innovation capability, recently single indicator measurement (e.g. R&D expenditures, number of patents) is regarded not sufficient for such a

comprehensive concept (Carayannis et al., 2016; Tidd & Bessant, 2018). As stated, European Innovation Scoreboard is one of most popular measurements as an example of composite indicator approach to measure innovation capability. The GII provides innovation index for 131 countries, covering 93.5% of world population. According to Androschuk (2021), China is the only middle-income country among top 25 innovation economies. Meanwhile, in recent five years, China has greatly improved its ranking in GII report as showed in below Table 1.1.

Table 1.1 Annual china ranking in GII report from 2016-2023

Year	China ranking
2016	25
2017	22
2018	17
2019	14
2020	14
2021	12
2022	11
2023	12

Source: World Intellectual Property Organization (WIPO, 2024)

GII comprises of two parts: innovation input and innovation output. China has relative low ranking on innovation input compared with innovation output. For example, in 2023, China ranked 12 for overall GII. Chinese innovation input only ranked 25 in 2023 and output ranks 8, which stands out as regards the efficiency of innovation investment. Still, in some sub-indices China is performing below the general rank which means there is room to build up and implement more comprehensive innovation policies and infrastructure which will help to boost the Chinese innovation to become the global innovation leader.

In China, National Innovation Index (NII) 2020 was published by Chinese Academy of Science and Technology for Development. Although NII uses different sub-index and analytical methods from the above mentioned two international indices, it shows consistency with these two international indices. For example, China's technology innovation capacity was among the middle class based on both NII and EIS. However, China's technology innovation capacity is converging quickly in both index reports. NII 2020 demonstrated that China was ranked 14 among 40 evaluated countries, which is exact the same ranking with GII in 2020. As commented by NII, China has just become the innovation leading country although there is a long way to go for China to catch up with the most innovative countries such as U.S.A and Switzerland.

Regional innovation disparity is the important factor of regional economic indifference. China is experiencing major social economic shifts from "Made in China" to "Designed in China". Characters of regional innovation disparity have been changing dramatically as well. China Academy of Sciences published the "Report of China Regional Innovation Index" saying that cross-region innovation collaboration community will be dominant innovation carrier

instead of previous city-based innovation clusters.

After long-term development of city-based innovation clusters, they need to diversify and differentiate themselves in order to compete for innovation resources China wide. There is a trend to form innovation communities among existing innovation clusters within the same province to compete with other provinces. Also provincial innovation policies would be more popular than previous city-based innovation policies.

At present, East China is far ahead of the rest of China in terms of regional innovation capability. Middle China, North East and West China follows East China in this order. There is a trend that East China is widening the gap with the rest of China. When looking at key cities, Shenzhen has been the most innovative city for many years based on the city's innovation input, innovation output and innovation environment. The following cities are Guangzhou, Suzhou, Chengdu, Hangzhou, Ningbo, Nanjing and Xi'an. These cities have formed a balanced innovation environment, while the rest of the cities (e.g. Hefei, Dongguan) are either focusing on innovation input or innovation output. More and more East cities are listed among Top 30 most innovative cities in the Report of China Regional Innovation. Top 30 innovative cities have substantial advantage compared with the rest of the cities in terms of their innovation capabilities. Among these top 30 cities, the competition is fierce. The ranking of Top 30 cities has not been stable these years. However, the cities not within the Top 30 positions have not showed much improvement recently, which demonstrates the innovation resources are absorbed greatly by top 30 leaders and there is urgent need to form innovation communities to help other cities catching up.

President Xi calls for development of core advanced technologies. He acknowledges that China is still lacking original advanced technology. And these core advanced technologies will be the main driver for future innovation. Therefore, top innovation cities put great efforts to build high-end national science labs in order to gain future innovation advantages.

Chinese small and middle enterprises have an average life expectancy of three years while large enterprises have an average life expectancy of eight years (Gibb & Li, 2003). According to these authors, Chinese unicorn enterprises usually need six years to incubate. These numbers are below the global average. The reason is that Chinese enterprises mainly innovate based on new business models (X. Luo et al., 2022). For example, the use of internet technology enables many enterprises to generate profit based on breaking distance barrier or information barrier. However, business model innovation is easier to imitate compared with product or technology innovation. Therefore, the life expectancy of Chinese enterprises is less than global average. While there is less and less opportunity for business model innovation after almost 50 years

elapsed from the national reform and opening up, technology and product innovation will be the main driver of new enterprises. Innovation cities and alliances will also focus on attracting technology and human resources rather than simply providing financing and tax policy to keep their innovation positions.

In summary, regarding regional inequality of innovation capability, there is an existing large gap among different cities. City innovation competition is fierce, and the innovation resource tends to gather on top 30 innovation cities. To help after-30 city catching up, there will be innovation communities across cities and provincial policy shall be implemented to coordinate innovation resources. To strengthen innovation capability of most innovative cities and the whole country, more efforts shall be put to generate original advanced technology and products.

China's economy has entered the new normal. In the past, economic growth was mostly driven by extensive investment, which often neglected efficiency. Nowadays, Chinese economy is geared to be driven by innovation in order to keep economic development sustainability.

Based on Deng et al. (2023), innovation has a relative low contribution to Chinese economy in the last decade. However, more and more Chinese politicians and scholars are discussing how the innovation can be a supporting pillar on future economic development.

The innovation strategy becomes crucial. If innovation cannot be the main driver of economy development for China in the future, high investment low productivity model cannot continue in China as natural resources and environment will not support this model. The future of Chinese economy must lie in the innovation capability.

1.1.3 Innovation policy in China

China has a sophisticated bureaucratic system to formulate and implement policies related to the economy, science and technology. The National People’s Congress, through its Standing Committee and the Committee on Science, Technology, Education, and Health, has the power to draft, enact, and amend innovation-related laws. National People’s Congress monitors the implementation of such laws and approves the budget for application of the policies. The Ministry of Science and Technology is the principal administration government body along with the National Development and Reform Commission (NDRC), the Ministries of Finance (MOF), Education (MOE), Agriculture (MOA), Health (MOH), and Industry and Information Technology (MOIIT). The role of the Ministry of Finance (MOF) is extremely important as it scrutinizes ministerial budgets and allocates monies for particular projects and initiatives. National Development and Reform Commission (NDRC) also plays an important role, and it

not only formulates innovation related policies but also manages and implements major S&T programs such as the State Major S&T Achievement Industrialization Program, the State Key Industrial Testing Program, and the National Engineering Research Center Program.

After China's Opening up and Reform in 1978, China held five National Science and Technology Conferences to make strategic decisions regarding S&T and innovation. The Conferences were held in 1978, 1985, 1995, 1999 and 2006 respectively. After 1995 National Conference, more and more financial, tax, and fiscal policies were announced to support high-tech startups. From reconstruction of S&T system in China in 1978 to 2005, many policies were enacted by different ministries or together by several ministries (committees). However, the lack of adequate coordination when implementing these policies became an unavoidable problem. 2006 National Science and Technology Conference tackled the problem and set the milestone for China's future innovation pathway. 2006 Conference issued the Medium and Long-term Plan for Science and Technology Development (2006-2020), which stated China's ambition to become an "innovation-oriented society" by the year 2020 and a world leader in science and technology by 2050. The Plan pushed NDRC, MOST, MOF, and other ministries to work together through inter-ministerial cooperation to produce 79 detailed policy documents under the Plan.

Recently, a series of technology related commercial conflicts became more and more common. Developed countries not only strictly block key core technologies, but also control China's introduction of general high technology. The reality pushes China to realized that core technologies cannot be introduced through commercial practices. Relying on foreign key core technology is not sustainable but dangerous to China's economic stability. Independently developing China capacity of radical innovation is a high priority under "to do list" for China's central government.

UK, Germany, USA and Japan have respectively achieved economic leapfrog through radical innovations. James Hargreaves invented the Jenny spinning machine in 1767. In 1769, Richard Arkwright made a hydraulic spinning machine. In 1779, Samuel Crompton invented the Muir spinning machine. Marx pointed out that it was because of the invention of these machines that the revolution of the steam engine became necessary. James Watt of Scotland invented the first single-acting steam engine in 1769. The interlocking steam engine was invented in 1782. Productivity of light industry, metallurgy, mining, transportation and other industries had been greatly improved. This set the base for rising of UK. Like UK, Germany had a large number of key core technologies in the fields of electricity, internal combustion engine, chemical industry and steel-making industry. Many scientists and technological

inventors such as Chase, Siemens, Koch, Roentgen and Einstein had emerged. Similarly, the development history of the USA for more than 200 years is, to some extent, a history of innovation and entrepreneurship. From Edison's invention of electric light to Wright brothers' invention of plane to Bill Gates, the founder of software empire; From the birth of the world's first electronic digital computing computer at the University of Pennsylvania to the invention of transistors at Bell Laboratories; From the 49-qubit test chip developed by Intel to the advanced manufacturing technology represented by 3D printing, USA has developed gradually. USA still has the global leading position in computers, new materials and artificial intelligence. The key factor for Japan's rise at the end of the 19th century was that Japan introduced and absorbed western advanced core technology and localized them.

In recent years, developed countries have set up their strategies on key core technological innovation. The USA launched the third edition of American innovation strategy in 2015. The UK attaches great importance to improving the ability of radical innovation and has successively issued a number of scientific and technological innovation plans. Germany issued the “Digital Strategy 2025”.

China is now shifting from the stage of high-speed growth to the stage of high-quality development. Improving radical innovation capability is also an urgent need to safeguard China’s national security. President Xi Jinping stressed that only by holding the core technology in own hands can China truly grasp competition advantage so as to fundamentally protect national economic security, national security and other security.

Under the large context of efforts put to leverage innovation capability in China, the leadership plays a central role. However, there are many proposals about which profile of leadership is more suited to foster innovation, especially radical innovation. Among these proposals one is intrinsically related to Chinese traditional philosophy, but it is unclear how it compares to others, how effective it is, and if there are limits to its assumed effectiveness. The following section explores this subject.

1.2 Research problem, question and objectives

Leadership is always an important research topic in management and innovation literature. Previously, different leadership behaviors have been studied to understand what kind of leadership is more effective in facilitating radical innovation. For example, transformational leadership (Avolio et al., 1988), servant leadership (Parris & Peachey, 2013), and ethical leadership (Sosik et al., 2014) have been all analyzed on their relationship towards innovation

or radical innovation.

Going beyond this objective, Zhang and Bartol (2010) pointed out that leadership behaviors, particularly those during innovation processes, ought not to follow a one-size-fits-all approach; in fact, leadership needs to be adjusted according to spatial situations, subordinates' abilities, work expectations, job characteristics, and personalities.

Rosing et al. (2011) proposed ambidextrous leadership, defined as the integration of empowering and directive leadership styles. Ambidextrous leadership is currently receiving growing attention (Cunha et al., 2019; Klonek et al., 2023; Mueller et al., 2020; Zacher & Rosing, 2015), as this leadership emphasizes the flexibility when implementing leadership behaviors and the flexibility is what is need to tackle the uncertainties during innovation process. It is therefore natural that it has been recently proposed to understand the causality of leadership behaviors on innovation outcomes (Wang et al., 2021).

It suggests that innovative leaders need to show two paradoxical leadership behaviors (opening and closing leadership) to foster team's explorative and exploitative innovation behaviors. In addition, the flexible adoption between opening leadership behaviors and closing leadership behaviors is expected to inspire ambidextrous innovation behaviors in individuals (Zacher et al., 2016) and teams (Rosing et al., 2011) so that radical innovation outputs will come as a result.

Although ambidextrous leadership has the obvious advantage of giving subordinates more leeway to focus on opening or closing behaviors, it also entails a sense of paradox or inconsistency, that is cognitively more demanding for those who need to follow. This paradoxical pressure might be helpful because when it is absent it may stick subordinates to just exploration or exploitation thinking modes, but if it becomes too pressing, then subordinates might not cope well with the divergent requisites and simply paralyze. This is yet unknown and therefore, we question:

"To which extent is ambidextrous leadership self-limiting in producing innovation, especially radical innovation?"

The main objective of this research can thus be stated as testing if indeed ambidextrous singalling by leaders is advantageous to a certain point after which it becomes counterproductive. Simultaneously, it is also an objective to ascertain in which degree is incremental and radical innovation operating in a trade-off or not. Likewise, this research is intended to test the intervening role of innovation climate in the relationship between leadership and both incremental and radical innovation.

1.3 Research significance

Ambidexterity as a leadership theory is yet to be explored comprehensively in Chinese context particularly when concerning radical innovation rather than general innovation output. By researching effects originating from ambidextrous leadership in China, and especially by discarding the assumption of a linear association between ambidextrous leadership and radical innovation, this research contributes to literature and management practices on four areas:

Firstly, past studies have more explored the relationship between ambidextrous leadership and innovation. However, radical innovation differs from incremental innovation in various ways. Radical innovation incorporates technology that is a clear, risky departure from existing practice. Radical innovation often requires a different innovation process as oppose to incremental innovation (Ettlie, 1983). Therefore, it is not sensible to assume that ambidextrous leadership and radical innovation have the same causality as ambidextrous leadership and incremental innovation. This research contributes to the research area where no much efforts have been spent. The differentiation between radical innovation and incremental innovation enables us to reveal the answer to more important questions, to industry breakthrough and national development.

Secondly, there is indication in literature that ambidextrous leadership is better depicted as having curvilinear effects namely upon innovation outcomes, and a recent call for such research has been made by Wang et al. (2021).

Thirdly, there is not much research focusing on mediating factors between ambidextrous leadership and radical innovation that can help uncover the plausible curvilinear effects. This research can disentangle this issue.

Fourthly, China context deserves special attention in this domain. In Chinese society, ambidexterity has a deep root in ancient Chinese philosophy as Confucianism tends to foster stability, while Taoism fosters continuous change. By targeting ambidextrous leadership in a Chinese context, this research is also exploring a context where ambidextrous leadership can be more impactful in radical innovation outcomes.

1.4 Research methods

This research is designed to comprehend two empirical studies. The first study has a quantitative nature and is designed to test both indirect effects from ambidextrous leadership on two types of innovation: incremental and radical. This study is set also to test to which extent

this indirect effect follows a curvilinear, instead of a linear effect as usually assumed. A second study, of a qualitative nature, is designed to socially validate our findings (whatever they are), in the hope of contrasting scholar generated knowledge with real-world experts opinions about the reason of such findings. This study is also intended to understand what policies and recommendations can be based on our findings, so to leverage the applied value of such findings.

Although details on the methods deployed will be given in each study's specific section, the data collection is designed to prevent common method bias, through a time-lagged data collection strategy. The qualitative data collection and analysis is also designed to triangulate inferences and interpretations, so to reduce subjectivity.

For the first study, path analysis is deployed to test the conceptual model (and respective hypotheses) after the validity and reliability of the measures is tested and guaranteed. For the second study, independent coding in content analysis is made available so to control for subjectivity bias through interrater agreement index.

1.5 Thesis structure

The thesis is arranged as illustrated below.

Chapter one: Introduction. This chapter offers the background on China's innovation history, policy and current issues and strategic importance of innovation in China. It offers the background why innovation is such an important research and practical area, which leads to the research question of this thesis.

Chapter two: Literature review. This chapter reviews literature of our constructs and related concepts in order to scrutinize research on ambidextrous leadership and radical innovation. It starts by generally exploring literature on enablers and barriers to innovation and some factors associated with it. It then moves to depict the wider context of innovation policies, and differentiates between incremental and radical innovation, to finally focus on ambidexterity in all its expressions in society, organizations, and leadership. It ends by focusing on the relationship between ambidextrous leadership and innovation, highlighting both the curvilinear effects and innovation climate as a mediator to end with the conceptual model shown graphically to facilitate understanding.

Chapter three: Study 1. This chapter first summarizes the method deployed to test the conceptual model, and shows results concerning the hypotheses under analysis, to discuss them at the end.

Chapter four: Study 2. After doing a brief introduction to the study and its guiding questions,

the chapter shows the method deployed for this qualitative study, and results, closing the chapter with the respective discussion of results.

Chapter five: General discussion and Conclusion. This chapter integrates the main points of literature and all the findings from both studies, to present an overall discussion with the mind set on the motivating research question as stated in the introduction. It also offers recommendations while acknowledging own limitations but also suggesting future avenues for research on this topic.

[This page is deliberately left blank]

Chapter 2: Literature Review

2.1 Innovation research overview

Innovation is widely regarded as a critical source of competitive advantage in an increasingly changing environment (Azeem et al., 2021). Firm innovation capability is urgently sought in order to compete in a fast-changing globalized business environment. Modern companies require employees to demonstrate innovative behaviors and innovation capability, while past companies regarded these behaviors as inappropriate or disrespectful. This practical demand drives the scientists to put substantial efforts into research on innovation knowledge, skills, abilities, and other factors. Therefore, innovation research has flourished more than 50 years as organizations have changed from previously bureaucratic structures to more flexible and flat structures (Anderson et al., 2004).

Innovation often starts with problem recognition and idea generation, either novel or adopted. Then innovators seek sponsorship for an idea and attempt to build an alliance of supporters for it. After that, the innovator completes the idea by producing a prototype or model of the innovation that can be touched or experienced, that can now be diffused, mass-produced, turned to productive use, or institutionalized (Garbuio & Lin, 2021; Rice et al., 2001).

Although it is a popular research term, there is no consensus among management scholars on the definition of innovation. The first definition of innovation was written by Schumpeter in the late 1920s, who emphasized the novelty side within innovation (Hansen & Wakonen, 1997). Based on Schumpeter's point, innovation is about novel outputs: a new good or a new quality of a good; a new method of production; a new market; a new source of supply; or a new organizational structure, which can mean "doing things differently". However, according to the same authors one cannot do things identically (Hansen & Wakonen, 1997). Therefore, it is difficult to tell which level of changes or new products can be called innovation.

There is also long-time discussion among academics on various aspects of innovation: its necessity and sufficiency (Mahoney, 2001), its intentionality (Cañibano et al., 2006), its beneficial nature (Faems et al., 2005), its successful implementation (Ensminger et al., 2004), and its diffusion (Rogers et al., 2014) to qualify as innovation. Here this study defines innovation as the implementation of a new or significantly improved product (good or service),

or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations in line with Bloch (2005).

From this definition, we can see that there are mainly three types of innovation: product innovation, process innovation, and business model innovation. Scholars differentiate these three innovation types as follows: a) product or service innovation refers to the novelty and meaningfulness of new products introduced to the market in a timely fashion (C. L. Wang & Ahmed, 2004). The degree of novelty can vary depending on the referent dimension: a product or service can be new to the company (Davila et al., 2006), the customer (C. L. Wang & Ahmed, 2004), or the market (T. S. Lee & Tsai, 2005). b) process innovation refers to the introduction of new production methods, new management approaches, and new technology that can be used to improve production and management processes (C. L. Wang & Ahmed, 2004); and c) business model innovation refers to how a company creates, sells, and delivers value to its customers (Davila et al., 2006), whether it is new to the firm, customer, or industry. A systematic literature review uncovered several research gaps in innovation capability research and based on 137 reviewed studies, authors highlight the need for a clearer definition of innovation (Mendoza-Silva, 2021), but they settled on the three types (product, process, and organizational model) to which they add marketing innovation.

2.1.1 Innovation enablers

According to a review, there are two important research streams within thousands of innovative related research studies: innovation enablers and innovation barriers (Johnsson, 2017). Innovation enablers are defined as factors facilitating an innovation team in conducting innovation work within an organization. This study identified 20 innovation enablers among historical researches. These enablers may duplicate or rely on each other, and Table 2.1 provides a holistic overview and explanation of these.

Table 2.1 Innovation enablers and their explanation

Innovation enablers	Explanation of innovation enablers
Awareness	Ability to “see” invisible or unrevealed innovation related opportunities
Capabilities	Skills related to management or work in an innovation project
Climate	OK to fail-, let’s try-, let’s do-mentality in work environment
Collaboration	X-functional teams, collaboration between departments, suppliers and customers, open innovation, networks
Culture	Norms and invisible rules within the organization, “this is how we do it here”-mentality
Dedication	Factors making one feel dedicated, motivated or stimulated to work in innovation projects
Economy	Budget, non-monetary resources
Education	Innovation-related training in theory and practice

Empowerment	Trust to take one's own decisions regarding resources to spend on tasks to do, autonomy, interdependence
Entre-/intrapreneurship	Doers that make things happen
Human resources	Access to other colleagues that could contribute to innovation project, sharing competence and contributing to reduce bottle necks
Incentives	Monetary and non-monetary rewards
Knowledge	Regarding innovation and expertise in an innovation project topic
Knowledge management	How to use knowledge or how to fill knowledge gaps related to the innovation project
Management	Project managers, leadership, management support related to the innovation project
Mind-set	Self-confidence "I can," contributing "I share," want-to develop company, pro-innovation bias "I like," free-will "I want to"
Need	Explicit and clarified unsolved need of the customer, organization… The "why we should do this"
Processes	Innovation process, models and best practice that guides from idea to product on market
Strategy	Directions in customer segment, areas, geographical markets, level of novelty on new products and technology to use or develop
Time	Time dedicated or allocated to the innovation project

Source: Johnsson (2017)

Furthermore, different innovation enablers have received a varying degree of attention by researchers as showed in Figure 2.1.

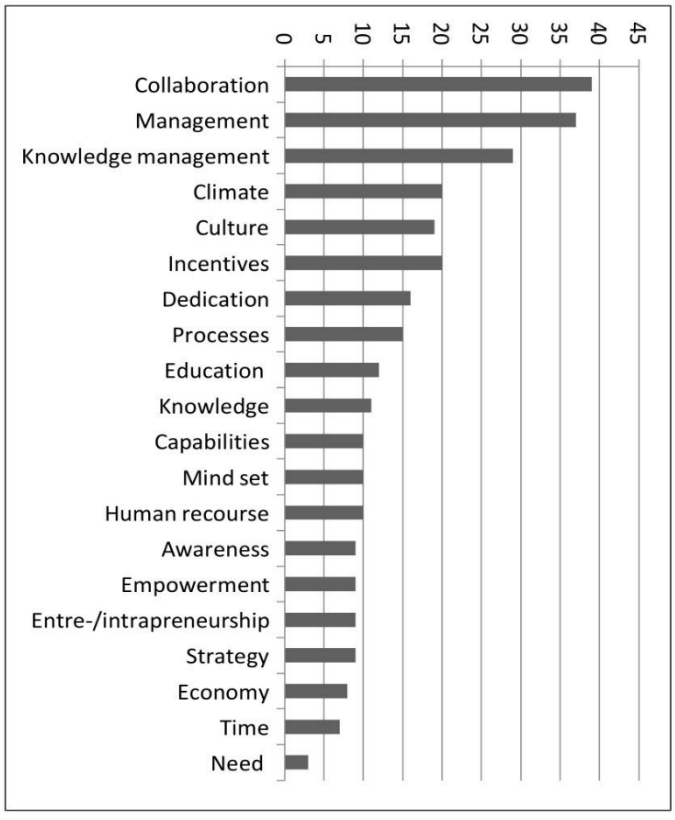

Figure 2.1 Number of studies referring to various innovation enablers

Source: Johnsson (2017)

2.1.2 Innovation barriers

The barrier approach is different from the enabler approach in that it explores which factors hinder innovation (Hadjimanolis, 2003) as it investigates factors that impede or hamper innovative activities (D'Este et al., 2012; Madrid Guijarro et al., 2009). The barrier approach is a much smaller research stream compared with enabler approach (Mohnen & Rosa, 2002). Innovation barriers consist of deterring barriers and hampering barriers. Deterring barriers prevent innovative activities in companies (Oke, 2004), whereas hampering barriers obstruct company from achieving innovation outcomes and can be overcome with efforts (Sandberg & Aarikka-Stenroos, 2014).

Innovation barriers are proved to be dynamic: the importance of barriers differs according to corporate size, industry of the company, innovation stage and other factors (Hadjimanolis, 2003). For example, large mature companies are more concerned with risks of commercial failure, cost uncertainty and internal obstacles like organizational bureaucracy and structured procedures, while small enterprises often encounter obstacles such as lack of financial and personnel resources and inadequate legitimacy of the firm (D'Este et al., 2012; Hewitt-Dundas, 2006). Moreover, barriers are also sector sensitive. Telecommunications sector is more sensitive to legal obstacles, while banking sector is vulnerable to internal mindset towards change. General speaking, the more competitive and research-driven the sector is, the greater the barriers are (Mohnen & Rosa, 2002).

The most accepted classification of innovation barriers is based on Piatier's research of internal and external barriers (Hadjimanolis, 2003); Reynolds and Hristov (2009). Internal barriers are closely related to its management and organization itself including financial resources, competencies, and mindsets. External barriers relate to a firm's external network including the behavior of competitors, customers, partners, and governments (Madrid Guijarro et al., 2009).

2.1.3 Innovation capability and corporate performance

During the past decades, different industries faced far border challenges. Demographic shift, financial reforms, emerging market, advancement of communication and information technology and changing customer behavior had a considerable impact to change the efficiency, productivity and the structure of many industries. These challenges create very competitive threat and recast the market. The firm’s capability to innovate is the most crucial factor for competitive advantage in highly turbulent market condition. Innovation capability leads

organization to develop innovations continuously to respond the changing market environment (Slater et al., 2010). And innovation capability building should be embedded to all the strategies, system and structure that support innovation in an organization. Thus, innovation capability is regarded as the most important determinant of corporate performance (Rajapathirana & Hui, 2018).

Innovation capability can be explained as combination of assets and resources. It requires wide variety of resources, assets, and capabilities to drive through success in rapidly changing environment (Sen & Egelhoff, 2000). Technology is the major asset for corporation innovation. However non-technological aspects are also considered as very important. Technology or product innovation provides corporation the capability to expand into the new market and industries and enables digging the opportunities to earn an abnormal profit and providing the route for the firms to earn profits. Non-technological innovation for example process innovation, market innovation or organization innovation are all crucial to help the corporation realize the profit in its business model. Process innovation is the implementation of new or significantly improved production or delivery methods. It may be considered changes in tools, human capital, and working methods or a combination of these. Marketing innovation is introducing new marketing methods involving significant changes in product design, product placement and product promotion or pricing. The main objective of the marketing innovation is to better address the customer needs to penetrate new market or new positioning a firm’s product on the market with objective of increasing firm sales. Alsamydai et al. (2010) have found marketing innovation has positive effect on creating long-term competitive advantage and company growth. Organizational innovation is implementation of a new organizational method in the firm’s business practice or external relations. Organizational innovation can lead to improve the firm performance by reducing administrative and transaction cost and it intend to improve the workplace satisfaction as well. Organizational innovations are strongly connected with all the administrative efforts including renewing the organizational systems, procedures, routines to encourage the team cohesiveness, coordination, collaboration, information sharing practice and knowledge sharing and learning. According to Hamdouch and Samuelides (2001), organizational innovation will help absorb the innovation and exploit the innovation in order to achieve rampant market growth. Most of the research studies tended to focus on product and process innovation rather than given importance to the organizational and marketing innovation in the literature. Few types of research have adopted organizational innovation to identify the effect on firm performance. Damanpour and Evan (1984) explored that adoption of administrative and technological innovations are more important for the organization to

improve their performance level. Johne and Davies (2000) suggested that marketing innovation is given a decisive importance for the firms to increase their sales and enhance the profitability.

Scholars are dedicated to identifying the relationship between the innovation and firm performance. The relationship between innovation capability and corporate performance is verified by several empirical studies (Jin & Choi, 2019; Migdadi, 2022; Saunila et al., 2014). Researchers have used a different kind of financial and non-financial indicators to analyze the business performance; it may be subjective and objective indicators. C. H. Wang and Hsu (2014) conducted research which related to high-tech industry in Taiwan to identify the relationship between the market orientation, service innovation, and innovation performance. Findings revealed that innovation as fully mediating effect on innovation performance. Mabrouk and Mamoghli (2010) have investigated innovation in banking sector. Their study indicated that product innovation improves the profitability while process innovation improves the profitability and efficiency and also revealed that first mover of innovation both product and process have great effect on profitability. Implementation of product, process and organizational innovation makes firms to become more flexible in their operations and it drives company to improve the quality of products, expansions of network, acquirement of quality people and technology competitiveness.

Meanwhile, Venkatraman and Ramanujam (1986) suggested that corporation performance is multiple hierarchical constructs which indicating financial performance and operational performance such as market share and quality. Calantone et al. (2002) found a positive relationship between a firm's ability to change and adopt innovations and overall profitability. Cooper and Kleinschmidt (2000) studied the relationship between new product strategies and new product performance. Van Leeuwen and Klomp (2006) reported a positive relationship between process innovation and performance measured by sales performance, sales per employee, and employment growth. T. Li and Calantone (1998) discovered the relationship between new product advantage and market performance measured by EBITDA, ROI, pre-tax margins, and market share. Therefore, it is difficult to generalize findings from previous research. Still, majority of past studies revealed that there is a positive relationship between innovation and firm performance. As improving corporate performance is the final goal of management practitioners, there will be more future research and meta-analysis concentrating on the causal relationship.

2.1.4 Innovation capability and leadership

Creative and effective organizations do not emerge by accident. They require leaders to drive and control deliberate changes in structure, culture, and process in order to transform them into creative, effective, and productive ones. Even though many organizations look for competitive advantage in their structure, strategy, technology, and culture, leadership is the most important source of competitive advantage. Organizational leaders usually decide what happens in the organization and give the direction, vision, and momentum that bring success. Therefore, leaders are the catalyst that create and manage the environment, organizational culture, and strategies that encourage and sustain innovation, effectiveness, and success in the organization. When the organization establishes its strategy and work processes, the leaders direct the implementation that brings it to accomplishment. Technology, right culture, and strategy are necessary and contribute to the success of the organization. However, for any of these vital aspects to bring any real benefit, the leadership must support, sustain, encourage, and inspire followers to make it work. Therefore, for the innovation process to begin in any organization, that organization must first put the right leaders and leadership structure in place. Moreover, the leaders must themselves be interested in innovation; otherwise, they can stifle creativity and innovation in the organization. The top leaders in the organization usually have the power and authority to develop strategies that lead to innovation, which means if they are unable to perceive opportunity for innovation, do not wish to exploit them, or are unable to respond to them, these leaders can impede innovation. Conversely, if the leaders' objectives are dynamic, ambitious, and innovative, and if they demonstrate proactive attitudes as well as a capacity to respond to change, this can help bring innovation and success to the organization. For example, when IBM had to change its culture in order to renew the organization, it brought in a new CEO, Lou Gerstner. Similarly, it took Jack Welch, a new CEO, to change the culture of General Electric to help it become highly innovative and successful. Cameron and Quinn assert that culture change will not occur without the involvement, commitment, and active support of leaders who repeatedly work to convince the members of the organization of the benefits and need for an organizational culture change.

Organizations with weak leadership tend to be less effective and are prone to constant restructuring and downsizing in order to solve their short-term problems. Organizations with creative and effective leaders work to avert the need for major restructuring and downsizing. These leaders run the organization effectively and innovate constantly therefore prevent it from reaching the stage of business failure. Many of the problems and failures that face organizations

come from lack of creative leadership. Consequently, leadership is the fundamental competitive advantage for success because without the right creative and effective leadership in organizations, the strategy, technology, and innovations will not succeed. Organizations need creative and effective leadership to manage the implementation of the strategy and encourage innovation in the organization.

As stated before, leadership is an important enabler of innovation. It is an essential element to achieve organizational innovation (Anning-Dorson et al., 2017; Do Adro & Leitão, 2020; Liao et al., 2017). However, not every kind of leadership is effective in creating innovation capability. Building up certain kinds of leaderships can produce results that generate creativity. Agbor (2008) states that successful organizations discovered that shared and collaborative leadership, rather than heroic and authoritarian management, is what unlocks the potential of organizations. Organizations that operate from the authoritarian, hierarchical, command and control model, where the top leaders control the work, information, decisions, and allocation of resources, produce employees that are less empowered, less creative, and less productive. This kind of model focuses on leadership as an extension of the top leader's actions and will. This heroic model of leadership was popular in the 19th century but continues even today in many organizations. The heroic approach to leadership has little chance of bringing innovation and renewal because leaders do not single-handedly lead organizations to greatness (Agbor, 2008). Rather, leadership involves many individuals with various tools and skills who together transform the organization. The alternative form of leadership is that it is not the ability of one person to take charge, but the ability to inspire, empower, and exert broad influence in the organization. Contemporary leaders know that no individual has all the ideas, the skills, and time to carry out the complex tasks of contemporary leadership. They know that organizations will not survive if their leadership is limited to the top leaders because leadership opportunities exist at every level of the organization. Therefore, for an organization to become innovative and successful, it must benefit from the creativity of all its members. Organizations can achieve this by harnessing all its leadership abilities. Everyone in the organization in some way needs to be involved in its leadership (Agbor, 2008).

As the research problem of this thesis is focused on the effect of ambidextrous leadership on innovation, we will review the relationship between innovation and ambidextrous leadership to support our hypotheses.

Then how the leaders can encourage innovation and creativity in organizations. Firstly, leaders build the environments which encourage creativity, sharing and risk-taking behaviors (Mehmood et al., 2021). This kind of innovation climate encouraged by leaders facilitates the

bottom-up process of innovation generation (Koutsouris & Zarokosta, 2020). Secondly, in a top-down process, leaders set up strategic goal for innovation and give clear directions (Y. Zhou et al., 2021). Furthermore, in the top-down process, leaders obtain financial and personnel resource, gain external and internal support, grant autonomy to the teams so that such teams or the organization as a whole can conquer obstacles during innovation process (Deschamps, 2005; Y. H. Kim et al., 2014; Kozioł-Nadolna, 2020). Therefore, the leader facilitates the dual process of organization innovation. Furthermore, leaders can be more effective in encouraging creativity by treating organizations as living systems filled with the innovative dynamics and potential that exists in all of the people. In essence, leaders must stop treating the people in the organization as machines, but rather as living beings who work in organizations that are living systems. This worldview helps leaders create organizations filled with followers who are capable of adapting, alert to changes in their environment, and able to innovate purposefully (Agbor, 2008).

Within the innovation research field, the specific construct of ambidextrous leadership has emerged among other approaches to leadership. These will be further developed in later sections of this thesis.

Alongside these factors there are overarching structures and mechanisms intended to leverage innovation and that fall under the umbrella of the innovation policy construct.

2.2 Innovation policy

Innovation policy is a comprehensive and complex policy system with the objective of promoting innovative activities, improving economic competitiveness and achieving sustained economic growth through policy instruments (Asheim, 2019; Fagerberg, 2017). Since innovative policies are often exploratory and experimental, they are characterized by greater uncertainty, and these policies need to be constantly reviewed and verified for their effectiveness toward the set targets.

There are several important research directions regarding innovation policies and their implementations in various countries.

Innovation policy instruments research is focusing on the different policy tools used by governments to promote innovation, such as financial support, tax incentives, intellectual property protection, and talent attraction and procurement of innovation services (Borrás & Edquist, 2013). Research in this line analyzes the effectiveness, applicability, interaction and possible limitations of these policy tools, and explores how to optimize the policy mix to better

promote innovation.

Innovation ecosystems research studies the construction and development of networks of players that interact to contribute to innovation, including building up industry-university research cooperation, innovation networks, and innovation platforms (Radicic et al., 2020). Research that falls within this scope is intended to analyze how these ecosystems promote knowledge sharing, technology transfer and commercial application, and how to improve the innovation efficiency of the whole system.

Evaluation of innovation performance research focuses on how to scientifically evaluate the performance of innovation policies, including innovation output, economic benefits, social impact and other aspects (K. Kim et al., 2021). By constructing a reasonable evaluation index system, quantitative and qualitative analysis of innovation policies can be researched to provide a basis for policy adjustment and optimization.

Comparison of innovation policies research studies the experiences and lessons learned from different countries in innovation policy formulation and implementation, and through comparative analysis and case studies (S. Wang et al., 2021), it intends to distill successful policy models and strategies, so as to provide reference for innovation policy formulation in other countries.

2.2.1 Innovation policy instruments

Innovation policy instruments or instrument mix refers to a set of different and complementary policy instruments to address the problems identified (Borrás & Edquist, 2013). The choice of appropriate combinations of policy instruments considers complementary and balancing effects of individual tools on the innovation system. Policy instruments also need a certain degree of adaptation to the changing needs of the system.

Innovation policy instruments include, but are not limited to, public procurement, subsidies, credit, venture capital, tax incentives, contract research, patents, technical standards, education and training (Denney et al., 2023). These policy instruments can affect innovation activities from different levels and dimensions, including provision-side, demand-side, and environment-side. Provision-side policy instruments directly promote innovation activities, demand-side policy instruments encourage innovation activities, while environmental-side policy instruments indirectly affect innovation activities.

Among the innovation policy instruments, they can also be categorized into incentive-type, regulation-type, and soft-type according to the mechanism of actions (Borrás & Edquist, 2013).

Incentive-type policy instruments emphasize the direct driving of innovation behavior, such as financial subsidies or tax incentives. Regulation-type policy instruments emphasize the intervention on innovation behavior. And soft-type policy instruments emphasize the guiding function of innovation behavior.

