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The Impact of Professional Training in Technology-based SMEs on the Turnover Intention of R&D Personnel

GU Hao

Doctor of Management

Supervisors:
PhD Alexandra Fernandes, Associate Professor,
ISCTE University Institute of Lisbon
PhD LU Ruoyu, Professor,
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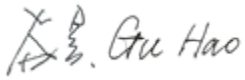
Declaration

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:  Date: 2024.3.19

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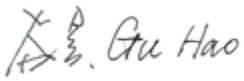
作者签名：  日期：2024.3.19

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Abstract

To investigate the impact of professional training on the turnover intention of R&D personnel in technology-based SMEs, this thesis introduced job embeddedness as a mediating variable and considered gender, educational level, and employee hierarchy as moderating variables. Based on 623 survey questionnaires from 65 enterprises, a structural equation model was established to analyze the findings. The results indicated that professional training had a significant negative impact on turnover intention through job embeddedness. The effect of professional training was significant for male employees but not for female employees. The effect of professional training became less significant as educational level increased. Professional training had a significant effect on middle-level employees but not on grassroots and senior-level employees.

This thesis inspired differentiated research on professional training, enriched the application context of job embeddedness theory, and attempted to measure training variables through subjective and objective dimensions.

Keywords: R&D personnel; professional training; turnover intention; job embeddedness; employee characteristics

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Resumo

Para investigar o impacto da formação profissional na rotatividade do pessoal de I&D em PMEs no domínio da tecnologia, esta investigação introduziu o conceito de *embeddedness* no trabalho como variável mediadora e considerou o género, o nível educacional e a hierarquia do empregado como variáveis moderadoras. Tendo por base em 623 questionários realizados a 65 empresas, foi estabelecido um modelo de equações estruturais para analisar os resultados. Ao efetuar a análise dos resultados observou-se que a formação profissional influenciou significativamente de forma negativa a intenção de rotatividade através do *embeddedness* no trabalho. O efeito da formação profissional foi significativo para os empregados do sexo masculino, mas não para os do sexo feminino. Com o aumento do nível educacional, a importância do efeito da formação profissional diminuiu. A formação profissional teve um efeito significativo nos empregados de nível médio, mas não empregados da base e empregados de topo.

Em conclusão, esta investigação permitiu pesquisas diferenciadas sobre formação profissional, enriqueceu o contexto de aplicação da teoria do *embeddedness* no trabalho e tentou medir as variáveis de formação através de dimensões subjetivas e objetivas.

Palavras-chave: pessoal de pesquisa e desenvolvimento; treinamento profissional; intenção de rotatividade; imersão no trabalho; características do funcionário
JEL: L2, M12

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摘要

为研究专业培训对科技型中小企业研发人员离职倾向的影响，本文引入工作嵌入作为中介变量，并把性别、教育程度和职位层级作为调节变量，基于 65 家企业的 623 份调查问卷，建立结构方程模型分析发现：专业培训通过工作嵌入显著负向影响离职倾向；专业培训对男性员工的效果显著，对女性员工不显著；随着教育程度的提高，专业培训的效果显著性被削弱；专业培训对中层员工的效果显著，对基层员工和高层员工的效果不显著。

本文启发了开展专业培训的差异化研究，丰富了工作嵌入理论的应用情境，尝试了通过主观和客观维度对培训变量进行测量。

关键词：研发人员；专业培训；离职倾向；工作嵌入；员工特征

JEL: L2, M12

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Acknowledgements

When I finished writing this thesis, I felt a sense of relief. Suddenly, I found myself thinking of the situation of attending the admission ceremony. In regards to the completion of study tasks and thesis writing as required, I have finally fulfilled my promise to Professor Xiao Wen, director of the DoM Program of the School of Economics and Management, UESTC, after three years of the Covid-19 epidemics recurring constantly and despite the challenging time and energy management between study, work, family, and sports. Such completion will be a good start, and a good start heralds a good result.

I owe all of the teachers for this completion. I still remember feeling uneasy when selecting a supervisor, concerned when determining the thesis topic, perplexed when taking part in the thesis workshop and midterm defense, powerless when faced with obstacles in my research, and uneasy when updating my supervisor on my progress in the study. Through your patient instruction and variety of approaches, you filled in the gaps and cleared the mist in my study and supported me with an open mind. You also validated my perseverance. Your expertise and rigorous academic philosophy guided my research ideas and methods. You also rectified my spelling and punctuation errors, provided kind and thoughtful assistance, and promptly responded to ensure the smooth continuation of my thesis writing. The expectations of my teachers are reflected in the responsibilities I bear. I would like to extend my heart-felt gratitude to my Portuguese supervisor, Professor Alexandra Fernandes, my Chinese supervisor, Professor Lu Ruoyu, Professor Xiao Wen from the School of Economics and Management of UESTC, Dr. Sun Ping, Ms. Chen Yang, Ms. Gao Xiaoli and Professor Virginia Trigo from ISCTE. My thanks also go to all the teachers and experts that provided guidance.

The assistance I received is reflected in the responsibilities I bear. Dr. Zhou Yang, student of my Chinese supervisor, Professor Lu, helped to solve problems in the research. Dr. Ding Yiwen, student of Professor Lu, helped to make the questionnaire and process the data. Ms. Li Silai and Mr. Song Liunan helped to improve the questionnaire. Ms. Zhang Hongyu translated the thesis. My classmate Lei Pigui helped me master the literature management tool. Several other classmates and friends such as Ms. Wang Xiaosheng, Ms. Cao Xifei, Ms. Zhang Jing, and Mr. Xiao Bo et al helped collect data. My wife, Wang Yu, helped with proofreading the

thesis. The responsibility on my shoulder is not a heavy burden, but the trust of my helpers. Thank you for your assistance and support.

I am also the source of such responsibility. I am a human resource manager in a technology-based SME, so I am well aware of how most SMEs are struggling to grow because of a lack of resources. A personal ache is the incompetence and frequent turnover of R&D staff in technology-based SMEs. My research allowed me to make useful explorations to change this situation and achieve the original purpose of applying what I have learned. This kind of responsibility is not a big weight; rather, it is a duty. I am glad that I shouldered that responsibility and fulfilled my obligation.

Former marathon world record keeper Kipchoge claimed that after he crossed the finish line, the festivities came to a stop. In fact, finishing my thesis is merely the culmination of several stages of my research and study. My path to lifetime learning and lifelong research will always include the support of my teachers and my facilitators.

致谢

写下论文的最后一个字，那一刻如释重负。头脑中蓦然浮现出参加入学仪式的情景，白驹过隙，经历了三年疫情的反复，通过对学习、工作、家庭和运动的时间、精力分配的艰难平衡，终于实现了与电子科大经济与管理学院 DoM 项目主任肖文教授的约定，按要求完成学习任务与论文写作，以终为始，善始善终。

论文的重负源于各位师长。还记得在选择论文导师时的忐忑，还记得在确定论文主题时的担忧，还记得在参加论文工作坊以及中期答辩时的懵懂，还记得在遇到研究困境时的无助，还记得向导师汇报研究进展时的紧张。正是因为您们，以宽容的胸襟接纳了我，以包容和肯定的态度笃定了我的坚持，以耐心的教导和多元的方法为我的研究扫清了迷雾、填平了沟壑，以深厚的专业功底和严谨的治学理念引领了我的研究思路、方法，甚至纠正了文字拼写和标点符号的错误，以亲切周到的服务和积极主动的响应保证了论文写作的正常进展。重负不是沉重的负担，而是师长们的期望，感谢我的葡方导师 Alexandra Fernandes 教授、我的中方导师鲁若愚教授、电子科大经济与管理学院肖文教授、项目组的孙平博士、陈阳老师、高小丽老师、葡萄牙里斯本大学学院的 Virginia Trigo 教授，感谢所有给予指导的老师、专家。

论文的重负源于所有协助者。中方导师鲁教授的周阳博士帮助解决研究中的问题，中方导师鲁教授的丁奕文博士帮助制作问卷和处理数据，李思铼女士、宋柳男先生等帮助完善问卷，张宏宇老师帮助翻译论文，同学雷丕贵先生帮助掌握文献管理工具，王晓圣女士、曹习斐女士、张静女士、肖波先生等数位同学、朋友帮助采集数据，我的夫人王玉女士帮助校稿。重负不是沉重的负担，是协助者的信任，感谢所有协助者的支持。

论文的重负源于自己。作为科技型中小企业的人力资源管理者，对广大中小企业因资源窘迫而蹒跚前行的感受颇深，而科技型中小企业的研发人员能力不足和流动频繁更是个人的切肤之痛。通过论文的研究，能够为改变现状做出有益的探索，达成了学以致用的求学初衷。重负不是沉重的负担，而是自己的责任，感谢自己承担责任、履行责任。

前马拉松世界记录保持者基普乔格说，庆祝在冲过终点线那一刻就已经结束。是的，论文的完成只是我学习研究的阶段性成果，在各位师长的指导和协助者的帮助下，终生学习，终生研究，我将一直在路上。

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List of Acronym

HR	Human Resources
JE	Job Embeddedness
R&D	Research and Development Personnel
SMEs	Small and Medium Enterprises
T/D	Training and Development

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Chapter 1: Introduction

1.1 Research background

1.1.1 Reality background

According to statistics, the number of small and medium-sized enterprises in China accounts for more than 90 percent of the total number of enterprises in the country, contributing 65 percent of the invention patents of the country, and is an important economic force and source of innovation in the country (Yu, 2011). As the main body of small and medium-sized enterprises, technology-based SMEs have played an important role. Technology-based SMEs face a constant need to innovate to maintain their core competitiveness in an environment of fiercer external competition. This puts a lot of pressure on SMEs with limited resources and emphasizes the status and importance of R&D in businesses. Employee turnover is a severe issue in technology-based SMEs, as some scholars have noted, due to their limited resource base. In 2012, the Asia-Pacific Human Resources Association carried out a survey about employee turnover in a number of enterprises, in which they found that the turnover rate in ordinary enterprises was generally between 8% and 15%. Another survey conducted in 2013 in Zhongguancun, Beijing, with a focus on technology-based SMEs revealed that the maximum turnover rate of private technology-based SMEs can reach 28% (Cai & Cui, 2013). In addition, according to the 2017 Resignation and Salary Increase Survey Report released by 51 Job, a leading domestic human resources service provider, the turnover rate of employees in the high-tech industry reached 25.1% in 2016. All these figures indicated that it is now commonplace for technology-based SMEs to experience considerable staff turnover.

High employee turnover rate often lead to a decline in product quality, service quality, production efficiency, team cohesion, and customer and employee loyalty, ultimately affecting the success of the enterprise (Gunasekaran et al., 1992). Therefore, it is vital to find a solution for the issue of how to lower the employee turnover rate in technology-based SMEs, particularly the turnover rate of R&D professionals.

R&D personnel possess the characteristics of professional knowledge background, strong desire for achievement, strong job adaptability, high independence and so forth, and therefore hope to achieve rapid career growth (L. Jiang, 2002). Thus, providing training for R&D staff to

improve their professional skills and job satisfaction has become one of the effective ways to reduce the turnover rate of R&D personnel, and it is also one of the most effective interventions of human resources development (Anderson et al., 2001). However, most of these studies were based on large or mature enterprises, and many research results showed that the training program in technology-based SMEs is seriously inadequate. Through the investigation of 1488 small and medium-sized enterprises in Jiangsu Province, it was found that the training mechanism of the vast majority of small and medium-sized enterprises had not yet been established, the training was lack of strategic planning, and the quality of training was also at a low level (Zhou et al., 2010). Worse still, according to the 11th survey of private enterprises in 2014, up to 40% of enterprises did not implement on-the-job training, and the per capita investment in on-the-job training was only 1974 yuan, which was significantly lower than the per capita on-the-job training fee set by the government (5,043 yuan) (Xiao & Zhang, 2019). For one thing, the resource of small and medium-sized enterprises is poor, and the cost of training is unaffordable for many of them (X. Chen et al., 2015); for another thing, managers of small and medium-sized enterprises expressed suspicion about the benefits of employee training in terms of enterprise performance improvement, innovation ability improvement (Bai et al., 2017). Therefore, it is necessary to test how training in technology-based SMEs affects the turnover rate of R&D staff, to help enterprises make decisions on whether to carry out employee training.

1.1.2 Theoretical background

Employee turnover has drawn the attention of many researchers as one of the hot topics in traditional organizational behaviour research, with employee training being one of the solutions to the issue of employee turnover that is particularly important in this area (Jehanzeb et al., 2013; Kotey & Folker, 2007). In terms of employee training and turnover rate or turnover intention, most of the scholars designed their research based on human capital theory, but conclusions showed significant differences. The research of Parent, Yao Xianguo and Weng Jie shows that training level was negatively correlated with the turnover rate of employees (Parent, 1999; X. Yao & Weng, 2005). However, some scholars insisted that they found no clear evidence suggesting significant correlation between training and turnover rate (Levine, 1993; Veum, 1997; Krueger & Rouse, 1998). In addition, studies of Loewenstein and Spletzer, Fourier and Zels, as well as Heines et al., indicate a positive correlation between training and turnover rate (Loewenstein & Spletzer, 1999; Forrier & Sels, 2003; Haines et al., 2010).

Obviously, it is still challenging to draw a firm conclusion from the available research on

the relationship between training level and turnover rate due to the variety of research circumstances and research objects. Besides, the author believed that there might also be some biases in the analysis of the relationship between employee turnover and training from the perspective of human capital theory. Generally speaking, the study based on the perspective of human capital assumes that employee behaviour is based on the relationship between investment and return, in other words, it depends on the "rational" thinking of employees (Glenn et al., 2001). However, human behaviour is more like to be the result of the joint influence of rational and irrational thinking, and irrational thinking may even have a greater impact on the behaviour of employees (Popov & Popov, 2013). In particular, R&D personnel fall under the category of knowledge workers. While they are concerned with material interests, they also pay more attention to the realization of personal value, the development of personality and the identity of employers (G. Wang, 2009). Since the research based on human capital theory cannot well explain the relationship between training and turnover, it is necessary to find a new theoretical perspective to better explain and clarify the relationship between employee training and turnover.

1.2 Research question and purpose

1.2.1 Research question

It is pointed out that high quality human resources will promote the core competitiveness of enterprises (Yoo, 2012), and the economic return produced by training is obviously better than that of other human resources development measures (C. S. Fan & Wei, 2010). Therefore, training, as a method conducive to solving the turnover of employees in enterprises, has attracted the attention of a large number of scholars. Most of the related studies analysed the relationship between enterprise training and employee turnover from the perspective of organizational behaviour, mainly taking job satisfaction and organizational commitment as intermediary variables and incorporating non-work factors to build a model. These studies were based on the subjective perception of human beings, and fully considered the impact of irrational factors (Crossley et al., 2007; M. Zhang & Zhang, 2006). However, the existing research is limited to the relationship between general training and employee turnover, neglecting the classification of employee training and lacking consideration of the actual situation of the enterprise.

G. S. Becker (1962) believed that enterprise training is divided into general training and

special training. The value of general training is useful to many enterprises, and the value of special training is only useful to the enterprise. For small and medium-sized enterprises with poor resources, there is a subtle trade-off between the cost burden of staff training and the desire to solve the problem of high turnover rate of R&D staff. The general training for the improvement of the general ability of employees is obviously not suitable for technology-based SMEs. How to carry out professional training for core R&D staff to reduce turnover rate is a key issue that technology-based SMEs need to consider. At the same time, technology-based SMEs are likewise uncertain as to whether professional training for R&D personnel can considerably lower the employee turnover rate.

To solve these problems, based on the situation of technology-based SMEs and the classification of employee training by G. S. Becker (1962), this study constructed a theoretical framework of "professional training, job embeddedness, and employee turnover" by taking into account the mediating effect of job embeddedness, and studied the mechanism of professional training on the turnover intention of R&D personnel. Specifically, the main research issues in this research include the following aspects.

- In technology-based SMEs, does professional training affect the turnover intention of R&D personnel? Is this impact significant?
- Does the degree of job embeddedness of R&D personnel play a mediating role in the relationship between professional training and turnover intention? Is it a complete or partial mediation?
- For R&D personnel of different genders, educational levels, employee hierarchy and so forth, does professional training have the same impact on job embeddedness and turnover intention?
- Based on the results of empirical research, how can technology-based SMEs carry out training for R&D personnel reasonably and reduce the turnover rate of employees?

1.2.2 Research purpose

The main purpose of this study is to explore the mechanism of professional training on the turnover intention of R&D personnel in technology-based SMEs, and analyse the mediating effect of job embeddedness on professional training and turnover intention of employees to better clarify the relationship between training and turnover as well as provide new evidence to explain the diversity of current research findings. This study examined the value of training from the perspectives of organizational behaviour and psychology to help technology-based

SMEs find ways to reduce the possibility of R&D personnel leaving their jobs when technology-based SMEs are unable to change the external environment, rapidly increase salary and corporate visibility, and adjust technical work models and content.

1.3 Research content and method

1.3.1 Research content

This study consists of six chapters. The general content of each chapter is as follows.

Chapter one is introduction. Firstly, the status quo and theoretical background of this study were introduced. Based on background introduction, the core issue of this research was drawn out—the influence of professional training on the turnover intention of R&D personnel in technology-based SMEs. Then, this study introduced research contents and proposed research methods. Finally, the theoretical and practical significance of this study were proposed, and the technical roadmap was drawn.

Chapter two focuses on theoretical basis and literature review. First, the author traced the basic theories of this study, namely social cognitive theory and job embeddedness theory, and reviewed the origin, development, and roles of these theories. After that, related studies on corporate training and turnover intention were reviewed to clarify the theoretical relationship among relevant concepts. Finally, the connotation, dimensions, measurement and various mechanisms of job embeddedness were discussed to lay the foundation for the theoretical framework of this study.

The third chapter is theoretical model and hypotheses. This chapter mainly put forward the theoretical framework of this study, divided the connotation and dimensions of the main variables, and proposed the theoretical hypotheses of this study.

The fourth chapter is research design. This chapter primarily described the design process and research methods of this study, expounded the process of questionnaire design, conducted questionnaire distribution and data collection, verified the data through reliability and validity analysis and laid the foundation for hypothesis testing. First, the path of research design was determined, specifically utilizing questionnaire surveys. Second, the measurement methods for all variables involved in the study were determined and an initial questionnaire was designed. Third, a pre-survey was conducted using the initial questionnaire and based on the results, modifications were made to finalize the survey questionnaire. Fourth, formal distribution and collection of the questionnaire were conducted. Fifth, valid questionnaires were selected, and

the sample characteristics of the data were described. Finally, the reliability and validity of the data were measured.

The fifth chapter is empirical research. Initially, data was used to examine the relationship between professional training, job embeddedness and turnover intention. Then, data was used to examine group effects of employee gender, education level, and job hierarchy type.

Chapter six is results discussion, research conclusions and outlook. Based on the examination results, various effects in this study were discussed, conclusions were drawn, the value and contributions of the research were refined. Limitations of the research were expounded and the expectations for future research directions were proposed.

1.3.2 Research methods

This study intended to use a variety of research methods, including:

1. Literature analysis

This research mainly collected and collated existing research results in the field of employee training and turnover at home and abroad through various academic information databases such as China National Knowledge Infrastructure, Wanfang Data, Chinese Sci-tech Periodical Database (Weipu), China Doctoral Dissertations and Master's Theses Full-text Database, Web of Science and EBSCO. It analysed and cited the aforementioned research results. Through systematically reviewing and combing domestic and foreign literature, the author had a clear and comprehensive understanding of literature concerning training, job embeddedness, turnover and turnover intention, human capital and specialization, and organizational culture. At the same time, the author learned about the current situation of technology-based SMEs in China, dug into the predicaments of enterprises and the shortcomings of existing research, and determined the research questions. Then, through literature analysis, the theoretical model of "professional training, job embeddedness and turnover intention" of this study was established. Based on many classical theories in the fields of psychology, organizational behaviour and other disciplines, a series of hypotheses, including both confirmatory hypotheses and pioneering hypotheses, were put forward for verification and to construct the overall framework of this thesis. Finally, all kinds of measurement scales were collated to lay a foundation for follow-up investigation.

2. Questionnaire survey

The survey items were revised based on the interview results, and then the R&D personnel of technology-based SMEs in several regions across the country were selected as the survey subjects. Questionnaires were distributed based on sampling principle and sampling method to

obtain first-hand data. To ensure the reliability and validity of the research outcomes, a small sample questionnaire survey would be carried out. The questionnaire would be evaluated based on the results, and if necessary, corrections would be made and then a large sample questionnaire survey would be conducted. The collected questionnaires would be processed using SPSS software.

3. Statistics and regression analysis

This study used STATA, AMOS and other empirical analysis software for descriptive statistical analysis, factor analysis, reliability and validity analysis, variance analysis, regression analysis, moderation effect analysis and intermediary effect analysis to verify the mechanism of professional training on the turnover intention of R&D personnel, and to provide scientific basis for the conclusion of this study.

1.4 Research significance

Based on the research background, this thesis proposed the main problems to be solved and the purpose of the research. On this basis, the author further summarized the research significance, which mainly includes theoretical significance and practical significance.

1.4.1 Practical significance

The practical significance of this research are as follows.

1. To have an in-depth understanding of the loss of personnel in technology-based SMEs, to alleviate the turnover of R&D staff, to retain talents and core staff, and to lay a foundation for the long-term development of enterprises. The results verified the mechanism of professional training on the turnover intention of R&D personnel and the intermediary role of job embeddedness in technology-based SMEs. It also pointed out a clear direction for technology-based SMEs to reduce the turnover rate of R&D staff.

2. To provide guidance for the training of employees, especially for the training methods of R&D staff. The results confirmed the impact mechanism of training on employee turnover, and clarified the impact of professional training on employee turnover intention.

3. To explore the relationship between employee type and the effectiveness of professional training in technology-based SMEs, and improve the cost-effectiveness of professional training. This study categorized employees according to factors such as gender and rank, and verified the effect of professional training on different types of employees. The results showed that professional training could play a more significant role for certain specific types of employees.

4. Based on the research findings on technology-based small and medium-sized enterprises in this research, it inspires small and medium-sized enterprises in other industries to engage in corresponding thinking and research. It encourages them to try using professional training to address the high employee turnover rates they also face. It also reminds all businesses to place importance on management, particularly human resources management.