Regulatory instruments are laws and binding regulations important to innovation policy, for example patent regulation, researchers' employment regulations and regulations on higher education organizations and competition policy regulations concerning R&D, bioethics and other ethical regulations related to innovative.

Incentive instruments are the most widely used instruments, for example, tax incentives for R&D at firm level, incentive to technology transfer, and support to venture capital and seed capital. There has been a significant trend towards selecting and designing “market-based” or “market-like” economic incentives ever since the 1990s (Borrás & Edquist, 2013). In researching the standardization of 3G in China, Gao (2015) conclude that these sorts of hard instruments were the only ones, enacted by Government, that could guarantee goal achievement.

Soft-type policy instruments have been increasingly used in innovation policy. But these policy instruments are complimentary to regulatory and incentive instruments (Borrás & Edquist, 2013). There are various forms of soft instruments. For examples, voluntary technical standards at the national or international level, codes of conduct for firms, universities or public research organizations, management contracts with public research organizations, public-private partnerships sharing costs, benefits and risks in the provision of specific public goods (in the field of knowledge infrastructures), campaigns and public communication instruments. They are characterized by being non-coercive.

Another angle to analyze policy instruments is how to balance between demand-side and supply-side instruments. Demand side policy instruments are those that foster the market demand for a specific novel technology while supply side instruments leverage companies or R&D units to further their innovation activity. Ten years ago, Borrás and Edquist (2013) already observed that most of the existing incentive instruments are from the supply side rather than the demand side. This can have a perverse effect, called technology lock-in, where technological innovation can be hampered by self-limiting decisions regarding how much risk to take, how much to rely on public funding which ultimately leads to sub-optimal technical options (Kalkuhl et al., 2012).

Borrás and Edquist (2013) argued that there is a need for a new generation of innovation policy instruments, especially demand side instruments, such as public procurement for innovation. Public procurement instrument (PPI) occurs when a public agency places an order

for a product or system that does not yet exist; PPI generates the innovation. PPI has been used to address social challenges such as global warming, renewable energy, water and food, aging population, public health, pandemics or national security. China has also started to use public procurement instruments as an important tool to address economic development with positive outcomes in firms R&D investment (Dai et al., 2021).

By exploring the case of solar energy, J. Lee et al. (2022) highlight that the demand-side innovation policy instruments can also have detrimental effects on innovation potential by creating a mirror of the technological lock-in, due to market pressures which favor market-ready technologies as against those that require more investment to go to market.

Within this modern complex society nowadays, the cause of social economic problems also has a complex nature, which requires combined and systemic policy mix to address them. Smits and Kuhlmann (2004) argue that systematic policy mix become what the society needs compared with past implemented innovation policies. Research on innovation policy mix has received great attention from policy-makers as well. However, Borrás and Edquist (2013) point out that there are no perfect models or so called “optimal” policy mix for one country or a targeted problem. On the contrary, policy mixes are combined based on the context for which they are designed. In line with Meissner and Kergroach (2021) policy mix must be contingent upon innovation culture and history to gain legitimacy. It is impossible to have universal policy mixes because, the problems are different, and the socio-political and historical contexts of policy-making are different across countries and regions and legitimacy is required for policies to gain acceptance by society at large.

The outcome of policy mixes is not only depending on customization and combination of right policy instruments, but also actual implementation of these policy mixes. How well the policy mixes is put into practice and organizational capacity of the public administration often have a major impact on the results of innovation system improvement (Borrás, 2011). Still, currently there is yet room for improvement as regards measuring the impact of policy instruments as the methods deployed are yet not mature and this is critical for policy initiatives and decisions at the governmental level (Meissner & Sandrine, 2021).

2.2.2 Innovation ecosystem

Innovation ecosystem refers to the interaction and interdependence system formed by technological innovation organizations and technological innovation environment in a certain scope through the flow of innovation elements, energy and information (L. Huang, 2003).

Despite criticism of the adoption of the term “eco” (Oh et al., 2016) we opt to keep it so to highlight the systems thinking and dynamics that surely characterize innovation as a complex process.

There is much research focusing on the study of innovation elements and their functions. According to L. Huang (2003) the feedback mechanism is the first and foremost important mechanism within an innovation ecosystem. When an innovation ecosystem deviates from the equilibrium point, the positive feedback mechanism makes the system further deviate from the equilibrium point, making the system unstable; the negative feedback mechanism makes the system return to the equilibrium point, making the ecosystem remain stable.

Positive feedback causes a series of changes in innovation ecosystems, which accelerates its development. It is an incentive mechanism, which moves innovation ecosystems from a low status to higher level. Conversely, negative feedback is generally a kind of constraint mechanism, which can promote favorable aspects caused by positive feedback mechanism and overcome the destructive effect of the positive feedback mechanism.

According to the same author, in humankind history, science and technology innovation keeps improving survival conditions, which motivates people to continue to engage in science and technology innovation. Therefore, there is a belief that human beings should be liberated from the bondage of nature. However, the economic significance is not the only target of innovation ecosystem. This positive feedback has considerable impacts on ecological and environmental systems. Thus, negative feedback regulation becomes very necessary. When the goals of economic growth in the region can be realized, while green technological innovation, ecological and environmental objectives cannot be achieved, it is important to impose constraints to regulate innovation and control the production to avoid the coexistence of economic growth and ecological deterioration. The invention and manufacture of DDT is a good example that innovation brings economic gains but cause harm to long term ecology balance and human health. Although negative feedback regulation is imposed it is still difficult to restore the natural balance.

Negative feedback regulation should be carried out according to regional differences. If strong negative feedback regulation is applied indiscriminately to all regional innovation ecosystems, it will be difficult for less developed regions to develop. Targeted implementation of positive feedback regulation in China is also necessary. In majority of China provinces, the main problem is how to establish an incentive mechanism to greatly promote the region's technological innovation.

Alongside feedback, L. Huang (2003) highlights another important indicator for the

development of innovation ecosystems: its robustness. If the innovation ecosystem is not robust and stable, any small deviation can cause disturbance or disruption for this innovation ecosystem.

The robustness of the innovation ecosystem refers to the continuous technological innovation search and operation modes. Because all technology is subjected to obsolescence, the robustness of system relies on the stable status of keeping momentum of innovation. The stability of innovation state is more important than the stability of the result. The robustness of the innovation ecosystem means that the system maintains the stability of its structure, state and behavior, or that it can rapidly return to normal, despite large perturbations from a variety of internal and external factors. Redundancy in innovation elements is instrumental to produce robustness. Redundancy refers to innovation subjects with the same characteristics within the same innovation ecosystem. Redundancy means that eliminating some innovation subjects will not change the function and structure of the system. It can also foster the competitive pressure, stimulate innovation motivation, and then realize the system stability. However, excessive redundancy often leads to excessive competition and waste of resources.

In a recent study conducted in China, the size and strength of the innovation ecosystem network has an interaction effect with enterprise knowledge search in producing knowledge integration and subsequent breakthrough innovation (Y. Zhang et al., 2021). When the innovation ecosystem size and network are strong the indirect effect originating from knowledge search in leveraging breakthrough innovation is more evident.

2.2.3 Evaluation of innovation performance

Innovation performance refers to the results produced by innovation activities and the productivity of a given number of inputs of innovation resources (Z. Zhang & Hu, 2000). It is the result of cooperation and interaction among the components of the innovation system.

Analyzing and evaluating innovation performance can not only lead to better understanding of the operation mechanism of innovation activities, but also know how to enhance the operation efficiency of the innovation system and identifying the strengths and weaknesses of the innovation capacity to points out the direction for further development of the innovation capacity.

According to Z. Zhang and Hu (2000) the main methods for evaluating innovation performance are input-output evaluation method; innovation system function evaluation; and innovation subject interaction evaluation.

The input-output evaluation method views innovation activities as an input-output process. Output efficiency is at the core of innovation performance evaluation and has been targeted in evaluation frameworks such as the Global Innovation Index that comprehends five drivers: institutions, human capital and research, infrastructure, market sophistication, and business sophistication. Crespo and Crespo (2016) found that none is a sufficient condition to explain innovation performance and that configurations vary according to the level of the development of the country.

The system function evaluation method assesses various functions affecting the innovation system to measure the performance of innovation. For example, the "National Innovation Index Report" issued by the China Academy of Science and Technology Development Strategy (CASTDS) takes five aspects (innovation resources, knowledge creation, enterprise innovation, innovation performance and innovation environment) as the first level of evaluation indexes. Elahi et al. (2016) examined the relationship between a country's public innovation infrastructure, knowledge and technology absorptive capacity, and innovation performance, and constructed a model for evaluating innovation performance consisting of the above three dimensions and nine constructs.

The innovation subject interaction approach emphasizes the performance of innovation subjects and their interactions as a means of measuring innovation performance. For example, OECD uses four types of knowledge or information flows as the main indicators for evaluating national innovation performance: research and technology cooperation between firms, public-private interactions, implementation of knowledge and technology, and the mobility of innovation talents. Stek and Van Geenhuizen (2016) used patent-based bibliometric indicators to study how international research collaboration influence a country’s innovation performance. In general, there are several methods to evaluate innovation performance, among which the input-output evaluation is the most widely used till now.

2.2.4 Comparison of innovation policies

C. Huang (2004) conducted a comparative analysis of innovation policies between China and the European Union that was very informative. The author concludes that research and practice of China's innovation policy started relatively late. In 1996, the European Union (EU) published “the First Action Plan for Innovation in Europe”. “The First Action Plan for Innovation in Europe” adopts a systemic view of innovation, which is still being developed and researched, and sets out proposals and programs for the development of innovation policy in the EU.

According to this author, the EU strategy for innovation started more than 20 years ago with the Council of the European Union, held in Lisbon in March 2002. Ever since the EU has issued annual reports on EU innovation policy, reporting, qualitatively analyzing, comparing and evaluating the innovation performance of member states. This has given importance to lifelong learning in innovation policies in EU member States as they already had a mature higher education system. In the EU Innovation Scoreboard, participation in lifelong learning has become one of the 17 indicators. EU governments believe that it is very important for innovation to keep the skills of workers up-to-date with the ever-changing technological changes in the knowledge economy through lifelong education. At the same time, the development of information technology and the achievements of the EU in the construction of digital infrastructure also provide many options for the development of lifelong education. Another pillar from the Lisbon Strategy concerns the mobility of researchers between universities, research institutions and companies. A third pillar targets anti-monopoly, the reduction of government protection of certain industries, and promotion of technology transfer. Likewise, a focus on the countries' patent office's role changed from an archival function to a proactive agent of promoting and disseminating patent information, and also promoting the patent application for SMEs. The priority was to protect intellectual property. Additionally, acknowledging bureaucracy as a barrier to innovation, administrative procedures simplification measures were set in place to promote an efficient, clean, and modern government system.

One of the key features of the EU innovation policy lies in the Triple Helix which brings together Universities, Industry, and Government (Ranga & Etzkowitz, 2015). Twenty years ago, C. Huang (2004) had already highlighted the University-Research Cooperation (UIRC) in Europe, to promote technology transfer and joint research projects. In Germany, there were a series of programs, such as EX2IT (to promote university-founded enterprises), INNONET (to promote joint R&D projects between research institutes and enterprises), Pro InnoNet2work of Competence (participants are non-R & D personnel). Finland, Spain, the UK, the Netherlands, and Portugal strongly encouraged joint research programs between enterprises and research institutions.

Based on conception from Xiao et al. (2019) that differentiates between technical efficiency (that measures production efficiency due to innovation set up in the region), and scale efficiency (that measures the optimal level of input-output scale of innovation resources), but also comprehensive efficiency (that puts together technical and scale efficiency to measure the allocation of efficient utilization of innovation resources), Zhuang et al. (2021) conclude that between 2008 and 2018 the Triple Helix strategy was readily adopted by China and its

effectiveness is empirically sustained in a way that double-partnerships (e.g. government-industry, or university-government, or university-industry) leverage technical or scale efficiency, but the three together do leverage comprehensive efficiency.

This is also documented in the case of the emergence of nanotechnology ecosystems in Israel (Drori & Lavie, 2024), where bureaucratic inefficiency, resource constraints and conflicting agendas between universities and government made ecosystems stuck but once organizational metamorphosis occurs (the creation of an organization originating from an existing one but with altered organizational traits) and transition to a cooperation was established, the ecosystem unblocked bottlenecks to establish an efficient innovation productive state.

After nearly two decades of development, the gap between China and EU innovation economy is still visible but the growth rate of China clearly indicates convergence towards EU innovation level (Kowalski, 2021).

2.2.5 Policy design

Public policies are the expression of the government concern and options to solve problems related to citizens well-being (Weimer & Vining, 2017), and depending on its design, policies can be fully effective or, contrarily, totally ineffective. According to Siddiki (2020), policy design entails two dimensions: formulation and content. Policy formulation comprehends the choices made as regards the instruments, while content refers to the substantive characteristics of policies, as well as their functional and structural characteristics.

In researching policy design, Schneider and Ingram (1990) set out a theory that focuses on how policy tools are able to enact behaviors in line with the policy content. These authors distinguished between authority tools (which assume individuals comply with the policy based solely on deference to authority), inducements and sanctions (which assume individuals comply due to tangible payoffs), capacity-building tools (which assume training and having the right skills and values will make individuals comply), hortatory tools (which assume inspirational speeches, proclamations and other emotional based messages will activate the individuals willingness to comply), and learning tools (which assume individuals can be encouraged to solve problems by themselves once learning systems are set in motion).

From a behavioral viewpoint, according to Schlager and Cox (2018) policy design must consider three important factors if it is intended indeed to effectively implement policies. Firstly, the policy maker must consider the individual's citizens values; secondly, how strong is their

information processing capabilities, and thirdly, what internal psychological processes makes individuals act within a determined situation (that the policy is intending to govern). Policies that echo the individuals' values and provide them with a sense of utility will most likely be adopted. Likewise, policies that are written and conveyed in a simple way will require less cognitive effort, and therefore, be more readily understood by citizens. Lastly, when making judgments about the policy contents citizens will pay attention to how much the policy satisfies fundamental needs (their feeling of fairness, being competent, and belonging to a community) as well as their intrinsic motivations (Deci & Ryan, 2004). In line with this, policy design should be conceived to build upon choice architecture heuristics that are well known in behavioral economics (Suter, 2008).

As this study was designed to add interpretative value to the quantitative study and also to explore venues for its translation into policy making guidelines, we have proceeded to a qualitative study to be guided by our findings in the study one.

2.3 Radical innovation and incremental innovation

2.3.1 Difference between radical innovation and incremental innovation

Incremental and radical innovation is one of the most commonly used classification of innovation in the literature (Forés & Camisón, 2016). Similar to the definition of innovation, there is no consensus on the definition of radical innovation among scholars (Dahlin & Behrens, 2005; Kovacs et al., 2019). As Dahlin and Behrens (2005) pointed out almost twenty years ago, there was no consistent terminology concerning many closely related terms. Similar terms are discontinuous innovation, disruptive innovation, new product development, major innovation, and breakthrough innovation. The distinction of these terms remains inconsistent and ambiguous in the literature (Kovacs et al., 2019). Many researches use these terms and fail to clarify the exact differences between them. This is a challenge that remains today and creates difficulties.

In earlier studies, Ettlie (1983) described radical innovation as fundamental changes representing a clear departure from existing practice. Green et al. (1995) summarized four features of radical innovation: (1) technological uncertainty, (2) firm technical inexperience, (3) firm business inexperience related to the outcome of the innovation and (4) substantive cost. These can help composing a comprehensive definition. Chandy and Tellis (2000) gave a definition that "radical product innovation is a new product that incorporates a substantially

different core technology and provides substantially higher customer benefits relative to previous products in the industry". Dismukes et al. (2005) described radical innovation in terms of the dramatic changes it creates in technology, processes or products, transforming or creating whole new markets and industries. In many definitions, radical innovation is often regarded as new both to the firm and the market. Thus, radical innovation inspires new industry, new competition, new distribution networks and new business activities.

Opposite to radical innovation, incremental innovations are usually referred to minor improvements or simple adjustments in current technology (De Brentani, 2001). The major difference between them is the degree of novelty and new knowledge embedded in innovation (Knell & Srholec, 2009).

It seems easy to distinguish between radical and incremental innovation. However, in reality, managers tend to differentiate them based on their personal knowledge of technology and products (K. Z. Zhou & Li, 2012). Meanwhile, innovation evolves over time (Sood & Tellis, 2005). For example, steam locomotives used to be novel technology but now it is already obsolete technology. Therefore, radical innovation and incremental innovation are interchangeable categories (Van Reine & Robert, 2022). Whether to place an innovation in radical or incremental innovation category depends on the discretion of those familiar with the industry.

Radical innovations typically have the potential to greatly improve business performance compared with existing products, services, and processes. Companies with radical innovations usually benefit from substantial financial rewards, create extensive competitive advantage and offer unusual customer experiences (Sorescu et al., 2003). However, the likelihood of developing radical innovations is low (Herrmann et al., 2006) with many companies only able to introduce incremental improvements although they aim to drive radical innovations (Stringer, 2000). Part of the reason is that developing radical innovations requires different routines and structures than those that support incremental innovation (Stringer, 2000).

The existing structure and routines within many firms do not support antecedents of radical innovation (Bessant et al., 2010). Building radical innovation capability requires firms to make changes at the levels of strategy, structure, processes, culture, and leadership (Slater et al., 2014), while these firms will face high levels of uncertainty and risk (O'Connor & Rice, 2013). There are unexpected obstacles, unanticipated challenges, a requirement for absorbing new knowledge and solving new problems during radical innovation processes (Stringer, 2000). Meanwhile, the rewards for these efforts are often uncertain. Therefore, only individuals with exceptional commitment are likely to drive radical innovation (Ettlie & Rubenstein, 1987).

Many scholars pointed out that the employees should keep independence to create radical innovation without much management control (Hill & Rothaermel, 2003).

Incremental innovation can be generated through well-defined procedures, typically from a top-down strategic planning process (De Brentani & Reid, 2012; Koen, 2004) or through interactions between a company and its customers (Rice et al., 2002). However this kind of defined process is usually of little use for radical innovation (Alexander & Van Knippenberg, 2014). This can be ascribed to the differing connotations about what is incremental and radical innovation (Smismans & Stokes, 2017) and the underlying processes that produce the mindset for incremental and radical seem to be substantially divergent. Therefore, we hypothesize that:

H1: Incremental innovation has a direct negative effect on radical innovation.

2.3.2 Radical innovation in SMEs and large firms

SMEs and large firms have their relative advantages with respect to innovation. It is difficult to state who are better innovator (Spithoven et al., 2013). As Kumar et al. (2012) stated, large firms have relative innovative advantages on resources. Firstly, internal financing can be an important factor when external financing is absent. Also, it is easier for large firms to obtain external financing for risky innovation projects because returns from these projects are higher if the innovator has a large volume of sales. Secondly, large firms can diversify the risk by investing in a portfolio of projects. Large output of big firm can ensure that failures of R&D projects will not impact firm performance too much. Thirdly, the reputation of large firms helps new products to enter the market, explore the results and achieve a higher productivity. As Nooteboom (1994) found, the relative strengths of large firms are predominantly material, for example, economies of scale and scope, cheaper financial resources, risk sharing, wide diffusion.

SMEs cannot build their advantages on these factors. Instead SMEs have relative innovative advantages on behavioral characteristics, for example greater motivation, more efficient communication, or flexibility (Nooteboom, 1994).

As Jørgensen and Messner (2009) stated, large firms may be reluctant to innovate since they feel less threatened by competitors, or because a new production line may sacrifice sales of existing products. Meanwhile there are more decision makers in large firms, which causes management coordination inefficiency and loss of flexibility. The lack of bureaucracy within SMEs provides them with the freedom and ownership for innovation teams and individuals (Vossen, 1998). These relative advantages are summarized in Table 2.2.

Table 2.2 Relative advantages of small and large firms

SMEs	Large Firms
Little bureaucracy	Formal management skills
Rapid decision making	Able to control complex organizations
Risk taking	Can spread risk over a portfolio of products
Motivated and committed management	Functional expertise in staff management
Motivated labor	More specialized labor
Rapid and effective internal communication, shorter decision chains	Time and resources to establish comprehensive external Science & Technology networks
Fast reaction to changing market requirements	Comprehensive distribution and servicing facilities
Can dominate narrow market niches	High market power with existing products
R&D efficiency	Economies of scale and scope in R&D
	Can support the establishment of a large R&D laboratory
	Access to external capital
Capacity for customization	Better able to fund diversification, synergy
Capable of fast learning and adapting routines and strategy	Able to obtain learning curve economies through investment in production
	Capacity for absorption of new knowledge / technology
Appropriation of rewards from innovation through tacitness of knowledge	Able to erect entry barriers

Source: Vossen (1998)

O'Connor (2006) stated that with respect to radical innovation, large firms are often not regarded as successful innovators. This author posited that large firms are more inclined to generate incremental innovation based on their existing technologies and products. The genes of large firms usually do not match the requirements of radical innovation: values embodied in their leadership practices, their cultures and structures, their over-reliance on internal R&D, and their inability to attract and motivate aggressive and agile entrepreneurs.

This may explain why large firms often organize their innovative projects through small firm spin-offs (Eriksson & Kuhn, 2006) to avoid the disadvantages embedded within large firms. On an industry level, Cohen and Klepper (1992) found that sectors consisting of small firms tend to change technology more rapidly because more radical ideas come out and are tested frequently. An industry dominated by larges firms tends to develop incremental improvements more rapidly as large firms pursue these advancements.

2.4 Ambidexterity research overview

"Ambidexterity" derives from Latin. "Ambos" means "both "and "dexter" means "right hand" or flexible. So, the Latin word ambidexterity means "flexible on both sides". Related to organization innovation, the term ambidexterity comprises two complementary elements: exploration, and exploitation (Voss & Voss, 2013).

As Cantarello et al. (2012) and Walsh et al. (2016) explained, innovation is closely related to ambidexterity. Most of innovations comprise two processes: idea generation (creativity) and idea implementation. Idea generation requires the ability of "thinking out of the box". This idea generation links to exploratory activities. However, creative ideas must not only be new, but also useful, which requires the exploitation of existing knowledge. Idea implementation requires efficiency, planning, and execution, which is linked to exploitative activities. Implementing new ideas also requires exploration of new strategies and routines. Therefore, exploration and exploitation are important for both creativity and implementation, although idea generation is more closely linked to exploration and idea implementation is more closely linked to exploitation. Ambidexterity is critical to innovation and essential to achieve innovation.

2.4.1 Ambidexterity as a cultural root

Ambidexterity has a profound culture root in Chinese ancient philosophy. As Cheng (2008) explained, Yin-Yang is a fundamental concept in Taoism. Yin-Yang means the interplay between two opposing but complementary forces. Yin-Yang helps to explain the complexities of the natural world and the human experience.

The concept of ambidexterity can be related to Yin-Yang as X. Li (2019) explained that it is compatible with the contextual ambidexterity approach. Yin-Yang is the balance between opposing forces such as light and dark, male and female.

Both ambidexterity and Yin-Yang involve the idea of adaptability and flexibility (F. Jiang et al., 2022). To be ambidextrous, one must be able to switch between using their left and right hand. Similarly, in Yin-Yang, there is a need for individuals to adapt to changing circumstances and find a balance between opposing forces in order to achieve harmony. While ambidexterity and Yin-Yang are from different philosophical backgrounds, they share similarities in terms of the importance of balance, harmony, and adaptability (F. Jiang et al., 2022).

2.4.2 Organizational ambidexterity

Organization ambidexterity is defined as the ability of an organization to simultaneously pursue both explorative (radical) and exploitative (incremental) innovation (O'Reilly & Tushman, 2008). Exploration relates to search, experimentation, and variance increase, while exploitation relates to increasing productivity and efficiency through improved processes and variance reduction (March, 1991). Exploration expresses the capability of researching, taking risks and

implementing radical changes, while exploitation entails the capability of improving current products and processes (Gibson & Birkinshaw, 2004; McCarthy & Gordon, 2011).

If firms would only focus on exploitative activities, they would not be good at developing new ideas or solutions toward environmental change and industry trend (Raisch & Birkinshaw, 2008). Conversely, if firms would put too much emphasis on exploratory activities, they would hamper their ability to benefit from existing resources and capabilities (Carmeli & Halevi, 2009). Additionally, an exclusive or unbalanced focus on exploratory activities would sacrifice efficiency, and firms would face immediate financial difficulties. Thus, exploitation and exploration should be taken as complementary to each other, which is the exact idea that underlies the construct of organizational ambidexterity (Guisado-González et al., 2017).

Again, the definition of organization ambidexterity is not universally shared (Cao et al., 2009). It is argued whether organization ambidexterity refers to achieving an optimal balance between exploration and exploitation or whether it involves a combination of high levels of both exploration and exploitation (Cao et al., 2009). A group of scholars suggest that achieving and maintaining a proper balance between exploration and exploitation is essential for organizational ambidexterity (March, 1991; Simsek et al., 2009). Other scholars agree that exploration and exploitation are considered independent activities, implying that the levels of both exploration and exploitation can and should be maximized to achieve a high level of organization ambidexterity (Cao et al., 2009). The prevalent idea is that there is no necessary trade-off between exploitation and exploration, rather that both can be pursued although it is uncertain to which extent they should be maximized or just achieving an optimal level, as the use of the term “balanced use of exploration and exploitation” suggests (Hwang et al., 2023).

There are two main research streams concerning organization ambidexterity. The first stream focuses on determinants (anecdotes) of organization ambidexterity while the other focuses on outcomes (e.g. relationship of organization ambidexterity and corporate performance) (Raisch & Birkinshaw, 2008; Simsek et al., 2009).

With respect to determinants, there are three proposed approaches to achieve organization ambidexterity: structural, sequential, and contextual. Researchers proposed that structural ambidexterity is the approach where different parts of the organization focus on either exploitative or exploratory innovation (Benner & Tushman, 2003). Meanwhile, Birkinshaw and Gibson (2004) suggested that a firm can cultivate the capacity to simultaneously exploit and explore across the organization, which is called contextual ambidexterity.

Structural approach

The former researchers consider that exploration and exploitation are conflicting on

organizational resources (Simsek et al., 2009). Therefore, structural ambidexterity was conceived (Cantarello et al., 2012; Ossenbrink et al., 2019). Based on this assumption, researchers advised that the way to achieve ambidexterity was by creating separate business units with different structures, systems and cultures for exploration and exploitation activities. These business units also differ on competencies, incentives and processes (Benner & Tushman, 2003). For example, the production department is responsible for exploitation, while the marketing and sales departments are responsible for exploration. Under this proposal of structural ambidexterity, the key issue would be the coordination of exploratory and exploitative activities across independent business units. It is suggested that an overarching strategy (O'Reilly & Tushman, 2008), a shared vision among senior management team (Jansen et al., 2008), or knowledge integration systems (Tiwana, 2008) can be helpful tools to establish and effective coordination system.

Sequential approach

Meanwhile, exploration and exploitation can take place within the same business unit in sequential manner (Simsek et al., 2009). Gupta et al. (2006) argued that it is feasible to build a mechanism between long time exploitation and short time exploration within the same business unit. However, this cyclical ambidexterity will bring changes into structure, routines and the skill-set required. The key challenge is managing conflicts and facilitating the switch between exploration and exploitation (Floyd & Lane, 2000). Simsek (2009) discards this approach because the author sustains that switching between exploitation and exploration may jeopardize interpersonal relationships among the business unit. The transition costs related to human resource and culture within business units will be too high.

Contextual approach

Unlike structural and sequential ambidexterity, contextual ambidexterity (Gibson & Birkinshaw, 2004) or harmonic ambidexterity (Simsek et al., 2009) considers exploration and exploitation can be merged as complementary elements within the same business unit.

For instance, high-tech firms are operating in a highly competitive environment, and they have to run their current business while finding new technologies and markets (Gibson & Birkinshaw, 2004). Contextual ambidexterity is the only way for them to survive in the short term and to succeed in the long term. Contextual ambidexterity helps firms building up organizational learning capability (S. C. Kang & Snell, 2009).

This contextual ambidexterity is also pointed out as an organizational capability which is complex and time-consuming to develop (Khan & Mir, 2019). Rosing and Zacher (2017) suggest that contextual ambidexterity is to built up through a bottom-up approach which

involves participation of every individual within the business units. Organizational employees are required to engage in both explorative and exploitative behaviors and decide autonomously how to divide time and energy between both behaviors. It then becomes part of the organizational culture and context (Gibson & Birkinshaw, 2004; Simsek et al., 2009). Chang et al. (2009) found that contextual ambidexterity outperformed structural ambidexterity among their sample of university spin-offs. According to these authors, scholars and managers are increasingly recognizing contextual ambidexterity.

2.4.3 Organization ambidexterity and firm performance

It is argued that organization ambidexterity can help firms achieve outstanding performance compared with firms only focusing on one dimension over the other i.e. exploration or exploitation (Raisch & Birkinshaw, 2008). If firms put too much emphasis on exploitation of current business at the expense of exploring new opportunities, firms will fall into organizational inertia which causes poor performance on the long term (Smith et al., 2017). Conversely, if firms put too much emphasis on exploration, new products will not have a chance to be successfully rolled out in the market with the ensuing revenue (Teece, 2010). Thus, theoretically, firms should keep a optimal balance between exploration and exploitation in order to succeed both in the short and long term (Bocanet & Ponsiglione, 2012).

However, empirical studies have mixed findings. Some studies show a positive relationship (Gibson & Birkinshaw, 2004; Lubatkin et al., 2006), but others found a negative association (Atuahene-Gima, 2005), or no relationship at all (Venkatraman & Lee, 2007). A systematic review summarized the overall effects of organization ambidexterity on performance, concluding they were positive and significant (Junni et al., 2013). But the significance of the relationship differs according to the research method, performance measure, level of analysis and industry. For example, organization ambidexterity is less effective on performance in manufacturing than in service and high-tech sectors. This can be explained due to high-tech firms being in a more dynamic market and the fact that the competitive advantage from existing technology not lasting much long. In software industry, a software product becomes out of date in averagely three months. Thus, high-tech firms need to constantly explore new opportunities and keep organization ambidexterity. For traditional sectors such as manufacturing, the market is more stable. This allows firms to concentrate on exploitation for longer periods before they need to move to new technology or product (Junni et al., 2013).

Although organization ambidexterity is a key driver of firm performance, the cost of

building up ambidexterity is a countervailing factor (Gibson & Birkinshaw, 2004) and research is continuously exploring this issue to understand which is the most cost-effective way to establish organization ambidexterity capability (Jarzabkowski et al., 2013).

2.4.4 Ambidextrous leadership

Ambidextrous leadership is defined as the ability, from a leader's position, to foster both explorative and exploitative behaviors in followers by increasing or reducing variance in their behavior and flexibly switching between those behaviors (Rosing et al., 2011). According to this definition an effective leader of innovation should foster both exploration and exploitation behaviors within the team and be capable of flexibly switching between both activities. In more detail, ambidextrous leadership consists of three elements (1) opening leader behaviors to foster exploration, (2) closing leader behaviors to foster exploitation, (3) and the temporal flexibility to switch between both as the situation requires (Rosing et al., 2011). Below Table 2.3 gives samples of opening and closing leader behaviors.

Table 2.3 Examples for opening and closing leader behaviors

Opening leader behaviors	Closing leader behaviors
Allowing different ways of accomplishing a task	Monitoring and controlling goal attainment
Encouraging experimentation with different ideas	Establishing routines
Motivating to take risks	Taking corrective action
Giving possibilities for independent thinking and acting	Controlling adherence to rules
Giving room for own idea	Paying attention to uniform task accomplishment
Allowing errors	Sanctioning errors
Encouraging error learning	Sticking to plans

Source: Rosing et al. (2011)

Since its proposal, the research on ambidextrous leadership has taken many developments. In reviewing more than a decade of ambidextrous leadership research, Rosing and Zacher (2023) conclude that there is still much room for research within the field, also concerning mediators that explain why ambidextrous leadership leads to innovative performance.

2.4.5 The difference between ambidextrous leadership and other leadership styles

Transformational leadership and transactional leadership are two mostly common mentioned leadership styles in innovation context (Alrowwad et al., 2020). For instance, transformational leader with an inspiring vision can encourage explorative behavior or prevent the team members to think creatively themselves if the vision is very detailed and absorptive by the team (V. Li et al., 2016). Below Table 2.4 gives the examples on how transformational and transactional leadership are cross-related to opening and closing behaviors.

Table 2.4 Categorization of transformational and transactional leadership as opening and closing behaviors

	Opening leader behaviors	Closing leader behaviors
Transformational leadership	A vision that motivates exploratory behavior	A vision that motivates confirmatory behavior
	Stimulation of thoughts in very new directions	Stimulation of small improvements and enhancement of efficiency
	Communication of the values of openness and tolerance	Communication of the values of conscientiousness and rules adherence
Transactional leadership	Rewarding experimentation	Rewarding efficiency
	Focus on errors to learn from errors	Focus on errors to avoid errors
	Setting and monitoring exploration goals	Setting and monitoring exploitation goals

Source: Rosing et al. (2011)

The meta-analysis by Rosing et al. (2011) also shows that although transformational and transactional leadership are related to innovation, the relationship has large variance, which means correlations between transformational and transactional leadership and innovation often vary from positive to negative. Both theoretical deduction and statistical analysis suggest that none of traditional leadership can apply to innovation effectively, and this is why leadership theory has been moved to recognize situational variability and flexible leadership behavior (Zaccaro et al., 1991). Therefore, ambidextrous leadership is regarded by more and more scholars as a better construct in innovation context because it accommodates previous findings (Rosing et al., 2011).

In the latest available review on ambidextrous leadership, Rosing and Zacher (2023) clarified conceptual differences between ambidextrous and paradoxical leadership where the former is specifically focused on promoting innovation while the latter has a more comprehensive general stance. Still, ambidextrous leadership can be taken as a subset of paradoxical focused leadership theories.

2.4.6 Antecedents of ambidextrous leadership

Rosing et al. (2011) listed four potential antecedents of ambidextrous leadership: behavior and cognitive complexity; integrative thinking; emotional intelligence; and forecasting skills.

Behavioral complexity includes behavior repertoire and differentiation (Hooijberg, 1996). The behavioral repertoire refers to the range of behaviors that a leader is capable of performing while behavioral differentiation denotes the degree of variation between different behaviors according to situational requirements (Hooijberg, 1996). To be an ambidextrous leader, the leader needs to be capable of having a repertoire of both opening and closing leader behavior while switching between these behaviors (behavior difference).

Martin (2007) defined integrative thinking as the capacity to constructively approach the

tension created by opposing ideas. Integrative thinking requires integrating two opposing ideas into one superior idea rather than making a choice between one or the other idea. Ambidextrous leaders are conceived as being capable of simultaneously holding in their mind both exploration and exploitation and integrate them into an overall strategy.

J. Zhou and George (2003) proposed emotional intelligence as an important leader characteristic that helps the leader to guide the emotions of followers to the innovation process. They found that leaders with high emotional intelligence are better in fostering in the followers a more flexible information processing. Thus, the leader's emotional intelligence helps in recognizing when and what kind of leader behaviors shall be used to meet followers' conditions.

Forecasting and planning is also thought to help leaders to decide when to use different leader behaviors (Mumford et al., 2002). Although innovation is an unpredictable process, the cycle of innovative activities is somehow similar. Forecasting and planning ability can help leaders to anticipate several steps forwards and smoothly shift their focus and behaviors to avoid internal transition costs.

Besides these antecedents, a systematic review summarized other individual characteristics that may favor ambidextrous behaviors, such as intrinsic motivation; self-efficacy; attitudes and orientation of handling work stress; trust building for social support ; and psychological empowerment (Mueller et al., 2020).

Other management related features are found promoting leaders' ambidextrous behaviors, such as leaders' decision-making authority, cross-functional interfaces and connectedness to other organization members, individual risk propensity, or organizational tenure (B. Luo et al., 2018; Mom et al., 2015).

Alongside these antecedents, some other have been found to either direct associate with ambidextrous leadership or to interfere with at least one of its components. Such seems to be the case for gender but also for age, organizational tenure and educational background in relation to the capacity to handle paradoxes (Zuraik et al., 2020) but there is yet not enough knowledge about the antecedents of ambidextrous leadership (which are intrinsically also variables one should control when studying its effects) (Rosing & Zacher, 2023).

2.5 The relationship between ambidextrous leadership and innovation

As stated, ambidextrous leadership was proposed under the innovation context because other leadership styles have not been found to suit innovation process and its unique features such as non-linear interactions, high uncertainty, and complexity (Rosing et al., 2011). Figure 2.2

shown below depicts the hypothesized theory in Rosing's research as the basis for the relationship between ambidextrous leadership and innovation.

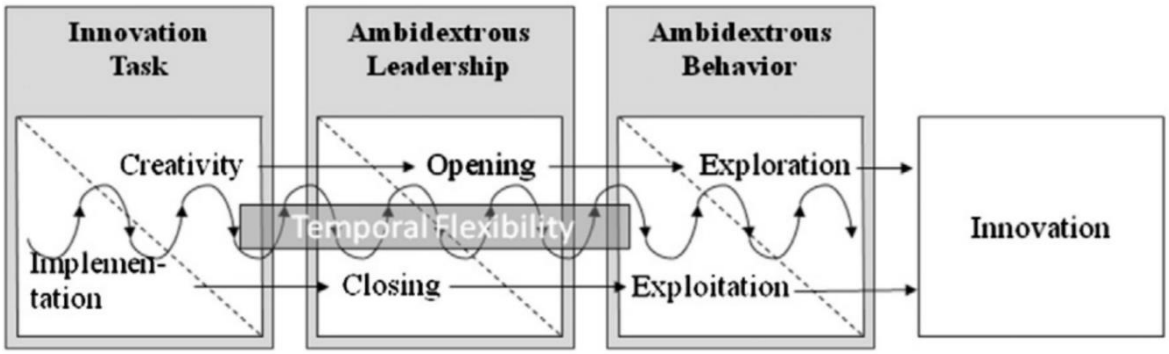

Figure 2.2 The relationship between ambidextrous leadership and innovation

Source: Rosing et al. (2011)

Rosing et al. (2011) theoretical model departs from the premise that innovation cannot be consistently achieved without the concurrence of both exploration and exploitation behavior. According to this model, to foster exploration, leadership must increase the variance within followers' behavior by creating a climate that leads to breaking up with norms and routines and help thinking divergently. This can only be achieved by removing the error-penalty culture which is aversive to experimentation and risk taking. Once achieved, the creative task of innovation is favored. Concomitantly, to foster exploitation behavior leadership must narrow down variance within followers' behavior by taking corrective action, setting guidelines, and keeping the process under control. To achieve this, leaders must establish routine and check adherence to rules, monitor and control goal fulfillment, and sanctioning errors while correcting paths. This will favor the implementation task of innovation. The theoretical model posits a continuous dialectics between creativity task and implementation task, but also a simultaneous exhibition of opening and closing behaviors by leaders which also, simultaneously, foster both exploration and exploitation followers' behavior.

Since the publication of Rosing et al. (2011) seminal research, ambidextrous leadership for innovation has attracted substantial attention from both scholars and practitioners (Rosing & Zacher, 2023). Universities even start to offer training programs to improve managers' ambidexterity. Meanwhile, scholars have conducted research to test the relationship. Table 2.5 outlines the main research work which aim to test ambidextrous leadership theory.

Table 2.5 Outline of main publications that have tested ambidextrous leadership theory

Publication	Findings
Alghamdi (2018)	Opening behaviors → employee exploration; Closing behaviors → Employee exploitation; Opening*Closing leader behavior→Employee innovation
Hu et al. (2020)	Opening behaviors * Closing behaviors → Employee innovative performance Opening behaviors → exploration behavior (only partial support in Study 2);

Klonek et al. (2021)	Opening leadership (vs. closing leadership or vs. transf. leadership) → innovation outcomes; Ambidextrous leadership (vs. closing leadership or vs. transf leadership) → innovation outcomes
Rosing and Zacher (2017)	Employee ambidexterity →employee innovative work performance
Wang et al. (2021)	Opening behaviors*Closing behaviors – Dyadic innovative performance
Zacher et al. (2016)	Opening behaviors → Employee exploration; Closing behaviors → Employee exploitation; Employee exploration, exploitation, and exploration*exploitation (controlling for opening and closing behaviors) → self- reported innovation
Zacher and Rosing (2015)	Opening behaviors → team innovation; Closing behaviors (→X) team innovation; Opening*Closing leader behavior→team innovation
Zacher and Wilden (2014)	Opening behaviors → Daily self-reported innovation; Closing behaviors (→ X) daily innovation; Opening*Closing behaviors → daily innovation performance

Source: Based on Rosing and Zacher (2023)

Despite above findings, there is potential counterargument on ambidextrous leadership for innovation. For example, Sok et al. (2016) found that employee ambidexterity can lead to role stress. Keller and Weibler (2015) found that the more ambidextrous behavior of managers, the more they may suffer from cognitive strain; and Agnihotr et al. (2017) reported higher levels of employee role conflict experience when they are ambidextrous.

In general, theoretical reasoning and most of the studies support the causal relationship between ambidextrous relationship and innovation.

As reviewed, radical innovation is a fundamental approach to achieve technological and economic advantages in the modern world. It is surprising that there is very few research concerning the relationship between ambidextrous leadership and radical innovation. Also limited findings in existing researches are either somehow against theoretical reasoning or not strong enough to fully support this relationship. For example, De Visser and Faems (2015) reported a negative indirect effects between individual ambidexterity and radical innovation, although individual ambidexterity positively influences incremental innovation performance. S. Li (2020) found that punctuated ambidextrous leadership is more beneficial for radical innovation, but simultaneous ambidextrous leadership does not positively influence radical innovation capability.

As radical innovation is a more unpredictable process which requires better skills to deal with external and internal complexity, ambidextrous leadership shall facilitate radical innovation more than it does on incremental innovation. There is research urgency to test the relationship and discover why some of previous findings are inconsistent with theoretical reasoning.

One of the fundamental reasons for inconsistent findings in organizational research stems from the adoption of wrong assumptions, e.g. about the linearity of effects between variables under study. Over 10 years ago, an influential study by Pierce and Aguinis (2013) brought out

this issue under the name of the TMGT (too-much-of-a-good-thing) effect in management.

After reviewing cultural and philosophical foundations of advocates of moderation in all things in life, which is depicted in Chinese culture and the Confucian Zhong Yong doctrine, they show how conflicting findings in empirical research in management can be attributed to a dependence on the level of the predictors, i.e. when the outcome increases as the predictor increases to achieve a certain level where no relationship is found and above which, the relationship becomes negative. This entails a fundamental rejection of the linearity often assumed in research and claims the existence of an inflection point in such relationship in such a way that it is better depicted as a curvilinear effect, either following a U shape or an inverted U shape.

Leadership was a notable example of a topic that Pierce and Aguinis (2013) used to illustrate their TMGT idea. By reviewing researchers' dismay with conflicting findings related to the benefits or initiating structure (i.e. the instrumental control by leaders) versus consideration (i.e. the leaders concern with followers' needs), Pierce and Aguinis (2013) highlight how recent research has solved such conflict by uncovering inverted U-shaped relationship between those and outcomes, indicating that putting them together is beneficial up to a certain point, above which the paradox becomes too influential and harms such outcomes. Therefore, as an expression of the co-occurrence of opposite forces (opening and closing behavior), ambidextrous leadership perfectly fits with such example.

Following this research, in the year after, an empirical study reported an inverted U-shape relationship between employee creative idea generation and idea implementation, that was sensitive to supervisor support given to implementation (Škerlavaj et al., 2014). These authors did not refer explicitly to ambidextrous leadership, but they do cite Rosing et al. (2011) research to support their assertion that creativity and innovation research relied too much on linear relations assumption. In China, ambidextrous leadership can be associated with Zhong Yong leadership (Guo & Hu, 2022), these authors take as an expression of ambidextrous leadership in the Chinese context.

The explicit focus on ambidextrous leadership curvilinear effects has been witnessed only in the last three years with scarce empirical publications. S. Wang et al. (2021) tested with a sample of 416 dyads, the effects of ambidextrous leadership on innovative behavior mediated by two psychological states (job stress and role ambiguity) to find that ambidextrous leadership had positive effects on innovative behavior but simultaneously it increased both stress and role ambiguity, which had detrimental effects. Authors conclude that ambidextrous leadership exerts both positive and negative effects, which they depict under the umbrella of TMGT and call for

further research to test such curvilinear effects.

Wu et al. (2022) tested the indirect effect of ambidextrous leadership on employee silence via similar variables and relational energy, moderated by power distance orientation. They found that under high power distance orientation, ambidextrous leadership has a U-shaped relationship with employee silence, thus suggesting that ambidextrous leadership can inhibit less employees voice when it reaches moderate levels, as predicted by TMGT theory.

Therefore, we hypothesize that:

H2: Ambidextrous leadership has an inverted U shape direct effect on innovation capability, such that when ambidextrous leadership increases, innovation capability also increases until it reaches a plateau, after which innovation capability decreases as ambidextrous leadership increases.

H2a: Ambidextrous leadership has an inverted U shape direct effect on incremental innovation, such that when ambidextrous leadership increases, incremental innovation also increases until it reaches a plateau, after which incremental innovation decreases as ambidextrous leadership increases.

H2b: Ambidextrous leadership has an inverted U shape direct effect on radical innovation, such that when ambidextrous leadership increases, radical innovation also increases until it reaches a plateau, after which radical innovation decreases as ambidextrous leadership increases.

2.6 Central role of innovation climate

2.6.1 Innovation climate

The concept of organizational climate is first seen under the form of “social climate” in Kurt Lewin’s work over 80 years ago (Glisson, 2015). It did not gain momentum in organizational research until the 1980s (Schneider et al., 2013) but this collective level construct became a central one being acknowledged as high on instrumental value for management, as it can foster organizational performance.

A precursor of the relation between innovation climate and organizational outcomes can be found in Baer and Frese’s (2003) study that reported a positive relation between a climate that foster initiative taking and organizational performance (measured as goal achievement and return on assets) which was later found to relate also with innovation capability (Fischer et al., 2014). Among the several types of climates researched, innovation climate plays a central role

in innovation studies.

Firms often do not lack innovative employees, but they may not have a supportive climate for innovative employees. Only when a firm shapes and cultivates the right climate can it stimulate employees motivation, encourage them to create bravely, and then achieve the innovation output. Each of the three major theories of organizational creativity—the componential theory (Amabile, 1996), the interactionist theory (Woodman et al., 1993), and the multiple social domains theory (Ford, 1996)—includes the work climate as factor of employee creativity.

Along the evolution of research on organizational climate, scholars learned that consistent findings require a focus on specific facets of climate (Kozlowski & Doherty, 1989). Therefore, since the 1990s, the research focus of organizational climates has shifted to explore specific types of climate within the organization, such as service climate, safety climate, ethical climate, and innovation climate. Because innovation climate is more focused research area, this research better predicted the hypothesis and made more sense toward research questions.

Innovation climate derives from organizational climate, which is defined as a set of shared perceptions regarding the policies, practices, and procedures that an organization rewards, supports, and expects. The previous research on organizational climate paid too much attention to the general level of the overall characteristics of the organization, and there was no specific pertinence.

Innovation climate is the overall perception of firms' members on the innovation characteristics of firms' environment. Some researchers define innovation climate in their own way. For example, Amabile (1996) sustained that innovation climate, existing in creative and transforming organizations, includes commitment to challenging goals, work freedom and autonomy, encouraging creativity, ensuring sufficient creative time, appropriate feedback and rewarding creative work. Tesluk et al. (1997) thought innovation climate is an environmental atmosphere in which individuals recognize innovation policies, practices and processes, and concrete innovation objectives into the creation and development of new products, services and process to improve organizational innovation capacity as a whole. Bharadwaj and Menon (2000) believed that innovation climate is the encouragement of organizational members to innovate by using the right methods and tools and providing appropriate resources. In fact, these definitions have great similarity. The author thinks that innovation climate is a lasting organizational characteristic that exist within the organization, can be experienced by employees and affect their innovation behavior.

According to literature review conducted by Y. Wang and Zhu (2006), previous research

describe three possible formation processes of innovation climate:

Organization attribute theory. Organizational attribute theory posits that innovation climate is the product of firms' objective environment such as firms' scale, performance, degree of decentralization, decision-making process, hierarchy, and other factors. Organizational attribute theory regards these as objective environmental factors shaping innovation climate. Environmental differences cause employees to form different cognitions, hence to form different types of innovation climate.

Select-attract-assimilate theory. This theory argues that the characteristics of employees are the main determinant of the firms' innovation climate. Firms will attract and select employees with similar characteristics, while employees with different characteristics will gradually leave firms or be assimilated by the organization, so the remaining employees are becoming more and more similar. Employees' cognition tends to be consistent. This theory emphasizes the influence of individuals on organizational innovation climate and, so personnel selection is of great significance to the formation of the organizational innovation climate.

Socialization model. This theory posits that innovation climate is a specific cognition formed by organizational members in the process of interaction with the organizational environment. Differences in individuals and firm environments will lead to different innovation climates. The theory posits individuals and organizations are equally important in sharping innovation climate as it is formed after long-term interaction between them. None of them can independently determine the innovation climate.

With respect to causal relationship between innovation climate and innovation performance, scholars sustain three positions. According to Y. Wang and Zhu (2006) the most used model, the "main effect model", states that innovation climate not only influences innovation performance through individual innovative behavior but also that it exerts a direct effect on innovation performance. The "buffering model" posits that innovation climate only affects innovation performance through enhancing individuals' innovative behavior. Last, the "interaction model" claims that there is a mutual influence between innovation climate and innovation outcomes. Most research supports the main effect model that innovation is directly impacted by innovation climate as literature review will show below.

In a systematic literature review on innovation climate, Newman et al. (2020) conclude that, despite the variations in its conceptual definition, most authors base their view upon Anderson and West (1998) definition of innovation climate, which is defined as shared perceptions at the team or organizational level regarding the extent to which team or organizational processes encourage and enable innovation. This differs from innovation culture, defined as the shared

common values, beliefs and assumptions of organizational members that could facilitate the product innovation process (Martín-de Castro et al., 2013). It also differs from creative climate which focuses only on the exploration facet of innovation processes targeting the cognitive processes entailed in generating novel insights and solutions, whereas innovation goes beyond by including also the exploitation facet, that aims to apply this creativity (Isaksen & Akkermans, 2011). As Newman et al. (2020) state, literature on innovation climate has differentiated between team innovation climate and organizational innovation climate which refers to the different, and nested, levels of analysis.

Most of the interest scholars placed on this construct stems from its consequences, namely at the organizational level. An empirical study with 91 public healthcare organizations in Great Britain tested how strongly innovation climate predicted organizational performance (measured as a multidimensional construct entailing HRM, clinical effectiveness, risk management, information management and stakeholder involvement) to find a standardized regression coefficient of .41 ($p<.05$) but also an interaction with job demands which showed innovation climate could cushion against its negative effects upon organizational performance (King et al., 2007).

In conducting a meta-analysis on team level predictors of innovation at work, it was reported consistent positive effects of closely-related to innovation climate constructs (e.g. participative safety, support for innovation) with both individual level innovation (e.g. number of creative suggestions made by employees) and team level innovation (e.g. patents, new products) (Hülsheger et al., 2009).

Innovation climate has deserved special attention in innovation studies to the point of giving it a distinguished status within conceptual models. Treating it as a boundary condition, Charbonnier-Voirin et al. (2010) found that it interacted with transformational leadership to strengthen a cross-level positive effect upon individual adaptive performance. Although no correlation was reported between transformational leadership and innovation climate, and also no correlation was reported between innovation climate and individual adaptive performance, a recent study, which also treated innovation climate as a moderator (between ambidextrous leadership and innovative work behavior), did report strong correlations (Akıncı et al., 2022). Namely, they reported positive strong correlations between innovation climate and both opening behaviors and closing behavior, and likewise, they also report an interaction between these (i.e. ambidextrous leadership) to explain innovation climate. Therefore, a reminding that an interaction is operationally defined as a product of two terms, and that in mathematics, products are reversible ($A*B = B*A$), the effects reported can fit the thesis that innovation

climate is a direct precursor of innovation behaviors and capability.

With a sample of 427 SMEs in Spain, Popa et al. (2017) reported positive effects of innovation climate on both inbound open innovation (inflows of knowledge and technology from external stakeholders) and outbound open innovation (exploitation of internal knowledge and technology via patents or proprietary licenses). Another Spanish study focused on SMEs reported positive effects of innovation climate on both incremental and radical innovation (Barba-Aragón et al., 2024). Ye et al. (2022) conducted a study with 318 technical, first line and middle line managers in China to find a positive effect between innovation climate and innovation behavior.

H3: Innovation climate has a positive direct effect on innovation capability.

H3a: Innovation climate has a positive direct effect on incremental innovation capability

H3b: Innovation climate has a positive direct effect on radical innovation capability

2.6.2 Ambidextrous leadership and innovation climate

As reviewed, innovation climate is characterized by its support to idea generation, risk acceptance, autonomy, and a learning focus (Ye et al., 2022) but these features are co-constructed within the interaction between individuals in the organization. By experiencing the same challenges, learning how to overcome them, and passing on this information to other coworkers, a determined degree of convergence starts to take shape to produce shared perceptions about what works and what does not work, what is acceptable and what falls outside of acceptance, and what are the valued attitudes and behaviors facing work. Although the joint experience by coworkers plays an obvious role in these processes of creating shared mental models (Miles & Kivlighan Jr, 2008), the leader has been ascribed with an even more important role, due to power and influence position.

Leadership then has been acknowledged as a critical determinant of organizational climate ever since this research line within organization studies regained interest (B. Schneider et al., 2013). There is no reason to state innovation climate is an exception to this.

Within the research on innovation capability, ambidextrous leadership has been acknowledged as having an influence on team innovation and other innovation outcomes (Alghamdi, 2018; Klonek et al., 2021) but this correlation cannot overlook the fact that leadership has been consistently found across time, to condition organizational climate (Grojean et al., 2004; J. C. Kao et al., 2023) and that innovation climate is a likely antecedent of innovation capability (Barba-Aragón et al., 2024; Fischer et al., 2014; Popa et al., 2017).

Reports in literature have been highlighting the often-doubtful assumption that linear relations characterize most of the effects within social and organizational life. Just like the reasoning exposed for the curvilinear relationship between ambidextrous leadership and innovation capability, so does the same rationale apply to ambidextrous leadership and innovation climate. We therefore hypothesize that:

H4: Ambidextrous leadership has an inverted U shape direct effect on innovation climate, such that when ambidextrous leadership increases, innovation climate also increases until it reaches a plateau, after which innovation climate decreases as ambidextrous leadership increases.

Because of hypothesis 3 and hypothesis 4, it is logical to infer innovation climate is an intervening variable between leadership and innovation capability. This is in line with reports that innovation climate mediates processes leading to innovation e.g. between complexity leadership (a derivation of ambidextrous leadership (Uhl-Bien & Arena, 2017) and exploratory innovation (radical) and exploitative innovation (incremental) (Diesel & Scheepers, 2019).

Although this study found a linear positive indirect effect, the option authors did for operationally define complexity leadership as a means of the three components (operational leadership, entrepreneurial leadership, and enabling leadership) diverges from the one found in ambidextrous leadership literature that conceives it as an interaction effect between the opposing components. We trust the entangled nature theoretically prescribed in complexity leadership theory (Uhl-Bien et al., 2007) is more closely related to such interaction model and thus the linear relationship found does not go counter to our curvilinear hypothesis. A study that supports this mediation role was published by J. H. Kang et al. (2015) focusing on the effects of leadership styles from founding members upon manager's innovative behavior measured as the extent the directors exhibited behaviors such as searching for new technologies or promoting ideas. With a sample of 173 SME young organizations, they found transactional and transformational leadership affected managers' innovative behavior only through the mediating effect of innovation climate. Therefore, we hypothesize that:

H5: Ambidextrous leadership has an inverted U shape indirect effect on innovation capability via innovation climate, such that when ambidextrous leadership increases, innovation also increases until it reaches a plateau, after which innovation decreases as ambidextrous leadership increases.

H5a: Ambidextrous leadership has an inverted U shape indirect effect on incremental innovation via innovation climate, such that when ambidextrous leadership increases, incremental innovation also increases until it reaches a plateau, after which incremental

innovation decreases as ambidextrous leadership increases.

H5b: Ambidextrous leadership has an inverted U shape indirect effect on radical innovation via innovation climate, such that when ambidextrous leadership increases, radical innovation also increases until it reaches a plateau, after which radical innovation decreases as ambidextrous leadership increases.

2.7 Conceptual model

By integrating all the hypotheses, we have produced a conceptual model that departs from ambidextrous leadership with a twofold path, one directed to radical innovation and another one (parallel) to incremental innovation, intermediated also by innovation climate in a non-linear way. Figure 2.3 shows the conceptual model in this thesis.

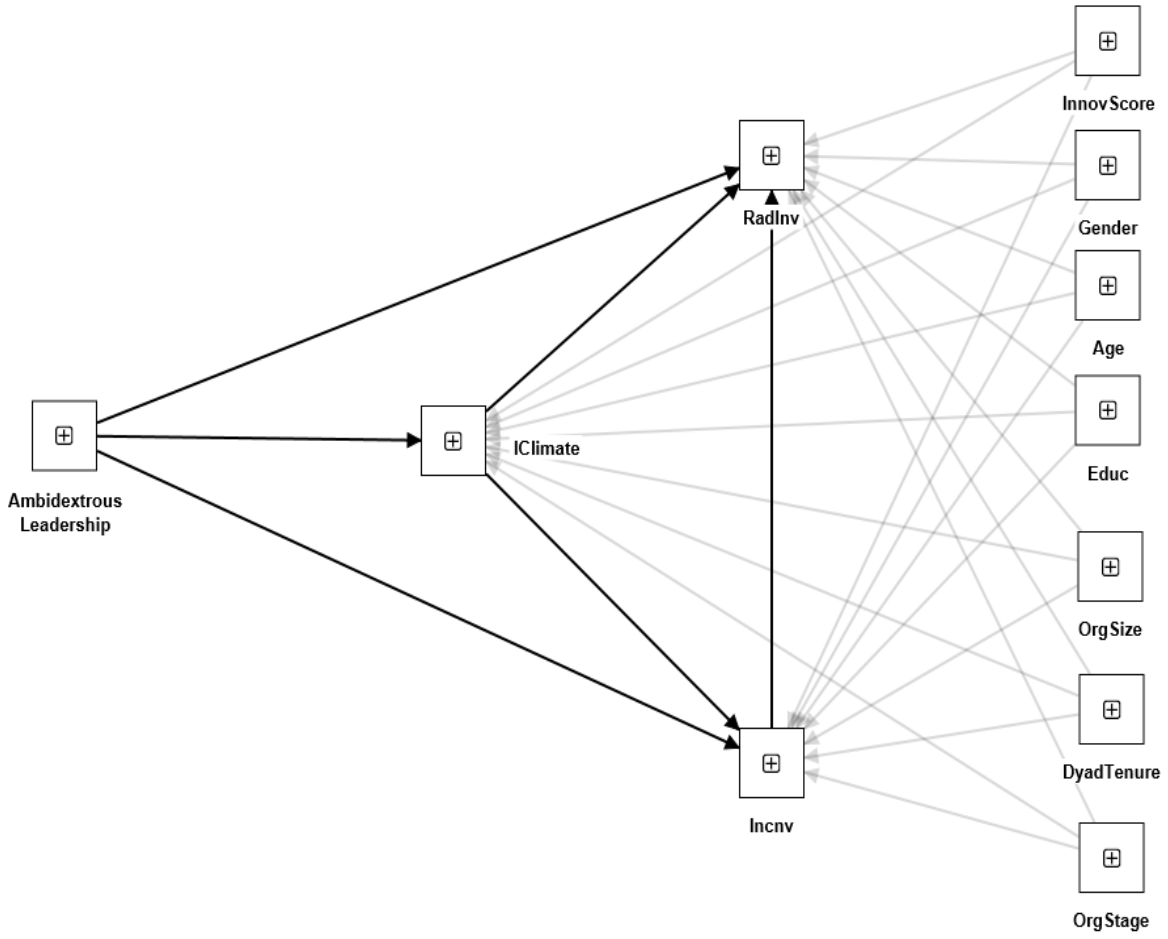

Figure 2.3 Conceptual mode

Chapter 3: When More is Too Much: Ambidextrous Leadership and Innovation (Study 1)

3.1 Method

3.1.1 Research design

Following Hancock et al. (2010), we designed this research to guarantee it is structured so to deploy a study that minimizes error and allows for generalization of findings. The first decision pertained to the approach one should adopt, if qualitative, quantitative, or mixed. As regards this first study, its purpose is clear and guided by robust literature that has both theory backgrounds and much empirical evidence to motivate the overall conceptual model. Therefore, although there can be topics that deserve an exploratory approach, we think the conceptual model is more suitable for a hypothetical deductive approach (Morgan, 2007).

This approach reflects a positivistic worldview where the researchers assume they can detach themselves from the object under observation to extract objective features that can be translated into measurable concepts (Casula et al., 2021). This does not preclude an interpretative stance, but it serves as a ground upon which quantitative methods are usually deployed. Under this umbrella, researchers aim to test causality and predict phenomena based on numerical description (Antwi & Hamza, 2015).

This is better achieved with experimental designs, but the phenomena under study are not always compatible with the artificial environment created by laboratory or by the intervention of the researcher, that can alter the natural processes (Lin et al., 2021). Therefore, one must gauge the internal validity of the measures with the external validity, which translates into generalization of findings.

So, although acknowledged as having larger room for error, questionnaire-based research is a widely accepted practice that has minimum interference in organizations and still is able to capture perceptions of real-world settings. Indeed “perceptions” means subjectivity which means error, but questionnaire-based research is supported by a sophisticated apparatus of data analysis techniques (and design options such as time-lagged data collection) that allow for the measurement of the psychometric properties of the scales thus leaving less room for the

researchers' own beliefs while simultaneously mitigating issues stemming from biases, e.g. common method variance (Podsakoff et al., 2003).

Strang (2015) highlights the role that pragmatism, as a research ideology, can play in management research. According to this author, pragmatism stiches positivism with interpretivism trying to avoid the problems that these extremes entail. From a pragmatic stance, the researcher that deploys a quantitative method does not have to be restrained by positivism as instead of being guided by a methodological orthodoxy it is more advisable to be guided by theory. Thus, pragmatism departs from the thesis that flexibility is an asset when conducting empirical research in management.

3.1.2 Data analysis strategy

Data was first screened for cases of lack of attention and streamlining answers which contribute to low data quality. We checked two attentional items that were purposively included in the questionnaire to judge on the level of attention from each respondent. These items explicitly asked the respondent to fill in a specific option in the scale (e.g. "for attention control purposes please answer this item with 5").

After this, we tested for construct validity and reliability. Construct validity refers to analytic indication about the true capability each measure must depict the construct under focus. This can be expresses by means of a factorial analysis. If the scale structure is already known, a Confirmatory Factor Analysis (CFA) is the recommended technique to be deployed for this purpose. CFA will indicate a valid factor structure if it has good fit indices. Following Hair et al. (2019) recommendations we use the following fit indices: X^2 which should have a non-significant p-value, normed X^2 which should fall below 3, comparative fit index (CFI) which should be .95 or higher, Tucker-Lewis index (TLI) which should be .95 or higher, root mean square error of approximation (RMSEA) which should fall below .07, and standardized root mean square residual (SRMR) which should fall below .08. In case the CFA reveals unfitted models it is commonly accepted to apply Lagrange Multipliers to probe for unexpected covariances that hamper the model fit. This analysis is guided by theory but it must consider empirical data patterns to infer what changes can be done without breaking the theoretical assumptions about the constructs. Additionally, in case the fit indices continue to inform the model is unfit, an exploratory factor analysis is advisable. In such case a principal components analysis (PCA) can be conducted to judge on the patterns of association between items and their eventual latent constructs. A PCA is considered valid when KMO indicator reaches at least .500,

and Bartlett's test of sphericity has a significant X^2 statistic where the p-value falls below .01 while having MSAs always above .500, and the commonalities should also reach .500. The extracted solution is subjected to a rotation that can accept the axes are not orthogonal (i.e. that components can correlated among themselves, e.g. oblimin rotation) or that operates with orthogonal axes (i.e. that components are independent among themselves, e.g. varimax rotation). The suitability of the PCA is also judged on the variance the components account after rotation, which should be at least 60%.

Additionally, a valid measure should show convergent validity, i.e. the items should load in the latent construct at least half of its variance. We judge this cased on Fornell and Larcker (1981) average extracted variance (AVE=.500 or higher). Details are shown in Formula 3.1 and 3.2.

$$\boldsymbol{AVE} = \sum_{i=1}^{n} \boldsymbol{\lambda_i^2} \Big/ \left(\sum_{i=1}^{n} \boldsymbol{\lambda_i^2} + \sum_{i=1}^{n} \boldsymbol{\sigma_i} \right) \tag{3.1}$$

$$\boldsymbol{CR} = \left(\sum_{i=1}^{n} \boldsymbol{\lambda_i} \right)^2 \Big/ \left[\left(\sum_{i=1}^{n} \boldsymbol{\lambda_i} \right)^2 + \sum_{i=1}^{n} \boldsymbol{\sigma_i} \right] \tag{3.2}$$

λ is the standardized factor loading, ε is the error variation

In cases where the construct entails more than one latent variable, it is usually required that such latent variables distinguish from each other which is measured via the HeteroTrait MonoTrait (HTMT, Henseler et al., 2015). This indicator considers both a strict (.85) and a liberal (.90) cutoff, below which we can accept the measure as having discriminant validity.

Also, in psychometric theory (Nunnally, 1975) the items used to measure the same latent factor should be answered consistently, which we refer to as internal reliability. This is judged based on Joreskog's composite reliability index (CR) which should achieve the minimum threshold of .70 in a similar manner of Cronbach's alpha.

As regards the conceptual model, adding all latent constructs and respective observed items into the same CFA is a commonly observed procedure to test its overall quality which is judged with the same fit indices and thresholds from the specific CFAs identified above.

As per the hypothesis testing, following commonly adopted practices, we start by showing descriptive statistics and bivariate statistics so to offer a better understanding of the profile of the sample as well as eventual emerging patterns of association between sociodemographic variables and those in the conceptual model, and likewise preview the bivariate patterns within the conceptual model variables. This is done by computing the means and standard-deviations as well as the Pearson correlations (should the data follow normal distribution) or, as an alternative, Spearman correlations (if otherwise). Normality is tested with Kolmogorov-

Smirnov statistic which allows for a decision either to accept (p>.05) or reject (p<.05) the null hypothesis that the distribution matches the normal distribution.

Analyses were conducted with SPSS 29 software and its embedded Analysis of Moment Structures (AMOS 29) software in addition to Smart-PLS 4 software for PLS-SEM statistics.

3.1.3 Procedure

The scales included in the questionnaire were translated and back-translated from English to Chinese following Brislin's (1970) procedure whenever there were no validated Chinese versions available. The questionnaire was pre-tested with 30 individuals to look for any indication of inconsistency and to gauge the answering time. The questionnaire was shown in Chinese (Appendix A, also with English translation).

Data collection was made through Credamo panel platform which is a database suitable for surveys conducted via web and that has been credited in research as evidenced by published empirical studies in reputed journals (W. Li et al., 2021; Ren et al., 2023; R. Sun et al., 2023). This platform offers matching services as regards finding suitable respondents for this study. Namely, we included only individuals that: 1) were actively working, 2) were in their current employer for at least 1 year, 3) were working in privately-owned for-profit companies, 4) in industries that have a stronger tradition of innovation (e.g. manufacture), 5) working in China. To avoid common method bias (Podsakoff et al., 2003), we have deployed a time-lagged data collection process where ambidextrous leadership and innovation climate were collected in time one, and incremental and radical innovation in time two. The data collection was separated by three weeks starting in July 2023. Because ambidextrous leadership and innovation climate's relationship is conceived as curvilinear, collecting data in the same wave cannot contribute to possible variance inflation (Siemsen et al., 2010).

3.1.4 Sample

The sample comprises 233 individuals which observed the inclusion criteria. It is mostly feminine (55.8%), educated (74.2% with a bachelor's degree), and mostly (72.1%) falling within the 31 to 40 years-old range. The working experience is more equally distributed with 32.2% reporting 1 to 3 years work experience in the current organization, 35.2% with 4 to 6 years, 18.9% with 7 to 10 years and the remaining 10 or more years of organizational tenure. The average falls in the 4-6 years tenure range. The respondents are mostly without managerial or supervisory functions (52.8% self-characterized as team members only), with a strong

presence of team leaders in the sample (42.1%) and a smaller presence of directors (4.2%) and general directors (0.9%).

The organizations where participants work vary in size with a balanced distribution among small companies (up to 99 employees making 17.2% of the sample), medium-small companies (100-249 employees, 27.5% of the sample), medium companies (250-499 employees, 28.3% of the sample) and large companies with 500 of more employees comprising 27% of the sample. The organizations where participants work are mostly reported as being in the growth/expansion stage (64.8%) followed by mature companies (30.5%) and only a small number of organizations reported as being nascent (startups or at founding stage, 4.7%).

Industries vary considerably with manufacture taking most of the sample (34.8%) followed by IT (22.3%) and bank-finance (9.4%). With a smaller representation education, services, health and medical services, and retail have each between 3% and 3.4% of the sample. Wholesale, hospitality & tourism, media & communications, and online-retail each have about 2% of the sample and the remaining of the sample comprises a varied array of industries such as construction (1.7%), real estate (1.3%), logistics (1.3%). Overall, the sample is varied and dominated by manufacture and IT services (taking more than half the sample together.

3.1.5 Measures

Ambidextrous leadership (wave one) was measured with Rosing et al.'s (2011) scale as used by S. Wang et al. (2021) in China. This scale comprehends 14 items divided into two components: Opening behaviors (seven items, e.g. "my leader… encourages my team to experiment with different ideas", "motivates my team to take risks") and closing behaviors (seven items, e.g. "controls adherence to rules", "pays attention to uniform task accomplishment"). The CFA for the original two-factor structure has poor fit ($X^2(76)=164.089$, $p<.001$; Normed $X^2=2.159$, CFI=.901, TLI=.882, RMSEA=.071 90% CI [.056, .086] PClose<.012, SRMR=.072) and lacking convergent validity (AVE <.500) which rendered the factors unusable.

A principal component analysis confirmed some items had too low commonality. After their removal, the solution found suggested a valid (KMO=.799; .713<MSA<.862; Bartlet $X^2(45)=606.683$, $p<.001$) three factor structure accounting for 62.5% variance after oblimin rotation. Closed behavior comprehends four items ("they monitor and control the achievement of work goals", "they establish strict work processes", "they require us to follow rules", and "they pay attention to whether we all achieve work goals"), and opening behavior split in two:

one factor comprehending four items pertaining to fostering divergent thinking (i.e. “they allow us to work in different ways”, “they encourage us to try different ideas”, “they provide us with space for independent thinking and work”, and “they give us opportunities to express our ideas”), and the other with two items fostering risk taking (“they motivate us to take risks in our work.”, and “they allow us to make mistakes”) albeit highly correlated, suggesting a second order factor.

A subsequent CFA of this structure showed acceptable fit indices ($X^2(34)=64.108$, $p<.001$; Normed $X^2=1.886$, CFI=.947, TLI=.930, RMSEA=.062 90% CI [.038, .085] PClose<.190, SRMR=.0713) and no Lagrange multipliers were suggesting issues regarding the items. Both opening behaviors subscales aggregated into a second order factor. All factors in this solution have acceptable convergent validity ($AVE_{openbehaviors}=.624$, $AVE_{closebehaviors}=.519$) as well as discriminant validity (HTMT=.0000). The factors have also acceptable reliability ($CR_{openbehaviors}=.768$, $CR_{closebehaviors}=.811$). The solution is shown in Figure 3.1. Ambidextrous leadership is computed as the multiplicative term between open and closing behaviors (after being centered) as recommended by Rosing and Zacher (2023).