5. In addition to the actions taken by the companies themselves, government departments can also improve the effectiveness of their operations by utilizing the research findings. They can enhance the targeting of policy formulation, funding provision, industry guidance, and even training and market cultivation for technology-based small and medium-sized enterprises. This will help enhance the operational efficiency of the government and avoid inappropriate measures and misguided directions.

6. This research will also help organizations and individuals in the training industry to understand the potential market trends, enabling them to plan and implement targeted strategies based on their own resources and capabilities. By meeting the needs of technology-based small and medium-sized enterprises, they can achieve satisfactory market returns. However, the most important value of this research is to strengthen the confidence of relevant industries and individuals in their professions, and to promote their ability to move away from excessive focus on short-term gains and losses.

1.4.2 Theoretical significance

The theoretical significance of this research includes the following aspects.

1. To fill in the research blank of the relationship between professional training and employee turnover in organizational behaviour. Most of the existing research on training and employee turnover has not categorize training, and a few studies with training categorization have not verified the mechanism of professional training on employee turnover intention. This study filled in this gap and proposed new ideas for research concerning employee training.

2. To study the relationship between professional training, job embeddedness and turnover intention, and to evaluate whether job embeddedness can be used as a mediating variable between professional training and turnover intention. Based on the theory of job embeddedness, this study verified the possibility of professional training as an antecedent variable of job embeddedness. Conclusions of this study partly explained why existing studies have shown different results in the effect of training on employee turnover. It called on scholars in related research fields to explore more mediating factors and moderating factors between training and employee turnover to clarify the relationship between training and employee turnover.

3. The difference of geo-culture leads to different individual values. Based on the local situation in China, this research verified the explanatory effect of job embeddedness theory on the turnover of R&D staff in technology-based SMEs, and developed a useful measurement tool. The questionnaire was designed based on existing literature on professional training, job embeddedness, and employee turnover intention scales, and was revised based on actual feedback from Chinese respondents. This provided a reference for subsequent research and made the research questions more relevant to the Chinese context.

1.5 Technology roadmap

Figure 1.1 shows the technical roadmap of this study.

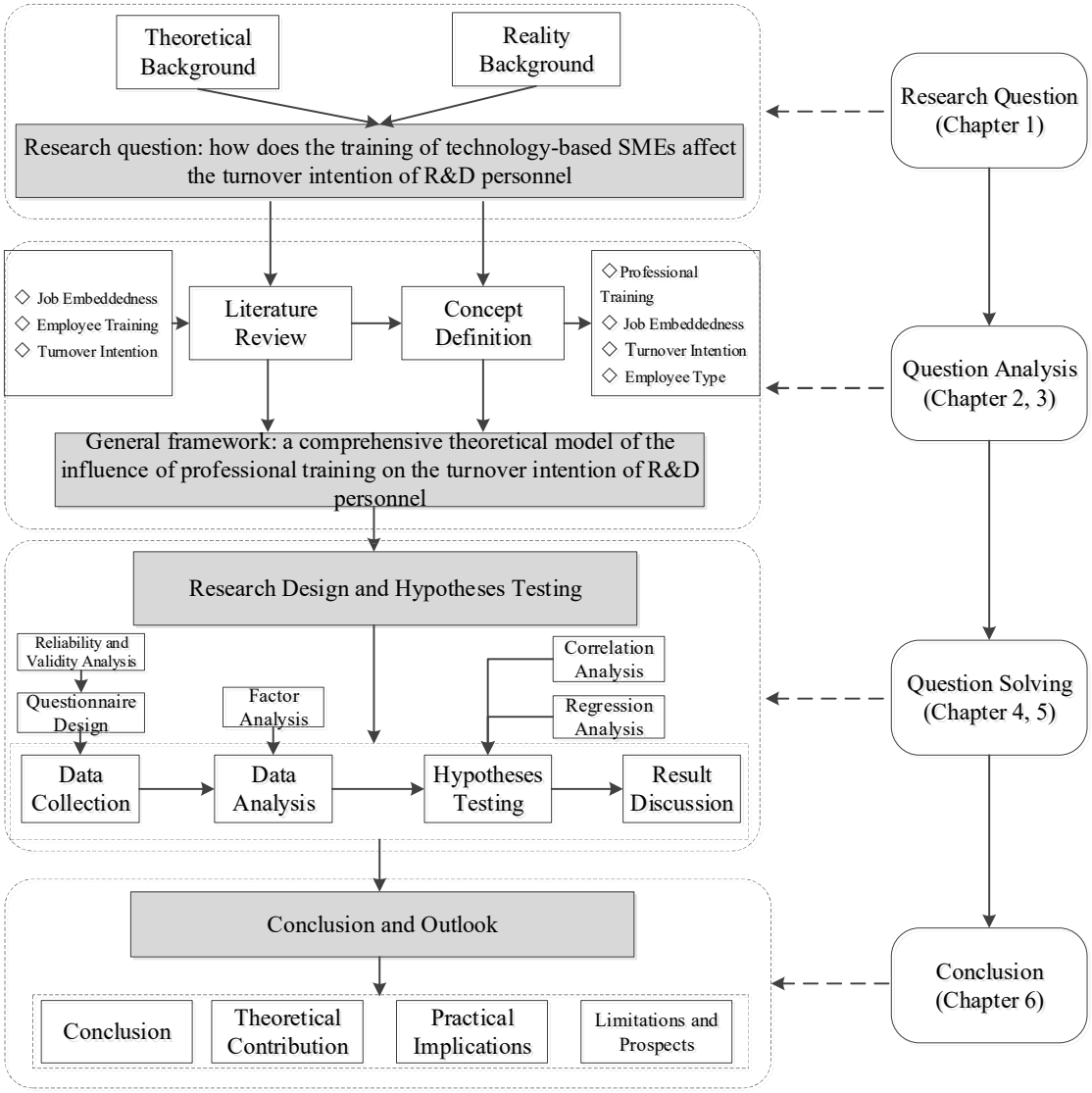

Figure 1.1 Technology roadmap

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Chapter 2： Literature Review

In this chapter, the author will provide a comprehensive review and analysis of the research progress in the core theories and related research fields involved in this study. The aim is to present a clearer depiction of the theoretical evolution and trends in the relevant research, identify any gaps or areas that require further exploration, and demonstrate the theoretical value of this study. This will lay a foundation for the subsequent research design. Specifically, the author will conduct a literature review in detail on four directions of research, namely social cognitive theory, employee training, turnover intention, and job embeddedness theory.

2.1 Social cognitive theory

1. The origin of social cognitive theory

Social cognitive theory, developed by American psychologist Albert Bandura, is a widely recognized and influential theory in the fields of psychology and education. The theory of Bandura, which builds upon and critiques previous theories, provides a comprehensive understanding of human behaviour. In 1986, Bandura (1986) published Social Foundations of Thought and Action: A Social Cognitive Theory, in which he systematically elaborated on the concepts and principles of social cognitive theory. Since its publication, the theory has gained rapid acceptance and has been acknowledged for its significant contributions to the field of psychology.

According to this theory, there is a continuous dynamic reciprocal relationship among environment, cognitive factors, and behaviour. This means that these three elements are constantly interacting with each other, and the relationship between any two factors is two-way. This dynamic interaction is subject to change under different environments, individuals, and behaviours, as depicted in Figure B.1.

This theory delves into the intricate interplay between these elements. First, it explores the interaction of behaviours exhibited by different individuals, which suggests that the selection of behaviour is influenced by human cognition and thinking. Moreover, any changes in thinking and cognition will subsequently impact individual behaviour. In other words, the way individuals think and perceive the world directly influences their actions.

Second, the theory highlights the reciprocal relationship between the environment and behaviour. It emphasizes that the environment has the power to modify the behavioural process, while behaviour, in turn, can alter the state of an individual and social dynamics within that environment. This implies that the environment plays a crucial role in shaping behaviour, and behaviour, in turn, can have a significant impact on individuals and their social interactions within a given environment

Third, the theory emphasizes the dynamic relationship between humans and the environment. It suggests that human consciousness, cognition, and thinking are not only influenced by the environment but are also formed within it. Furthermore, these cognitive processes are subject to adjustment based on the environment. Consequently, individual behavioural decisions are the outcome of the combined influence of individual cognition and environmental factors.

This theory has gained widespread usage in understanding and predicting behavioural selection and characteristics. Its comprehensive approach to examining the reciprocal relationships between environment, cognition, and behaviour provides valuable insights into the complex dynamics that shape human actions.

2. Ternary interactive determinism in social cognitive theory

When considering whether human behaviour is influenced by external or internal forces, there have been longstanding discussions surrounding two types of determinism: personal determinism and environmental determinism. Personal determinism places emphasis on the regulation and control of behaviour by internal psychological factors within individuals. On the other hand, environmental determinism focuses on the control of behaviour by external factors present in the environment. However, American psychologist Bandura introduced his own theory that critiques previous notions and seeks to explore the dynamic and reciprocal relationship between the environment, humans, and their behaviours.

In his theory, Bandura views environmental factors, behaviour, and human subject factors as distinct entities that interact and mutually influence one another. Among them, human subject factors encompass various physical and mental functions, including physiological responses and cognitive function. The concept of interactive decision-making suggests that the environment, behaviour, and individuals are both causes and effects of one another. This means that each component plays a role in shaping and determining the others, establishing a two-way interactive and decisive relationship.

In the ternary interactive determinism, on the one hand, the human subject factors highlight the significant role of internal psychological factors, such as beliefs and motivations,

in shaping and directing human behaviour. These internal factors often exert a strong influence on individuals and guide their actions. Moreover, the outcomes and consequences of these behaviours can, in turn, impact the content and form of human thinking and emotional responses.

On the other hand, environmental determinism emphasizes the impact of external environmental factors on human behaviour. Individuals, through their unique subject characteristics like personality and social roles, have the ability to trigger or activate different responses from the environment. This means that individuals can actively shape their surroundings to align with their needs and goals, thereby influencing their own behaviour.

Furthermore, behaviour serves as a crucial intermediary between individuals and their environment. It is a tool that humans utilize to modify their surroundings, making them more conducive to their needs and facilitating their survival. However, it is important to acknowledge that behaviour is not solely driven by individual needs but is also constrained by the actual conditions of the environment.

In summary, the concept of ternary interactive determinism recognizes the dynamic and reciprocal relationship between human beings, their behaviours, and the environment. It acknowledges the interplay between internal psychological factors, external environmental influences, and the interactive nature of behaviour, which highlight the complex and multifaceted nature of human behaviour.

3. Application of social cognitive theory

Since Bandura first proposed the social cognitive theory, academic study of it has grown and improved, and it is now frequently applied to organizational research.

Aşkun et al. (2018) explored the moderating role of self-efficacy in the relationship between perception of justice and turnover intention according to the theoretical framework of social cognitive theory. The results of the study revealed an important individual pattern of how self-efficacy plays a role in justice perception and turnover outcome. While people who put a lot of effort into finishing the task are less likely to quit the organization when the process is unfair, those who have a strong propensity to take initiative and the ability to persevere in adversity are more likely to consider leaving the organization.