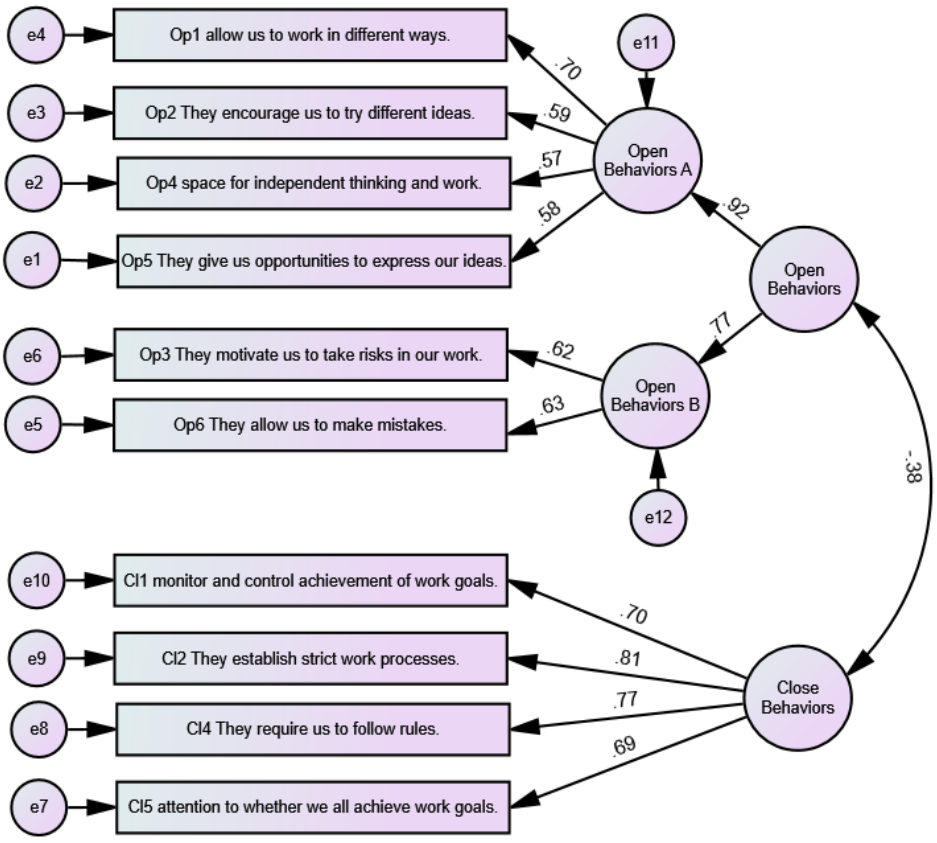

Figure 3.1 Factor structure ambidextrous leadership

Radical innovation (wave two) was measured with Marvel and Lumpkin (2007) subscale comprising four items organized in a single component (e.g. “our product/service represents an

entirely new type of product/service", "our product/service meets a want or need that has not been addressed by other products/services"). The CFA showed suboptimal fit (X2(2)=5.866, p=.053; Normed X2=2.933, CFI=.984, TLI=.953, RMSEA=.091 90% CI [.000, .181] Pclose=.154, SRMR=.0273). Lagrange multipliers suggested one item was harming the structure. After removal of the item, the structure has good fit (X2(1)=1.153, p=.283; Normed X2=1.153, CFI=.999, TLI=.998, RMSEA=.026 90% CI [.000, .178] Pclose=.411, SRMR=.0132) and also good convergent validity (AVE=.553) as well as reliability (CR=.788) as shown by Figure 3.2.

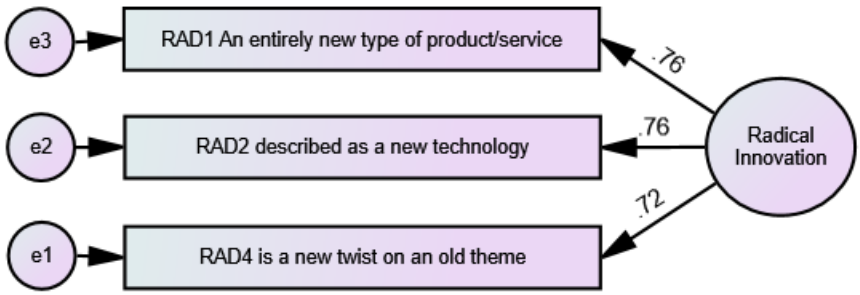

Figure 3.2 Factor structure radical innovation

Incremental innovation (wave two) was measured with Marvel and Lumpkin (2007) subscale comprising three items ("there is a large group of customers that already uses a very similar product/service", "our product/service is a gradual progression upon the last generation", and "our product/service could be described as a product line extension") together with another three item scale from İncekara and Koçak (2017) organized in a single component (e.g. "we regularly implement small adaptations to existing products and services", "we introduce improved, but existing, products and services for our local market", "we increase economies of scales in existing markets").

The CFA for a joint single factor showed good fit indices (X2(9)=11.899, p=.219; Normed X2=1.322, CFI=.991, TLI=.985, RMSEA=.037 90% CI [.000, .088] Pclose=.599, SRMR=.0325) but with clear indication of insufficient lambdas for item "we increase economies of scales in existing markets", which also compromised convergent validity (AVE=.372). By removing this item, the resulting factor solution has also good fit indices (X2(5)=5.751, p=.331; Normed X2=1.150, CFI=.998, TLI=.995, RMSEA=.025 90% CI [.000, .098] PClose=.623, SRMR=.0215) although the convergent validity is suboptimal (AVE=.447) but reliability is good (CR=.799). For a principal component analysis (KMO=.820, .781<MSA<.877, Bartlett X2(10)=320.286, p<.001) convergent validity is

acceptable (AVE=.553) which means that individuals do not hold a clear mental representation of this construct but its overall composite index can still be computed as representative as showed by Figure 3.3.

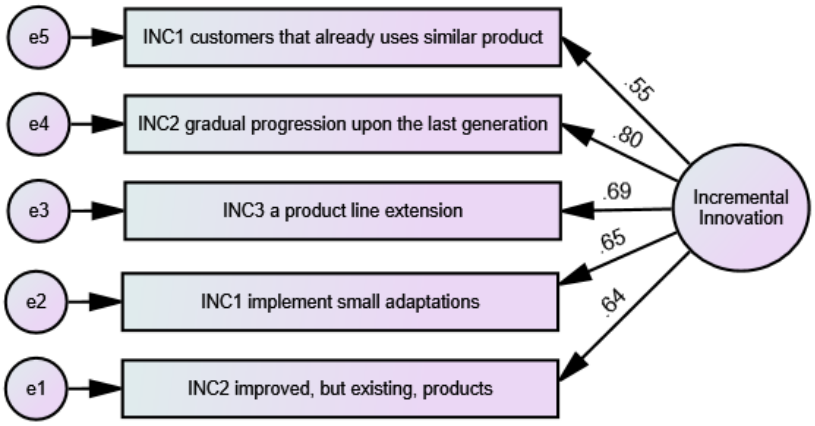

Figure 3.3 Factor structure incremental innovation

Innovation climate (wave one) was measured with Remneland-Wikhamn and Wikhamn's (2011) scale comprehending six items organized in a single component (e.g. "people in this organization are always searching for new ways of looking at problems", "this organization is quick to respond when changes need to be made"). The CFA showed good fit indices (X2(9)=17.552, p<.041; Normed X2=1.950, CFI=.979, TLI=.964, RMSEA=.064 90% CI [.013, .108] Pclose=.264, SRMR=.0337) albeit with poor convergent validity (AVE=.436) but with good reliability (CR=.822). However the convergent validity for principal component analysis (KMO=.855, .842<MSA<.878, Bartlett X2(15)=408.495, p<.001) is acceptable (AVE=.529) which means that individuals do not hold a clear mental representation of this construct but its overall composite index can still be computed as representative as showed by Figure 3.4.

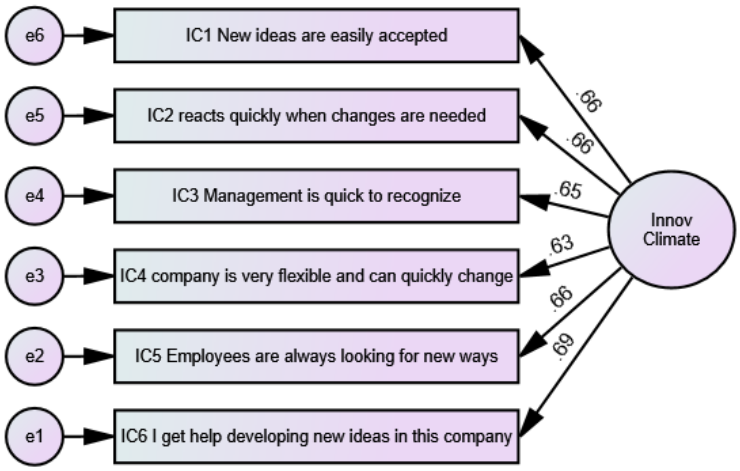

Figure 3.4 Factor structure innovation climate

3.1.6 Measurement model and common method bias

We tested the overall measurement model as well as performed a model comparison by subsequently fusing adjacent latent constructs in the conceptual model. We paid especial attention to cases where constructs were measured in the same wave, namely ambidextrous leadership and innovation climate, but we also paid attention to the fusion between innovation climate and radical and incremental innovation. Lastly, we tested the common method bias with the latent common factor (Podsakoff et al., 2003).

Table 3.1 shows the measurement model (including second order factor for open behaviors or simply the first order factors) and alternative models with respective fit indices and comparative indicators. The alternative models are: A model (OpenBehaviors fused with Innovation climate); B model (CloseBehaviors fused with Innovation climate), C model (Ambidextrous Leadership fused Innovation Climate), D model (Innovation climate fused with radical innovation), E model (Innovation climate fused with incremental innovation), F model (ambidextrous leadership fused with innovation climate, radical innovation, and incremental innovation), G model (ambidextrous leadership fused with innovation climate, radical innovation, incremental innovation, and organizational support to innovation). This showed the original conceptual model outperforms all the alternatives. Adding a common latent factor to the measurement model showed a lambda of .146 (p=.036) which means there is no significant association found, which indicates common method variance is not an issue in our analyses.

Control variables comprised gender (1=Male, 2=Female), Age (1=up to 25 years-old; 2=26-30; 3=31-35; 4=36-40; 5=41-45; 6=46-50; 7=51-55; 8=56-60; 9=61+), Education (1=up to 9

years schooling, 2=9 complete years schooling; 3=12 complete years schooling; 4=Bachelor; 5=Master; 6=Doctor degree). Organizational tenure and dyadic tenure (the number of years working with the same supervisor) were both measured in an ordinal fashion (1=up to 1 year, 2=1-3; 3=4-6; 4=7-9; 5=10+). Hierarchical position was measured with four ordinal points (1=Team member, 2=Team leader; 3=Director; 4=General director). Organizational size was also ordinally coded (1=1-99; 2=100-249; 3=250-499; 4=500+). Because the topic of innovation is closely related to the stage where the organizations are we measured if it was in the startup/founding stage (1), growth/expansion stage (2), or mature/established (3). Likewise, for descriptive purposes the industry was asked as a free text and recoded to standardize the terms. Lastly, an innovation score was requested in a 5 point scale (What score would you give to your team as regards the frequency of doing innovation at work?) where 5 stands for the highest innovation frequency.

Table 3.1 Measurement model comparison

Model	χ^2/df	CFI	TLI	RMSEA	CI90	PCLose	SRMR	AIC	$\Delta\chi^2(\Delta df)$ Baseline2	ΔCFI
Baseline 1 (2nd order factor)	1.427	.936	.928	.043	[.034;.051]	.922	.0649	720.166	-	-
Baseline 2 (1st order factors)	1.392	.942	.934	.041	[.032;.049]	.961	.0594	710.267	-	
Model A OpenBeh+InnovClim	1.466	.929	.922	.045	[.036;.053]	.855	.0662	731.408	41.141(10)*	.013
Model B ClosBeh+InnovClim	2.490	.776	.750	.080	[.074;.087]	.000	.1054	1106.377	408.11 (6)*	.166
Model C AmbLead+InnovCl	2.511	.767	.746	.081	[.074;.087]	.000	.1071	1118.026	435.759(14)*	.175
Model D InnovClim+RadInnov	1.571	.914	.904	.050	[.042;.057]	.524	.0630	772.325	72.058(5)*	.028
Model E InnovClim+IncInnov	2.330	.800	.777	.076	[.069;.082]	.000	.1004	1048.053	349.786(6)*	.142
Model F fused Model C+D+E	3.506	.610	.579	.104	[.098;.110]	.000	.1252	1494.343	820.076(18)*	.332
Model G Single factor model (OSI fused)	3.503	.610	.580	.104	[.098;.110]	.000	.1253	1494.521	822.254(19)*	.332

Note: * p<.001, A model (open behaviors fused with innovation climate); B model (close behaviors fused with innovation climate), C model (ambidextrous leadership fused innovation climate), D model (innovation climate fused with radical innovation), E model (innovation climate fused with incremental innovation), F model (ambidextrous leadership fused with innovation climate, radical innovation, and incremental innovation), G model (ambidextrous leadership fused with innovation climate, radical innovation, incremental innovation, and organizational support to innovation).

3.2 Results

This section will start by showing the descriptive statistics, namely the means and standard deviations together with the bivariate statistics, namely those found between sociodemographic variables and those variables that integrate the conceptual model so to highlight possible biases or unaccounted effects stemming from sociodemographic variables that one should control at a latter data analysis stage. Lastly, this section will show the hypotheses testing.

3.2.1 Descriptive and bivariate statistics

As reported in the sample description, most participants are feminine, aged 30-40 and highly educated, with and average organizational tenure falling in the four to six years work experience and members approximately half without supervision responsibilities and the other half with direct team supervisor functions. As expected, age, organizational tenure and dyadic tenure are all positively correlated, and organizational tenure is also positively correlated with organizational stage, size, and hierarchical position. Male participants tend to report more tenure (both organizational and dyadic) and job innovation is positively correlated with organization size.

Among the sociodemographic variables and those that compose the conceptual model there are eight cases of statistically significant correlations, albeit all have weak magnitudes ($r < .30$, according to Cohen, 2013). The most notable concerns education that is negatively correlated with closed behavior ($r=-.177$, $p<.01$) and incremental innovation ($r=-.175$, $p<.01$) and positively correlated with open behavior type two ($r=.186$, $p<.01$). Dyadic tenure has also two significant correlations, one with innovation climate ($r=.135$, $p<.05$) and the other with organizational support to innovation ($r=.175$, $p<.01$). Participants with higher hierarchical position report more open behavior ($r=.142$, $p<.05$) and females less open behavior type two ($r=-.130$, $p<.05$). Participants working in larger organizations also tended to report lower levels of incremental innovation ($r=-.167$, $p<.05$). Although treated within the block of sociodemographic variables, job innovation has a special status due to its subjective nature and it is thus understandable that it shows many cases of strong correlation with many of the variables in the conceptual model. Such is the case between job innovation and innovation climate ($r=.580$, $p<.01$), with radical innovation ($r=.554$, $p<.01$), and organizational support to innovation ($r=.513$, $p<.01$). Moderate correlations are also found between job innovation and open behavior ($r=.483$, $p<.01$), open behavior type one ($r=439$, $p<.01$) and open behavior type

two (r=.358, p<.01). Close behavior is correlated negatively and with a weak magnitude with job innovation (r=-.203, p<.01).

Among the variables integrated in the conceptual model the strongest correlations found are observed between open behavior (general and type two) with innovation climate (r above .750, p<.01). Likewise, a similar pattern is observed between open behavior (general and type two) with organization support to innovation (r above .680, p<.01). Innovation climate is also strongly correlated with organization support to innovation (r=.751, p<.01). Innovation climate is also strongly correlated with radical innovation (r=.606, p<.01) but without correlation with incremental innovation. Lastly, organization support to innovation is positive and strongly correlated with radical innovation (r=.563, p<.01) but also no correlation with incremental innovation (r=.039, p>.05). This encourages a chain of associations between organization support to innovation, open behavior, innovation climate, and radical innovation.

Open behaviors show a negative correlation with close behaviors although with a weak magnitude (r=-.174, p<.01) and radical innovation is also negatively correlated with incremental innovation with similar magnitude (r=-.142, p<.05).

Radical innovation, unlike incremental innovation has strong correlation with open behavior (general and type two), moderate with open behavior type 1 (r=.373, p<.01), and a weak negative correlation with close behavior (-.132, p<.05). Incremental innovation is the least correlated construct in the model with no significant correlations with neither open behavior general nor open behavior type two, having a weak negative one open behavior type 1 (r=-.190, p<.01) but a moderate correlation with close behavior (r=.384, p<.01). Table 3.2 below gives more details on descriptive and bivariate statistics.

Table 3.2 Descriptive and bivariate statistics

	Min-max	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Job_Innovation	2-5	3.88	0.64	1															
2. Gender MF	1-2	56%F	-	-.094	1														
3. Age	1-8	3.38	1.32	.037	-.053	1													
4. Education	1-6	3.94	0.80	.078	.015	-.091	1												
5. Organization Tenure	1-5	3.11	1.02	.072	-.185**	.498**	-.049	1											
6. Organization Size	1-4	2.65	1.06	.209**	-.031	.076	.040	.162*	1										
7. Organization Stage	1-3	2.26	0.54	.063	.008	.179**	-.091	.295**	.372**	1									
8. Hierarchy. position	1-4	1.53	0.62	.080	-.072	.237**	.206**	.409**	.112	.104	1								
9. Dyadic Tenure	1-6	3.01	1.03	.107	-.216**	.499**	-.051	.837**	.115	.267**	.345**	1							
10. Open Behaviour	2-5	4.29	0.50	.439**	-.038	.065	.036	.004	.019	-.016	.121	.080	1						
11. Open Behaviour_A	1.5-5	3.56	0.70	.358**	-.130*	.062	.186**	.066	.120	-.028	.117	.100	.390**	1					
12. Open_Behaviour_B	2-5	4.05	0.48	.483**	-.090	.076	.116	.035	.072	-.025	.142*	.105	.893**	.762**	1				
13. Close_Behavior	1.5-5	3.83	0.79	-.203**	.082	-.067	-.177**	-.007	-.097	.048	.006	-.012	-.174**	-.344**	-.290**	1			
14. Radical_Innovation	1.67-5	3.87	0.77	.554**	-.118	-.062	.076	.015	.106	.025	.072	.081	.520**	.373**	.548**	-.132*	1		
15. Increm_Innovation	1.2-5	3.87	0.72	-.105	-.086	.020	-.175**	-.071	-.167*	.019	-.059	-.118	-.009	-.190**	-.099	.384**	-.142*	1	
16. Innovation_Climate	1.83-4.67	4.04	0.58	.580**	-.083	.045	-.002	.032	.085	-.028	.067	.131*	.755**	.470**	.760**	-.169**	.606**	-.024	1
17. Support_Innovation	2.5-5	4.29	0.42	.513**	-.128	.081	.044	.079	.115	-.006	.133*	.175**	.693**	.407**	.686**	-.060	.563**	.039	.751**

Note: * $p<.05$; ** $p<.01$

As the KS statistic rejects the null hypothesis, Spearman correlations are shown. For gender Kendal's tau is shown.

3.2.2 Hypothesis testing

The overall empirical findings are depicted in Figure 3.5 as follows:

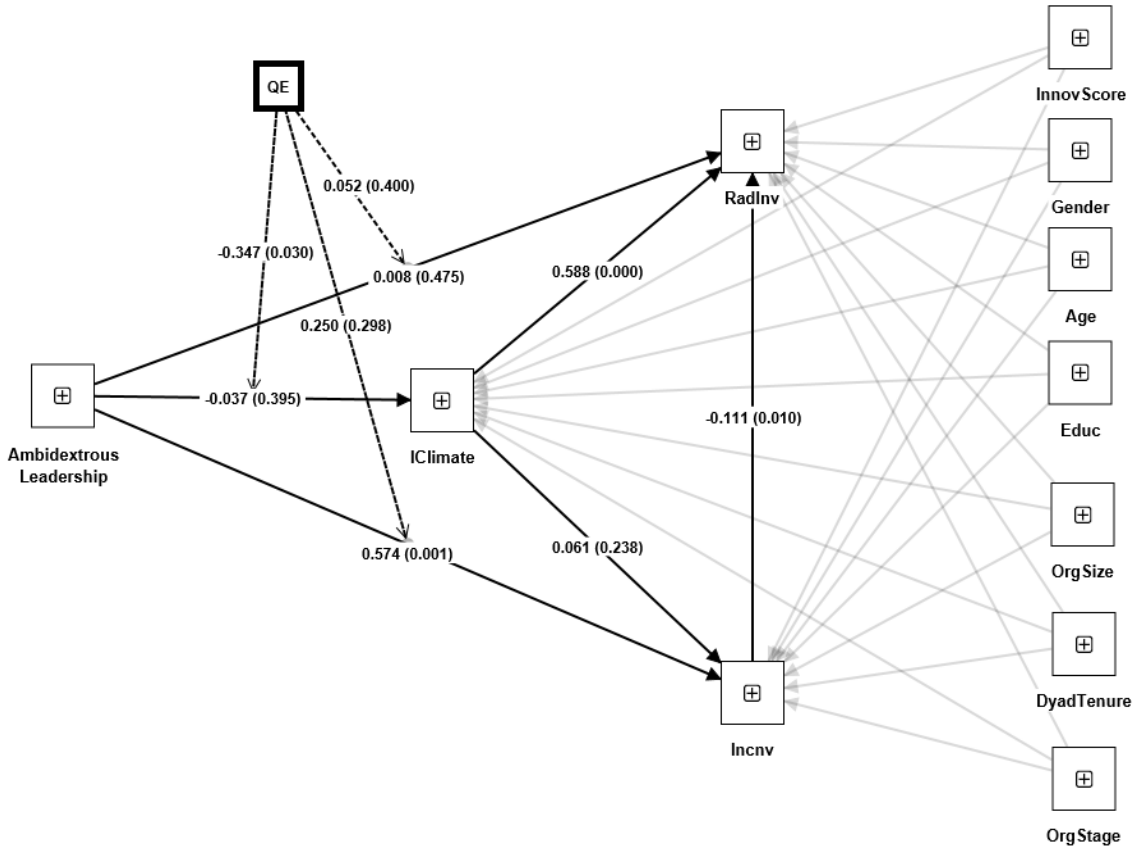

Figure 3.5 Conceptual model coefficients

The first hypothesis posits a trade-off between incremental and radical innovation, which findings show to be supported due to a negative regression coefficient (B= -.111, p=.01). Therefore, hypothesis one is supported.

The second hypothesis splits in two by positing that ambidextrous leadership has an inverted U-shaped relation both with incremental innovation and with radical innovation in such a way that it has an optimum level, above which ambidextrous leadership is counterproductive. As regards incremental innovation, the quadratic term of ambidextrous leadership coefficient B=.250, corresponding to a non-significant p-value of .298. This rejects hypothesis 2a. Likewise, the quadratic term of ambidextrous leadership in relation to radical innovation has a coefficient B=.052, corresponding to a non-significant p-value of .400, which rejects hypothesis 2b. Overall, the second hypothesis is not supported.

The third hypothesis states innovation climate has a positive direct effect on innovation capability, both upon incremental innovation capability and radical innovation capability. Findings concerning incremental innovation show a coefficient B = .061, corresponds to a non-

significant p-value of .238, thus rejecting hypothesis 3a. However, the B coefficient for the direct effect of innovation climate on radical innovation is .588, with a significant p-value of 0.001, which corroborates the hypothesis 3b. Thus, the third hypothesis receives partial support.

The fourth hypothesis posits an inverted U-shaped relation between ambidextrous leadership and innovation climate. Findings showed a quadratic coefficient B= -.347 which corresponds to a p-value of .03 which is significant. Therefore, the fourth hypothesis is supported as shown by following Figure 3.6.

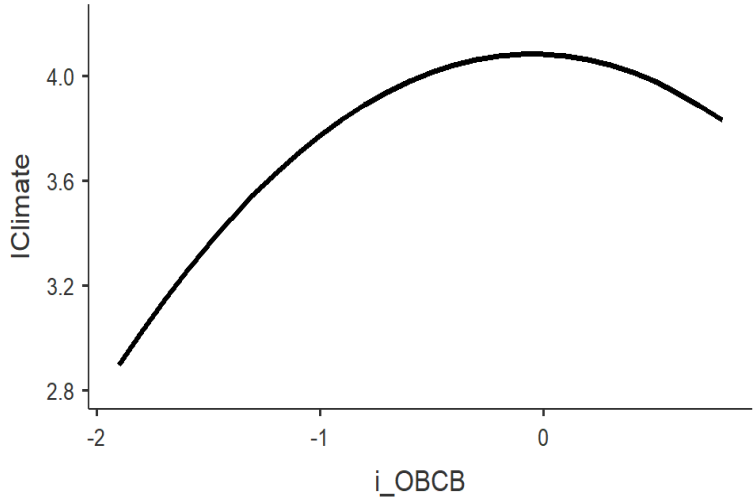

Figure 3.6 Quadratic function for ambidextrous leadership

The fifth hypothesis also splits in two sub-hypotheses by positing that ambidextrous leadership has an inverted U-shaped indirect relation with incremental innovation via innovation climate (hypothesis 5a) and also with radical innovation via innovation climate (hypothesis 5b) in such a way that the indirect effect's strength depends on ambidextrous leadership level increasing until it reaches an optimum and then decreasing when ambidextrous leadership becomes too strong. Findings concerning incremental innovation show a coefficient B= -.021, with a non-significant p-value of .268, thus rejecting hypothesis 5a. Conversely, the quadratic term of ambidextrous leadership exerts an indirect effect upon radical innovation with a B= -.204, with a significant p-value of .04, thus supporting hypothesis 5b. Therefore, the fifth hypothesis is partially supported. Table 3.3 shows direct and indirect effects of our five hypotheses.

Table 3.3 Direct and indirect effects

	InnovClimate				Incremental Innov.				Radical Innov.			
	Coeff.	t	p-value	HH	Coeff.	t	p-value	HH	Coeff.	t	p-value	HH
Direct effect												
Gender	-.020	0.308	.379		-.190*	2.033	.021		-.105	1.357	.087	
Age	-.008	0.279	.390		.064*	1.790	.037		-.060	1.502	.067	
Education	-.024	0.600	.274		-.139**	2.813	.002		.031	0.680	.248	
Org. Size	.008	0.260	.397		-.158***	3.185	.001		-.019	0.465	.321	
Dyadic Tenure	.060	1.563	.059		-.113*	2.192	.014		.005	0.106	.458	
Org. Stage	-.075	1.027	.152		.160*	1.665	.048		.070	0.901	.184	
Innovation Score	.525***	7.778	.001		-.095	1.099	.136		.344***	4.448	.001	
Ambidextrous Leadership	-.037	0.266	.395		.574***	3.081	.001		.008	0.063	.475	
Innovation Climate					.061	0.713	.238	H3a	.588***	6.291	.001	H3b
Incremental Innovation									-.111**	2.314	.010	H1
AmbidextLead (quadratic)	-.347*	1.881	.030	H4	.250	0.531	.298	H2a	.052	0.254	.400	H2b
Indirect effect												
AmbLead-InnClimat-IncInnov					-.002	0.147	.442					
AmbLead-InnClimat-RadInnov									-.022	0.260	.397	
AmbLead(quad)-InnClimat-IncInnov					-.021	0.618	.268	H5a				
AmbLead(quad)-InnClimat-RadInnov									-.204*	1.746	.040	H5b
Sequential Indirect effects												
AmbLead-InnClim-IncInv-RadInv									.001	0.129	.449	
AmbLead(quad)-InnClim-IncInv-RadInv									.002	0.524	.300	
R^2		37.6%			15.9%				45.5%			

Note: * p<.05; ** p<.01; *** p<.001

3.3 Discussion of results and conclusion (study 1)

Innovation became a motto in the post-industrial decades as it was recognized to be the main driver of progress and economic growth (Edwards-Schachter, 2018). However, today it is radical innovation that is mostly stressed because its disruptive nature turns it into a fast-track for overcoming problems, or mounting challenges to business and societies. Incremental innovation, by definition, is a much lengthier process. Likewise, from a business viewpoint, radical innovation offers true competitive advantage as the novel products or services may be valuable, singled out in the market, difficult to imitable (due to patents and technological barriers) and hardly replaceable (Barney, 1991).

After the Opening up and Reform in 1978, the Chinese national conferences on Science and Technology cumulatively defined a strategy that establish policies to make China's an "innovation-oriented society" by 2020 with a world leading role by 2050. From the international context, China learned that core technologies and innovation should be independently ensured at national level, and this pushed to top priority the investment in innovation in China with a focus on radical innovation.

Although innovation is a system-wide product that entails the whole of organizations to work together in line with extant societal resources leadership is an obvious critical factor in mobilizing and creating the conditions for such resources to translate into innovation. Due to the complexity of the innovation process, ambidextrous leadership is a well-suited profile to leverage organizational innovation capabilities (Rosing et al., 2011).

As expected, empirical research has been offering support to the value of ambidextrous leadership in producing innovation (Klonek et al., 2021) but there is inconsistency in findings (De Visser & Faems, 2015; S. Li et al., 2020). This inconsistency can be solved by discarding the often-assumed linear relationship to accept the underlying TMGT logic proposed by Pierce and Aguinis (2013) that stresses an optimum level of ambidextrous leadership instead of a maximum level. This approach is even more suitable for China cultural context where the doctrine of Zhong Yong (Guo & Hu, 2022). Some recent published research has been exploring this path (S. Wang et al., 2021; Wu et al., 2022) but not fully integrating the TMGT into a process model.

The conceptual model proposed in this thesis makes this explicit by conceiving innovation climate as an intervening variable that can be produced by ambidextrous leadership following this TMGT logic, towards fostering both incremental and radical innovation, which are also

linked theoretically. This model entails five hypotheses and findings were found to be informative.

The first hypothesis claimed incremental and radical innovation are triggered by divergent cognitive processes that go counter to each other or are at least divergent (Stringer, 2000). Incremental thinking requires less resources and this may explain its predominance over radical even when organizations strive for radical innovation but seem to be falling short from reaching radical and stick to incremental (Stringer, 2000).

This can be ascribed to the stronger investment organizations have to do to create conditions for radical innovation affecting strategy and culture (Slater et al., 2014). While incremental innovation was found to be linked to well-defined top-down procedures (Koen, 2004; Reid & De Brentani, 2004) radical innovation requires precisely the opposite in the sense that uncertainty is welcomed (O'Connor & Rice, 2013). Still, judging from the magnitude of the regression coefficient, the competing forces that lead to incremental versus radical innovation are not so strong in our sample as the literature might suggest. This can be interpreted by the fact that most empirical studies have been conducted in the West where opposite forces tend to be taken as incompatible. However, with a Chinese sample this assumption that opposites operate in a perfect trade-off does not hold, as the opposites may be taken more as complementary rather than incompatible from a Daoist view (Smith et al., 2017).

The second hypothesis departed from a TMGT reasoning to posit a curvilinear inverted U-shaped relation with incremental innovation (hypothesis 2a) as well as with radical innovation (hypothesis 2b) as a maximum association coefficient is expected to occur at the moderate levels of ambidextrous leadership. Findings support neither hypothesis 2a nor hypothesis 2b, this fully rejecting this hypothesis. In the case of incremental innovation, the alternative linear relationship is indeed observed (with a strong value of $B=.574$, $p<.001$) suggesting such relationship is not following the TMGT assumption. This means that the more individuals perceive leaders to be ambidextrous (the more they show both open and close behaviors) the stronger they report the existence of incremental innovation. This finding diverges from the non-existent direct relations reported by Y. Jiang et al. (2023). These authors opted to conceive ambidextrous leadership on the basis of the interaction between empowering leadership (where the leader gives leeway for subordinates to autonomously do their job with greater decision-making power) and directive leadership (where the leader focuses on stressing what subordinates should do, when and how in a traditional command approach) which is a slightly different operationalization from the one adopted in our study. Likewise, incremental and radical innovation are conceived in that study as self-reported expression of one's own behavior

instead of the perception of the overall organizational degree of shared behaviors related to innovation. This may help explain the divergence between our findings and those reported in such a study. Still, in our sample radical innovation has neither a direct linear nor a curvilinear relationship with ambidextrous leadership, which curiously goes counter to the results reported by this same study of Y. Jiang et al. (2023) which found a positive linear relationship with ambidextrous leadership. The same reasoning applies. Based on the same operationalization of ambidextrous leadership (empowering versus directive), S. Li et al. (2020) found high levels of ambidextrous leadership (high empowering and high directive) were not related to high levels of radical innovation. Instead, only when empowering behaviors were high and directive behaviors were low could one see high levels of association. This finding is a denial of the ambidextrous leadership hypothesis on fostering radical innovation which goes in line with our findings.

The third hypothesis introduced the role of innovation climate as a likely predictor of innovation capability, relating to both incremental innovation and radical innovation. Findings rejected the hypothesis that incremental innovation was fostered by innovation climate. This goes counter to Barba-Aragón et al. (2024) reports. In explaining why such relationship was not found we can rule out the possibility that climate was being generally measured because innovation climate can be taken as a facet of organizational climate, and thus the observations (Kozlowski & Doherty, 1989) that consistent findings related to climate research require measuring climate facets apply here. One important reason for innovation climate not being associated with incremental innovation can be found that incremental innovation can be attained by means of a top-down process that initiates activities directed to improving existing products or solving clearly defined problems (Koen, 2004; Reid & De Brentani, 2004). Therefore, as long as the process is well structured, communication will flow clearly, and people will be engaged with the process. Thus, incremental innovation will ensue. So, when such a process is implemented, it becomes irrelevant if employees share or not a feeling and perception that innovation is valued. They will just follow the process. Conversely, Reid and De Brentani (2004) sustained that radical innovation (which they called discontinuous innovation) has a bottom-up nature (not initiated by management) that is dependent on the individuals' interest in going beyond their boundaries to inquire on emerging patterns from the environment that could impact the organization and deciding whether that is relevant or not (they operate as gatekeepers). This fuzzy front-end activity can be triggered by the interactions with customers (Stringer, 2000). This occurs in 1) a discretionary way, 2) develops in a fuzzy manner with unstructured processes, and 3) management gets involved only when lower-end decisions

produce enough signal to be detected by managers which then 4) decide to create a project. It perfectly fits with our findings that innovation climate is positively associated with radical innovation but not with incremental innovation.

So, to foster the individuals' will to extend their boundaries and be attentive to emerging trends and patterns that could be of interest to the organization, managers can indeed encourage a shared perception that values the outcomes of such an attitude. By creating an innovation climate, the organization is increasing the chances that employees will perform their boundary spanning function and exert their reflective though so to operate as gatekeepers of novel information. Once enough critical mass is attained, managers can trigger innovation projects that will turn these novel ideas into concrete and radically new products or services. As Alexander and Van Knippenberg (2014) stated, the top-down process conducive to incremental innovation is of no use to produce radical innovation. Management can still foster the fuzzy front-end activity by implementing the right human resource practices that empower teams to be more autonomous (Aagaard & Andersen, 2014). This fuzzy front-end model has been widely accepted as evidenced by many existing tools (software) available to promote ideas generation and the whole involvement of employees in these radical innovation processes both with an individual or a group-based focus (Zhu et al., 2023).

The fourth hypothesis established a curvilinear relation between ambidextrous leadership and innovation climate. Although it seems obvious that open behaviors are drivers of innovation, there is indication that a too-much-of-a-good-thing phenomenon may be operating in these processes underlying the production of innovation climate. Findings supported this curvilinear relation in the direction the hypothesis establishes (inverted U-shape). Although ambidextrous behavior has been linked to employee innovative work performance (Rosing & Zacher, 2017) and innovation outcomes (Klonek et al., 2021) too much ambidextrous behavior makes managers suffer from strain, and employees from role conflict (Gabler et al., 2017; Keller & Weibler, 2015). This suggests there must be a limit to the positive effects of ambidextrous leadership above which it becomes counterproductive or just unbearable. This reasoning is the backbone of the TMGT phenomenon where a given variable (with both advantages and disadvantages) is required to achieve a certain level of an outcome but from a threshold onwards, its disadvantages start to offset its advantages. This TMGT approach is suitable for this domain as indicated by its application to the research on cognitive and neurodiversity in relation to idea generation in groups where many inverted U-shape relations have been reported (van Rijswijk et al., 2024). Therefore, the production of an innovation climate is not a maximal function of ambidexterity but rather an optimal function, meaning that fostering innovation climate through

ambidextrous leadership requires the leaders to have a sense of sufficiency and not fall into the trap of maximization.

The fifth hypothesis played a connective role in the conceptual model by integrating the posited relationship in hypotheses three and four. It claims innovation climate is not only a consequence of the curvilinear effect of ambidextrous leadership but also an antecedent of both incremental and radical innovation, therefore hypothesizing its mediating role in the process. Findings rejected the mediator role towards incremental innovation and supported it towards radical innovation. The rejection of the path leading from ambidextrous leadership through innovation climate to incremental innovation is not surprising considering that hypothesis 3a was rejected. The explanation that was advanced to this specific sub-hypothesis hypothesis 3a remains valid to explain the rejection of hypothesis 5a. To avoid redundancy, we will not repeat it but just highlight that incremental innovation can be fully triggered without the need for an innovation climate. As per the path leading to radical innovation, this indirect effect is most interesting in the sense that albeit a stronger innovation climate directly fosters radical innovation, ambidextrous leadership TMGT rationale still applies and thus, the optimum level of radical innovation through climate innovation is not set at the maximum level of ambidextrous leadership.

This is not in line with previous empirical findings closely related to our conceptual model (Diesel & Scheepers, 2019), but the operational definition of concomitant contradictory leadership behaviors (e.g. exploitation vs exploration; close vs open behaviors; empowering vs directive behaviors) is crucial to understand the divergent effects reported. Because we have opted to define ambidexterity as the interaction between both dimensions (which we believe is the only way of testing their concomitant effect as interactions can grasp configurations instead of just averages between dimensions), we reason the effect we report is more in line with the theoretical nature of ambidexterity.

Findings generally support the conceptual model stressing the importance of innovation climate as a key channel towards radical innovation based on ambidextrous leadership. The curvilinear relationship found is very informative and it goes in line with the TMGT rationale underlying the integration of opposing forces into organizational management, of which ambidextrous leadership is an example. Interestingly, incremental innovation is also produced by such ambidexterity but in a direct linear way, discarding the need of an innovation climate. This is an obvious sign that incremental and radical innovation are based on distinct cognitive processes just as literature suggests. Additionally, the fact that in our sample incremental has a negative association with radical makes this argument even stronger.

These findings offer novelty to extant theory. By showing a curvilinear relation is suited to characterize how much innovation climate is produced by ambidextrous leadership, future theory should stress quadratic effects in conceiving the role of ambidextrous leadership or any other construct that operates as a balance between opposing constructs (e.g. exploration vs. exploitation; open behaviors vs. close behaviors). Future theory should focus on optimal functions and discard the maximum functions in producing radical innovation. The finding that ambidextrous leadership relates to radical innovation with a full mediation (the indirect effect is significant and there is no direct effect) can also imply that future theory should consider innovation climate as a key construct that expresses the collective nature of radical innovation. Likewise, the negative relationship between incremental and radical deserves more theoretical attention because findings have been inconsistent but in our model the mediator seems to disentangle a possible process that helps explaining this apparent trade-off between incremental a radical logic.

For policy makers and practitioners, these findings are important as such policies or decisions within the organizational level must stress a couple of guiding principles: 1) rewards or promoting leaders that only put pressure on open behaviors in the hope of promoting innovation is a mistake. Leaders should be taught to adopt ambidextrous behaviors. 2) Such ambidextrous leadership should keep in mind Zhong Yong as a good principle to follow in promoting radical innovation. Putting too much pressure on both close and open behaviors is as bad as putting no pressure at all. 3) Measuring innovation climate is a positive practice in management because of its important intermediate role in producing radical innovation. The innovation climate should be fostered and monitored as it is directly linked to radical innovation. 4) Practitioners may also learn from these findings that betting simultaneously on incremental and radical innovation may be counterproductive because incremental innovation entails divergent cognitive processes from the ones implied by radical innovation. So, the strategy should define which one prevails.

These recommendations and plausible implications for both theory and practice must consider the limitations of this study. Firstly, the conceptual model considers innovation climate only while other mediators may be in play. Other factors, e.g. organization support, absorptive capability, leader-member exchange have not been tested in the hypotheses. Secondly, findings are generated based on team level self-reported questionnaires. Organization level research will enable all-round estimation of innovation capability and ambidextrous leadership. Thirdly, our sample method selects participants from many industries while innovation is most likely dependent on the nature and dynamics of each industry.

Future research can further expand this conceptual model by introducing boundary conditions, i.e. moderators, among which, the industry itself. Sectorial studies using this conceptual model can be very informative for theory building and practice in high-innovative industries such as IT, AI, or telecom. Likewise, innovation as a process requires time and, although our findings are based on a time-lagged design, the temporal windows required for radical innovation are longer than the time period adopted. Thus, longitudinal research may bring more information on how this process develops, how ambidextrous leadership produces innovation climate across the time. Naturally, expanding this model to incorporate new mediators or testing it in other cultures that may be more averse to ambidexterity, may bring value to literature towards understanding the cross-cultural nature of our findings.

Chapter 4: Bridging Findings with Policy Making (Study 2)

4.1 Introduction

This study aims to explore how findings from the previous study can be put to good use to design policies and offer concrete recommendations to foster incremental and radical innovation. It relies on literature reviewed on innovation policies crossed the thematic literature reviewed on ambidexterity, leadership, incremental and radical innovation and also innovation climate within organizations. To avoid redundancy, as this study is embedded in a full thesis, the literature review integrated before is the ground upon which this study is conducted (also based on findings from the 1st study).

As detailed below, the approach for this study is qualitative and guided by a set of questions that was designed to cover the most central issues in the conceptual model and respective findings, as reported and discussed in the previous chapter.

4.2 Guiding questions

Guiding questions were designed to help understand the reasoning underlying the policy making recommendations. For clarity's sake, this specific study target results that directly concern the three last guiding questions and leaves out (for the overall discussion and conclusion) all findings that have a more comprehensive nature (first six guiding questions that focus on leadership and the interpretation of the empirical model from the first study).

As regards leadership role in innovation we set three guiding questions as follows:

Guiding question one: What kind of leadership is successful in fostering innovation?

Guiding question two: What kind of leadership hinders innovation?

Guiding question three: How well do interviewees integrate the idea of ambidextrous leadership?

As regards interpreting the empirical model, we set three guiding questions as follows:

Guiding question four: Incremental vs. Radical innovation: Trade-off?

Guiding question five: Divergent intervening processes?

Guiding question six: How much ambidextrous leadership is good? Maximum vs. optimum

As regards recommendations for policy making, we set two guiding questions to cover both the abstract principles and the concrete measures as follows:

Guiding question seven: What recommendations for policy making: abstract principles?

Guiding question eight: What recommendations for policy making: concrete measures?

As regards the last topic, acknowledging model's future developments, we set a single guiding question as follows:

Guiding question nine: What blind spots and future development for this model?

4.3 Method

4.3.1 Research design

Among the options to design research, qualitative research stands out as a preferred approach for theory building, for extracting meaningful and close-to-reality inferences (Lune & Berg, 2017). These authors refer to life-worlds where subjectivity is the common denominator, rejecting positivistic views of the world as social objects are judged based on interpretative frameworks that escape the logic of a mechanical equation. The purpose of this qualitative approach is then to seek answers and extract patterns that convey a meaningful understanding of the phenomena under study.

4.3.2 Data analysis strategy (content analysis)

To infer the qualitative constructs and reasoning underlying any statement on the topics under scrutiny, there are many qualitative techniques that are suitable to extract meaning. One of the most adopted is content analysis. As the name suggests, it broadly refers to systematic, objective, quantitative analysis of message characteristics (Neuendorf, 2017). which means it can focus upon semantical categories (such as the meaning of words or sentences), upon the specific syntax or literary style, and visual features of images e.g. commercial advertising, paintings, or any other visual stimulus.

According to Neuendorf et al. (2017) content analysis differs from other qualitative text-focused analyses such as: 1) rhetorical analysis (focused on the persuasive feature of messages), 2) narrative analysis (focused on the structure of the text and how it relates to a representation of social reality), 3) discourse analysis (focused on the consistency and connection of words to a theme that expresses the communicator motives and ideologies), 4) semiotic analysis (focused on the deep meaning of message by uncovering deep cultural rooted structures and latent

meanings), 5) interpretative analysis (focused on creating theory from the coding under a methodological sampling process that entails theoretical sampling, cumulative and comparative analysis), 6) conversation analysis (focused on naturally occurring conversations between at least two individuals to prevent premature theory construction), 7) critical analysis (focused on uncovering structures of power than maintain social differences between groups), and 8) normative analysis (focused on identifying how strongly normative / prescriptive, stereotypical issues are observable in any text).

To conduct a content analysis, the researcher should consider six questions (Krippendorff, 2018): 1) Which data are analyzed?; 2) How are they defined?; 3) What is the population from which they are drawn?; 4) What is the context relative to which the data are analyzed?; 5) What are the boundaries of the analysis?; 6) What is the target of the inferences?

According to Stemler (2000), data can be considered at the word, sentence, or paragraph levels. As per word frequency, it is informative on how frequently individuals refer to a given idea, but it must consider polysemic features of some words and the fact that the context of the sentence changes the exact meaning of a word. Sentences (especially considered within the paragraph) provide a better understanding of the idea and therefore a thematic analysis is the option often taken by researchers.

This thematic analysis expresses categories (or codes) that can be produced by using existing categories from literature (i.e. a priori coding), or that can freely emerge from the coding process without any previous example or guiding (i.e. a posteriori coding). As content analysis often targets constructs that relate to previous literature but also entail some novelty, researchers often opt to do a mixed coding, considering both a priori and a posteriori coding. For clarity the dictionary of categories is shown in Appendix B.

As an intrinsically subjective process, coding is prone to individual bias. No researcher is free of assumptions when approaching a given text or topic and although efforts can be made to gain critical distance to positions or become aware of such assumptions, their fundamentally subconscious nature (and personal ethics) will most likely produce cognitive bias in interpreting text. Therefore, one of the key issues in content analysis pertains to testing its reliability. This is usually done with interrater agreement text (Cohen, 1960). This indicator expresses a ratio of the difference of matched categorization between two independent raters minus those cases that would emerge by chance divided all by the reverse chance.

Formula 4.1 shows the detail.

$$K=P_a-P_c/1-P_c \quad (4.1)$$

P_a is the proportion of units on which the raters agree. P_c is the proportion of units for which agreement is expected by chance.

As Kappa reaches 1.0, there is indication that raters do converge. Landis (1977) proposed the following kappa values interpretation: above .60 up to .80 it is considered substantial, and above .80 it is considered almost perfect. Most recently, Stemler and Tsai (2008) recommended .50 as the threshold for acceptable reliability. Similarly, cut off for a random effects estimate was empirically found based on S. Sun (2011) meta-analysis which set the minimum Cohen's Kappa at 0.53 value. In the case of the present study, we asked an independent rater to match four groups of four statements (16 statements in total) with identical number of categories randomly extracted from the transcripts. The Cohen's Kappa found is 0.833 which has an approximate t-statistic of 5.804, that is significant for p-value below 0.001, which suggests the categorization greatly converges between independent raters.

4.3.3 Procedure

Interviewees were contacted directly by the researcher in wechat and informally probed on their availability to participate in the interviews. After this, an online interview was scheduled. This mode of online interview was chosen because it makes high profile interviewees more easily available and in this specific case, the audio and video channels facilitate overcoming some biases due to the absence of some social cues (e.g. body position, or other non-verbal cues) as compared to those constrained with other remote interviewing options such as the telephone (Gray et al., 2020).

At the beginning of the interview an informed consent was read aloud and only if the interviewee stated he/she understands and wants to proceed, we deploy the interview. The informed consent is as follows:

"This interview is set within the doctoral study I am taking in management, with a focus on innovation capabilities, and leadership. I am happy to count on your voluntary participation, and this is a study for academic purposes only. The interview should take about 30 minutes (depending on how much you would like to elaborate on your answers) but please take whatever time you think is suitable.

For rigor's sake, I ask you for authorization to record this interview and at the end I will erase the record once the transcription is made. The analysis will focus on the overall set of interviewees and not on a single one, so all data is treated as anonymous, and your identity or your company's identity will be kept confidential except if you would prefer otherwise (for

which you should state your option either at the beginning of the end of the interview). You can drop out of the interview at any time and also ask to put the record off at any moment.

Would you like to proceed? Can I record this interview? Thank you for your collaboration."

Because it is important to guarantee an alignment of the terms used in the interview, we started by offering an introduction to the topic together with some definitions pertaining to the most central constructs implied in the interview. The introduction stated that:

"This study is focused on innovation capability of firms highlighting the role of leadership. The purpose of this interview is to understand your thoughts and recommendations about firm innovation in relation to leadership and shared working climate in teams and organizations. To understand this study there are three important concepts: Firm innovative capability, Innovation climate, and ambidextrous leadership."

The three constructs were defined as follows:

"Firm Innovative capability refers to two types of innovation: incremental (small novel features that are added of changed to improve an existing product or service), and radical innovation (disruptive changes that can come from technologies or the innovative use of them but also radically new products or services that are game changers)".

"Innovation climate is the shared perception among employees (within teams or the entire organization) that there is a collective feeling and action that fosters innovation, taking risk, and accepting failure as a way to improve and learn".

"Ambidextrous leadership refers to leaders that simultaneously show open behavior (i.e. allows my team to do different ways of accomplishing a task; motivates my team to take risks; gives my team possibilities for independent thinking and acting) and close behavior (i.e. establishes routines; pays attention to uniform task accomplishment; sanctions errors). Although it seems paradoxical to show them simultaneously or alternatively, this kind of leadership has been claimed to be suited to produce innovation climate".

4.3.4 Sample

To ascertain the eligibility of each participant, a first question pertaining to their former experience with innovation was asked as follows:

Question one. What is your experience in relation to firm innovation? Have you had a direct role in it or have integrated a firm that went through such a process or had such culture? Have you played any role in relation to promoting innovation in firms (e.g. funding or government programs)?

The sample comprises 20 interviewees that match the eligibility criteria and provide a comprehensive overview of differentiated profiles in relation to innovation. Namely, the sample comprises nine individuals who have worked as employees in business enterprises with innovation practices. Among those nine individuals, three interviewees have organizational leading roles (senior managers), six interviewees have middle management roles in their organizations. Meanwhile, three individuals have entrepreneur experience related to innovation. Four individuals have worked with innovation enterprises as consultants. One individual is an investor in innovation enterprise. And three individuals are external expert evaluators for innovation enterprises.

The sample is also diversified as regards age (ranging from 27 to 54), and gender (nine females), and industry (covering ICT, healthcare, education, aerospace, manufacture, agriculture, finance and clean technology).

The first interviewee is an associate professor teaching management in Chinese University of International Business and Economics. This interviewee has consulted an innovation project for two years since 2012.

The second interviewee has more than 20 years working experience as Business Development director in international pharmaceutical companies. Innovation is the revenue driving force for international pharmaceutical companies. Therefore, this interviewee is heavily involved in innovation in her daily job.

The third interviewee works in aerospace high technology company as vice president for 15 years. His company products are tailored to Chinese high-tech industry and aim to achieve radical innovation for their products.

The fourth interviewee works in technology transfer company under Beijing Medical University as vice president. This technology transfer organization is responsible for linking the medical industry with innovation ideas or prototypes developed by Beijing Medical University in Beijing. So, he is heavily involved in the process of developing innovative products in the healthcare industry.

The fifth interviewee works as a team leader in ICT companies for eight years. He had led an internal entrepreneur project incubated by his company, which required him to make decisions and mobilize resources and lead the team as an entrepreneur.

The sixth interviewee works in the innovation department of a prestigious international consulting company. Their department focuses on helping traditional enterprises setting up their innovation strategy. She observes how innovation strategy is designed and implemented in different companies and how leaders drive these innovation strategies.

The seventh interviewee works in healthcare industry for more than 30 years as a team leader and then as an organization senior manager. She has experience of implementing international innovation projects and has profound understanding of cross-culture innovation.

The eighth interviewee is a government official working in a department to evaluate innovation projects. He has five years' experience in this department and has observed numerous projects in order to make the decision whether the government should provide tax reduction for high quality innovation projects. Although he has relatively short working experience, he has accumulated more innovation cases than other jobs.

The ninth interviewee is a business development manager for more than 10 years in a healthcare company. He has led internal innovation projects himself.

The tenth interviewee is an entrepreneur in ICT industry for more than 20 years. His own company focuses on big data area and aims to drive radical innovation for the industry.

The eleventh interviewee has more than 10 years team leader experience in the finance industry. She helps Chinese listed company to evaluate innovation projects. Therefore, she has abundant experience on how investors and entrepreneurs think about their projects from different angles.

The twelfth interviewee works in innovation incubator for more than 10 years. She is also involved in the process of implementing innovation projects with entrepreneurs.

The thirteenth interviewee also works in an innovation incubator for more than five years. Her experience covers industries such as agriculture, healthcare, and manufacturing.

The fourteenth interviewee works in the governmental sector for 12 years, to promote innovation projects in advanced manufacture, clean technology, and agriculture.

The fifteenth interviewee is an associated profession on healthcare in Chinese medical university. She plays a role of evaluating innovative healthcare projects on behalf of the government.

The sixteenth interviewee works in manufacture industry for 15 years. She led a team to implement an innovative project in her company and has hands-on experience on the process of delivering innovation.

The seventeenth interviewee works in finance industry for 12 years. As a vice president, he collects innovative projects and evaluates them to make the investment decisions. Therefore, he has profound understanding of innovation and how the leaders play role on its implementation.

The eighteenth interviewee is an individual investor herself for more than 20 years. She has invested in more than 30 agriculture and aerospace projects. She also has abundant experience

in management and performs multiples leadership roles as she runs a team to help her with investment activities.

The nineteenth interviewee works in education industry for 25 years. He has been an expert consultant for educational innovative projects for two years.

The twentieth interviewee works in ICT industry for 15 years. He led a team to implement an innovative project in his company for three years.

Therefore, these 20 interviewees are selected because they play different roles when engaging with innovation processes in various industries (which are innovative intensive). Their personal experience offers us different angles and insights on how the findings of the study 1 can come up with policies and recommendation, which benefit industries and society in China.

4.3.5 Interview script

The interview script was designed to reflect the guiding questions for this study. It comprises five sections. The first focuses on understanding the interviewee's experience with innovation and activating the focus on incremental and radical innovation. The second section focuses on uncovering the interviewees perception about the role leadership played in the reported cases of innovation, both targeting the opening and closing behaviors. The third section showed the conceptual model empirically tested and the respective findings and then asked for personal interpretation of the reasons that can explain such findings. The fourth section asked for recommendations and ideas for policy making that can originate from such findings. Lastly, interviewees were asked to add anything they think might be missing from the interview and adds value to the study.

"Your experience. Firstly, I would like to understand your background in relation to innovation and these concepts.

Question one. What is your experience in relation to firm innovation? Have you had a direct role in it or have integrated a firm that went through such a process or had such culture? Have you played any role in relation to promoting innovation in firms (e.g funding or government programs)?

Question two. And what about specifically incremental innovation and radical innovation? The experiences you are referring to are most closely related to incremental or radical? Both?

Role of leaders

Question three (a). What was the role of leadership in such case or cases you are sharing with me? Can you share some successful cases?

Question three (b). And what about leadership from another angle? Is there some case where you think there was potential for innovation, but leadership hampered it? Why do you think it happened? (R: Three types of leader behavior that can hamper innovation: 1) too much control and direction (no room for initiative, creativity or risk taking – too much closed behavior), 2) too much room for creativity and idea generation without a sense of direction, or 3) neither (the leader does not seem to be very strict on control or promoting initiative).

Question four. Another idea that goes around concerns the fact that the best leaders do both. They are ambidextrous. Do you know anyone that fits this description? Can you describe or offer some examples of his/her behavior in a specific case?

The model we tested

Question five. We tested the claim that ambidextrous leadership improves innovation climate, and that innovation climate leads to stronger incremental and radical innovation. We also tested the direct relationship between leadership and innovation capability. I will share the most central findings and ask you please to offer your thoughts on them based on some questions.

Our model is the following one:

Question five (a). Our first finding is that: Incremental innovation is negatively related to radical innovation. So, the more incremental innovation a team is, the less it shows radical innovation capabilities. Why do you think this happens? (R: the attitude to create incremental innovation is different from the one that leads to radical innovation because incremental is small-steps and lower risk, while radical is the opposite.)

Question five (b). Our second finding is that: Innovation climate leads to radical innovation but not to incremental innovation. So, it seems that a climate that everyone thought would foster both types of innovation is only good to produce radical innovation. Why do you think this happens?

Question five (c). Lastly, our third finding is that: a leader that shows simultaneously open and closed behaviors, increases the innovation climate in the team up to a certain level. Above this level, showing both these behaviors simultaneously will be counterproductive because the innovation climate starts to decrease (where you have the arrow). How would you explain this? Why does it happen? (Figure 3.6 is shown alongside with this text)

Recommendations and policy making

Question six. Based on these findings, if you were asked to write a policy to optimize innovation capabilities in firms, what would be your recommendations?

Question seven. How would you transfer these recommendations into organizational and

governmental concrete actions? (if there is no mention to leadership, it is necessary to highlight that one).

Additional issues

Question eight. Is there anything else you would like to add that we haven't mentioned, and you believe adds to our conversation about innovation?

Thank you."

4.4 Results

Guiding Question one: What kind of leadership is successful in fostering innovation?

Instead of naming leadership styles, interviewees focused on leadership competencies, which also enables inferring the prototypical profile of innovation-fostering leaders. Among the 20 interviews, the total frequency of leadership skills fostering innovation is 48. The most frequent mentioned management skills for innovation are "setting up strategy" (F=17, N=15), "forming team culture" (F=7, N=7), "coordinating resources" (F=7, N=6), "solving problems" (F=4, N=4), "making decisions" (F=4, N=3), "continuous communication" (F=4, N=3).

"Leaders, I believe, should be the driving force behind innovation. Leaders should set up the direction of innovation. What kind of problem can be sorted out and what kind of value the company should have. These questions need to be answered by the leader." (setting up strategy; interviewee 3)

"He/she has the responsibility and the right to shape the culture and the atmosphere of the team. The culture and atmosphere of the team will depend greatly on his/her leadership style." (forming the team culture; interviewee 5)

"Mobilize resource is key in the process of innovation, especially at the beginning. There are many kinds of resources team members have not used or known before, particularly for radical innovation. So, the leader is required to get external resources for the team." (coordinating sources; interviewee 9)

"the leader needs to think all possible ways to help achieving the goal as long as the method is legal" (solving problems; interviewee 20)

"In the process of innovation, external experts will have a lot of opinions. But it is not necessary to take all experts' opinions. And sometimes their opinions are contradictory to each other. As a leader, I think he/she should make the decision whether the external advice should be taken according to the initial goal." (making decisions; interviewee 15)

“leader needs to communicate frequently with the team members so that the team member knows why their leader sometimes have controlling behavior or make decisions that they do not understand” (continuous communication; interviewee 20)

Besides the above-mentioned management skills, other management skills are also mentioned: “taking the responsibility (risk)” (F=2, N=2), “deploying task according to ability” (F=2, N=2), “clarifying boundary of freedom” (F=2, N=2), and “mentoring and training “(F=1, N=1).

“I remember at that time my boss told me, you just go and make it. If you fail, it is not your responsibility, I'll take the blame. His word gives me great encouragement.” (taking the responsibility; interviewee 2)

“The leader assigns these tasks depending on each person's ability, and if there may be small mistakes, other team members can help to remedy the mistake.” (deploying task according to ability; interviewee 15)

“When giving the team space, the leader set up the boundary of time and scope, so that the team knows exactly how far they can go.” (clarifying boundary of freedom; interviewee 20)

“I spent lot of time to train new team member. She comes from a different background and is not familiar with this particular sector. I took her with me when meeting every partner. She now becomes an important team member” (mentoring and training; interviewee 19)

Table 4.1 shows interviewee answers on management skills fostering innovation.

Table 4.1 Management skills fostering innovation

Category	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11	I12	I13	I14	I15	I16	I17	I18	I19	I20	Freq.	N
Set up strategy	1	1	1	1	1	1		2	1	1	1		1		2	1	1		1		17	15
Coordinate resource			2			1		1	1					1	1						7	6
Making decision												2			1				1		4	3
Continuous communication															1				1	2	4	3
Take responsibility(risk)												1		1							2	2
Form team culture		1	1		1		1				1		1					1			7	7
Solve problems						1							1				1			1	4	4
Deploy task based on ability															1				1		2	2
Clarify boundary of freedom	1																			1	2	2
Mentoring and training																			1		1	1
Total	2	2	4	1	2	3	1	3	2	1	2	3	3	2	6	1	2	1	5	4	48	20

Guiding question two: Experience of harmful leadership

In the 20 interviewees, 17 interviewees have experienced over-controlling leadership. 11 interviewees have experienced erratic leadership while only one interviewee mentioned his experience of passive leadership.

"For example, when I was a foundation director at ..., the leader had a very different understanding of how a Chinese foundation operates than an international foundation, including fundraising. He had a lot of control over the foundation because he didn't understand the operation. He thought his past knowledge can be adopted. For him, he is always worried that things will go wrong." (interviewee 7)

"There are also leaders who are kind of pie-in-the-sky leadership. They have too many ideas and creativity. These leaders are less likely to impede innovation, but they will impede execution." (interviewee 2)

"People are complicated. Three leaderships can sometimes exist on the same person. For example, when a leader is particularly unfamiliar with the business, he might show erratic or passive leadership." (interviewee 3)

Guiding question three: How well do interviewees integrate the idea of ambidextrous leadership?

Among the 20 interviewees, 14 interviewees have positive attitude towards ambidextrous leadership. 11 interviewees think that they have personal experience with ambidextrous leaders in their career, and three interviewees mentioned the rareness of ambidextrous leadership. Table 4.2 illustrates more details.

"It is very difficult to find this kind of leader. Usually, we can find one company that has two leaders who play different roles in the company and complement each other. It is rare to find one leader to be ambidextrous himself." (interviewee 10)

"I'm actually an ambidextrous leader myself. Well, I will provide the general direction to the team. But in the process of doing it, I think I just do not intervene, and let the team figure it out on their own." (interviewee 7)

"For example, Mr. Zhang Ruimin of Haier, Alibaba's Jack Ma, Tencent's Ma Huateng, I think that they are this kind of leaders. They can build the system and also encourage innovation." (interviewee 3)

Table 4.2 gives details on interviewees' experience of harmful or ambidextrous leadership.

Table 4.2 Interviewees' experience of harmful or ambidextrous leadership

Category (Harmful)	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11	I12	I13	I14	I15	I16	I17	I18	I19	I20	Freq.	N
Over-controlling leadership	1	1	1	1	1	1	1	1		1	1	1	1	1			1	1	1	1	17	17
Erratic leadership		1	1	1	1	1	1			1					1	1	1		1		11	11
Passive leadership			1																		1	1
Total	1	2	3	2	2	2	2	1	0	2	1	1	1	1	1	1	2	1	2	1	29	20

Category (Ambidextrous)	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11	I12	I13	I14	I15	I16	I17	I18	I19	I20	Freq.	N
Rareness					1					1				1							3	3
Positive attitude	1	1	1		1		1		1	1		1	1	1		1		1	1	1	14	14
Personal experience	1	1			1		1		1		1		1			1	1		1	1	11	11
Total	2	2	1	0	3	0	2	0	2	2	1	1	2	2	0	2	1	1	2	2	28	20

As regards interpreting the empirical model, we set three guiding questions as follows:

Guiding question four: Incremental vs. Radical innovation: Trade-off?

In the 20 interviewees, 15 out 20 stated it made sense to them that incremental innovation is negatively related to radical innovation. So, the more incremental innovation a team is, the less it shows radical innovation capabilities. However, 5 interviewees disagree with this finding.

"I also agree with your findings because it seems like one coin with two sides. Incremental innovation is kind of a gradual improvement. Imagine put a frog into the hot water, then later on the frog loses the ability to jump out of the water. Incremental team will lose the ability to conduct radical innovation" (interviewee 7)

"Instead, I think radical innovation is positively related to incremental innovation similar to the relationship between quantitative change and qualitative change. When quantitative changes accumulate enough, a qualitative change will happen. Similarly, radical innovation is based on enough incremental innovation" (interviewee 16)

The interviewees also give their explanation for the negative relationship between radical innovation and incremental innovation. These reasons are different mindset (F=7, N=6), inertia of team (F=7, N=7), risk preference (F=6, N=6), divergent resource requirements (F=5, N=4), market pressure (F=2, N=2), and time horizon (F=1, N=1).

"If the team accepts incremental innovation, it's not going to be able to make radical innovation. A team aiming for radical innovation shall not satisfy with incremental innovation as a way of thinking." (different mindset; interviewee 14)

"inertial thinking makes team stay on their comfortable zone. They rely on what they have achieved and think things based on current foundation" (inertia of team; interviewee 9)

"Team which have less willingness to take risks usually like incremental innovation. They take slow steps to adjust according to market needs. Their innovation ability is usually low and their ability to bear market risk is low." (risk preference; interviewee 12)

"The mechanisms for organizing people, money and materials are also different. It is impossible to have a team that can achieve both incremental and radical innovation. when the team is equipped with such a mechanism for radical innovation, relevant personnel will be employed to suit it." (divergent resource requirement; interviewee 18)

"Sometimes, the market you are in forces you to go into radical innovation. Besides radical, there is no other way that the company can go." (market pressure; interviewee 16)

"Time horizon means that incremental innovation can produce results in shorter time period. However, radical innovation needs longer time and also needs to be validated by the

market. Sometimes, radical innovation is not allowed because of time horizon." (time horizon; interviewee 13)

Table 4.3 gives details on interviewees' understanding of negative relationship between radical and incremental innovation.

Table 4.3 Summary of interviewees' understanding of negative relationship between radical and incremental innovation

Category	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11	I12	I13	I14	I15	I16	I17	I18	I19	I20	Yes	No
Negative relationship	N	Y	N	Y	N	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	15	5
Reasons for negative relationship																					Freq.	N
Different mindset						1					1			1		1		1		2	7	6
Inertia of team		1	1				1						1		1				1	1	7	7
Risk preference						1				1		1				1	1			1	6	6
Divergent resource requirement														2	1		1	1			5	4
Market pressure				1												1					2	2
Time Horizon	1												1								1	1
Total	1	1	1	1	0	2	1	0	0	1	1	1	2	3	2	3	2	2	1	4	28	20

Guiding question five: Divergent intervening processes?

In 20 interviewees, only six of them agreed that innovation climate only leads to radical innovation, but not to incremental innovation. Most of them (14 out of 20) thought innovation climate facilitates not only radical but also incremental innovation. Table 4.4 gives details on interviewees' agreement or disagreement of this divergent intervening process.

"I do not think that incremental innovation is so-called innovation. It is kind of improvement. Companies which have profit driven mechanism can result in incremental innovation." (interviewee 15)

"Innovation climate can completely change the team atmosphere. Radical innovation needs this kind of emotion of the team. It is essential for achieving radical innovation. However, I think that innovation climate is also helpful for driving incremental innovation." (interviewee 3)

"Radical innovation requires innovation climate more than incremental. In the process of radical innovation, team will experience many times of failure. If the team always criticize each other, blame each other, how can this kind of innovation climate creates radical innovation." (interviewee 19)

"A company's innovation climate co-relates to its development stage. When the company just starts it business, it is more likely to have better innovation climate and aims to achieve radical innovation. When the company have a good revenue, everyone will tend to stay in their comfortable zone, and be more reserved." (interviewee 17)

"Radical innovation requires team has mission in their heart. Team do not think that their jobs are only the tasks what the company ask them to do. Once this kind of mission oriented climate is created, radical innovation then can be possible." (interviewee 15)

"In the beginning of China's opening up in 1979, there are lots of small businesses. Probably because of their volume and stage, they have no business foundation so they are brave to choose radical innovation." (interviewee 20)

"If the team has good innovation climate, every team member wants to create new products and do not want to stay in their comfortable zone. If this kind of emotion dominates the team, members will tend to be more brave and dare to try widely. I think this kind of team emotion is very key to radical innovation." (interviewee 20)

Table 4.4 Summary of interviewees' understanding of "innovation climate leads to radical innovation but not to incremental innovation"

Category	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11	I13	I14	I15	I16	I17	I18	I19	I20	No
Innovation climate only leads to radical innovation	Y	N	N	N	N	N	N	N	N	Y	N	N	Y	Y	Y	N	N	N	Y	14

Guiding question six: How much ambidextrous leadership is good? Maximum vs Optimum

In the 20 interviewees, 18 of them agree that there is optimum level of ambidextrous leadership to foster innovation climate while two of them disagree with the above statement.

"I totally agree that there is a turning point for ambidextrous leadership. But it is very difficult to find this balance point." (interviewee 18)

"I do not think the optimum point makes sense. For example, Jobs of the Apple always demands a lot from the team. However, the Apple's innovations are great under his leadership." (interviewee 19)

13 interviewees explained why they think there is optimum level of ambidextrous leadership rather than maximum level to foster innovation. These reasons are "No more extra potential under pressure" (F=8, N=8), "too much failure experience" (F=5, N=5), "confusion or role conflict of the team" (F=4, N=4).

"Any innovative ideas need a process of verification and implementation. If there are too many innovative ideas, the resource will be tight and not enough to support verification and implementation. The team will feel that many ideas do not have a closure process of verification. The team will need time to pause to reflect on their direction. This kind of feeling will have an impact on their willingness to try more new ideas." (interviewee 9)

"When ambidextrous leadership goes beyond the turning point, however pressure the leader gives to the team, no more potential can be activated. The innovation capability of the team has been exhausted." (interviewee 18)

"The leader's ambidextrous behaviors to some extent will be positive incentive to the team. However, when there is too much ambidextrous behaviors, team will feel that the leader has double side personality and hard to understand and adjust to the leader. This will then become negative incentive to the team." (interviewee 3)

Below Table 4.5 gives details on interviewees' understanding of optimum ambidextrous leadership for innovation climate.

Table 4.5 Summary of interviewees' understanding of optimum ambidextrous leadership for innovation climate

Category	I1	I2	I3	I4	I6	I7	I8	I9	I10	I11	I12	I13	I14	I15	I16	I17	I18	I19	I20	Yes	No
Agreement on optimum	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	18	2
Reasons to reject maximum																				Freq.	N
To much failure experience								1			1		1						1	5	5
No more extra potential		1							1	1			1	1	1		1			8	8
Confusion or role conflict		1	1									1		1						4	4
Total		2	1					1	1	1	1	1	2	2	1		1		1	17	13

As regards recommendations for policy making, we set two guiding questions to cover both the abstract principles and the concrete measures as follows:

Guiding question seven: What recommendations for policy making: abstract principles?

During our interview, 20 interviewees offered policy recommendations (F=82, N=20). Most of these recommendations are abstract principle-based recommendations. Most common abstract recommendations are "giving more governmental financial incentive" (F=15, N=12); "rewarding innovation" (F=10, N=7); "breaking silos for knowledge flow" (F=12, N=9); "foster ambidextrous leadership" (F=16, N=15); and "fault tolerant mechanism" (F=13, N=11). Following are quotes for these abstract policy recommendations.

"Local governments can provide some financial support. For example, Hangzhou decides to develop e-commerce industry, because Alibaba and NetEase are here. Then the local government will encourage Internet e-commerce innovation. Industry park will support entrepreneurship with tax preference policies, rental discounts and other financial policies. " (giving more government financial incentive; interviewee 9)

"The openness between different departments within the company is quite necessary. Openness in the entire ecosystem is also required. I think this allows everyone to complement each other's strengths. Every partner in the innovation process should play some of their own strengths." (break silos for knowledge flow; interviewee 6)

"When we design institutional mechanisms for innovation, we shall have rewarding mechanisms, including material, spiritual rewards. The company can also consider promotion in line with innovation. For example, if employees come up with innovative proposals, the employee can gain certain points on his/her performance record. Then at the end of the year, these points can be rewarded financially or lead to a promotion." (rewarding innovation; interviewee 16)

"We needs specialized training courses related to ambidextrous leadership, and I think that company leaders requires not only training for domestic practice of innovation and also international experience to influence more leaders." (foster ambidextrous leadership; interviewee 11)

"It is very important that direct leader of the innovation can be immunized from fault obligation. The responsibility should be borne by company as a whole." (fault tolerant mechanism; interviewee 14)

There are other less frequently mentioned abstract policy recommendations proposed by

our interviewees. Below Table 4.6 gives the summary of principal policy recommendations interviewees suggested.

"The company shall encourage internal innovation projects. Employees can volunteer to be innovative leaders and organize his/her own team to implement the ideas. The company can choose to mobilize financial resource and manpower to support these innovation projects." (establish internal incubator; interviewee 9)

"I think there needs external innovation evaluation in the innovation process. Stage evaluation is very necessary so that the projects will keep the right direction. We can correct or terminate some projects in time." (external innovation evaluation; interviewee 3)

"We should identify countries which we would like to learn from in terms of innovation policy. Our neighboring countries, such as South Korea, Singapore and Japan, have similar culture background. We can learn from these countries." (benchmarking; interviewee 20)

"I think that the government shall not have too much intervention on business. This will really help to boost the company's innovation capacity. Strict and wide government control is not aligned with the innovation purpose. Let market coordinate innovation activities." (less government control; interviewee 2)

"Innovation will naturally deliver some changes within organizations or industries. Some people will gain interest while the other will lose their interest. Those who foresee that they will lose their interest will create obstacles during the process. So sometimes, we do not know how exactly the innovation fails. We need to think about how to compensate those who will lose their interest so to remove counterforce for innovation. This is true for both radical and incremental innovation." (remove counterforce; interviewee 3)

"I think that most of the innovation should be from bottom up. Although external experts have profound knowledge on technologies, they do not know customers' needs. Our own employees often understand the business reality and start to think solutions from their daily work. They are most likely to come up with valuable innovative ideas." (inspiring bottom-up innovation; interviewee 9)

"It is useful to introduce competition to companies driving innovation. Our team needs to compete with teams around the world. This kind of mechanism will create innovative ideas." (competition to encourage innovation; interviewee 16)

Table 4.6 Summary of principle policy recommendation

Category	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11	I12	I13	I14	I15	I16	I17	I18	I19	I20	Freq.	N
Government financial incentive			1	1		1	1	1	2		1	1			3	1		1		1	15	12
Reward innovation			1	2	1	2							1			1			2		10	7
Break silos for knowledge flow		1	1	1		2					1	1	2		1					2	12	9
Foster ambidextrous leadership		1	1		1	1	1	1	1		2	1	1	1	1		1	1	1		16	15
Fault tolerant mechanism	1		1	1						1		2	1	1	1	1	2		1		13	11
External innovation evaluation			1													1		1	1		4	4
Benchmarking					1					1										2	4	3
Remove counterforce																			1		1	1
Inspire bottom-up innovation									1												1	1
Encourage internal incubator									1			1	1								3	3
Competition to encourage																1					1	1
Less government intervention		1					1														2	2
Total	1	3	6	5	3	6	3	2	5	2	4	6	6	2	6	5	3	3	6	5	82	20

Guiding question eight: What recommendations for policy making: concrete measures?