J. S. Miller et al. (2014) used social cognitive theory to explore the performance appraisal process, which is regarded as situational cognition, by examining the relationships among key factors such as the knowledge of employees on organizational environment, their assessment preparation and their responses. The results showed that job resource sufficiency, communication sufficiency, peer relationships and preparation time are significantly

positively correlated with employee response to the performance appraisal process, and preparation time moderates the relationship between organizational environment and employee response.

Turel et al. (2011) used the behaviour-environment interface in social cognitive theory to explain some negative consequences of work-related widespread technology addiction on families and organizations. The research pointed out that the dependence of employees on mobile email enhances their perception of overwork and technology-related family conflict. Overwork in turn reduces their organizational commitment, and increases the level of their perceived overwork. At the same time, more frequent technology-related family conflicts exacerbate work-family conflict.

2.2 A review of employee training

2.2.1 The connotation of employee training

Training is a targeted and organized process of behaviour, in which knowledge is disseminated, skills are increased, standards are set, messages are transmitted, and beliefs and management admonitions are strengthened. Through training, the operation of trainees will be more standardized and the work psychology of them will be more mature, thus enabling both employees and organizations to achieve better performance. According to James P. Clement, a professor at Harvard University, training is not only a bottleneck in the sustainable development of an enterprise but also an important activity within it. Nowadays, the importance of training is being increasingly recognized. Failure to prioritize training can potentially lead to the failure of an enterprise (Lin, 2012). Given that training can enhance enterprise performance and contribute to its survival and development, it holds significant value and impact. In fact, it is considered an important method and approach for enterprises to enhance their core competitiveness in the 21st century (K. Becker & Smidt, 2016).

The theory of employee training has its roots in the scientific management theory that emerged in the early 20th century. It was in 1911 that Taylor published The Principles of Scientific Management, wherein he introduced the renowned four principles of scientific management. The second principle emphasized the importance of scientifically selecting workers and providing them with training and education to facilitate their growth. According to Taylor, to acquire top-notch employees, a rigorous selection process and systematic training are essential. This marked the first theoretical recognition of the pivotal role of training in

enhancing corporate performance. At the same time, Max Weber introduced the concept of the "bureaucratic administrative organization model". He highlighted that in an ideal organization, formal training of employees serves as the foundation for achieving exceptional organizational performance. His insights further reinforced the significance of training in optimizing the functioning of an organization.

Early employee training theories assumed that employees were seen as "human capital" and primarily focused on objectively analysing their operational actions. However, these theories often neglected to consider the importance of human psychological factors, which frequently resulted in employees experiencing psychological conflicts. Consequently, this lack of attention to psychological factors made it challenging for employee training to effectively achieve its intended goals.

As research in the field continued to evolve, the 1960s marked a significant turning point for training-related theories and research, ushering in a new era of modern employee training theory. During this time, a diverse range of training theories began to emerge. One such theory is the training needs analysis theory, which emphasizes the need for organizations to develop training plans that encompass various aspects such as strategy, tasks, and personnel (McGehee & Thayer, 1961; Kirkpatrick, 1979). Another theory, known as the theory of capital training, highlights how personnel training can greatly enhance the efficiency of employment costs. This theory signifies a shift in the concept of enterprise training, transforming it from being viewed as mere consumption to being recognized as a valuable investment. In fact, training is now acknowledged as a means to generate capital gains for enterprises (B. Becker & Huselid, 1999). Additionally, Humphrey (1990) introduced the theory of group training of employees, which asserts that "group training" is a behavioural process that can effectively transform complex organizations through training. This perspective emphasizes the importance of approaching the issue of employee training from a holistic organizational standpoint. Thus, the evolution of employee training theories has led to a greater recognition of the significance of psychological factors, the need for comprehensive training plans, the value of training as an investment, and the transformative potential of group training in achieving organizational success.

Furthermore, many scholars have also interpreted the connotation of training. For example, Noe (2013) defined training as a series of planned activities to improve the work skills of employees or change the attitudes and behaviours of employees to meet organizational goals and work needs. Employee training generally includes formal training, informal training, on-the-job training, career development and other development-related

learning activities to prepare employees for their current or future work. Olenick et al. (2020) believed that training is a collection of guidelines that employees can follow to attain the intended results. Ogundele et al. (2012) pointed out that training is basically a series of instructions, techniques, and expertise to improve the skills of employees to achieve the desired goals. Employee training can be defined as "an organized approach involving individual learning and development to enhance their personal, team and organizational value" (Kumpikaitė, 2007). Training increases and updates the knowledge of employees, thereby improving previously established performance. Employee training is considered an asset since competent employees will boost the performance of the enterprise more than that of its rivals and will support future performance (Wijayanti, 2019).

In different studies, training is regarded as the continuous development of the attitude, knowledge and skills of employees. Despite slight variations in definitions among scholars, training generally has the same meaning: it is a crucial means of enhancing organizational human capital, and its goals include enhancing the knowledge, competence, and productivity of employees, as well as changing their attitude and improving their organizational identity. Employee training is not only an important part of human resource management, but also a crucial way for enterprises to improve their core competitiveness (Schuler & MacMillan, 1984; Kotey & Folker, 2007; Hur & Ha, 2019).

2.2.2 Division of employee training

G. S. Becker (1994) divided on-the-job training into two types, namely general training and specific training. He then defined them respectively.

General training refers to the training that encompasses not only the benefits it brings to the enterprises providing the training but also its positive impact on other enterprises. When enterprises offer on-the-job general training, it not only enhances the capabilities and work efficiency of their own employees, but also improves their future marginal values. Simultaneously, this type of training also contributes to the future marginal values of other enterprises. Complete general training refers to the extreme form of general training, which benefits not only the enterprises that provide training, but also all other enterprises, and the benefits are the same, that is, the extent of promotion of marginal values is the same. However, the implementation of general training in enterprises may give rise to certain challenges. According to Oatey (1970), if the employer bear all the investment costs of general training, the trainee may switch positions to other enterprises once the training is completed. Balmaceda (2005) further argued that under the principle of market-selected wages, if

enterprises cover the cost of general training, employees receive all the benefits associated with it. Therefore, enterprises need to carefully consider whether they should bear the full cost of general training, taking into account the potential risks and benefits involved.

Specific training refers to a type of training that is specifically tailored to meet the needs and requirements of a particular enterprise, with the main focus being on benefiting the organization that provides it. This form of on-the-job training is designed to enhance the overall value and effectiveness of the enterprises that offer it, resulting in improved performance and productivity. However, it should be noted that while specific training can have a positive impact on the enterprises providing it, its influence on other enterprises is limited. In fact, completely specific training is an extreme version that solely benefits the organizations that offer the training, without any significant effect on other enterprises. To clarify further, it is important to emphasize that the primary improvement resulting from specific training is confined to the enterprises that provide the training.

Although every training form has a certain degree of particularity, the distinction between general training and specific training is very useful for theoretical analysis (Cahuc & Zylberberg, 2004).

2.2.3 The mechanism of employee training

1. Employee training and organizational performance

Many early employee training theories and studies have proved that employee training plays a positive role in improving the skills, work efficiency and performance of employees (Machin & Wilkinson, 1995; Asfaw et al., 2015). However, whether this role can be reflected at the enterprise level and whether employee training has an impact on enterprise performance has become an important issue for scholars to explore.

Improving the performance of employees is crucial for the success of organizations. By providing continuous training and development opportunities, organizations can help their employees unlock their full potential.

Research conducted by Olenick et al. (2020) emphasizes that training serves as a consistent set of guidelines that employees can follow to enhance their productivity, skills, and achieve desired outcomes. When employees lack competence and motivation, they tend to hesitate in performing their work tasks (Ogundele et al., 2012). If they continue to work with lower competencies and lower motivation, their work output will be severely affected (Maina & Bula, 2019). Therefore, providing training to improve the performance of employees is conducive to boosting organizational performance. Y. Liu and Zhong (2018)

found a correlation between employee training and organizational performance. Employee training provides a comprehensive perspective of work tasks, allowing employees to choose areas and technologies that need to be improved to achieve better performance without improving management because the most recent working methods and techniques also need to be trained (Kaz, 2015). Sung and Choi (2016) explored the influence of employee training and development (T/D) on enterprise innovation. Their research identified two different dimensions of employee training and development: enterprise investment and positive cognition of employees. They held that the two dimensions indirectly affect the innovation performance of enterprises by improving the ability and commitment of employees. The results of their study showed that when employees voluntarily participate in employee training and development, the positive indirect effect of employee training and development on corporate innovation performance becomes stronger through employee capabilities and commitment.

Existing research on employee training and its impact on organizational performance usually focuses on economic rationality, that is, the economic and competitive advantages that companies can gain through the training of employees. However, Esteban-Lloret et al. (2016) introduced background factors into the analysis from an institutional theory perspective. Their study highlighted the relationship between employee training and organizational outcomes, emphasizing the significant positive role that training plays in improving organizational legitimacy and performance. In summary, employee training is a vital aspect of organizational success. It not only enhances individual employee performance but also contributes to overall organizational performance, innovation, and legitimacy. By investing in continuous training and development, organizations can empower their employees to reach their full potential and drive success.

There is a need for further expansion of the existing research on employee training to gain a deeper understanding of its effectiveness and impact on enterprise performance. Numerous empirical studies have consistently demonstrated that employee training has a positive influence on improving the overall performance of organizations. However, it is important to explore whether training is equally effective for all employees or if there are variations in its effectiveness based on different employee categories.

To address this question, Georgiadis and Pitelis (2016) conducted a comprehensive study on the effectiveness of training provided by enterprises for both ordinary employees and management. Their findings revealed that the training of ordinary employees had a more significant positive impact on corporate labour productivity and profitability compared to the

training of managers. This suggests that providing training specifically tailored to the needs of ordinary employees can yield greater benefits for the organization. Additionally, Keen and Berge (2014) conducted a study that emphasized the importance of training or subsidies for low-skilled employees. Their research indicated that such interventions can lead to increased employment time and income for these employees in the short-term. This highlights the potential benefits of providing targeted training programs for low-skilled workers, which can contribute to their professional development and overall well-being. In conclusion, the effectiveness of employee training varies depending on the type of employees being trained. Future research should focus on identifying effective strategies for providing job-specific training that caters to the unique needs and requirements of different employee categories. This will help organizations maximize the benefits of training programs and enhance overall performance.

Chinese scholars have also conducted a large number of studies on the issue of how employee training can improve enterprise performance.

Based on the database of Chinese manufacturing enterprises, W. Wu and Tang (2016) studied the relationship between the dynamic changes of employee training and enterprise performance by adopting the method of “experimental group-control group comparison”. The results demonstrated that enterprises that provide employee training perform better than those who do not, and those that provide training to their employees are already excellent, and they are more likely to choose training activities. After the enterprise conducts employee training, the number of employees increases significantly, but the growth rate of per capita performance index does not increase accordingly. At the same time, the TFP growth rate of enterprises that just include employee training is the fastest, whereas that of enterprises that perform continuous employee training shows no improvement. Finally, conducting employee training can reduce the risk of business failure by about 4%.

Based on the unique data of Chinese manufacturing enterprises, Z. Zhang (2018) explored the impact of on-the-job training of Chinese manufacturing enterprises on enterprise productivity and employee bargaining ability. It was found that on-the-job training improves the bargaining power of employees in different industries and the wages of employees in different industries. On-the-job training has become an important way for Chinese manufacturing enterprises to enhance their competitiveness.