Among 20 interviewees, only three interviewees offered concrete measures regarding policy recommendations to foster innovation, as follows.

"We can give one-two hour time to employees to do work not related to their KPI. KPI sometimes oppress innovation capability. Employees shall have their own time for something they are interested in but not deployed by their line managers." (protected time for interest; interviewee 19)

"Local government in Guangzhou has set up a TCM fund. We all know that TCM is great to save patients under medical emergency, The purpose of this fund is to cover any legal conflict and compensation in case that TCM doctors have not successfully save patients. Protected by this fund, TCM doctors will not be afraid of any unfortunate consequence. This kind of policy should be applied to protect innovation failure as well" (fault tolerant mechanism; interviewee 16)

"I suggest that we shall have brainstorming meeting every week or every two weeks to listen to any innovative ideas proposed by the team. No matter they are possible or not, team should not say no to these ideas and should seriously discuss these ideas. The brainstorming session itself generate innovation, The discussion process is very important to knowledge sharing and creation." (brainstorming; interviewee 19)

Table 4.7 shows the frequencies (Due to the very small frequencies, for parsimony's sake only cases with at least one hit are shown).

Table 4.7 Summary of concrete policy recommendation

Category	I12	I16	I19	Freq.	N
Protected time for interest			1	1	1
Fault tolerant mechanism		1		1	1
Brainstorming session	1		1	2	2
Total	1	1	2	4	3

As regards the last topic, acknowledging model's future developments, we set a single guiding question as follows.

Guiding question nine: What blind spots and future development for this model?

Seven out of 20 interviewees mention innovation relevant topics they thought interesting and important for future studies. Other interviewees have no comments on those questions.

"In China, innovation involves lots of negotiation with government, especially to gain more failure tolerance from government and less regulation for trials, like free trade zone policies. Theoretically any business which is not forbidden by the law should be legal. However,

we have seen examples of squaring accounts after the autumn harvest. This makes innovation more difficult. I want to see how the government sectors can open their minds and tolerate innovation." (interviewee 1)

"I want to know how to evaluate innovation. Otherwise, as a senior manager, I do not know how to systematically encourage innovation in company." (interviewee 3)

"I want to know if there is any method or theory to realize incremental innovation. If this kind of method can be taught to companies, it will help us to generate more incremental innovation." (interviewee 6)

"I want to know how we can unleash individual's innovation capability to the extreme and how to identify certain individual who can change the company in the future." (interviewee 11)

"The big companies usually will have two ways of finding new business engine. The first one is that the company will establish many incubators or business unites. And let these small teams to try these ideas. Two second one is that the company will set up a fund to invest external teams who have good ideas. These two pathways have their cons and pros. I would like to discover more information on how other big companies in the world try to innovate and to find any method to innovate more effectively for big companies." (interviewee 18)

"Innovation in schools is the basis for China to have an innovative culture in the society. Nowadays, in Chinese schools, the students always have one answer to a question. In this kind of school culture, we cannot expect them to become innovation leaders and individuals when they grow up." (interviewee 14)

Below table 4.8 demonstrates interviewees' suggestion of future research topic.

Table 4.8 Summary of interviewees' suggestion of future research topic

Category	I1	I3	I6	I11	I14	I18	Freq.	N
How to create innovation culture in government sector	1						1	1
How to drive innovation in school					1		1	1
How to form innovation culture in the society					1		1	1
Internal innovation process for large company						1	1	1
Rationale to develop incremental innovation			1				1	1
How key individual drives company innovation				1			1	1
Evaluation innovation		1					1	1
Total	1	1	1	1	2	1	7	7

In addition to the guiding questions, as the interviews developed, some emerging issues settled and therefore we reason they deserve to be reported. These are a) frequency of radical innovation compared to incremental innovation, b) innovation facilitator factors, and c) innovation blocking factors.

Frequency of radical compared with incremental innovation

In 20 interviewees, 19 interviewees mentioned radical innovation is very rare compared to incremental innovation. Three interviewees expressed that they have never experienced radical innovation. One interviewee said that he experienced radical innovation before.

“Globally, USA has more radical innovation and Israel has more as well. Compared with these two countries, China has relatively less radical innovation” (interviewee 1)

“In pharmaceutical industry, which is innovation intensive, I would say that radical innovation is about 10-15%.” (interviewee 2)

“Radical Innovation is very rare, probably it exists in some particular industry. I never experienced radical innovation in my career and in the companies, we often know in our daily life.” (interviewee 5)

“I have experienced both radical and incremental innovation. Sometimes, founders think their companies are radical innovation. However, investors think they are only incremental innovation.” (interviewee 11)

“The private companies I know are all incremental innovation. Radical innovation requires large investment. In China, it is very difficult for private company to raise that level of investment.” (interviewee 18)

Below Table 4.9 gives summary of interviewees’ experience of radial innovation.

Table 4.9 Interviewees' understanding of rareness of radical innovation compared with incremental innovation

Category	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11	I12	I13	I14	I15	I16	I17	I18	I19	I20	Freq.	N
Never experience radical innovation					1				1	1											3	3
Rareness	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	19	19
Experience radical innovation					1																1	1

Innovation facilitating factors

In our interview, nine interviewees mentioned the factors facilitating innovation (F=25, N=9) (Table 4.10). These factors are "qualified leader" (F=9, N=7), "open and fair market environment" (F=3, N=2), "experience industry change" (F=2, N=1), "flat organization structure" (F=2, N=2), "authorized power by organization" (F=1, N=1), "team's innovation climate" (F=4, N=3), "innovation culture of a nation" (F=3, N=3), "key individual's innovation capability" (F=1, N=1).

"Good leader needs to have an open mind. He/she has experienced a lot of industries and is also an expert in a certain area. Cross industry experience is very valuable for driving innovation." (qualified leader; interviewee 7)

"I observe good leaders for successful company have two facets. On the one hand, they have good technical background. On the other hand, they have good management skills and can listen to other people's ideas. " (qualified leader; interviewee18)

"If there is a fair market environment and open social regulation system, everyone can have the chance to unleash their imagination and creativity." (open and fair market environment; interviewee 7)

"I have seen an internal innovation example. The management gives space and power to these teams to innovate, which greatly generate the creativity of these team to come up with bold ideas." (authorized power by organization, interviewee 20)

" from my personal experience among the projects I have invested, innovation results often rely on key individual's innovation capability." (key individual's innovation capability; interviewee18)

"Innovation coincides with changes of industry and society. If the industry the company is in has no change, it is impossible to cultivate innovation. Timing and favorable location are both very key to innovation." (industry change; interviewee10)

" Flat structure is helpful for innovation. The decision-making process will be much shorter and help the company to adjust to market environment so that the company can constantly try new ideas." (flat structure; interviewee1)

"The innovation culture of the nation is actually foundation to company's innovation. Like in Israel, innovation is in their gene and they appreciate failure as the precedence of success. Therefore, they have a high level of innovation in their society. China needs to have this kind of innovation culture." (an innovation culture of a country; interivewee14)

"Company leader sometime will have wrong judgement toward technology development.

If the leader cannot listen to team's opinion, the company will most likely fail because the leader has too much ego himself." (qualified leader; interviewee18)

"Company needs to have a team with the same objective. If the team member has their own objective, it is impossible for the team to achieve innovation." (team's innovation climate; interviewee10)

"Innovation team has to have failure experience. Otherwise, they will never achieve innovation." (team's innovation climate; interviewee14)

Below Table 4.10 lists factors facilitating innovation suggested by interviewees.

Table 4.10 Factors facilitating or blocking innovation suggested by interviewees

Category	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11	I12	I13	I14	I15	I16	I17	I18	I19	I20	Freq.	N
Facilitating factors																						
Qualified leader	1				1		2			1	1							2		1	9	7
Open and fair market environment	1						2														3	2
Experience industry change										2											2	1
Team's innovation climate										2				1				1			4	3
Flat organization structure	1													1							2	2
Authorized power by organization																				1	1	1
Innovation culture of a nation	1											1		1							3	3
Key individual's innov. capability																		1			1	1
Total facilitating factors	4				1		4		5		1	1		3				4		2	25	9
Blocking factors																						
Unqualified leader										2		1		1	1				3		8	5
Nature of company	1				1						1						1				4	4
Bureaucracy	1																				1	1
Over-regulated environment								1										1			2	2
Inertial thinking of team									1								1				2	2
Total blocking factors	2				1			1	1	2	1	1		1	1		2	1	3		17	12

Innovation blocking factors

Part of our interviewees also mentioned 5 factors blocking innovation (F=17, N=12) (Table 4.10）.These factors are "unqualified leaders" (F=8, N=5), "nature of the company" (F=4, N=4), "bureaucracy" (F=1, N=1), "over-regulated environment" (F=2, N=2), "inertial thinking of the team" (F=2, N=2).

"Sometimes, leaders give too many ideas. However, the team do not know how to implement them or which one is the priority. Lack of coordination between leaders and team often create pause of innovation process. These leaders usually do not think through these ideas carefully before they pass them to the team." (unqualified leader; interviewee 10)

"If the company is state-owned, it cannot bear any market risk. However, innovation is always accompanied by risk. Therefore, state-owned company is very difficult to innovate." (nature of the company; interviewee 11)

"Big companies become bureaucratic, and they have long decision-making process. In Alibaba, there are many ideas on new products, however because of long decision-making process, when management team decide to proceed, the idea is not innovative in the market any more. Therefore, innovative individuals will choose to leave these companies." (bureaucracy; interviewee 1)

"One company I invested has their products listed as military used products. Once it becomes military use, the company need to take great efforts to comply with relevant regulations. This actually becomes barrier for the company to expand its market share." (over-regulated environment; interviewee 18)

"The team receive information as they used to do. They will gradually have an inertial thinking style. It will make them difficult to have any breakthrough. The information they collect in the mind forbid them to think differently." (inertial thinking of the team; interviewee 9)

Above Table 4.10 also lists factors blocking innovation suggested by interviewees.

4.5 Discussion of results and conclusion (study 2)

The focus of this study is the individuals' critical thinking about ambidextrous leadership, incremental and radical innovation and the role innovative climate plays, with the ultimate purpose of proposing recommendations for policy making.

Incentives

All the interviewees offered recommendations at the abstract level. These recommendations firstly target incentives (namely more governmental financial incentives, followed by rewarding innovation performance), organizational dynamics that foster the flow of knowledge (e.g. breaking organizational silos), creating a fault tolerance culture, and a focus on promoting ambidextrous leadership in organizations. Such recommendations highlight the importance of incentives that can broadly comprehend subsidies or tax reductions. This is most likely the policy instrument that is on top of mind as incentive-type instruments are easy to grasp as compared to regulation-type or soft-type instruments (Borrás & Edquist, 2013).

Knowledge flow

Other suggested policies are not within the public domain but rather as organizational policies targeting knowledge flow. As a fundamentally knowledge-based activity, innovation benefits from sharing knowledge and this can be extended to a knowledge-centered culture which Gui et al. (2022) found to be moderating the relationship between transformational leadership and incremental innovation. Researchers found that when knowledge-centered culture is stronger, this effect increases. However, they also reported that it has no effect upon the relationship between transformational leadership and radical innovation. Still, although not hypothesized in that study, the bivariate associations between knowledge-centered culture and both incremental and radical innovation are significant and positive, which may stress its fundamental driving role in innovative systems. Thus, the proposed policies targeting stronger emphasis on knowledge sharing (and knowledge centered culture, by inference) are sound. Within this line of reasoning, interviewees also highlighted the importance of breaking silos. This is obviously related to knowledge sharing but goes further by specifying it should be cross-departmentalized. Such is a recurrent topic in innovation research as its complexity entails many contributes from divergent domains of knowledge and also from aligning the needs emerging from operations and requirements from the market and stakeholders (Jugend et al., 2018).

Fault tolerance

Lastly, a fault tolerance (or error acceptance) culture has been highlighted not as a policy but rather as an outcome that policies should pursue. This is also a recurrent topic in innovation research as it is one of the features of opening behaviors and closely related to higher risk acceptance (Ye et al., 2022).

Relieving pressure from short-term KPIs

At the concrete level, although the recommendations made were quite insightful, it is rather surprising that only a small number of interviewees could suggest recommendations to

implement the policies they suggested. One of these interesting concrete suggestions focused on relieving the pressure from KPIs by dedicating time for employees to work outside such pressure. This is an explanation that echoes management literature that criticizes short termism due to the quarterly KPI pressures (Terry, 2023) and it has been reported to harm innovation performance focused on an innovation policy failure in healthcare, observed in a region of Danmark (Hansen & Waldorff, 2020). Researchers conclude this (among other higher-level causes) was due to time pressures related to KPIs which pushed decision makers into discarding the best, but time-consuming, methods to design and deploy innovation strategies. Additionally, there is also indication that short-termism can increase R&D investment in times of good market performance and decrease it in times of market deteriorating performance indicators (Latham & Braun, 2010). This finding implies that such adjustments may reflect a cost-saving defensive strategy that might be counterproductive to turnaround from a negative outlook. Retrenchment strategies only will bring the company down instead of helping to overcome hardship from industry contraction (Mann & Byun, 2017). R&D, seen as a balance of exploration and exploitation, is reported by these authors as the best strategy to ensure a successful turnaround.

Do brainstormings

Another one, also targeting employee level, concerns creating recurrent brainstorming, dedicated moments for the teams, to foster knowledge sharing and creativity. This recommendation has been observed in successful cases such as the Boeing-Rocketdyne where twice a week, employees were requested to participate in a collaborative synchronous online brainstorming and were pressured to share knowledge with everybody so to develop a radically new product (Malhotra et al., 2001). Recurrent brainstorming sessions, with rules enforced to participate and share knowledge with all the team were thus the conditions to explain this successful case. In literature there is also indication that groups produce less, and lower quality ideas as compared to individual ideation (Mullen et al., 1991). This would compromise brainstorming as a useful instrument, and it explains why it has been gradually less targeted in innovation research. However, despite contradictory findings in literature, Kalargiros and Manning (2015) sustain that brainstorming is an effective technique to produce divergent thinking, which is required to foster creativity and innovation. These authors reason that such negative findings neglected the organizational cultural forces that can prevent divergent thinking from becoming normative processes. A more reasonable conclusion is that brainstorming might not be per se an effective concrete measure. It requires further attention to context and, as a technique itself, to the way it is deployed and how it follows the rules (Acar et al., 2019).

Consider macro level factors

Outside the scope of this model, interviewees were invited to think about other variables that could add value to the conceptual model under analysis. Some facilitating factors were also suggested such as open and fair market environment, industry change, and national innovation culture which are also acknowledged in literature (Ilyas et al., 2024). However, these suggestions fall outside the reach of organizational managers, as they refer to macro-level factors, better depicted as organizational context. Still, within the reach of managers, interviewees mentioned the flat organizational structure, team innovation climate, and individuals' innovation capability. Flattening organizational structures is a long-known reform that is linked to higher innovation performance (Reitzig, 2022). However, the other two recommendations fail to attain the level of concreteness that were requested. One can infer that managers should foster innovation team climate and likewise they should strive to either develop or hire individuals that show high innovation capabilities. Additionally, interviewees highlighted the importance of cutting down bureaucracy, of countering inertial thinking, and lowering over-regulation because these are structural blocks to innovation.

[This page is deliberately left blank.]

Chapter 5: General Discussion and Conclusion

The value of academic endeavors cannot be overstated in a world that is developing based on a paradigm that puts at the center knowledge and innovation. Such value is realized by technological transfer but outside the technical domains, it is realized by convening to decision makers and citizens novel ideas and evidence-based guidelines that show different ways to solve or prevent problems, or to leverage current strengths.

Among the many strategies to realize such innovation diffusion and implementation are public policies. Innovation policies can be the leading factor that triggers systemic change in business and society, fostering high performance innovation ecosystems. These policies can change incentives, protect the interest of innovators, develop, attract and retain talent (Borrás & Edquist, 2013) and are, therefore, critical to govern innovation and gear up the competitiveness of firms and the overall economy.

Hence, the second study was conducted to realize how findings from the first study could inform policy makers into fostering the conditions to optimally promote ambidextrous leadership to leverage incremental and radical innovation through a favorable climate to innovation.

When prompted to profile leadership that fosters innovation, most interviewees highlighted setting up a strategy, followed by forming a team culture supportive of innovation, coordinating resources, solving problems, and making decisions, while continuously keep open channels for communication. The competencies profile set by interviewees broadly matches literature both general and specific of innovation leadership. As per the transversal competencies, setting a strategy, solving problems, decision making, coordinating resources, and keeping open communication are in line with general competencies (Meriac et al., 2014). Within the specialized literature on innovation, these competencies also echo those found in a systematic literature review on innovation drivers that highlighted creative strategy designing, problem-solving, and decision making as key drivers (Dani & Gandhi, 2022). In the same vein Ilmudeen et al. (2021) stress coordinating resources in producing firm innovative capability.

Intending to probe how much such leadership is witnessed, or how much its opposite occurs, we focused on reports of harmful leadership experience. We think harmful refers to all sorts of behavior manifested by leaders or supervisors that go against the grain of innovation. Judging by their personal experience, harmful leadership has been extensively observed which mainly consists of overcontrolling behaviors (almost all of the interviewees have experienced this) but

also erratic leadership. Based on their descriptions, such leaders change their minds or set up directions that do not fit into an overarching objective. Even within the context of more complex leadership that entails several behavioral dimensions such as the Paternalistic leadership (which includes dimensions of benevolence, morality, and authoritarian), overcontrolling can be found in the authoritarian dimension and has been reported as detrimental for innovation performance in organizations (Lu et al., 2022). Per definition, leadership as a process is expected to set a direction that guides behavior and aligns goals. Simultaneously, leaders are expected to preserve some adaptative capability so to accommodate changes, but also to promote adaptability by not letting the organization become stuck to the same operational and thinking mode, which matches the idea of ambidexterity (Rosing et al., 2011). One could state that erratic leadership expresses inconsistency in a non-sensical way to individuals (Schilling et al., 2023), so that such leaders will create confusion and therefore harm innovation efforts.

One of the central constructs in this research is ambidexterity and its application to leadership under the name of ambidextrous leadership. Although Chinese Daoist ancient philosophy accommodates well the idea of co-existing opposing forces which are not taken as a problem but rather as the solution, and likewise Chinese culture integrated well the idea of paradox not as tension but as balance (Smith et al., 2017), normative Confucian prescriptions about harmony through structured voids within the society's network that guarantees stability and harmony in a hierarchical system have also deep roots in Chinese philosophy and culture (C. Li, 2006). Therefore, an important question to uncover is to which extent ambidextrous leadership is judged in a positive or negative light. When asked about it, most interviewees showed a positive attitude and about half of them reported having witnessed it in their professional life.

Contradictory or complementary leadership roles have been extensively theorized in Western literature ever since Blake and Mouton's (1964) managerial grid that distinguishes between production-concerned leadership and people-concerned leadership. Still, this model accepts that with effort, one can either reach a compromise between both or, ideally, maximize both concerns. Other models, such as Fiedler's (1967) LPC ascribe leadership styles as dispositional and label one individual as either task oriented or relationship oriented (Jago, 1982), which implies a mutual exclusion assumption. Newer models have highlighted other focuses are did not really based their reasoning upon mutual exclusive features, but the idea of opposing or mutual exclusivity is also observable in most contemporary models that are largely researched such as the LMX (Graen & Uhl-Bien, 1995) that conceives individuals' relationship with the leader as either belonging to the inner circle or the outer circle, and the same is

observable in Chinese context theory building such as paternalistic leadership that bring together divergent behaviors from leaders such as showing benevolence but also authoritarianism over followers. Additionally, it is interesting to learn that the authoritarian dimension seems not to be welcomed but rather it is counterproductive, which made some scholars to ask for a revision of the label "paternalistic" (Wong et al., 2022). Another deeply rooted theory on Daoism is the paradoxical leadership (M. J. Chen, 2002) that expresses a contemporary view of the need leaders have to comply with competing demands from organization and employees. This can be witnessed in behaviors that are apparently contradictory such as keeping control while allowing for some autonomy in decision making, maintaining a distance from employees but also closeness, or enforcing work procedures but also allowing for flexibility (Y. Zhang et al., 2015). A recent meta-analysis on the effects of paradoxical leadership found that it has positive effects on both individual innovation (either rated by oneself or the supervisor, independently of being a cross-sectional or time-lagged design) and team level innovation (A. Lee et al., 2023). This study has also reported that paradoxical leadership has incremental validity (i.e. it is able to explain unique variance over and above other constructs) over transformational leadership, transactional leadership or servant leadership in explaining innovation. These findings not only encourage the idea that ambidexterity resonates in peoples' minds and that translates into positive outcomes at the innovation level.

Another important construct in the present research relates to the different nature of incremental versus radical innovation. It can be conceived as a difference in degree only (where radical goes one step further by using the same processes) but it can also be conceived as fundamentally entailing divergent cognitive processes and attitudes, which may suggest a trade-off between them. When probed to critically think about this, most interviewees agreed that incremental and radical do not go side-by-side. In their reasoning to support such divergence, interviewees refer to internal behavioral states such as different mindset, inertia, or divergent risk preference but also to external factors such as incremental and radical innovation having very different resource requirements or complying with the market pressures.

Another important perception collected from interviewees pertains to the rareness of radical innovation compared to incremental. By conceiving incremental and radical innovation as operating in a trade-off, interviewees converge with literature that explores the organizational processes underlying both sorts of innovation. Namely, Alexander and Van Knippenberg (2014) assertion that the top-down strategic planning process often observed in incremental innovation is not in line with the requirements of radical innovation (Reid & De Brentani, 2004). In an

empirical study, findings showed that exploitation activities co-occurring with moderate exploration activities maximally foster incremental innovation while only high levels of exploration activities without any interaction with exploitation foster radical innovation (Lennerts et al., 2020). Therefore, exploration seems to be the critical factor (more than exploitation) to explain incremental innovation (following an inverted U-shape relationship). This implies that too much exploration is counterproductive to organizations that want to leverage their incremental innovation although it is always positive to produce radical innovation. In sum, the situations where incremental and radical have negative correlation correspond to the trade-off of effects originating from exploration (the too-much-of-a-good-thing effect from exploration on incremental, but always maximizing radical innovation). Exploitation is irrelevant for radical innovation but essential for incremental. As exploitation and exploration as considered to be different mindsets (Andries & De Winne, 2019) the interviewees implicit theory to explain such trade-off is in line with literature. Likewise, their inference on different risk proneness is also stated in literature where the evident higher risk acceptance is found in organizational with stronger radical innovation (Naranjo-Valencia & Calderon-Hernández, 2018). As per the rareness of radical innovation compared to incremental, findings align with arguments that radical innovation is less frequent due to the requirements of the exceptionality of individuals' commitment to drive this sort of innovation within a context where managers do not put much emphasis on control over such individuals (Poskela & Martinsuo, 2009).

When faced with the relation found between innovative team climate and both incremental and radical innovation, implicit theories in most interviewees sustained the idea that innovation climate is universally leveraging all types of innovation, independently of being incremental or radical. This does not align with our findings that showed innovation climate was only helpful in leveraging radical innovation, but not incremental innovation. The explanation can be found in the possibility that interviewees are considering innovation climate only, instead of inscribing it in a larger set of factors where ambidextrous leadership is also included. Still, by looking carefully to figures, judging from the mean of the innovation climate reported in the previous study (M=4.05, SD=0.5), it is possible that the experienced innovation climate level is sufficiently strong to endorse efforts towards radical innovation, shifting attention away from incremental innovation. Without experiencing the context (namely the level of innovation climate felt), interviewees might just highlight the innovation focus of the climate, which is logically attached to stronger innovation efforts, no matter if they are incremental or radical. However, by reading the literature there is an impression left of a tone that stresses the added

value of radical innovation as compared to that originating from incremental innovation. This may help explain why after a certain level of innovative climate (eventually the one found in our results) there is a felt preference for radical innovation efforts instead of incremental.

Due to its intrinsically contradictory nature, ambidextrous leadership does have the potential to open room for more flexible options but also blurring individuals' understanding of which direction the leadership wants to set. Thus, all the conditions are met to be dealing with a TMGT factor instead of a maximum performance factor (Pierce & Aguinis, 2013). However, most theory advocates maximum performance models, which are simpler from the cognitive viewpoint but indeed may not accommodate the reality. When asked to give a critical opinion of the curvilinear nature of the relation between ambidextrous leadership and innovation climate, almost all of the interviewees do think curvilinear depicts better reality. Explanations put forth by interviewees for such pattern relate to a ceiling effect of the pressure from high levels of ambidexterity after which innovation performance will be compensated for the extra effort in producing strong open and close behaviors. This is followed by an inference that very intense levels of ambidextrous leadership will undermine efforts by producing either too many failure experiences (which will add negatively to the employees and teams) and create confusion or role conflict. The TMGT idea has a basis on the Zhong Yong doctrine that establishes the advantages of not been extreme, and therefore it is not surprising that almost all interviewees related positively with the curvilinear findings reported above. When referring to a possible ceiling effect from too much ambidexterity, interviewees go in line with the proposition that ambidexterity can be functional if individuals ascribe contradictory behaviors of leaders to the needs of the phase (the specific phase in an innovation process, e.g. exploration followed by exploitation) and not to self-contradiction. If such ambidextrous behaviors become so strong to the point of not being possible to ascribe them to a given phase (Schilling et al., 2023), then it is reasonable to accept role confusion occurs. The ideas of ceiling effects and too many failures stemming from too much pressure is insightful and relates to literature that reports innovation fatigue (Chung et al., 2017).

5.1 Relevance for Chinese context

China's strategic shift from "made in China" to "created in China" represents a paradigm rupture and the unequivocal acknowledgement that innovation is paramount as a driving force of the economy and society (Keane, 2007). Within the effort to promote innovation in firms, decision makers must unlearn the efficient-driving lessons from the past and leverage new

productive factors, namely human resources. Among these, leadership stands out as the traditional engine that sets the right vision, and also sets the mobilization of resources and human effort to collectively achieve what would not be possible without such agency.

This paradigm shift does not occur in a social void, as all societies are built upon a set of cultural values that can either help or hamper this change process. China has an old-rooted culture that is unique in some features that can be helpful in leveraging innovation. Among these, one cannot overlook the Daoist philosophical tradition. From a Daoist viewpoint, opposites are not necessarily conflicting poles that require a right vs wrong decision. Instead, opposites can be approached in a rather paradoxical fashion and be taken as equally necessary. Additionally, Chinese culture also accommodates the Confucianism doctrine that tends to anchor society on the ideal of harmony, stability and social balance. Therefore, Chinese traditional cultural values incorporate principles that can be used to foster innovation. However, under this umbrella of innovation there are two categories that can be considered qualitatively distinct: incremental and radical innovation.

According to J. Chen et al.'s (2024) process innovation (where one can more easily find examples of incremental innovation) can be fostered by Confucianism principles while product innovation (mostly identified with radical innovation) can be fostered by Daoism.

This theoretical view highlights the important role ambidexterity plays in organizations, especially, ambidextrous leadership. Defined as the joint promotion of exploitation and exploration behaviors in followers (Rosing et al., 2011), ambidextrous leadership gained a central position in innovation studies when compared to other leadership styles (Klonek et al., 2021). Literature has conflicting findings relating ambidextrous leadership to radical innovation outputs (Keller & Weibler, 2015; S. Li et al., 2020) but these can be due to wrong assumptions about its linearity. Based on the idea of TMGT (Pierce & Aguinis, 2013), both findings can be partially correct as the curvilinear relationship can accommodate both under the contingency of the magnitude of the independent variable itself. This idea has already been started to take shape in empirical research (S. Wang et al., 2021; Wu et al., 2022) but it is yet very unexplored.

This study's research motivation is mainly driven by the TMGT hypothesis applied to ambidextrous leadership in producing radical and incremental innovation. From literature reviewed, we contend the TMGT is witnessed not only in a direct link between ambidextrous leadership and innovation but also (and mostly) through an intermediate behavioral process that matches the construct of innovation climate, operating as a mediator. This conceptual model drove the first study, that took a quantitative approach to find ambidextrous leadership follows a TMGT pattern in fostering innovation climate; that innovation climate is a mediator towards

radical innovation, and that ambidextrous leadership is a linear producer of incremental innovation. Lastly, that incremental innovation has a trade-off with radical innovation.

What can be concluded from overall findings? The first major conclusion is that ambidextrous leadership can be an important leverage of radical innovation through innovation climate if it is neither too low nor too high. A moderate level of exploration and exploitation shown by leaders will enact the optimal level of innovation climate, which will foster radical innovation. Another conclusion is that this same path does not apply to incremental innovation. This type of innovation is directly and linearly fostered by ambidextrous leadership. Still, due to the negative effect incremental innovation seems to exert on radical innovation (echoed in literature by means of a divergent mindset, organizational divergent processes needs (Alexander & Van Knippenberg, 2014), one can also conclude that if the ultimate goal is to foster radical innovation, then an extreme level of ambidextrous leadership will definitely be counterproductive. This is so because it will leverage up incremental innovation to the point that radical becomes even lower, while simultaneously radical is not fostered at all by innovation climate (that went above the optimal point). Both paths advise leadership against putting too much emphasis on ambidextrous behaviors. As a conclusion, the Confucian principle of Zhong Yong applies in showing paradoxical behaviors.

The second study took a qualitative nature to understand how findings relate to real world experience and how they could be helpful to design policies. Findings overall gave support to all relations found in the first study to the exception of the lack of association between innovation climate and incremental innovation. The most important finding concerns the acknowledgement that ambidextrous leadership is effective to promote innovation under a condition of a TMGT; and that the conditions favorable to incremental innovation are not in line with those needed to produce radical innovation. From this we can conclude that academic-based knowledge echoes in the practitioners' implicit theory on leadership and innovation. Findings also suggest individuals can think about abstract principles and recommendations based on this, but concrete recommendations are not readily available in their minds. Still, this indicates there is room to social validation of this sort of leadership in future policies aimed to foster innovation.

5.2 Contributions for theory and practice

This research offers substantial contributions for theory as the existing research that explores curvilinear effects stemming from ambidextrous leadership is very scarce but mostly, to our

knowledge, this is the first study to empirically show a curvilinear mediated effect simultaneously towards incremental and radical innovation via innovation climate. This does not fundamentally change paradox theory but it extends its to the ambidextrous leadership bringing together conflicting findings from literature as regards its ability to promote (or not) innovation in organizations.

For practitioners, the applied value of our findings can be substantial when one realizes that the simple recipe of promoting opening and closing behaviors in leaders (by means of cultural regulation, or training; of performance assessment) can be as simple as detrimental for the organization. It requires a more sensible understanding about when "the good thing" becomes "too much of a good thing", which might not be readily accessible to most policy and decision makers. So, reaching a consensus on the optimal level of ambidexterity can be the new goal for innovation managers. Likewise, asking individuals to excel in both incremental and radical innovation can also be counterproductive and prevent the organization from being excellent in any of these.

5.3 Limitations

Findings must always be carefully taken by acknowledging the limitations of the conceptual model and the empirical options made. The first limitation pertains to the complexity of innovation as a process that is much wider than the simple model we designed. Although many variables were controlled in the first study, there are many other contextual factors operating simultaneously that we could not control. The national homogeneity of the sample also prevents us from extrapolating this outside China although ambidexterity has been also a topic of interest in much research conducted in the West. The methodological caveat of deploying a time-lagged data collection procedure is usually taken as positive, but the loss of participants between waves can foster biases (e.g. self-selection bias) that are not fully accounted in literature and naturally, also not in our research. As per the qualitative study, we acknowledge limitations stemming from the impossibility of ascertaining the representativeness of the interviewees. The criteria to identify the profiles has been set to offer a diverse range of profiles and the saturation met in the interview process (i.e. the repetition of information) suggests sufficient convergence to take results as informative of the main ideas. Still, the poor performance in offering concrete recommendations from this sample may indicate that more individuals would be needed from other types of profile, most likely, more used to draft policies. However, it is also true that our recommendations were not targeting specific industries and therefore, individuals may feel

uneasy with offering concrete examples without being directed to the precise context.

5.4 Future research

The curvilinear relationship found in our study may deserve further exploration. Namely, from an abstract way, we know that somewhere in the middle lies the optimum level of ambidexterity leadership should show. Still, from a practical perspective, what exactly does this means as regards daily life of a leader interacting with teams? A qualitative or diary approach can throw light into the exact behaviors that can be recommended to achieve the optimal level. Another line of research may further explore the relationship between incremental and radical innovation. Although there are reasons to sustain the trade-off found, for a manager that has to comply with both required KPIs for incremental and for radical innovation, it is frustrating to accept none can be excellent simultaneously. Future research can delve into the intricacies of this trade-off to uncover possible boundary conditions that turn the trade-off into a mutual beneficial innovation performance (both incremental reinforcing radical and vice versa). In our view this may require novel theory on the contingencies of trade-offs that entail divergent mindsets, and inertial systems in organizations. Another obvious line of future research stems from the very limitations acknowledged. Future research will benefit from comparative international studies testing these curvilinear effects but also testing mirror doctrines (like Zhong Yong) in other cultures that may be existing under different names. Larger samples are also an obvious suggestion for future studies as are longitudinal data that can allow for the understanding of these relations across time. Therefore, there is plenty of room for future studies in this domain with both strong theoretical value and practical applications to reach the maximum potential for innovation.

[This page is deliberately left blank.]

Bibliography

Aagaard, A., & Andersen, T. (2014). How can HR practices support front-end innovation and increase the innovativeness of companies? *European Journal of International Management*, *8*(5), 488-505.

Acar, O. A., Tarakci, M., & Van Knippenberg, D. (2019). Creativity and innovation under constraints: A cross-disciplinary integrative review. *Journal of Management*, *45*(1), 96-121.

Agbor, E. (2008). Creativity and innovation: The leadership dynamics. *Journal of Strategic Leadership*, *1*(1), 39-45.

Agnihotri, R., Gabler, C. B., Itani, O. S., Jaramillo, F., & Krush, M. T. (2017). Salesperson ambidexterity and customer satisfaction: Examining the role of customer demandingness, adaptive selling, and role conflict. *Journal of Personal Selling & Sales Management*, *37*(1), 27-41.

Akinci, G., Alpkan, L., Yildiz, B., & Karacay, G. (2022). The link between ambidextrous leadership and innovative work behavior in a military organization: The moderating role of climate for innovation. *Sustainability*, *14*(22), 15315.

Alexander, L., & Van Knippenberg, D. (2014). Teams in pursuit of radical innovation: A goal orientation perspective. *Academy of Management Review*, *39*(4), 423-438.

Alghamdi, F. (2018). Ambidextrous leadership, ambidextrous employee, and the interaction between ambidextrous leadership and employee innovative performance. *Journal of Innovation and Entrepreneurship*, *7*(1), 1-14.

Alrowwad, A., Abualoush, S. H., & Masa'Deh, R. (2020). Innovation and intellectual capital as intermediary variables among transformational leadership, transactional leadership, and organizational performance. *Journal of Management Development*, *39*(2), 196-222.

Alsamydai, J., Alnawas, A., & Yousif, R. A. (2010). The impact of marketing innovation on creating a sustainable competitive advantage: The case of private commercial banks in Jordan. *Asian Journal of Marketing*, *4*(3), 113.

Amabile, T. M. (1996). *Creativity and innovation in organizations*. Harvard Business School Press.

Anderson, N. R., & West, M. A. (1998). Measuring climate for work group innovation: Development and validation of the team climate inventory. *Journal of Organizational Behavior*, *19*(3), 235-258.

Anderson, N., De Dreu, C. K., & Nijstad, B. A. (2004). The routinization of innovation research: A constructively critical review of the state-of-the-science. *Journal of Organizational Behavior*, *25*(2), 147-173.

Andries, P., & De Winne, S. (2019). Knowledge management practices for stimulating incremental and radical product innovation. In T. Aybars & L. Adam (Eds.), *Strategic renewal* (pp. 100-119). Routledge.

Androschuk, G. (2021). Global innovation index 2020: Who will finance innovations. *Law and Innovations*, *1*(33), 7-13.

Anning-Dorson, T., Odoom, R. K., Acheampong, G., & Tweneboah-Koduah, E. (2017). Innovation and organizational development: The role of organizational leadership. *African Journal of Economic and Management Studies*, *8*(3), 338-351.

Antwi, S. K., & Hamza, K. (2015). Qualitative and quantitative research paradigms in business research: A philosophical reflection. *European Journal of Business and Management*, *7*(3), 217-225.

Asheim, B. T. (2019). Smart specialisation, innovation policy and regional innovation systems: What about new path development in less innovative regions? *Innovation: The European*

Journal of Social Science Research, *32*(1), 8-25.

Atuahene-Gima, K. (2005). Resolving the capability–Rigidity paradox in new product innovation. *Journal of Marketing*, *69*(4), 61-83.

Avolio, B. J., Waldman, D. A., & Einstein, W. O. (1988). Transformational leadership in a management game simulation: Impacting the bottom line. *Group & Organization Studies*, *13*(1), 59-80.

Azeem, M., Ahmed, M., Haider, S., & Sajjad, M. (2021). Expanding competitive advantage through organizational culture, knowledge sharing and organizational innovation. *Technology in Society*, *66*, 101635.

Baer, M., & Frese, M. (2003). Innovation is not enough: Climates for initiative and psychological safety, process innovations, and firm performance. *Journal of Organizational Behavior*, *24*(1), 45-68.

Barba-Aragón, M. I., Jimenez-Jimenez, D., & Valle-Mestre, L. (2024). Effects of open climate on innovation radicality in SMEs: Relevance of hidden innovation. *European Journal of Innovation Management*, *27*(1), 43-68.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99-120.

Benner, M. J., & Tushman, M. L. (2003). Exploitation, exploration, and process management: The productivity dilemma revisited. *Academy of Management Review*, *28*(2), 238-256.

Bessant, J., Von Stamm, B., Moeslein, K. M., & Neyer, A. K. (2010). Backing outsiders: Selection strategies for discontinuous innovation. *R&D Management*, *40*(4), 345-356.

Bharadwaj, S., & Menon, A. (2000). Making innovation happen in organizations: Individual creativity mechanisms, organizational creativity mechanisms or both? *Journal of Product Innovation Management*, *17*(6), 424-434.

Birkinshaw, J., & Gibson, C. (2004). Building ambidexterity into an organization. *MIT Sloan Management Review*, *45*(4), 47-55.

Blake, R., & Mouton, J. (1964). *The managerial grid: The key to leadership excellence*. Gulf Publishing Company.

Bloch, C. (2005, December 5-9). *Innovation measurement: Present and future challenges*. Eurostat Conference on Knowledge Economy, Luxemburg.

Bocanet, A., & Ponsiglione, C. (2012). Balancing exploration and exploitation in complex environments. *Vine*, *42*(1), 15-35.

Borrás, S. (2011). Policy learning and organizational capacities in innovation policies. *Science and Public Policy*, *38*(9), 725-734.

Borrás, S., & Edquist, C. (2013). The choice of innovation policy instruments. *Technological Forecasting and Social Change*, *80*(8), 1513-1522.

Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology*, *1*(3), 185-216.

Calantone, R. J., Cavusgil, S. T., & Zhao, Y. (2002). Learning orientation, firm innovation capability, and firm performance. *Industrial Marketing Management*, *31*(6), 515-524.

Cañibano, C., Encinar, M., & Muñoz, F. (2006). Evolving capabilities and innovative intentionality: Some reflections on the role of intention within innovation processes. *Innovation*, *8*(4-5), 310-321.

Cantarello, S., Martini, A., & Nosella, A. (2012). A multi-level model for organizational ambidexterity in the search phase of the innovation process. *Creativity and Innovation Management*, *21*(1), 28-48.

Cao, Q., Gedajlovic, E., & Zhang, H. (2009). Unpacking organizational ambidexterity: Dimensions, contingencies, and synergistic effects. *Organization Science*, *20*(4), 781-796.

Carayannis, E. G., Grigoroudis, E., & Goletsis, Y. (2016). A multilevel and multistage efficiency evaluation of innovation systems: A multiobjective DEA approach. *Expert*

Systems with Applications, *62*, 63-80.
Carmeli, A., & Halevi, M. Y. (2009). How top management team behavioral integration and behavioral complexity enable organizational ambidexterity: The moderating role of contextual ambidexterity. *The Leadership Quarterly*, *20*(2), 207-218.
Casula, M., Rangarajan, N., & Shields, P. (2021). The potential of working hypotheses for deductive exploratory research. *Quality and Quantity*, *55*(5), 1703-1725.
Chandy, R. K., & Tellis, G. J. (2000). The incumbent's curse? Incumbency, size, and radical product innovation. *Journal of Marketing*, *64*(3), 1-17.
Chang, Y., Yang, P. Y., & Chen, M. (2009). The determinants of academic research commercial performance: Towards an organizational ambidexterity perspective. *Research Policy*, *38*(6), 936-946.
Charbonnier-Voirin, A., El Akremi, A., & Vandenberghe, C. (2010). A multilevel model of transformational leadership and adaptive performance and the moderating role of climate for innovation. *Group & Organization Management*, *35*(6), 699-726.
Chen, J., Chen, Y., & Zhang, L. (2024). Innovative culture and differences for product versus process innovation: Reflect on Confucianism and Taoism. *Asian Journal of Technology Innovation*,(32), 1-24.
Chen, M. J. (2002). Transcending paradox: The Chinese "middle way" perspective. *Asia Pacific Journal of Management*, *19*, 179-199.
Cheng, C. (2008). The yi-jing and yin-yang way of thinking. In M. Bo (Ed.), *The Routledge history of Chinese philosophy* (pp. 36). Routledge.
Chung, G. H., Choi, J. N., & Du, J. (2017). Tired of innovations? Learned helplessness and fatigue in the context of continuous streams of innovation implementation. *Journal of Organizational Behavior*, *38*(7), 1130-1148.
Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, *20*(1), 37-46.
Cohen, W. M., & Klepper, S. (1992). The tradeoff between firm size and diversity in the pursuit of technological progress. *Small Business Economics*, *4*, 1-14.
Cooper, R. G., & Kleinschmidt, E. J. (2000). 2 new product performance: What distinguishes the star products. *Australian Journal of Management*, *25*(1), 17-46.
Crespo, N. F., & Crespo, C. F. (2016). Global innovation index: Moving beyond the absolute value of ranking with a fuzzy-set analysis. *Journal of Business Research*, *69*(11), 5265-5271.
Cunha, M. P. E., Fortes, A., Gomes, E., Rego, A., & Rodrigues, F. (2019). Ambidextrous leadership, paradox and contingency: Evidence from Angola. *The International Journal of Human Resource Management*, *30*(4), 702-727.
Dahlin, K. B., & Behrens, D. M. (2005). When is an invention really radical?: Defining and measuring technological radicalness. *Research Policy*, *34*(5), 717-737.
Dai, X., Li, Y., & Chen, K. (2021). Direct demand-pull and indirect certification effects of public procurement for innovation. *Technovation*, *101*, 102198.
Damanpour, F., & Evan, W. M. (1984). Organizational innovation and performance: The problem of "organizational lag". *Administrative Science Quarterly*, *29*(3), 392-409.
Dani, M. V., & Gandhi, A. V. (2022). Understanding the drivers of innovation in an organization: A literature review. *International Journal of Innovation Science*, *14*(3/4), 476-505.
Davila, T., Epstein, M., & Shelton, R. (2006). *Making innovation work: How to manage it, measure it, and profit from it*. Pearson Prentice Hall.
De Brentani, U. (2001). Innovative versus incremental new business services: Different keys for achieving success. *Journal of Product Innovation Management*, *18*(3), 169-187.
De Brentani, U., & Reid, S. E. (2012). The fuzzy front-end of discontinuous innovation:

Insights for research and management. *Journal of Product Innovation Management*, *29*(1), 70-87.

De Visser, M., & Faems, D. (2015). Exploration and exploitation within firms: The impact of CEO s' cognitive style on incremental and radical innovation performance. *Creativity and Innovation Management*, *24*(3), 359-372.

Deci, E. L., & Ryan, R. M. (2004). *Handbook of self-determination research*. University Rochester Press.

Deng, Z., Song, S., Jiang, N., & Pang, R. (2023). Sustainable development in China? A nonparametric decomposition of economic growth. *China Economic Review*, *81*, 102041.

Denney, S., Southin, T., & Wolfe, D. A. (2023). Do winners pick government? How scale-up experience shapes entrepreneurs' assessments of innovation policy mixes. *Science and Public Policy*, *50*(5), 858-870.

Deschamps, J. P. (2005). Different leadership skills for different innovation strategies. *Strategy & Leadership*, *33*(5), 31-38.

D'Este, P., Iammarino, S., Savona, M., & Von Tunzelmann, N. (2012). What hampers innovation? Revealed barriers versus deterring barriers. *Research Policy*, *41*(2), 482-488.

Diesel, R., & Scheepers, C. B. (2019). Innovation climate mediating complexity leadership and ambidexterity. *Personnel Review*, *48*(7), 1782-1808.

Dismukes, J. P., Miller, L. K., Bers, J. A., & McCreary, W. N. (2005). "Technologies of thinking" seen key to accelerated radical innovation. *Research Technology Management*, *48*(4), 2-4.

Do Adro, F. J. N., & Leitão, J. C. C. (2020). Leadership and organizational innovation in the third sector: A systematic literature review. *International Journal of Innovation Studies*, *4*(2), 51-67.

Drori, I., & Lavie, D. (2024). How do innovation ecosystems emerge? The case of nanotechnology in Israel. *Journal of Management Studies*, *61*(8), 3754-3785.

Edwards-Schachter, M. (2018). The nature and variety of innovation. *International Journal of Innovation Studies*, *2*(2), 65-79.

Elahi, S. B., Kalantari, N., Azar, A., & Hassanzadeh, M. (2016). Impact of common innovation infrastructures on the national innovative performance: Mediating role of knowledge and technology absorptive capacity. *Innovation*, *18*(4), 536-560.

Ensminger, D. C., Surry, D. W., Porter, B. E., & Wright, D. (2004). Factors contributing to the successful implementation of technology innovations. *Journal of Educational Technology & Society*, *7*(3), 61-72.

Eriksson, T., & Kuhn, J. M. (2006). Firm spin-offs in Denmark 1981-2000: Patterns of entry and exit. *International Journal of Industrial Organization*, *24*(5), 1021-1040.

Ettlie, J. E. (1983). Organizational policy and innovation among suppliers to the food processing sector. *Academy of Management Journal*, *26*(1), 27-44.

Ettlie, J. E., & Rubenstein, A. H. (1987). Firm size and product innovation. *Journal of Product Innovation Management*, *4*(2), 89-108.

Faems, D., Van Looy, B., & Debackere, K. (2005). Interorganizational collaboration and innovation: Toward a portfolio approach. *Journal of Product Innovation Management*, *22*(3), 238-250.

Fagerberg, J. (2017). Innovation policy: Rationales, lessons and challenges. *Journal of Economic Surveys*, *31*(2), 497-512.

Fiedler, F. E. (1967). *A theory of leadership effectiveness*. McGraw-Hill.

Fischer, S., Frese, M., Mertins, J. C., Hardt, J. V., Flock, T., Schauder, J., Schmitz, M., & Wiegel, J. (2014). Climate for personal initiative and radical and incremental innovation in firms: A validation study. *Journal of Enterprising Culture*, *22*(1), 91-109.

Floyd, S. W., & Lane, P. J. (2000). Strategizing throughout the organization: Managing role

conflict in strategic renewal. *Academy of Management Review*, *25*(1), 154-177.
Ford, C. M. (1996). A theory of individual creative action in multiple social domains. *Academy of Management Review*, *21*(4), 1112-1142.
Forés, B., & Camisón, C. (2016). Does incremental and radical innovation performance depend on different types of knowledge accumulation capabilities and organizational size? *Journal of Business Research*, *69*(2), 831-848.
Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 39-50.
Freeman, C. (1992). Formal scientific and technical institutions in the national system of innovation. In L. Bengt-Åke (Ed.), *National systems of innovation: Towards a theory of innovation and interactive learning* (pp. 169-187). Pinter Publishers.
Gabler, C. B., Ogilvie, J. L., Rapp, A., & Bachrach, D. G. (2017). Is there a dark side of ambidexterity? Implications of dueling sales and service orientations. *Journal of Service Research*, *20*(4), 379-392.
Gao, P. (2015). Government in the catching-up of technology innovation: Case of administrative intervention in China. *Technological Forecasting and Social Change*, *96*, 4-14.
Garbuio, M., & Lin, N. (2021). Innovative idea generation in problem finding: Abductive reasoning, cognitive impediments, and the promise of artificial intelligence. *Journal of Product Innovation Management*, *38*(6), 701-725.
Gibb, A., & Li, J. (2003). Organizing for enterprise in China: What can we learn from the chinese micro, small, and medium enterprise development experience. *Futures*, *35*(4), 403-421.
Gibson, C. B., & Birkinshaw, J. (2004). The antecedents, consequences, and mediating role of organizational ambidexterity. *Academy of Management Journal*, *47*(2), 209-226.
Glisson, C. (2015). The role of organizational culture and climate in innovation and effectiveness. *Human Service Organizations*, *39*(4), 245-250.
Graen, G. B., & Uhl-Bien, M. (1995). Relationship-based approach to leadership: Development of leader-member exchange (LMX) theory of leadership over 25 years: Applying a multi-level multi-domain perspective. *The Leadership Quarterly*, *6*(2), 219-247.
Gray, L. M., Wong-Wylie, G., Rempel, G. R., & Cook, K. (2020). Expanding qualitative research interviewing strategies: Zoom video communications. *The Qualitative Report*, *25*(5), 1292-1301.
Green, S. G., Gavin, M. B., & Aiman-Smith, L. (1995). Assessing a multidimensional measure of radical technological innovation. *IEEE Transactions on Engineering Management*, *42*(3), 203-214.
Grojean, M. W., Resick, C. J., Dickson, M. W., & Smith, D. B. (2004). Leaders, values, and organizational climate: Examining leadership strategies for establishing an organizational climate regarding ethics. *Journal of Business Ethics*, *55*, 223-241.
Gui, L., Lei, H., & Le, P. B. (2022). Determinants of radical and incremental innovation: The influence of transformational leadership, knowledge sharing and knowledge-centered culture. *European Journal of Innovation Management*, *25*(5), 1221-1241.
Guisado-González, M., González-Blanco, J., & Coca-Pérez, J. L. (2017). Analyzing the relationship between exploration, exploitation and organizational innovation. *Journal of Knowledge Management*, *21*(5), 1142-1162.
Guo, S., & Hu, Q. (2022). Be zhongyong and be ethical: Dual leadership in promoting employees' thriving at work. *Chinese Management Studies*, *16*(5), 1021-1042.
Gupta, A. K., Smith, K. G., & Shalley, C. E. (2006). The interplay between exploration and exploitation. *Academy of Management Journal*, *49*(4), 693-706.
Hadjimanolis, A. (2003). The barriers approach to innovation. In L. V. Shavinina, (Ed.), *The*

international handbook on innovation (pp. 559-573). Elsevier.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, *31*(1), 2-24.

Hamdouch, A., & Samuelides, E. (2001). Innovation's dynamics in mobile phone services in France. *European Journal of Innovation Management*, *4*(3), 153-163.

Hancock, G. R., Mueller, R. O., & Stapleton, L. M. (2010). *The reviewer's guide to quantitative methods in the social sciences*. Routledge.

Hansen, K. B., & Waldorff, S. B. (2020). Collaborative planning for radical innovation: Lessons from a health care region in Denmark. *Scandinavian Journal of Public Administration*, *24*(4), 3-23.

Hansen, S., & Wakonen, J. (1997). Innovation, a winning solution? *International Journal of Technology Management*, *13*(4), 345-358.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*, 115-135.

Herrmann, A., Tomczak, T., & Befurt, R. (2006). Determinants of radical product innovations. *European Journal of Innovation Management*, *9*(1), 20-43.

Hewitt-Dundas, N. (2006). Resource and capability constraints to innovation in small and large plants. *Small Business Economics*, *26*, 257-277.

Hill, C. W., & Rothaermel, F. T. (2003). The performance of incumbent firms in the face of radical technological innovation. *Academy of Management Review*, *28*(2), 257-274.

Hooijberg, R. (1996). A multidirectional approach toward leadership: An extension of the concept of behavioral complexity. *Human Relations*, *49*(7), 917-946.

Huang, C. (2004). 欧盟与中国创新政策的比较研究 [A comparative study of innovation policies in the European Union and China]. *Research in Science*, *22*(2), 212-217.

Huang, L. (2003). 区域技术创新生态系统的稳定机制 [On the survival mechanism of regional technological innovation ecosystem]. *Science Management Research*, *21*(2), 47-51.

Hülsheger, U. R., Anderson, N., & Salgado, J. F. (2009). Team-level predictors of innovation at work: A comprehensive meta-analysis spanning three decades of research. *Journal of Applied Psychology*, *94*(5), 1128.

Hwang, B., Lai, Y., & Wang, C. (2023). Open innovation and organizational ambidexterity. *European Journal of Innovation Management*, *26*(3), 862-884.

Ilmudeen, A., Bao, Y., Alharbi, I. M., & Zubair, N. (2021). Revisiting dynamic capability for organizations' innovation types: Does it matter for organizational performance in China? *European Journal of Innovation Management*, *24*(2), 507-532.

Ilyas, I. M., Kammerlander, N., Turturea, R., & van Essen, M. (2024). When business model innovation creates value for companies: A meta-analysis on institutional contingencies. *Journal of Management Studies*, *61*(5), 1825-1883.

İncekara, M., & Koçak, H. (2017, June 18-21). *The optimal time to integrate suppliers into radical product innovation*. ISPIM International Society for Professional Innovation Management Innovation Conference, Vienna, Austria.

Isaksen, S. G., & Akkermans, H. J. (2011). Creative climate: A leadership lever for innovation. *The Journal of Creative Behavior*, *45*(3), 161-187.

Jago, A. G. (1982). Leadership: Perspectives in theory and research. *Management Science*, *28*(3), 315-336.

Jansen, J. J., George, G., Van den Bosch, F. A., & Volberda, H. W. (2008). Senior team attributes and organizational ambidexterity: The moderating role of transformational leadership. *Journal of Management Studies*, *45*(5), 982-1007.

Jarzabkowski, P., Smets, M., Bednarek, R., Burke, G., & Spee, P. (2013). Institutional

ambidexterity: Leveraging institutional complexity in practice. In M. Lounsbury & E. Boxenbaum (Eds.), *Institutional logics in action* (pp. 37-61). Emerald Group Publishing Limited.

Jiang, F., Wang, D., & Wei, Z. (2022). How yin-yang cognition affects organizational ambidexterity: The mediating role of strategic flexibility. *Asia Pacific Journal of Management*, *39*(4), 1187-1214.

Jiang, Y., Asante, D., Zhang, J., & Ampaw, E. M. (2023). The influence of ambidextrous leadership on the employee innovative behavior: An empirical study based on Chinese manufacturing enterprises. *Current Psychology*, *42*(11), 9452-9465.

Jin, S. H., & Choi, S. O. (2019). The effect of innovation capability on business performance: A focus on IT and business service companies. *Sustainability*, *11*(19), 5246.

Johne, A., & Davies, R. (2000). Innovation in medium-sized insurance companies: How marketing adds value. *International Journal of Bank Marketing*, *18*(1), 6-14.

Johnsson, M. (2017). Innovation enablers for innovation teams: A review. *Journal of Innovation Management*, *5*(3), 75-121.

Jørgensen, B., & Messner, M. (2009). Management control in new product development: The dynamics of managing flexibility and efficiency. *Journal of Management Accounting Research*, *21*(1), 99-124.

Jugend, D., Araujo, T. R. D., Pimenta, M. L., Gobbo Jr, J. A., & Hilletofth, P. (2018). The role of cross-functional integration in new product development: Differences between incremental and radical innovation projects. *Innovation*, *20*(1), 42-60.

Junni, P., Sarala, R. M., Taras, V., & Tarba, S. Y. (2013). Organizational ambidexterity and performance: A meta-analysis. *Academy of Management Perspectives*, *27*(4), 299-312.

Kalargiros, E. M., & Manning, M. R. (2015). Divergent thinking and brainstorming in perspective: Implications for organization change and innovation. In B. R. S. Abraham & A. N. Debra (Eds.), *Research in organizational change and development* (pp. 293-327). Emerald Group Publishing Limited.

Kalkuhl, M., Edenhofer, O., & Lessmann, K. (2012). Learning or lock-in: Optimal technology policies to support mitigation. *Resource and Energy Economics*, *34*(1), 1-23.

Kang, J. H., Solomon, G. T., & Choi, D. Y. (2015). CEOs' leadership styles and managers' innovative behaviour: Investigation of intervening effects in an entrepreneurial context. *Journal of Management Studies*, *52*(4), 531-554.

Kang, S. C., & Snell, S. A. (2009). Intellectual capital architectures and ambidextrous learning: A framework for human resource management. *Journal of Management Studies*, *46*(1), 65-92.

Kao, J., Cho, C., & Kao, R. (2023). Perceived organizational support and organizational citizenship behavior–A study of the moderating effect of volunteer participation motivation, and cross-level effect of transformational leadership and organizational climate. *Frontiers in Psychology*, *14*, 1082130.

Keane, M. (2007). *Created in China: The great new leap forward*. Routledge.

Keller, T., & Weibler, J. (2015). What it takes and costs to be an ambidextrous manager: Linking leadership and cognitive strain to balancing exploration and exploitation. *Journal of Leadership & Organizational Studies*, *22*(1), 54-71.

Khan, S. J., & Mir, A. A. (2019). Ambidextrous culture, contextual ambidexterity and new product innovations: The role of organizational slack and environmental factors. *Business Strategy and the Environment*, *28*(4), 652-663.

Kim, K., Choi, S. O., & Lee, S. (2021). The effect of a financial support on firm innovation collaboration and output: Does policy work on the diverse nature of firm innovation? *Journal of the Knowledge Economy*, *12*, 645-675.

Kim, Y. H., Sting, F. J., & Loch, C. H. (2014). Top-down, bottom-up, or both? Toward an

integrative perspective on operations strategy formation. *Journal of Operations Management*, *32*(7-8), 462-474.

King, E. B., De Chermont, K., West, M., Dawson, J. F., & Hebl, M. R. (2007). How innovation can alleviate negative consequences of demanding work contexts: The influence of climate for innovation on organizational outcomes. *Journal of Occupational and Organizational Psychology*, *80*(4), 631-645.

Klonek, F. E., Gerpott, F. H., & Parker, S. K. (2023). A conceptual replication of ambidextrous leadership theory: An experimental approach. *The Leadership Quarterly*, *34*(4), 101473.

Klonek, F. E., Volery, T., & Parker, S. K. (2021). Managing the paradox: Individual ambidexterity, paradoxical leadership and multitasking in entrepreneurs across firm life cycle stages. *International Small Business Journal*, *39*(1), 40-63.

Knell, M., & Srholec, M. (2009, October 6-8). *The novelty of innovation and the level of development*. Globelics 7th International Conference, Dakar, Senegal.

Koen, P. A. (2004). The fuzzy front end for incremental, platform, and breakthrough products. In B. K. Kenneth (Ed.), *PDMA handbook of new product development* (pp. 81-91). John Wiley & Sons.

Koutsouris, A., & Zarokosta, E. (2020). Supporting bottom-up innovative initiatives throughout the spiral of innovations: Lessons from rural greece. *Journal of Rural Studies*, *73*, 176-185.

Kovacs, A., Marullo, C., Verhoeven, D., & Van Looy, B. (2019). *Radical, disruptive, discontinuous and breakthrough innovation: More of the same?* Academy of Management Proceedings, *1*, 14866.

Kowalski, A. M. (2021). Dynamics and factors of innovation gap between the european union and China. *Journal of the Knowledge Economy*, *12*(4), 1966-1981.

Kozioł-Nadolna, K. (2020). The role of a leader in stimulating innovation in an organization. *Administrative Sciences*, *10*(3), 59.

Kozlowski, S. W., & Doherty, M. L. (1989). Integration of climate and leadership: Examination of a neglected issue. *Journal of Applied Psychology*, *74*(4), 546.

Krippendorff, K. (2018). *Content analysis: An introduction to its methodology*. Sage Publications.

Kumar, K., Boesso, G., Favotto, F., & Menini, A. (2012). Strategic orientation, innovation patterns and performances of SMEs and large companies. *Journal of Small Business and Enterprise Development*, *19*(1), 132-145.

Landis, J. (1977). The measurement of observer agreement for categorical data. *Biometrics*, *33*, 159-174.

Latham, S., & Braun, M. (2010). Does short-termism influence firm innovation? An examination of S&P 500 firms, 1990-2003. *Journal of Managerial Issues*, *29*, 368-382.

Lee, A., Lyubovnikova, J., Zheng, Y., & Li, Z. F. (2023). Paradoxical leadership: A meta-analytical review. *Frontiers in Organizational Psychology*, *1*, 543-545.

Lee, J., Jun, S., & Lee, C. (2022). Does demand-side innovation policy drive lock-in? Global evidence from solar energy in 155 countries. *Energy Research & Social Science*, *89*, 539-545.

Lee, T. S., & Tsai, H. J. (2005). The effects of business operation mode on market orientation, learning orientation and innovativeness. *Industrial Management & Data Systems*, *105*(3), 325-348.

Lennerts, S., Schulze, A., & Tomczak, T. (2020). The asymmetric effects of exploitation and exploration on radical and incremental innovation performance: An uneven affair. *European Management Journal*, *38*(1), 121-134.

Li, C. (2006). The confucian ideal of harmony. *Philosophy East and West*, *56*(4), 583-603.

Li, S., Jia, R., Seufert, J. H., Wang, X., & Luo, J. (2020). Ambidextrous leadership and radical innovative capability: The moderating role of leader support. *Creativity and Innovation*

Management, *29*(4), 621-633.
Li, T., & Calantone, R. J. (1998). The impact of market knowledge competence on new product advantage: Conceptualization and empirical examination. *Journal of Marketing*, *62*(4), 13-29.
Li, V., Mitchell, R., & Boyle, B. (2016). The divergent effects of transformational leadership on individual and team innovation. *Group & Organization Management*, *41*(1), 66-97.
Li, W., Zhou, X., & Yang, Q. (2021). Designing medical artificial intelligence for in-and out-groups. *Computers in Human Behavior*, *124*, 929-938.
Li, X. (2019). Is "yin-yang balancing" superior to ambidexterity as an approach to paradox management? *Asia Pacific Journal of Management*, *36*(1), 17-32.
Liao, S., Chen, C., Hu, D., Chung, Y., & Liu, C. (2017). Assessing the influence of leadership style, organizational learning and organizational innovation. *Leadership & Organization Development Journal*, *38*(5), 590-609.
Lin, H., Werner, K. M., & Inzlicht, M. (2021). Promises and perils of experimentation: The mutual-internal-validity problem. *Perspectives on Psychological Science*, *16*(4), 854-863.
Lu, L., Zhou, K., Wang, Y., & Zhu, S. (2022). Relationship between paternalistic leadership and employee innovation: A meta-analysis among Chinese samples. *Frontiers in Psychology*, *13*, 920006.
Lubatkin, M. H., Simsek, Z., Ling, Y., & Veiga, J. F. (2006). Ambidexterity and performance in small-to medium-sized firms: The pivotal role of top management team behavioral integration. *Journal of Management*, *32*(5), 646-672.
Lune, H., & Berg, B. L. (2017). *Qualitative research methods for the social sciences*. Pearson.
Luo, B., Zheng, S., Ji, H., & Liang, L. (2018). Ambidextrous leadership and TMT-member ambidextrous behavior: The role of TMT behavioral integration and TMT risk propensity. *The International Journal of Human Resource Management*, *29*(2), 338-359.
Luo, X., Cao, D., Tjahjono, B., & Adegbile, A. (2022). Business model innovation themes of emerging market enterprises: Evidence in China. *Journal of Business Research*, *139*, 1619-1630.
Mabrouk, A., & Mamoghli, C. (2010). Dynamic of financial innovation and performance of banking firms: Context of an emerging banking industry. *International Research Journal of Finance and Economics*, *5*(6), 20-26.
Madrid Guijarro, A., Garcia, D., & Van Auken, H. (2009). Barriers to innovation among spanish manufacturing SMEs. *Journal of Small Business Management*, *47*(4), 465-488.
Mahoney, J. (2001). Beyond correlational analysis: Recent innovations in theory and method. *Sociological Forum*, *16*(3), 575-593.
Malhotra, A., Majchrzak, A., Carman, R., & Lott, V. (2001). Radical innovation without collocation: A case study at boeing-rocketdyne. *Mis Quarterly*, *25*(2), 229-249.
Mann, M., & Byun, S. (2017). To retrench or invest? Turnaround strategies during a recessionary time. *Journal of Business Research*, *80*, 24-34.
March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, *2*(1), 71-87.
Martin, R. L. (2007). Becoming an integrative thinker. *Rotman Magazine*, *7*, 4-9.
Martín-de Castro, G., Delgado-Verde, M., Navas-López, J. E., & Cruz-González, J. (2013). The moderating role of innovation culture in the relationship between knowledge assets and product innovation. *Technological Forecasting and Social Change*, *80*(2), 351-363.
Marvel, M. R., & Lumpkin, G. T. (2007). Technology entrepreneurs' human capital and its effects on innovation radicalness. *Entrepreneurship Theory and Practice*, *31*(6), 807-828.
McCarthy, I. P., & Gordon, B. R. (2011). Achieving contextual ambidexterity in R&D organizations: A management control system approach. *R&D Management*, *41*(3), 240-258.
Mehmood, M. S., Jian, Z., Akram, U., & Tariq, A. (2021). Entrepreneurial leadership: The key

to develop creativity in organizations. *Leadership & Organization Development Journal*, *42*(3), 434-452.

Meissner, D., & Sandrine, K. (2021). Correction to: Innovation policy mix: Mapping and measurement. *Journal of Technology Transfer*, *46*(5), 1705.

Mendoza-Silva, A. (2021). Innovation capability: A systematic literature review. *European Journal of Innovation Management*, *24*(3), 707-734.

Meriac, J. P., Hoffman, B. J., & Woehr, D. J. (2014). A conceptual and empirical review of the structure of assessment center dimensions. *Journal of Management*, *40*(5), 1269-1296.

Migdadi, M. M. (2022). Knowledge management processes, innovation capability and organizational performance. *International Journal of Productivity and Performance Management*, *71*(1), 182-210.

Miles, J. R., & Kivlighan Jr, D. M. (2008). Team cognition in group interventions: The relation between coleaders' shared mental models and group climate. *Group Dynamics: Theory, Research, and Practice*, *12*(3), 191.

Mohnen, P., & Rosa, J. M. (2002). Barriers to innovation in service industries in Canada. In P. F. Maryann (Ed.), *Institutions and systems in the geography of innovation* (pp. 231-250). Springer.

Mom, T. J., Fourné, S. P., & Jansen, J. J. (2015). Managers' work experience, ambidexterity, and performance: The contingency role of the work context. *Human Resource Management*, *54*(S1), s133-s153.

Morgan, D. L. (2007). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research*, *1*(1), 48-76.

Mueller, J., Renzl, B., & Will, M. G. (2020). Ambidextrous leadership: A meta-review applying static and dynamic multi-level perspectives. *Review of Managerial Science*, *14*, 37-59.

Mullen, B., Johnson, C., & Salas, E. (1991). Productivity loss in brainstorming groups: A meta-analytic integration. *Basic and Applied Social Psychology*, *12*(1), 3-23.

Mumford, M. D., Scott, G. M., Gaddis, B., & Strange, J. M. (2002). Leading creative people: Orchestrating expertise and relationships. *The Leadership Quarterly*, *13*(6), 705-750.

Naranjo-Valencia, J. C., & Calderon-Hernández, G. (2018). Model of culture for innovation. *Organizational Culture*, *1*, 13-34.

Neuendorf, K. A. (2017). *The content analysis guidebook*. SAGE Publications.

Newman, A., Round, H., Wang, S., & Mount, M. (2020). Innovation climate: A systematic review of the literature and agenda for future research. *Journal of Occupational and Organizational Psychology*, *93*(1), 73-109.

Nooteboom, B. (1994). Innovation and diffusion in small firms: Theory and evidence. *Small Business Economics*, *6*, 327-347.

Nunnally, J. C. (1975). Psychometric theory—25 years ago and now. *Educational Researcher*, *4*(10), 7-21.

O'Connor, G. C. (2006). Open, radical innovation: Toward an integrated model in large established firms. In C. Henry & V. Wim (Eds.), *Open innovation: Researching a new paradigm* (pp. 62-81). Oxford University Press.

O'Connor, G. C., & Rice, M. P. (2013). A comprehensive model of uncertainty associated with radical innovation. *Journal of Product Innovation Management*, *30*, 2-18.

OECD. (2005). *Oslo manual: Guidelines for collecting and interpreting innovation data*. OECD Publishing.

Oh, D., Phillips, F., Park, S., & Lee, E. (2016). Innovation ecosystems: A critical examination. *Technovation*, *54*, 1-6.

Oke, A. (2004). Barriers to innovation management in service companies. *Journal of Change Management*, *4*(1), 31-44.

O'Reilly, C. A., & Tushman, M. L. (2008). Ambidexterity as a dynamic capability: Resolving the innovator's dilemma. *Research in Organizational Behavior*, *28*, 185-206.

Ossenbrink, J., Hoppmann, J., & Hoffmann, V. H. (2019). Hybrid ambidexterity: How the environment shapes incumbents' use of structural and contextual approaches. *Organization Science*, *30*(6), 1319-1348.

Parris, D. L., & Peachey, J. W. (2013). A systematic literature review of servant leadership theory in organizational contexts. *Journal of Business Ethics*, *113*, 377-393.

Pierce, J. R., & Aguinis, H. (2013). The too-much-of-a-good-thing effect in management. *Journal of Management*, *39*(2), 313-338.

Podsakoff, P. M., MacKenzie, S. B., Lee, J., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*(5), 879.

Popa, S., Soto-Acosta, P., & Martinez-Conesa, I. (2017). Antecedents, moderators, and outcomes of innovation climate and open innovation: An empirical study in SMEs. *Technological Forecasting and Social Change*, *118*, 134-142.

Poskela, J., & Martinsuo, M. (2009). Management control and strategic renewal in the front end of innovation. *Journal of Product Innovation Management*, *26*(6), 671-684.

Radicic, D., Pugh, G., & Douglas, D. (2020). Promoting cooperation in innovation ecosystems: Evidence from European traditional manufacturing SMEs. *Small Business Economics*, *54*(1), 257-283.

Raisch, S., & Birkinshaw, J. (2008). Organizational ambidexterity: Antecedents, outcomes, and moderators. *Journal of Management*, *34*(3), 375-409.

Rajapathirana, R. P. J., & Hui, Y. (2018). Relationship between innovation capability, innovation type, and firm performance. *Journal of Innovation and Knowledge*, *3*(1), 44-55.

Ranga, M., & Etzkowitz, H. (2015). Triple helix systems: An analytical framework for innovation policy and practice in the knowledge society. *Entrepreneurship and Knowledge Exchange*, *27*(3), 117-158.

Reid, S. E., & De Brentani, U. (2004). The fuzzy front end of new product development for discontinuous innovations: A theoretical model. *Journal of Product Innovation Management*, *21*(3), 170-184.

Reitzig, M. (2022). How to get better at flatter designs: Considerations for shaping and leading organizations with less hierarchy. *Journal of Organization Design*, *11*(1), 5-10.

Remneland Wikhamn, B., & Wikhamn, W. (2011). Open innovation climate measure: The introduction of a validated scale. *Creativity and Innovation Management*, *20*(4), 284-295.

Ren, S., Sun, H., & Tang, Y. (2023). CEO's hometown identity and corporate social responsibility. *Journal of Management*, *49*(7), 2455-2489.

Reynolds, J., & Hristov, L. (2009). Are there barriers to innovation in retailing? *The International Review of Retail, Distribution and Consumer Research*, *19*(4), 317-330.

Rice, M. P., Leifer, R., & O'Connor, G. C. (2002). Commercializing discontinuous innovations: Bridging the gap from discontinuous innovation project to operations. *IEEE Transactions on Engineering Management*, *49*(4), 330-340.

Rice, M., Kelley, D., Peters, L., & Colarelli O Connor, G. (2001). Radical innovation: Triggering initiation of opportunity recognition and evaluation. *R&D Management*, *31*(4), 409-420.

Rogers, E. M., Singhal, A., & Quinlan, M. M. (2014). Diffusion of innovations. In W. S. Don & B. S. Michael (Eds.), *An integrated approach to communication theory and research* (pp. 432-448). Routledge.

Rosing, K., Frese, M., & Bausch, A. (2011). Explaining the heterogeneity of the leadership-innovation relationship: Ambidextrous leadership. *The Leadership Quarterly*, *22*(5), 956-974.

Rosing, K., & Zacher, H. (2017). Individual ambidexterity: The duality of exploration and exploitation and its relationship with innovative performance. *European Journal of Work and Organizational Psychology*, *26*(5), 694-709.

Rosing, K., & Zacher, H. (2023). Ambidextrous leadership: A review of theoretical developments and empirical evidence. *Handbook of Organizational Creativity*,(8), 51-70.

Sandberg, B., & Aarikka-Stenroos, L. (2014). What makes it so difficult? A systematic review on barriers to radical innovation. *Industrial Marketing Management*, *43*(8), 1293-1305.

Saunila, M., Pekkola, S., & Ukko, J. (2014). The relationship between innovation capability and performance: The moderating effect of measurement. *International Journal of Productivity and Performance Management*, *63*(2), 234-249.

Schilling, J., Schyns, B., & May, D. (2023). When your leader just does not make any sense: Conceptualizing inconsistent leadership. *Journal of Business Ethics*, *185*(1), 209-221.