Based on the data of the 11th national survey of private enterprises, Xiao and Zhang (2019) argued that skill-centred training for employees in private enterprises plays an important role in promoting enterprise innovation, product innovation and process innovation

to a certain extent.

2. Employee training and their attitude

According to several employee training theories that have been mentioned, employee training has been found to have a positive impact on various aspects of the work of employees, including their skills, efficiency, and performance. Additionally, it has been observed that employee training can also lead to changes in their attitudes and behaviours towards work, such as increased job satisfaction, higher levels of organizational commitment, greater engagement in organizational citizenship behaviour, and reduced turnover behaviour.

(1) Organizational commitment

Organizational commitment refers to the belief of employees in investing valuable resources in the organization for the benefit of the organization and remaining loyal to their affiliated organizations (Lincoln & Kalleberg, 1985). Numerous studies have demonstrated that employee training, provided by enterprises, not only enhances their work skills but also has a significant positive impact on their level of organizational commitment (Rawashdeh & Tamimi, 2020; Schneider & Flore, 2019).

Ocen et al. (2017) took banking personnel as a sample to study the role of training in building employee commitment. It was found that there is a positive correlation between training and employee commitment, and job satisfaction of employees plays an intermediary role between the two. Tian et al. (2020) tested the concurrent impact of single HR practical training on the two dimensions of commitment (emotion and norm), with perceived organizational support as a mediator. Studies have shown that two human resource practices—training and development, enable organizations to obtain emotional and normative organizational commitment. Building upon the social exchange theory, Jung and Takeuchi (2019) studied the results of employee training based on social exchange theory. They made the argument that employers will gain from investing in the development of employees if employees receive training and view investment in training as a social exchange with the employers. This will boost emotional commitment and job satisfaction. Additionally, the research of Chinese scholars Ling and Zhang (2020) highlighted the positive influence of training on the professional commitment and organizational commitment of knowledge employees. Notably, professional commitment was found to partially mediate the relationship between training and organizational commitment.

(2) Job satisfaction

The level of job satisfaction experienced by individuals within an organization is of utmost importance, as it encompasses their positive emotions towards the work itself and its

various aspects, such as the working environment, conditions, mode, stress levels, challenges, and interpersonal relationships. It is worth noting that the impact of training on job satisfaction is similar to that of organizational commitment, as evidenced by numerous studies that have consistently demonstrated the positive influence of employee training on their overall job satisfaction (Thaler et al., 2017; Hur & Ha, 2019; Nauman et al., 2021).

Iliopoulos et al. (2018) have emphasized the significance of training as a crucial tool for enhancing job-related satisfaction, highlighting that highly skilled and well-trained employees contribute to improved performance and quality. Moreover, the research conducted by Bozionelos et al. (2020) has revealed that employees who undergo continuous training consistently exhibit high levels of job satisfaction and noticeable enhancements in their performance. When exploring the relationship between training and job satisfaction, White and Knight (2018) conducted a study to investigate whether training also leads to a higher level of job satisfaction or "happiness". Their results showed that enterprise training in general has a negative impact on job mobility, while job mobility is consistently associated with increased job satisfaction, and that job satisfaction is higher when the financial return of training is low, and vice versa. This suggests that the financial aspect of training plays a significant role in determining job satisfaction levels. Despite the existence of numerous studies on training and employee job satisfaction, as highlighted by Nauman et al. (2021), there are still many unanswered questions in this area. To address this gap, the researchers conducted a study on employees from civil society organizations in Pakistan as their sample. The findings of their study indicated that job training indirectly influences job satisfaction through emotional commitment and job performance. The training programs implemented by the organization enhance the commitment of employees to their jobs, leading to improved job performance and an elevated level of job satisfaction. In conclusion, job satisfaction is a multifaceted concept that encompasses various aspects of the work experience of an individual. Training plays a crucial role in enhancing job satisfaction, as it contributes to improved performance, quality, and emotional commitment. However, further research is needed to fully understand the complex relationship between training and job satisfaction and to address the remaining unanswered questions in this field.

(3) Employee turnover

Another issue that is closely related to training is the mobility of employees within an organization. The topics of training and turnover have always been of great interest in the field of human resource management, and they continue to perplex many enterprises, particularly small and medium-sized enterprises (SMEs) that have limited resources, as to

whether they should prioritize and allocate resources towards staff training (Beynon et al., 2015; Kotey & Folker, 2007).

On the one hand, many studies have pointed out that employee training can reduce the turnover intention of employees and improve the retention rate of employees.

For example, Newman et al. (2011) conducted a comprehensive survey involving 437 Chinese employees from five multinational enterprises operating in the service industry in China. The findings of their research aligned with the social exchange theory, emphasizing the value of training in fostering the emotional commitment of employees to the organization and diminishing their inclination to seek alternative employment opportunities.

Similarly, Kampkötter and Marggraf (2015) explored the effects of in-company training on absenteeism and turnover probability, employing the gift exchange framework. Their study revealed that employees tend to reciprocate company-sponsored training by exhibiting higher levels of effort and commitment, further supporting the notion that internal training serves as a vital tool for retaining newly hired employees.

Furthermore, Fletcher et al. (2018) employed the core emotional model of Russell to explain the process through which training perception and development influence employee retention. Their research demonstrated that employee training positively impacts the willingness of employees to remain with the organization by influencing psychological factors such as job satisfaction, employee engagement, and change-related anxiety.

Additionally, Zhao et al. (2018) validated the influence of various factors on turnover intention among employees in critical positions, such as research and development (R&D) staff in Internet companies, using the Price-Mueller turnover model. Their study revealed a significant negative correlation between employee training and turnover intention, further highlighting the importance of training in mitigating turnover risks.

However, it is worth noting that some studies have presented an alternative perspective, suggesting that employee training can inadvertently contribute to increased turnover rates by enhancing the working abilities of employees (Forrier & Sels, 2003; Haines et al., 2010).

In summary, while employee training has been widely recognized as a means to reduce turnover intention and enhance retention rates, it is important to consider the potential trade-off between improved working abilities and increased turnover. Nonetheless, the overall consensus supports the notion that investing in employee training is a valuable strategy for organizations, particularly in the context of addressing the challenges posed by employee mobility.

2.3 A review of turnover intention

2.3.1 Definition of turnover intention

The study of turnover in academic research has a long history, dating back to the early 20th century. Initially, economists were the pioneers in examining the macro factors that influence employee turnover. However, in the 1970s, industrial psychologists began delving into the micro elements that contribute to employee turnover. Over the years, numerous theories have emerged to explain the voluntary departure of employees from organizations. These theories include the organizational equilibrium theory (March & Simon, 1993), the met expectation model (L. W. Porter & Steers, 1973), the linkage model (Mobley et al., 1979), the turnover expansion model (T. W. Lee & Mitchell, 1994; T. W. Lee et al., 1999), and the job embeddedness theory of turnover (Mitchell & Lee 2001).

Throughout the research and development of turnover theory, various concepts related to turnover have been introduced to better understand and analyse the phenomenon. These concepts include turnover itself, which refers to the act of employees leaving an organization, turnover rate, which quantifies the frequency of turnover within a given period, turnover intention, which reflects the inclination of an employee to leave his or her current position, as well as active turnover, where employees actively seek new opportunities, and passive turnover, where employees passively disengage from their current roles. To ensure clarity and facilitate effective research, it is crucial to establish clear definitions and distinctions among these concepts. Therefore, in this study, the author will provide a comprehensive description and differentiation of these turnover-related terms.

Turnover, in the context of employment, refers to the process of terminating the organizational membership of an employee in an organization from which he or she receives material benefits (Huselid, 1995). This phenomenon can be further categorized into two types: voluntary turnover and passive turnover, which are determined by the underlying intentions behind the departure of employees. Voluntary turnover occurs when an employee makes a personal decision to leave the organization, driven by factors such as the pursuit of better career prospects, relocation for family reasons, health-related concerns, or other individual considerations. On the other hand, passive turnover refers to a situation where the organization initiates the departure of employees, often due to factors such as inadequate job performance, illness, violations of company policies or legal regulations, as well as organizational changes like strategic shifts, downsizing, or imminent bankruptcy.

It is important to note that voluntary turnover tends to incur higher costs for organizations. These costs can be explicit, such as expenses related to recruitment, training, and the loss of productivity resulting from turnover. Additionally, there are hidden costs, including decreased employee morale, a decline in corporate reputation, the loss of valuable human capital, and the potential exposure of trade secrets. Overseas researchers have estimated that the average cost of turnover for an employee can range from two to three times their annual income. When the voluntary turnover rate becomes excessively high, it can significantly impact the long-term survival and development of the organization. Consequently, employee turnover has become a subject of great interest and concern among scholars and researchers in the field. Since it is hard to predict turnover behaviour and distinguish active and passive turnover of employees in enterprise files, many studies on turnover have shifted their focus to the variable of turnover intention.

Intention refers to the attitude that an individual will adopt to deal with an event, indicating the purpose or plan in the mind of an individual. Turnover intention refers to the inclination or desire of an individual to leave his or her current organization and seek alternative employment opportunities. It is considered a crucial precursor to actual turnover behaviour, as it reflects the evaluation of the job satisfaction, organizational commitment, and perceived alternatives of an individual.

Mobley et al. (1979) have argued that turnover intention serves as a critical link between job dissatisfaction and the decision to actively search for and evaluate other job opportunities. Similarly, H. E. Miller et al. (1979) believed that turnover intention is the overall performance of the tendency of employees to leave the organization to find other job opportunities, that is, the process of evaluating and measuring turnover before making the real move. Steel and Ovalle (1984) pointed out that the most accurate predictor of turnover behaviour is turnover intention, which is the last stage in a chain of thoughts about wanting to leave working and attempting to shift employment. Moreover, Hom et al. (2012) have suggested that turnover intention plays a significant role in shaping actual turnover behaviour, accounting for a substantial portion of the variance observed in the decision of employees to leave their organization. Therefore, by examining turnover intention, researchers can gain valuable insights into the factors influencing employee turnover and develop effective strategies to mitigate turnover rates in organizations.

In existing research, the importance of turnover intention in comprehending and forecasting real turnover actions cannot be overstated. Numerous researchers have consistently discovered a robust correlation between turnover intention and subsequent

turnover behaviours. Price and Mueller (1981) held that it is more meaningful to replace actual turnover behaviour with turnover intention in study, because the external influencing factors of turnover behaviour are more complex, which makes the actual turnover behaviour more difficult to predict than turnover intention. According to the central tenet of the theory of reasoned action, which holds that "the behavioural intention of an individual can predict his or her behaviour" and based on the ideas that "behavioural tendency is a prerequisite for behaviour" in sociology and psychology, turnover intention can be used to foretell turnover behaviour in studies. Bluedorn (1982) further emphasized the direct and substantial relationship between turnover intention and turnover behaviour, providing support for the notion that individuals who express a desire to leave an organization are more likely to follow through with their intentions. In addition to these findings, Shore and Martin (1989) proposed that turnover intention can serve as a viable substitute for studying actual turnover behaviour, as it captures the underlying motivations and attitudes that drive individuals to contemplate leaving their current employment.