Schlager, E., & Cox, M. (2018). The IAD framework and the SES framework: An introduction and assessment of the ostrom workshop frameworks. In M. W. Christopher (Ed.), *Theories of the policy process* (pp. 215-252). Routledge.

Schneider, A., & Ingram, H. (1990). Behavioral assumptions of policy tools. *The Journal of Politics*, *52*(2), 510-529.

Schneider, B., Ehrhart, M. G., & Macey, W. H. (2013). Organizational climate and culture. *Annual Review of Psychology*, *64*(1), 361-388.

Sen, F. K., & Egelhoff, W. G. (2000). Innovative capabilities of a firm and the use of technical alliances. *IEEE Transactions on Engineering Management*, *47*(2), 174-183.

Siddiki, S. (2020). *Understanding and analyzing public policy design*. Cambridge University Press.

Siemsen, E., Roth, A., & Oliveira, P. (2010). Common method bias in regression models with linear, quadratic, and interaction effects. *Organizational Research Methods*, *13*(3), 456-476.

Simsek, Z., Heavey, C., Veiga, J. F., & Souder, D. (2009). A typology for aligning organizational ambidexterity's conceptualizations, antecedents, and outcomes. *Journal of Management Studies*, *46*(5), 864-894.

Škerlavaj, M., Černe, M., & Dysvik, A. (2014). I get by with a little help from my supervisor: Creative-idea generation, idea implementation, and perceived supervisor support. *The Leadership Quarterly*, *25*(5), 987-1000.

Slater, S. F., Hult, G. T. M., & Olson, E. M. (2010). Factors influencing the relative importance of marketing strategy creativity and marketing strategy implementation effectiveness. *Industrial Marketing Management*, *39*(4), 551-559.

Slater, S. F., Mohr, J. J., & Sengupta, S. (2014). Radical product innovation capability: Literature review, synthesis, and illustrative research propositions. *Journal of Product Innovation Management*, *31*(3), 552-566.

Smismans, S., & Stokes, E. (2017). Innovation types and regulation: The regulatory framing of nanotechnology as "incremental" or "radical" innovation. *European Journal of Risk Regulation*, *8*(2), 364-386.

Smith, K. W., Erez, M., Jarvenpaa, S., Lewis, M. W., & Tracey, P. (2017). Adding complexity to theories of paradox, tensions, and dualities of innovation and change: Introduction to organization studies special issue on paradox, tensions, and dualities of innovation and change. *Organization Studies*, *38*(3-4), 303-317.

Smits, R., & Kuhlmann, S. (2004). The rise of systemic instruments in innovation policy. *International Journal of Foresight and Innovation Policy*, *1*(1-2), 4-32.

Sok, K. M., Sok, P., & De Luca, L. M. (2016). The effect of 'can do' and 'reason to' motivations on service–sales ambidexterity. *Industrial Marketing Management*, *55*, 144-155.

Sood, A., & Tellis, G. J. (2005). Technological evolution and radical innovation. *Journal of*

Marketing, *69*(3), 152-168.
Sorescu, A. B., Chandy, R. K., & Prabhu, J. C. (2003). Sources and financial consequences of radical innovation: Insights from pharmaceuticals. *Journal of Marketing*, *67*(4), 82-102.
Sosik, J. J., Chun, J. U., & Zhu, W. (2014). Hang on to your ego: The moderating role of leader narcissism on relationships between leader charisma and follower psychological empowerment and moral identity. *Journal of Business Ethics*, *120*, 65-80.
Spithoven, A., Vanhaverbeke, W., & Roijakkers, N. (2013). Open innovation practices in SMEs and large enterprises. *Small Business Economics*, *41*, 537-562.
Stek, P. E., & van Geenhuizen, M. S. (2016). The influence of international research interaction on national innovation performance: A bibliometric approach. *Technological Forecasting and Social Change*, *110*, 61-70.
Stemler, S. E., & Tsai, J. (2008). Best practices in interrater reliability three common approaches. *Best Practices in Quantitative Methods*, *5*, 29-49.
Stemler, S. (2000). An overview of content analysis. *Practical Assessment, Research, and Evaluation*, *7*(1), 17-22.
Strang, K. D. (2015). Why practitioner-scholars need a research design typology. In D. S. Kenneth (Ed.), *The Palgrave handbook of research design in business and management* (pp. 3-16). Springer.
Stringer, R. (2000). How to manage radical innovation. *California Management Review*, *42*(4), 70-88.
Sun, R., Lam, L. W., & Wu, A. M. (2023). Work addiction in chinese white-collar workers: The psychometric properties of its measure and its comorbidity with general anxiety in network analysis. *BMC Psychology*, *11*(1), 214.
Sun, S. (2011). Meta-analysis of cohen's kappa. *Health Services and Outcomes Research Methodology*, *11*, 145-163.
Suter, G. (2008). Nudge: Improving decisions about health, wealth, and happiness. *Integrated Environmental Assessment and Management*, *4*(4), 525.
Teece, D. J. (2010). Business models, business strategy and innovation. *Long Range Planning*, *43*(2-3), 172-194.
Terry, S. J. (2023). The macro impact of short-termism. *Econometrica*, *91*(5), 1881-1912.
Tesluk, P. E., Farr, J. L., & Klein, S. R. (1997). Influences of organizational culture and climate on individual creativity. *The Journal of Creative Behavior*, *31*(1), 27-41.
Tidd, J., & Bessant, J. (2018). Innovation management challenges: From fads to fundamentals. *International Journal of Innovation Management*, *22*(5), 1840007.
Tiwana, A. (2008). Do bridging ties complement strong ties? An empirical examination of alliance ambidexterity. *Strategic Management Journal*, *29*(3), 251-272.
Uhl-Bien, M., Marion, R., & McKelvey, B. (2007). Complexity leadership theory: Shifting leadership from the industrial age to the knowledge era. *The Leadership Quarterly*, *18*(4), 298-318.
Uhl-Bien, M., & Arena, M. (2017). Complexity leadership: Enabling people and organizations for adaptability. *Organizational Dynamics*, *46*(1), 9-20.
Van Leeuwen, G., & Klomp, L. (2006). On the contribution of innovation to multi-factor productivity growth. *Economics of Innovation and New Technology*, *15*(4-5), 367-390.
Van Reine, P., & Robert, P. (2022). *Innovation culture: Learning from the history of innovation.* Innovation Culture.
van Rijswijk, J., Curșeu, P. L., & van Oortmerssen, L. A. (2024). Cognitive and neurodiversity in groups: A systemic and integrative review. *Small Group Research*, *55*(1), 44-88.
Venkatraman, N., & Lee, C. B. (2007, 2007-1-1). *Strategic ambidexterity and sales growth: A longitudinal test in the software sector*. Academy of Management Meetings, Honolulu, Hawaii.

Venkatraman, N., & Ramanujam, V. (1986). Measurement of business performance in strategy research: A comparison of approaches. *Academy of Management Review*, *11*(4), 801-814.

Voss, G. B., & Voss, Z. G. (2013). Strategic ambidexterity in small and medium-sized enterprises: Implementing exploration and exploitation in product and market domains. *Organization Science*, *24*(5), 1459-1477.

Vossen, R. W. (1998). Relative strengths and weaknesses of small firms in innovation. *International Small Business Journal*, *16*(3), 88-94.

Walsh, J. P., Lee, Y., & Nagaoka, S. (2016). Openness and innovation in the US: Collaboration form, idea generation and implementation. *Research Policy*, *45*(8), 1660-1671.

Wang, C. L., & Ahmed, P. K. (2004). The development and validation of the organisational innovativeness construct using confirmatory factor analysis. *European Journal of Innovation Management*, *7*(4), 303-313.

Wang, C., & Hsu, L. (2014). Building exploration and exploitation in the high-tech industry: The role of relationship learning. *Technological Forecasting and Social Change*, *81*, 331-340.

Wang, S., Eva, N., Newman, A., & Zhou, H. (2021). A double-edged sword: The effects of ambidextrous leadership on follower innovative behaviors. *Asia Pacific Journal of Management*, *38*, 1305-1326.

Wang, X., Wang, Z., & Jiang, Z. (2021). Configurational differences of national innovation capability: A fuzzy set qualitative comparative analysis approach. *Technology Analysis & Strategic Management*, *33*(6), 599-611.

Wang, Y., & Zhu, Y. (2006). An introduction of researches and theory of organizational innovation climate. *Advances in Psychological Science*, *14*(03), 443.

Weimer, D. L., & Vining, A. R. (2017). *Policy analysis: Concepts and practice*. Routledge.

Wong, C., Lan, J., Peng, K. Z., & Iun, J. (2022). Should we stop using the label of "paternalistic leadership"? Evidence from three Chinese samples. *Leadership & Organization Development Journal*, *43*(6), 909-927.

Woodman, R. W., Sawyer, J. E., & Griffin, R. W. (1993). Toward a theory of organizational creativity. *Academy of Management Review*, *18*(2), 293-321.

Wu, M., Wang, R., Estay, C., & Shen, W. (2022). Curvilinear relationship between ambidextrous leadership and employee silence: Mediating effects of role stress and relational energy. *Journal of Managerial Psychology*, *37*(8), 746-764.

Xiao, M., Deng, H., & Xie, W. (2019). 中国区域创新发展绩效测度研究 [Research on performance measurement of China's regional innovation development]. *Science and Technology Management Research*, (39), 1-10.

Ye, P., Liu, L., & Tan, J. (2022). Creative leadership, innovation climate and innovation behaviour: The moderating role of knowledge sharing in management. *European Journal of Innovation Management*, *25*(4), 1092-1114.

Zaccaro, S. J., Gilbert, J. A., Thor, K. K., & Mumford, M. D. (1991). Leadership and social intelligence: Linking social perspectiveness and behavioral flexibility to leader effectiveness. *The Leadership Quarterly*, *2*(4), 317-342.

Zacher, H., Robinson, A. J., & Rosing, K. (2016). Ambidextrous leadership and employees' self-reported innovative performance: The role of exploration and exploitation behaviors. *The Journal of Creative Behavior*, *50*(1), 24-46.

Zacher, H., & Rosing, K. (2015). Ambidextrous leadership and team innovation. *Leadership & Organization Development Journal*, *36*(1), 54-68.

Zhang, X., & Bartol, K. M. (2010). Linking empowering leadership and employee creativity: The influence of psychological empowerment, intrinsic motivation, and creative process engagement. *Academy of Management Journal*, *53*(1), 107-128.

Zhang, Y., Waldman, D. A., Han, Y., & Li, X. (2015). Paradoxical leader behaviors in people

management: Antecedents and consequences. *Academy of Management Journal*, *58*(2), 538-566.

Zhang, Y., Wang, D., & Xu, L. (2021). Knowledge search, knowledge integration and enterprise breakthrough innovation under the characteristics of innovation ecosystem network: The empirical evidence from enterprises in beijing-tianjin-hebei region. *PLoS One*, *16*(12), e0261558.

Zhang, Z., & Hu, S. (2000). 技术创新绩效评价方法 [Evaluation method of technological innovation performance]. *Statistics and Decision Making*, (7), 14-15.

Zhou, J., & George, J. M. (2003). Awakening employee creativity: The role of leader emotional intelligence. *The Leadership Quarterly*, *14*(4-5), 545-568.

Zhou, K. Z., & Li, C. B. (2012). How knowledge affects radical innovation: Knowledge base, market knowledge acquisition, and internal knowledge sharing. *Strategic Management Journal*, *33*(9), 1090-1102.

Zhou, Y., Liu, G., Chang, X., & Hong, Y. (2021). Top-down, bottom-up or outside-in? An examination of triadic mechanisms on firm innovation in Chinese firms. *Asian Business & Management*, *20*, 131-162.

Zhu, D., Al Mahmud, A., & Liu, W. (2023). A taxonomy of idea management tools for supporting front-end innovation. *Applied Sciences*, *13*(6), 3570.

Zhuang, T., Zhou, Z., & Li, Q. (2021). University-industry-government triple helix relationship and regional innovation efficiency in China. *Growth and Change*, *52*(1), 349-370.

Zuraik, A., Kelly, L., & Perkins, V. (2020). Gender differences in innovation: The role of ambidextrous leadership of the team leads. *Management Decision*, *58*(7), 1475-1495.

[This page is deliberately left blank]

Other References

WIPO. (2024). *Which are the most innovative economies in 2024?*. Global innovation index 2024.

[This page is deliberately left blank.]

Appendix A: Questionnaire for Study 1

Q1: 在从事创新工作方面，你会给你的团队打多少分？

从不从事创新工作　　极大量的创新工作

1	2	3	4	5

Q2:性别

◯ 男　◯ 女

Q3: 年龄

◯ 1-25 岁 ◯ 26-30 岁 ◯ 31-35 岁 ◯ 36-40 岁 ◯ 41-45 岁 ◯ 46-50 岁

◯ 51-55 岁 ◯ 56-60 岁 ◯ 61 岁及以上

Q4: 请选择您的最高学历

◯ 普高/职高/中专以下 ◯ 普高/职高/中专 ◯ 本科 ◯ 硕士 ◯ 博士

Q5: 您在现有公司工作多少年？

◯ 少于 1 年 ◯ 1-3 年 ◯ 4-6 年 ◯ 7-9 年 ◯ 10 年及以上

Q6:您所在公司有多少员工？

◯ 1-99 人 ◯ 100-249 人 ◯ 250-499 人 ◯ 500 人及以上

Q7: 您所在公司的发展阶段？

◯ 初创阶段 ◯ 成长/扩张阶段 ◯ 成熟阶段

Q8: 您所在的公司从事哪个行业？

Q9: 您在公司中的职位？

◯ 普通员工 ◯ 经理/团队管理者 ◯ 总监 ◯ 总监以上

Q10: 您与您直接领导一起工作多久？

◯ 少于 1 年 ◯ 1-2 年 ◯ 3-5 年 ◯ 6-7 年 ◯ 8-10 年 ◯ 10 年以上

Q11: **下列对您直接领导的描述，您是否认同：**

允许我们以不同的方式完成工作

◯ 很不认同 ◯ 不太认同 ◯ 还可以 ◯ 比较认同 ◯ 非常认同

鼓励我们尝试不同的想法

◯很不认同 ◯不太认同 ◯ 还可以 ◯ 比较认同 ◯ 非常认同

激励我们在工作中承担风险

◯很不认同 ◯不太认同 ◯ 还可以 ◯ 比较认同 ◯ 非常认同

为我们提供独立思考和工作的空间

◯很不认同 ◯ 不太认同 ◯ 还可以 ◯ 比较认同 ◯ 非常认同

给我们表达自己的想法的机会

◯很不认同 ◯ 不太认同 ◯ 还可以 ◯ 比较认同 ◯ 非常认同

允许我们犯错

◯很不认同 ◯ 不太认同 ◯ 还可以 ◯ 比较认同 ◯ 非常认同

鼓励我们从错误中学习

◯很不认同 ◯ 不太认同 ◯ 还可以 ◯ 比较认同 ◯ 非常认同

监测和控制工作目标达成的情况

◯ 很不认同 ◯ 不太认同 ◯ 还可以 ◯ 比较认同 ◯ 非常认同

采取措施纠正我们的工作

◯ 很不认同 ◯ 不太认同 ◯ 还可以 ◯ 比较认同 ◯ 非常认同

要求我们遵守规则

◯ 很不认同 ◯ 不太认同 ◯ 还可以 ◯ 比较认同 ◯ 非常认同

注重我们是否都能完成工作目标

◯ 很不认同 ◯ 不太认同 ◯ 还可以 ◯ 比较认同 ◯ 非常认同

对错误进行惩罚

◯ 很不认同 ◯ 不太认同 ◯ 还可以 ◯ 比较认同 ◯ 非常认同

坚持按计划开展工作

◯ 很不认同 ◯ 不太认同 ◯ 还可以 ◯ 比较认同 ◯ 非常认同

传统的、没有创造力的

◯ 很不认同 ◯ 不太认同 ◯ 还可以 ◯ 比较认同 ◯ 非常认同

性格复杂，喜欢尝试新鲜事物

◯ 很不认同 ◯ 不太认同 ◯ 还可以 ◯ 比较认同 ◯ 非常认同

为控制问卷质量，此题请选“还可以”

◯ 很不认同 ◯ 不太认同 ◯ 还可以 ◯ 比较认同 ◯ 非常认同

Q12 下列对您所在公司的描述，您是否认同：

在公司中，新想法很容易被接受

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

当需要做出改变时，公司会迅速做出反应

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

管理层可以很快发现有时候需要以新的方式开展工作

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

公司非常灵活，能快速改变工作流程来满足并解决工作中出现的新问题

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

公司中的员工一直在寻找解决问题的新方法

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

在这个公司中，我可以获得帮助来开发新的想法

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

Q13 下列对于您所在公司的描述，您是否认同：

我的公司鼓励创造性

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

公司领导们尊重创造性的工作能力

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

公司的奖励制度鼓励对现有产品/服务进行改进

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

公司公开表彰/表扬那些具有创新精神的人

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

为控制问卷质量，此题请选“很不认同”

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

Q14 关于您部门/公司研发的产品/服务，下列说法您是否认同：

一大群客户已经在使用非常相似的产品/服务

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

我们的产品/服务代表了一种全新的产品/服务类型

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

我们的产品/服务可以被描述为一项新技术

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

我们的产品/服务是在上一代产品/服务的基础上逐步发展而来的

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

我们的产品/服务满足了客户未解决的需求

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

我们的产品/服务可以描述为其他产品/服务的延伸

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

我们的产品/服务转变了市场上在售的产品/服务

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

公司经常对现有产品和服务进行小幅的调整

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

公司在市场上推出现有产品/服务的改进版本

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

公司的产品/服务增加了市场上现有产品/服务的市场规模

○ 很不认同 ○ 不太认同 ○ 还可以 ○ 比较认同 ○ 非常认同

Sociodemographic

Q1: How would you rate your team in terms of engaging in innovative work?

never have innovative task extensive innovative tasks

1	2	3	4	5

Q2: Gender

◯ Male ◯ Female

Q3: Age

◯ 1-25 ◯ 26-30 ◯ 31-35 ◯ 36-40 ◯ 41-45 ◯ 46-50

◯ 51-55 ◯ 56-60 ◯ 61 or above

Q4: Please select your highest level of education

◯ High school diploma ◯ Bachelor ◯ Master ◯ PhD

Q5: How many years have you worked for your current company?

◯ Less than 1year ◯ 1-3year ◯ 4-6year ◯ 7-9year ◯ 10 year or above

Q6: How many employees does your company have?

◯ 1-99 persons ◯ 100-249 persons ◯ 250-499 persons ◯ 500 persons or above

Q7: What is your company's stage of development?

◯ start-up ◯ growth and expansion stage ◯ mature stage

Q8: What industry is your company in?

Q9: What is your position in the company?

◯ frontier employee ◯ team leader/manager ◯ director ◯ above director

Q10: How long have you worked with your direct supervisor?

◯ Less than 1 year ◯ 1-2 years ◯ 3-5 years ◯ 6-7 years ◯ 8-10 years ◯ 10+ years

Q11: Do you agree with the following descriptions of your direct supervisor:

Allows us to do things differently

◯ strongly disagree ◯ disagree ◯ neutral ◯ agree ◯ strongly agree

Encourages us to try different ideas

◯ strongly disagree ◯ disagree ◯ neutral ◯ agree ◯ strongly agree

Motivates us to take risks in our work

◯ strongly disagree ◯ disagree ◯ neutral ◯ agree ◯ strongly agree

Gives us space to think and work independently

◯ strongly disagree ◯ disagree ◯ neutral ◯ agree ◯ strongly agree

Gives us the opportunity to express our ideas

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Allows us to make mistakes

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Encourages us to learn from our mistakes

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Monitors and controls achievement of work goals

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Takes steps to correct our work

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Require us to follow the rules

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Focuses on whether we all meet our work objectives

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Punishes mistakes

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Stays on schedule

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Conventional, uncreative

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Complex personality, likes to try new things

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Quality control item (To control the quality of the questionnaire, please select “neutral” for this question)

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Q12 Do you agree with the following descriptions of the company you work for:

New ideas are easily accepted in the company.

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

When changes are needed, the company responds quickly

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Management is quick to recognize when new ways of doing things are needed

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

The company is very flexible and can quickly change work processes to meet and solve

new problems at work

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Employees in the company are always looking for new ways to solve problems

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

In this company, I get help developing new ideas

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Q13 How do you agree with the following descriptions of the company you work for?

My company encourages creativity

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Company leaders respect the ability to work creatively

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

The company's reward system encourages improvements to existing products/services

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

The company publicly recognizes/praises those who are innovative

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Quality control item (To control the quality of the questionnaire, please select "strongly disagree" for this question)

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Q14 Regarding the products/services developed by your department/company, do you agree with the following statements?

A large group of customers are already using very similar products/services

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Our product/service represents a completely new type of product/service

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Our product/service can be described as a new technology

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Our product/service is a step-by-step development of a previous product/service

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Our product/service fulfills an unmet need of our customers

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

The product/service can be described as an extension of other products/services

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Our product/service transforms products/services sold in the marketplace

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

The company often makes minor adjustments to existing products and services

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

The company introduces improved versions of existing products/services in the marketplace

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

The company's product/service increases the market size of existing products/services in the marketplace

○ strongly disagree ○ disagree ○ neutral ○ agree ○ strongly agree

Appendix B: Dictionary of Categories (Study 2)

Category	Subcategory	Definition	Example
Innovation facilitating factors			
	Qualified leader	A leader that is judged as having competencies, attitudes, and values that are favorable to drive innovation.	Good leader needs to have an open mind. He/she has experienced a lot of industries and is also an expert in a certain area. Cross industry experience is very valuable for driving innovation
	Open and fair market environment	A market characterized by openness to trade and the use of fairness criteria in doing business.	If there is a fair market environment and open social regulation system, everyone can have the chance to unleash their imagination and creativity.
	Experience industry change	Structural or process changes occurring in industry with strong enough impact to be felt as such.	Innovation coincides with changes of industry and society. If the industry the company is in has no change, it is impossible to cultivate innovation. Timing and favorable location are both very key to innovation.
	Team's innovation climate	Shared perceptions within a team that that supports and fosters innovative behavior and practices	Company needs to have a team with the same objective. If the team member has their own objective, it is impossible for the team to achieve innovation.
	Flat organization structure	Organizations that are characterized by low number of hierarchical layers, which create closer links between the top and the bottom.	Flat structure is helpful for innovation. The decision-making process will be much shorter and help the company to adjust to market environment so that the company can constantly try new ideas.
	Authorized power by organization	Freedom to make decisions formally given to team by management.	I have seen an internal innovation example. The management gives space and power to these teams to innovate, which greatly generate the creativity of these team to come up with bold ideas."
	Innovation culture of a nation	Shared values in a nation that are in line with fostering and supporting innovation which nurture risk taking and flexibility.	The innovation culture of the nation is actually foundation to company's innovation. Like in Israel, innovation is in their gene and they appreciate failure as the precedence of success. Therefore, they have a high level of innovation in their

			society. China needs to have this kind of innovation culture.
	Key individual innovation capability	Individual features that can acknowledge by others are contributing to one's own capability to innovate	from my personal experience among the projects I have invested, innovation results often rely on key individual's innovation capability.
Innovation blocking factors			
	Unqualified leaders	Leaders that do not gather sufficient conditions or that have innovation counterproductive repeated practices.	Sometimes, leaders give too many ideas. However, the team do not know how to implement them or which one is the priority. Lack of coordination between leaders and team often create pause of innovation process. These leaders usually do not think through these ideas carefully before they pass them to the team.
	Nature of company	Status of company owners as regards State vs Private vs Mixed capital	If the company is state-owned, it cannot bear any market risk. However, innovation is always accompanied by risk. Therefore, state-owned company is very difficult to innovate.
	Bureaucracy	All formal rules and procedures one is expected or forced to follow in compliance with authorities	Big companies become bureaucratic, and they have long decision-making process. In Alibaba, there are many ideas on new products, however because of long decision-making process, when management team decide to proceed, the idea is not innovative in the market any more. Therefore, innovative individuals will choose to leave these companies.
	Over-regulated environment	Environment characterized by a perception of too much regulation and bureaucracy	One company I invested has their products listed as military used products. Once it becomes military use, the company need to take great efforts to comply with relevant regulations. This actually becomes barrier for the company to expand its market share.
	Inertial thinking of team	Tendency to remain stuck a determine routine resisting changes to action patterns or novel purposes.	The team receive information as they used to do. They will gradually have an inertial thinking style. It will make them difficult to have any breakthrough. The information they collect in the mind forbid them to think differently

Required management skills			
	Continuous communication	Intense and multidirectional communication within and between entities involved in an innovation project	leader needs to communicate frequently with the team members so that the team member knows why their leader sometimes have controlling behavior or make decisions that they do not understand
	Make decision	Act of choosing among several options which one increases the chances of achieving a certain objective.	In the process of innovation, external experts will have a lot of opinions. But it is not necessary to take all experts' opinions. And sometimes their opinions are contradictory to each other. As a leader, I think he/she should make the decision whether the external advice should be taken according to the initial goal." (Making decisions;
	Set up strategy	Devise a set of actions intended to bring the current situation of an organization to a desired state considering contingencies and available capabilities.	Leaders, I believe, should be the driving force behind innovation. Leaders should set up the direction of innovation. What kind of problem can be sorted out and what kind of value the company should have. These questions need to be answered by the leader.
	Coordinate resource	Envisaging what resources should be put together to achieve a certain objective, including acquiring, and mobilizing them at a specific time for such purpose.	Mobilize resource is key in the process of innovation, especially at the beginning. There are many kinds of resources team members have not used or known before, particularly for radical innovation. So, the leader is required to get external resources for the team.
	Take responsibility	Situation where the leader calls upon him or herself the responsibility of a subordinate's possible failure.	I remember at that time my boss told me, you just go and make it. If you fail, it is not your responsibility, I'll take the blame. His word gives me great encouragement
	Form team culture	Action of fostering and rewarding a given set of cultural values within the team members.	He/she has the responsibility and the right to shape the culture and the atmosphere of the team. The culture and atmosphere of the team will depend greatly on his/her leadership style
	Solve problems	Action of finding resources and deploy them to overcome a situation that is judged as contributing negatively to	the leader needs to think all possible ways to help achieving the goal as long as the method is legal

		a certain objective.	
	Deploy task based on ability	The degree to which an individual is ascribed task responsibilities based on his or her judged ability	The leader assigns these tasks depending on each person's ability, and if there may be small mistakes, other team members can help to remedy the mistake.
	Clarify boundary of freedom	Leader's action to establish clear deadlines and freedom to make choices within a team	When giving the team space, the leader set up the boundary of time and scope, so that the team knows exactly how far they can go
	Mentoring and training	Process of developing an individual's competencies, attitudes and values based on a personal one-to-one relationship or a formal learning program designed with such purpose.	I spent lot of time to train new team member. She comes from a different background and is not familiar with this particular sector. I took her with me when meeting every partner. She now becomes an important team member
Harmful leadership			
	Over-controlling leadership	Situations where the leader is judged by the team as demanding too much monitoring or decision-making power as regards otherwise expected decisions to be made autonomously by the team or the team members.	For example, when I was a foundation director at ..., the leader had a very different understanding of how a Chinese foundation operates than an international foundation, including fundraising. He had a lot of control over the foundation because he didn't understand the operation. He thought his past knowledge can be adopted. For him, he is always worried that things will go wrong.
	Erratic leadership	Situations where the leader is judged by the team as putting out too many novel ideas without prompting the right course of action to test them.	There are also leaders who are kind of pie-in-the-sky leadership. They have too many ideas and creativity. These leaders are less likely to impede innovation, but they will impede execution
	Passive leadership	Situations where the leader is judged by the team as falling behind the level of engagement and proactivity in regards to the team challenges or issues.	People are complicated. Three leaderships can sometimes exist on the same person. For example, when a leader is particularly unfamiliar with the business, he might show erratic or passive leadership
Reasons for negative relationship			
	Different mindset	Set of cognitions and beliefs upon which an individual establishes a	If the team accepts incremental innovation, it's not going to be able to make radical innovation. A team

		consistent view of the purpose, processes and action.	aiming for radical innovation shall not satisfy with incremental innovation as a way of thinking
	Inertia of team	Defensive mechanism a team displays to preserve certainty within their action routine.	inertial thinking makes team stay on their comfortable zone. They rely on what they have achieved and think things based on current foundation
	Risk preference	Willingness to take risk within a certain time period	Team which have less willingness to take risks usually like incremental innovation. They take slow steps to adjust according to market needs. Their innovation ability is usually low and their ability to bear market risk is low.
	Divergent resource requirement	Situation where resources required to achieve a certain objective and not compatible among themselves	The mechanisms for organizing people, money and materials are also different. It is impossible to have a team that can achieve both incremental and radical innovation. when the team is equipped with such a mechanism for radical innovation, relevant personnel will be employed to suit it
	Market pressure	The joint configuration of forces that push organizations to make decisions balancing costs, benefits and risks	Sometimes, the market you are in forces you to go into radical innovation. Besides radical, there is no other way that the company can go.
	Time horizon	The temporal limits subjectively set by individuals or organizations from which a given outcome is expected.	Time horizon means that incremental innovation can produce results in shorter time period. However, radical innovation needs longer time and also needs to be validated by the market. Sometimes, radical innovation is not allowed because of time horizon.
Reasons to reject maximum ambidextrous leadership			
	Too much failure experience	Shared perception that there were too many novel experiences that have not resulted in successful outcomes.	Any innovative ideas need a process of verification and implementation. If there are too many innovative ideas, the resource will be tight and not enough to support verification and implementation. The team will feel that many ideas do not have a closure process of verification. The team will need time to pause to reflect on their direction. This kind

			of feeling will have an impact on their willingness to try more new ideas
	No more extra potential	Situation above which investing time or resources will no longer increase returns	When ambidextrous leadership goes beyond the turning point, however pressure the leader gives to the team, no more potential can be activated. The innovation capability of the team has been exhausted
	Confusion/role conflict	Situation where the set of responsibilities, duties, and expectations a team member has is unclear or with overlapping aspects.	The leader's ambidextrous behaviors to some extent will be positive incentive to the team. However, when there is too much ambidextrous behaviors, team will feel that the leader has double side personality and hard to understand and adjust to the leader. This will then become negative incentive to the team
Principle policy recommendation			
	Government financial incentive	Resources made available by governmental entities under the form of funding for eligible entities with the purpose of innovating.	Local governments can provide some financial support. For example, Hangzhou decides to develop e-commerce industry, because Alibaba and NetEase are here. Then the local government will encourage Internet e-commerce innovation. Industry park will support entrepreneurship with tax preference policies, rental discounts and other financial policies.
	Reward innovation	Contingent extra resources made available to those that successfully innovate.	when we design institutional mechanisms for innovation, we shall have rewarding mechanisms, including material, spiritual rewards. The company can also consider promotion in line with innovation. For example, if employees come up with innovative proposals, the employee can gain certain points on his/her performance record. Then at the end of the year, these points can be rewarded financially or lead to a promotion.
	Break silos for knowledge flow	Action of creating horizontal communication channels	The openness between different departments within the company is quite necessary. Openness in the

		and interdependencies so to break the tendency to isolate in vertical organizational silos.	entire ecosystem is also required. I think this allows everyone to complement each other's strengths. Every partner in the innovation process should play some of their own strengths.
	Foster ambidextrous leadership	Action of developing cognitive, attitudinal and behavioral dimensions related to adopting and leading both to promote simultaneously exploration and exploitation.	We need specialized training courses related to ambidextrous leadership, and I think that company leaders requires not only training for domestic practice of innovation and also international experience to influence more leaders.
	Fault tolerant mechanism	Set of rules that removes the personal weight of eventual failure in innovative endeavors from the direct leader	it is very important that direct leader of the innovation can be immunized from fault obligation. The responsibility should be borne by company as a whole.
	External innovation evaluation	Qualitative or quantitative judgment about how extensively a given organization or team has fulfilled criteria for its action to be considered or having produced an innovative output.	I think there needs external innovation evaluation in the innovation process. Stage evaluation is very necessary so that the projects will keep the right direction. We can correct or terminate some projects in time
	Benchmarking	The act of systematically comparing oneself with a suitable third party so to identify possible gaps that add to current performance differences explanation.	We should identify countries which we would like to learn from in terms of innovation policy. Our neighboring countries, such as South Korea, Singapore and Japan, have similar culture background. We can learn from these countries.
	Remove counterforce	The action of withdrawing from the organizational decision making and work systems the factors that go counter the innovation processes.	Innovation will naturally deliver some changes within organizations or industries. Some people will gain interest while the other will lose their interest. Those who foresee that they will lose their interest will create obstacles during the process. So sometimes, we do not know how exactly the innovation fails. We need to think about how to compensate those who will lose their interest so to remove counterforce for innovation. This is true for both radical and incremental innovation.

	Inspire bottom-up innovation	The situation where the organization decision makers foster more attention to customers' and employees' critical judgment on service or product so to identify innovation possibilities.	I think that most of the innovation should be from bottom up. Although external experts have profound knowledge on technologies, they do not know customers' needs. Our own employees often understand the business reality and start to think solutions from their daily work. They are most likely to come up with valuable innovative ideas.
	Encourage internal incubator	Creating resource allocation criteria as opportunities for employees to engage in novel endeavors within the organization.	The company shall encourage internal innovation projects. Employees can volunteer to be innovative leaders and organize his/her own team to implement the ideas. The company can choose to mobilize financial resource and manpower to support these innovation projects
	Competition to encourage	Act of establishing rules and resource allocation criteria that produced a zero-sum game between organizations, teams or individuals interested in innovating	it is useful to introduce competition into companies to drive innovation. Like us, our team needs to compete with teams around the world. This kind of mechanism will create innovative ideas.
	Less government intervention	The subjective judgment that the performance of the system benefits from less governmental intervention as regards a certain phenomenon in organizations.	I think that the government shall not have too much intervention on business. This will really help to boost the company's innovation capacity. Strict and wide government control is not aligned with the innovation purpose. Let market coordinate innovation activities.
Concrete policy recommendation			
	Protected time for interest	Organizational policy hat reserves specific time for employees to focus on specific objectives.	We can give 1-2 hour time to employees to do work not related to their KPI. KPI sometimes oppress innovation capability. Employees shall have their own time for something they are interested in but not deployed by their line managers.
	Fault tolerant mechanism	Set of rules enacted by Government that removes the personal weight of eventual failure in	local government in Guangzhou has set up a TCM fund. We all know that TCM is great to save patients under medical emergency, The

		innovative endeavors from the direct leader	purpose of this fund is to cover any legal conflict and compensation in case that TCM doctors have not successfully save patients. Protected by this fund, TCM doctors will not be afraid of any unfortunate consequence. This kind of policy should be applied to protect innovation failure as well
	Brainstorming session	A structured group interaction moderated by a specialist and that is designed to foster greater creativity by engaging all participants.	I suggest that we shall have brainstorming meeting every week or every two weeks to listen to any innovative ideas proposed by the team. No matter they are possible or not, team should not say no to these ideas and should seriously discuss these ideas. The brainstorming session itself generate innovation, The discussion process is very important to knowledge sharing and creation
Future research topic			
	Create innovation culture	The disposal of resources and systems that maximize innovation output	In China, innovation involves lots of negotiation with government, especially to gain more failure tolerance from government and less regulation for trials, like free trade zone policies. Theoretically any business which is not forbidden by the law should be legal. However, we have seen examples of squaring accounts after the autumn harvest. This makes innovation more difficult. I want to see how the government sectors can open their minds and tolerate innovation.
	Drive innovation in school	Creation of programs and rewards associated with learning innovation favorable values, attitudes and competencies at early age.	Innovation in schools is the basis for China to have an innovative culture in the society. Nowadays, in Chinese schools, the students always have one answer to a question. In this kind of school culture, we cannot expect them to become innovation leaders and individuals when they grow up.
	Internal innovation process for large company	Setting up processes within organizations that are conducive to fostering, supporting and developing novel	The big companies usually will have two ways of finding new business engine. The first one is that the company will establish many incubators or business units. And let

		business based on the organic initiative.	these small teams to try these ideas. Two second one is that the company will set up a fund to invest external teams who have good ideas. These two pathways have their cons and pros. I would like to discover more information on how other big companies in the world try to innovate and to find any method to innovate more effectively for big companies.
	Rationale to develop incremental innovation	Structuring a method that progressively leads to incremental innovation at team level.	I want to know if there is any method or theory to realize incremental innovation. If this kind of method can be taught to companies, it will help us to generate more incremental innovation.
	Key individual drives company innovation	Action of systematically monitoring, identifying and incentivizing individuals that have favorable conditions to engage in innovation producing processes.	I want to know how we can unleash individual's innovation capability to the extreme and how to identify certain individual who can change the company in the future.
	Innovation evaluation	The act of applying criteria to critically assess how much a given innovative phenomenon has impacted or added value to the organization or society.	I want to know how to evaluate innovation. Otherwise, as a senior manager, I do not know how to systematically encourage innovation in company.