By examining turnover intention, researchers can gain valuable insights into the factors that contribute to turnover decisions and the potential actions that may follow. Overall, the extensive research conducted on turnover intention consistently highlights its significance in understanding and predicting actual turnover behaviour. It serves as a valuable tool for researchers to delve into the complex dynamics that influence the decisions of individuals to leave an organization, providing a deeper understanding of the underlying motivations and attitudes that drive turnover actions.

2.3.2 Influencing factors of employee turnover intention

In the field of organizational behaviour, turnover has been a subject of extensive research and has undergone significant development over the years. Numerous studies have highlighted that various factors play a crucial role in influencing the intention of employees to leave their current job (Mitchell & Lee, 2001; Mowday & Sutton, 1993; Osuji et al., 2014). These factors encompass a wide range of dimensions, including job-related factors, such as job characteristics, job stress, job satisfaction and organizational commitment (T. Zhang et al., 2021; Saleem et al., 2021). Additionally, individual related factors such as individual characteristics (gender, age, educational level) and human capital have also been identified as influential factors (Mvana & Louw, 2020; Roh et al., 2021; Ju & Li, 2019). Furthermore, perceptual factors such as perceived personal promotion, reward, career development and organization climate have been found to significantly impact the turnover intention of

employees (Mitchell et al., 2001; De Gieter & Hofmans, 2015; Satardien et al., 2019; Wadhera & Bano, 2020). Considering the multitude of factors involved, turnover emerges as a complex issue that requires comprehensive examination. In this chapter, the author will delve into a detailed discussion of these factors and their implications for turnover intention.

1. Research on job-related elements and employee turnover

Studies pointed out that job-related factors, such as job characteristics, job stress, job satisfaction and organizational commitment may be direct or indirect factors affecting employee turnover (Joseph et al., 2007; Ghasempour Ganji et al., 2021).

Most of the early research models are relatively simple, which directly verified the impact of job factors on the turnover intention of employees. For example, Moore (2000) pointed out that work fatigue has a significant direct impact on the turnover intention of employees in IT industry. P. C. B. Lee (2000) found that the influence of role ambiguity, role conflict and job incentive potential on the turnover intention of employees is regulated by job satisfaction. Factors such as workload cause work fatigue and work-family conflict, and the subsequent decline in job satisfaction is positively correlated with the intention to leave (Bakker et al., 2005).

As research has progressed and research models have become more sophisticated, studies have integrated multiple work-related variables to comprehensively examine the interactive, moderating, and mediating effects between these variables to provide a more comprehensive understanding of the factors influencing employee turnover intention. For example, Wan et al. (2018) conducted a questionnaire survey on nurses in Chinese hospitals. They found that working environment is positively correlated with higher work input and lower turnover intention, and work input plays a partial mediating role between work environment and turnover intention. Their study also showed that work characteristics are positively correlated with higher work input and lower turnover intention, and job engagement plays a full mediating role between work characteristics and turnover intention. Based on the mediating effect of job burnout and engagement on the relationship between job characteristics (job overload and social support) and turnover intention in the job demand-resource model, Gabel Shemueli et al. (2015) found that burnout completely mediates the relationship between job overload and turnover intention, while job engagement partly mediates the relationship between social support and turnover intention. Furthermore, Caillier (2021) focused on workplace aggressive behaviour. The results indicated that workplace aggression can reduce the satisfaction of work stress and work meaning, and workplace aggression increases turnover intention. The findings of this study filled a research void on workplace aggressive

behaviour in existing turnover models. Additionally, the research of Modaresnezhad et al. (2021) demonstrated the relationship between work restriction, work-family conflict, negative team orientation, anxiety, job satisfaction, and turnover intention. Their findings indicated that work restriction, work-family conflict, and negative team orientation lead to anxiety, which in turn reduces job satisfaction and ultimately increases turnover intention. However, supervisor support was found to weaken the relationship between job dissatisfaction and turnover intention. Overall, these studies highlight the complex nature of employee turnover and emphasize the importance of considering various job-related factors and their interplay in understanding and addressing turnover intention.

In terms of job-related factors and employee turnover, Chinese scholars have also carried out a lot of research. X. Li et al. (2018) focused on knowledge-skilled employees at the beginning of their careers in the manufacturing industry. Their findings revealed that job satisfaction among early-career employees has a significant negative predictive effect on turnover intention, indicating that when employees are satisfied with their job, they are less likely to consider leaving the organization. Additionally, the study found a significant positive predictive effect of job satisfaction on emotional commitment, normative commitment, and continuous commitment. This suggests that when employees are satisfied with their job, they are more likely to develop emotional attachment to the organization, adhere to its norms and values, and maintain a long-term commitment to their role. Furthermore, the study found that emotional commitment had a significant negative impact on turnover intention. This implies that when employees feel emotionally connected to their work and organization, they are less likely to have the intention to leave. However, the study did not find a significant impact of normative commitment and continuous commitment on turnover intention, suggesting that these forms of commitment may not directly influence the decision of employees to stay or leave.

Besides, the study also revealed that emotional commitment completely mediates the relationship between job satisfaction and turnover intention. This means that the impact of job satisfaction on turnover intention is fully explained by its effect on emotional commitment. When employees are satisfied with their job, they are more likely to develop emotional attachment to the organization, which in turn reduces their intention to leave. Based on the job demands-resources theory, Y. Li and Cai (2021) explored the factors influencing the turnover intention of the new generation of employees based on the job demands-resources theory. The results showed that job resources, such as support from supervisors, opportunities for growth, and work-life balance, had a negative effect on the turnover intention of the new generation of

employees. This suggests that when employees perceive that they have sufficient resources to perform their job effectively and maintain a healthy work-life balance, they are less likely to consider leaving the organization. However, the study found that quality-demanding work did not play a complete mediating role between job resources and turnover intention. This means that although job resources have a direct impact on reducing turnover intention, the effect is not fully explained by the demands of high-quality work. Instead, the study revealed that job resources reduce the turnover intention of the new generation of employees by reducing the sense of insecurity brought by quality-demanding work. This implies that when employees have access to resources that alleviate the stress and pressure associated with demanding work, they are more likely to stay with the organization. Based on the theory of social identity and the theory of social exchange, Xu et al. (2018) introduced the variable of job embeddedness to investigate its influence on the relationship between the ethical atmosphere of organization and turnover intention. Their research demonstrated that rule-oriented ethical climate and care-oriented ethical atmosphere have a significant negative impact on turnover intention whereas self-interest-oriented ethical atmosphere has a significant positive impact on turnover intention. They also found that job embeddedness plays an intermediary role between the two.

2. Studies on the relationship between personal characteristics and turnover

Compared with job characteristics, many scholars have pointed out that personal characteristics play a crucial role in understanding the factors that contribute to employee turnover. Scholars have also emphasized that while job characteristics directly impact turnover, personal characteristics indirectly influence employee turnover (Gallivan, 2004; Thoresen et al., 2003; Al-Hussami et al., 2014). As a result, numerous studies have utilized personal characteristics as control variables or grouping variables to investigate the various factors that influence employee turnover. Personal characteristics encompass a wide range of factors, including demographic characteristics, human capital, and motivation. Demographic characteristics such as age, gender, and region have been extensively studied in relation to turnover intention.

First, in terms of demographic characteristics, Tubay (2020) studied the internal and external job satisfaction and the impact of various demographic factors on employee turnover intention. The results showed that continuous commitment and job level have a significant positive impact on turnover intention. External job satisfaction, emotional commitment and gender have a significant negative impact on turnover intention. Ajayi and Olatunji (2019) analysed 925 questionnaires of teachers in senior high schools in Nigeria. They found that there is a significant correlation between the turnover intention of teachers and the age,

seniority, working status and experience of teachers. Similarly, Chinese scholars Gao and Zhao (2014) studied the work-family conflicts of the new generation of knowledge workers based on the differences in population characteristics. It was found that there are significant gender and seniority differences in the work-family conflicts of the new generation of knowledge workers. However, there is no significant difference in position hierarchy.

Second, according to the theory of human capital (G. S. Becker, 1994), education and experience of employees make them more valuable in the market, so it is more likely for them to resign. Relevant studies also point out that educational level (Trevor, 2001) and organizational tenure (Josefek Jr & Kauffman, 2003) of employees should be positively correlated with the possibility of job hopping, because these attributes reflect the ability of employees, and as a result, their salary should be improved. In recent years, relevant research has further verified the positive relationship between human capital and turnover intention. For example, the study of Wei (2015) points out how high-performance human resource practice and person-organization fit (P-O fit) affect general human capital and turnover intention. It was found that general human capital can actively predict turnover intention, and high-performance human resource practice is positively related to general human capital and weakens the relationship between general human capital and turnover intention. The study by Ju and Li (2019) shows that there is a significant negative relationship between job tenure and turnover intention.

Finally, in terms of motivation, it is a personal attribute which affects job orientation, intensity, and persistence (Kanfer, 1990). The study found that motivation affects turnover intention by influencing the willingness of employees to get promoted or work easily. For example, a study found that negative emotions are negatively correlated with individual job satisfaction and organizational commitment (Thoresen et al., 2003). Individuals who prioritize their careers and aspire for advancement are more likely to achieve greater career success (Ertas, 2015), which, in turn, increases the likelihood of resigning.

3. Perceived factors and employee turnover

With the advancement of turnover research, a large number of scholars have incorporated psychological research theories and concepts into turnover research and studied turnover from the perspective of employee perception. Related studies showed that the perception of employees is the key factor that affects the turnover intention of employees. Be it a variety of human resource training and development measures adopted by organizations, or external factors such as organizational scope, organizational culture and leadership support, they can only exert an influence through the perception of employees (Mitchell et al., 2001). These

perception-related factors encompass aspects such as rewards, career development opportunities, organizational atmosphere, organizational identity, and job support. To provide a comprehensive understanding, this review will examine the existing literature pertaining to these specific areas.

First, it is important to conduct a comprehensive review of studies that focus on various factors such as perceived income, fairness, promotion, and other relevant aspects. Within organizational settings, employees are primarily exposed to and directly influenced by certain structural elements related to promotion, such as the promotion and rating system, as well as the distribution of awards, including the fairness of awards, organization-based recognition, and salary considerations. Undoubtedly, the fairness of these rewards and the overall salary package have a direct impact on the job satisfaction of employees and their intention to leave the organization (De Gieter & Hofmans, 2015). Additionally, the perception of the promotion opportunities of employees and the fairness of the promotion process itself play a similar role in influencing the turnover intention of employees (Dasanayake & Dharmasiri, 2020; L. Zhang et al., 2020). The research conducted by De Gieter and Hofmans (2015) studied the influence of reward satisfaction on the behaviour and attitude of each employee and assumed that there were individual differences in the influence of financial, material and psychological rewards (satisfaction) on turnover intention and task performance. The results of their study put forward a unique model of relationships between satisfaction with financial, material, and psychological rewards and turnover intention. On the other hand, the study of Dasanayake and Dharmasiri (2020) attempts to explain how management can control employee turnover by attracting the attention of the organization to perceived fairness in establishing the quality relationship between employees and organizations.

Second, there are also studies on working environment-related factors such as the work support and authorization perceived by employees. Employees in modern times often encounter a variety of organizational pressures, such as work-family conflict, work stress and role conflict. Relevant research shows that when employees feel a good organizational atmosphere, such as organizational support and inclusive organizational environment, their turnover intention will be significantly reduced (Satardien et al., 2019; Davies et al., 2019; H. Wang et al., 2020).

For example, Wadhera and Bano (2020) tested the relationship between perceived organizational support, workplace spirit and job engagement and turnover intention. The results showed that there is a significant negative correlation between job commitment and turnover intention. However, there is no causal relationship between perceived organizational

support and workplace spirit and turnover intention. Srivastava and Agrawal (2020) studied the turnover intention of employees during the period of resistance to change. Resistance to change is an antecedent variable of turnover intention. Turnover intention often represents the future voluntary turnover of employees. The relationship between resistance to change and turnover intention can be explained by burnout, but perceived organizational support can weaken the resistance tendency of employees and reduce turnover intention. Davies et al. (2019) studied the effect of job flexibility on the compressive ability of employees in domestic environment. The results showed that job adjustment flexibility has an impact on turnover intention, and this adjustment is regulated by perceived organizational inclusiveness. T. Yang (2015) also found that community embeddedness has a significant positive regulatory effect between organizational embeddedness and turnover intention, and perceived organizational support has a significant negative regulatory effect between community embeddedness and turnover intention.

Finally, there are several perceived factors that play a significant role in influencing the turnover intention of employees. These factors include perceived employability, perceived value, perceived organizational link, fit, and sacrifice. The impact of these perceived factors is evident in the reduced desire of employees to resign from their current positions. This reduced desire can be attributed to the benefits and advantages that employees enjoy as a result of their association with the organization. Additionally, their mobility is limited due to the increased attachment they feel towards their current job (Mitchell et al., 2001). In a study conducted by Martin et al. (2021), the researchers explored the relationship between age, perceived external employability, and turnover intention. They also examined the regulatory role of human resource practices in this context. The findings revealed that the retention effect of motivational human resource practices is more pronounced among young and middle-aged employees compared to older employees, and the retention effect of human resource practices that enhance flexibility is greater among middle-aged and elderly employees compared to younger employees. These findings highlight the importance of tailoring human resource practices to different age groups to effectively address turnover intention and enhance employee retention.

4. Other factors

As we mentioned earlier, research on turnover is complex and diverse. In addition to the factors that affect employee turnover, there are some other variables that will have an impact on employee turnover intention, such as corporate leadership and employee career identity. A study conducted by Badrinarayanan et al. (2021) focused on turnover among salespeople and

found that leadership value plays a significant role in reducing turnover intention. This reduction can occur either directly or indirectly through the personal identification and trust that salespeople have in their managers. Furthermore, the study revealed that the level of gratitude felt by salespeople moderates the relationship between leadership value and turnover intention, as well as the level of identification with managers. Another study by Liaqat et al. (2021) examined workplace bullying in the medical industry and discovered a significant correlation between workplace bullying and the intention of nurses to leave their jobs. The findings suggest that the experience of bullying in the workplace can greatly influence the decision of nurses to seek alternative employment opportunities.

Additionally, through a questionnaire survey of 760 grass-roots civil servants, Z. Li et al. (2020) explored the relationship between professional identity and turnover intention. The study identified three dimensions of professional identity among grass-roots civil servants, namely professional behaviour input, career development identity, and professional value identity. The results indicated that a strong professional identity positively predicts job performance and negatively predicts turnover intention among grass-roots civil servants. Overall, these studies highlight the importance of considering variables such as leadership value, workplace bullying, and professional identity when examining the intention of employees to leave their current jobs. These factors can significantly impact the decision-making processes of employees and ultimately influence their turnover intentions.

2.3.3 Training and employee turnover

In the rapidly evolving technological era, the importance of human resources for organizations to thrive in the global market cannot be overstated. The positive impact of training on the development of human resources within enterprises has long been acknowledged, garnering significant attention from scholars (Nguyen & Duong, 2020).

Some scholars have posited that there exists a relationship between employee turnover and training, which can be understood from two perspectives. The first explanation suggests that organizations with high turnover rates tend to invest more in training as a means to compensate for the skills and abilities lost due to employee resignations (replacement investment) and to enhance future employee loyalty (retention management). According to an early study of Ahmad and Bakar (2003), there is a significant positive relationship between training and staying in the organization. The result of a similar study conducted by Benson (2006) also showed that training has a significant positive impact on the retention rate of young employees. Enterprises that heavily invest in training and development often possess

the capability to retain their employees effectively. The second explanation proposes that the provision of various training opportunities by enterprises may actually contribute to a higher turnover rate. This is because trained employees are more likely to seek higher-paying jobs elsewhere, where they can utilize the skills they have acquired. Training enhances the value of employees, thereby increasing their attractiveness to competitive organizations. Glen (2007) believed that providing job opportunities to employees with adept skills and great potential through formal education and educational opportunities will enable them to obtain career opportunities based on their previous experience. This view is essentially consistent with that of G. S. Becker (1994) on general training. The later believed that general training improves the future productivity of workers when working for other employers, and employers who provide a complete set of general trainings will not be able to obtain any future returns.

To sum up, for a long time, scholars have been unable to reach an agreement on the relationship between training and turnover. Explanations based on different theoretical perspectives and differences in empirical research data from different regions may be the core reasons for the differences in research results. Therefore, when conducting research on training and resignation, it is necessary to refine the research issues and clarify the specific objects and problems of the research to obtain more universal conclusions.

2.4 A review of job embeddedness theory

2.4.1 The origin and connotation of job embeddedness theory

1. The origin of job embeddedness theory

Since the 20th century, the topic of employee demission has been extensively discussed in academic circles, with numerous scholars dedicating their research efforts to understanding the factors that contribute to employee turnover. These scholars aimed to address crucial questions surrounding employee turnover, such as “what factors make employees leave” and “what factors make employees stay”. Throughout this research phase, several influential employee turnover models emerged, each shedding light on the various factors that influence this phenomenon. Notable models include the organizational balance model proposed by March and Simon (1994), the employee turnover model proposed by Price and Mueller (1981), the turnover model proposed by Mowday (1981) and the “expansion” model proposed by T. W. Lee and Mitchell (1994). These models effectively highlighted the impact of numerous factors on employee turnover, encompassing employee values, attitudes, job

satisfaction, and organizational commitment. Consequently, they demonstrated that employee turnover is influenced by a multitude of factors, encompassing individual factors, environmental factors, structural factors, and more (Liang et al., 2016; Coetzer et al., 2019 ; Martdianty et al., 2020).

Given that individuals may be bound by various factors from organizations and communities, which will "embed" them into their job, Mitchell et al. (2001) proposed the concept of job embeddedness based on these studies. Job embeddedness is defined as "various forces that prevent individuals from leaving their jobs". This concept comprehensively examines both internal and external factors that contribute to employee retention, providing a holistic perspective on the reasons why employees choose to stay in their jobs. According to the job embeddedness theory, elements related to organizations and communities significantly impact employee retention. These factors create a sense of being deeply embedded in their current positions, resulting in a sense of dependency. Even in situations where employees may experience job dissatisfaction or encounter enticing new career opportunities, the strong sense of embeddedness and dependence often leads them to opt for staying with their current employer (Mitchell et al., 2001; X. Yao et al., 2004).

The job embeddedness theory addresses the limitations of traditional turnover theories by offering a fresh perspective on the question of "why do employees quit?" by placing emphasis on the factors that encourage employees to remain in their jobs rather than focusing solely on the reasons for leaving. Job embeddedness encompasses various factors related to organizational embeddedness and community embeddedness, which play a crucial role in influencing the decisions of employees to either continue their tenure within the organization or seek opportunities elsewhere. As a result, job embeddedness has emerged as one of the significant theoretical frameworks for explaining employee retention and turnover (Coetzer et al., 2019).

2. The connotation of job embeddedness

Traditional studies on turnover primarily focus on examining the impact of job-related factors on employee turnover. These studies often use the subjective attitudes of employees, such as job satisfaction and organizational commitment, as mediating variables to explain why employees leave their jobs. However, this research paradigm overlooks the influence of non-job-related factors and fails to provide sufficient explanations for why employees choose to stay in their positions. Furthermore, the research on job-related factors has reached a relatively mature stage, leaving limited room for further exploration. Recognizing the significance of non-job-related factors, an increasing number of scholars have recently shifted

their attention to studying these factors in relation to turnover (Price, 2001; Kristof, 1996; Hom & Kinicki, 2001).

In response to the limitations of traditional turnover studies, Mitchell et al. (2001) took a new perspective to understand employee turnover behaviour based on the influencing factors of employee retention, and proposed the construct of job embeddedness—a broader set of factors that influence employee retention. To illustrate the concept of job embeddedness, Mitchell et al. (2001) drew an analogy to the use of "embedded images" in psychological tests. In these tests, individuals are asked to identify a simple image hidden within a complex image, which serves as a measure of their independence and dependence. Similarly, job embeddedness can be understood as a network that binds individuals to their jobs. The more individuals are connected and involved within this network, the more likely they are to stay in their current positions and the less likely they are to leave.

Job embeddedness examines the potential factors that affect the turnover intention of employees from a broader perspective, providing a more comprehensive understanding of employee retention. This model not only includes some organizational and individual factors that influence employee turnover but also takes into account the impact of unexpected events or "emergency events" on turnover. Mitchell et al. (2001) believed that when individuals are dependent on the organization, even if they have the intention to leave the organization when certain unanticipated events happen, this attachment link may prevent them from doing so. Therefore, individuals with a high level of job embeddedness will choose to stay in the organization even when the work environment is dissatisfied. At the same time, job embeddedness covers the multiple attachment relationships of individuals. As Mitchell et al. (2001) argued: "job embeddedness points out that employees and their families are interconnected in social, psychological and economic networks, including their friends, related groups, communities and the material environment in which they live". This broader perspective recognizes that the decisions of employees to stay or leave are influenced not only by their individual experiences within the organization but also by the broader social and environmental factors that shape their lives. In essence, job embeddedness seeks to uncover the various forces that drive employees to remain in their current jobs, even in the face of potential dissatisfaction or alternative career opportunities. By considering the complex web of relationships and dependencies that individuals have, job embeddedness provides a more nuanced and comprehensive explanation for employee retention.

3. The dimensions of job embeddedness

Job embeddedness (JE) is a comprehensive construct that encompasses various factors

influencing employee retention, including psychological, social, and financial aspects (Mitchell et al., 2001; X. Yao et al., 2004). These effects exist at work as well as outside the immediate work environment of employee and are often compared as a "net" or a rope in a "net" where one may "get stuck" (Mitchell et al., 2001). The more connections an individual has within this net, the more entrenched they become and the more difficult it becomes for them to leave their current job. The concept of job embeddedness consists of three dimensions, namely link, fit, and sacrifice. Each dimension is further divided into two sub-dimensions, namely organization and community, depending on whether the impact is primarily experienced within the workplace or extends to the external social and community networks of the individual (see Figure B.2).

First, the concept of link in the context of job embeddedness refers to the degree of interconnectedness and interdependence between an individual and others within an organization or community. It encompasses both formal and informal connections that exist between individuals, institutions, or other entities (T. W. Lee et al., 2004; Mitchell et al., 2001).

According to the theory of job embeddedness, there are numerous links that bind an employee and their family together in a comprehensive network that encompasses social, psychological, and financial aspects. These links include relationships with colleagues, non-work friends, various groups, and the broader community in which the employee resides. Within the organizational context, links can be formed through colleague groups within work teams, establishing a connection between employees and the organization. Similarly, links to entities within the community, such as relatives, friends, and social groups, contribute to the connection between employees and their community. Besides, Mitchell et al. (2001) argued that marriage and having children also contribute to the formation of community links. When the spouse of an employee works within the same community and their children attend local schools, it further strengthens their embeddedness in the community. The significance of these links increases with their number, as a greater number of connections between individuals and networks implies a higher level of importance placed on these relationships. Consequently, the more links an employee has, the stronger their connection to their job, supervisors, and other entities within the organization, such as teams. These "identifiable relationships" play a crucial role in deeply embedding employees within both the organization and the community (T. W. Lee et al., 2004; Mitchell et al., 2001). The multitude of links formed through various connections and networks contributes to the overall sense of belonging and attachment that individuals experience, ultimately influencing their level of engagement and commitment to

their job and the broader community.

Mary empirical studies have shown that links within and outside the organization, such as work partners, colleagues, family, relatives, and friends, can enhance the sense of attachment of employees and promote them to stay at work. Price and Mueller (1981) found that a pleasant environment and satisfaction with colleagues will reduce employee turnover. Mossholder et al. (2005) took 215 employees in a regional medical centre as samples and collected data on job satisfaction, turnover, the number of individual links in the organization and so forth. The results showed that the number of links presented a significant negative correlation with turnover, and the significance of such correlation is higher than that of job satisfaction. Zainal Abidin and Azhar (2016) investigated the relationship between salary, job security and employee retention, and found that there is an inevitable relationship between salary, job security and employee retention: working environment regulates the relationship between salary and employee retention and the relationship between job security and employee retention. Tian et al. (2020) found that transformational leadership plays a positive role in employee retention and team communication actively adjusts the relationship between transformational leadership and employee retention, indicating that leaders of SMEs should put these qualities into practice. These qualities include developing a compelling vision for employees, focusing on goals, possessing problem-solving skills, having a sense of purpose, and improving employee retention by enhancing their links with the organization. Similarly, studies have pointed out that non-organizational links such as the increase of age, marriage, children, hobbies and recreational activities can raise the organizational commitment of employees and promote employee retention (Cohen, 1995; Gentry et al., 2007; Adeoye & Hope, 2020). According to the research of Adeoye and Hope (2020), there is a correlation between organizational culture and employee retention, and there is also a substantial correlation between organizational values and employee loyalty.

Many empirical studies have consistently demonstrated that the presence of strong connections both within and outside the organization, including relationships with work partners, colleagues, family members, relatives, and friends, can significantly enhance the sense of attachment of employees and contribute to their willingness to remain in their current positions. For instance, Price and Mueller (1981) conducted a study that revealed how a pleasant work environment and satisfaction with colleagues can effectively reduce employee turnover rates. Similarly, Mossholder et al. (2005) conducted research on a sample of 215 employees in a regional medical centre, collecting data on various factors such as job satisfaction, turnover, and the number of individual links within the organization. Their

findings indicated a significant negative correlation between the number of links and turnover, with the strength of this correlation surpassing that of job satisfaction. Furthermore, Zainal Abidin and Azhar (2016) investigated the relationship between salary, job security and employee retention, and found that there is an inevitable relationship between salary, job security and employee retention: working environment regulates the relationship between salary and employee retention and the relationship between job security and employee retention. In line with these findings, Tian et al. (2020) found that transformational leadership has a positive impact on employee retention, and effective team communication actively moderates the relationship between transformational leadership and employee retention. This suggests that leaders in SMEs should prioritize the development of qualities such as articulating a compelling vision for employees, setting clear goals, possessing strong problem-solving skills, and fostering a sense of purpose, as these attributes can enhance employee retention by strengthening their links with the organization. Similarly, studies have also highlighted the significance of non-organizational links in promoting employee commitment and retention. Factors such as age, marriage, having children, and engaging in hobbies and recreational activities have been found to positively influence the dedication of employees to the organization (Cohen, 1995; Gentry et al., 2007; Adeoye & Hope, 2020). Adeoye and Hope (2020) specifically investigated the correlation between organizational culture and employee retention, as well as the substantial relationship between organizational values and employee loyalty.

Second, fit between individuals and organizations is a crucial factor in determining employee retention. It refers to the perceived compatibility of employees with both the organization and the surrounding communities (T. W. Lee et al., 2004； Mitchell et al., 2001).

On the one hand, when the personal values, career aspirations, knowledge, skills and abilities of employees are in line with the culture of the organization and the job requirements of the employees, there will be a good person-organization fit. This dimension reflects the degree of matching of personal interests and values perceived by employees with organizations and communities, as well as the compatibility of individuals with organizations and communities (C. Yang et al., 2010). The key to the fit between individuals and organizations lies in the consistency of individual and organizational values, that is, the matching of the personal values, work goals and future career planning of employees with organizational environment and work content (Cable & Judge, 1996; Chatman, 1989). The choice of job and the socialization process of employees are influenced by their perception of fit, which, in turn, impacts their likelihood of turnover. On the other hand, individuals also

consider their adaptation to various aspects of the community and the surrounding environment when assessing fit. Factors such as climate, weather conditions, religious beliefs, and recreational activities play a role in determining the extent to which individuals feel compatible with their surroundings (Mitchell et al., 2001). According to the job embeddedness theory, the level of cooperation and integration with both the organization and the surrounding community directly influences the strength of the connection of an employee to the organization. Employees who exhibit a better fit with the organization are less likely to leave, as are those who feel a strong alignment with the community and the surrounding environment (T. W. Lee et al., 2004; Mitchell et al., 2001).

The relationship between person-organization fit and employee turnover has recently been a hot topic in the study of turnover, and many scholars have explored it from their own perspectives (O'Reilly III et al., 1991; D. Chan, 1996; Hoffman & Woehr, 2006; Presbitero et al., 2015; Yusliza et al., 2021). O'Reilly et al. (1991) found that employees with a high person-organization fit can delay their leaving for 20 months, indicating the significant impact of fit on turnover. Presbitero et al. (2015) further investigated the role of fit in employee retention and discovered that the fit between employees and organizational values actively and partially adjusts the impact of human resource management practices on employee retention. This highlights the importance of improving the compatibility between employee and organizational values for enhancing employee retention. Yusliza et al. (2021) studied the supportive working environment, the fit between people and organizations and the retention rate of employees among academic staff in a public university in Malaysia. The study found that there is a direct and positive relationship between supportive working environment and academic staff retention, with person-organization fit playing a mediating role. In addition, individual-community fit also has an impact on turnover. Shaffer and Harrison (1998) examined the moderating effect of migration and found that non-job-related factors, such as community satisfaction and housing satisfaction, are related to turnover cognition. This implies that the satisfaction of employees with the community and their overall sense of belonging can influence their decision to stay or leave an organization. Additionally, McCole et al. (2012) conducted a study on summer camp staff and discovered a strong correlation between the sense of community of individuals within their workplace and yearly retention rates. This suggests that when employees feel a sense of connection and belonging to their surrounding community, they are more likely to remain in their current job.

Third, the concept of sacrifice in relation to employee turnover encompasses various aspects, including psychological, social, and material costs associated with leaving both the

organization and the community (T. W. Lee et al., 2004; Mitchell et al., 2001).

Employee turnover can result in losses related to the organization, including giving up non- economic benefits such as familiar colleagues, a familiar work environment, and the additional time investment required to adapt to a new position and organization，as well as economic benefits such as stock options, retirement compensation plans, and the additional costs of social integration into a new team. Employee turnover can also cause employees to relocate which leads to losses related to the community, such as giving up harmonious neighbourhood relationships, convenient service facilities, and enjoyable leisure activities. Even if not relocating, it may still mean changes in commuting, adjustments to schedules, and disruptions to family routines. All of these factors require employees to weigh the benefits gained from transitioning to a new job against the losses incurred. For familiar things，losses are often more apparent while the perception of gains is often more ambiguous. With a grasp on the psychological drive of what has already been obtained, the likelihood of employees staying with the organization increases. The job embeddedness theory suggests that the greater the perceived losses from leaving, the stronger the intention to stay, and the lower the inclination to leave.

There has also been extensive research conducted by scholars on the topic of sacrifice in relation to employee turnover. Community-related sacrifices, such as the sense of being loved, respected, and secure within the community, have been found to be negatively correlated with turnover (T. W. Lee et al., 2004). Using research data from the Indian aviation industry, Uniyal et al. (2018) re-examined the impact of job embeddedness on the turnover intention of employees, and pointed out that there is a negative correlation between sacrifice and turnover.

2.4.2 Measurement of job embeddedness

At present, job embeddedness measurement tools mainly involve two types of scales: composite scale and global scale. The composite scale regards the construct of job embeddedness as the sum of all of its components and measures various dimensions and the entire construct with specific constituent indicators covering the scope of the construct. This scale developed by Mitchell et al. (2001) is to realize the measurement of job embeddedness from the indicator level, that is, the dimensions are obtained from the combination of indicators, and then the construct is obtained from the combination of dimensions. The global scale advocates measuring the overall dependence of an individual on the job by reflecting the general evaluation indicators of job embeddedness. The global scale developed by Crossley et

al. (2007) is a direct measurement of job embeddedness from the construct level.

1. Global Scale

The global scale was developed by Crossley in 2007, which consists of seven items, namely, “I feel dependent on my work”, “It is difficult for me to make a decision to leave the organization”, “I care too much about my job to leave”, “I am tired of my organization”, “I really cannot leave my current organization rashly”, “It is easy for me to leave my current organization” and “I feel closely connected to the current organization” (Crossley et al., 2007). These indicators are generally evaluated and measured at the overall level of job embeddedness, using a 5-point Likert scale (“strongly disagree” to “strongly agree”).

Crossley et al. (2011) believed that the global scale they developed offers two theoretical advantages. First, it allows participants to include information based on their own judgment, since its items assess general dependence on the organization rather than specific aspects. In contrast, composite scale may ignore aspects that may be important to individuals or include unrelated aspects. Second, it can capture the unique weight that individuals may place in different aspects when forming a summary perception. For example, some interviewees may think that community factors are more important than work-related factors when developing concepts of embeddedness. In this case, when using the global scale, the individual can report his or her sense of embeddedness by mainly assessing community factors. Crossley and his colleagues discovered that, even after controlling for composite scales and organizational attitudes, the global scale is able to predict changes in exit intention, search intention, and turnover intention (Crossley et al., 2007; Crossley et al., 2011).

However, it is important to note that the global scale developed by Crossley et al. (2011) does have a significant limitation. This limitation lies in the fact that the overall measurement does not adequately reflect the out-of-duty factors that are considered to be a core part of the work theory. In their study, Crossley et al. (2011) elaborated in a statement that community embeddedness is included in the global scale, because job embeddedness is taken as a whole to question the subjects. For example, the subjects will be reminded before project evaluation: after taking into account work relationships (such as relationship, job fit and welfare) and non-work relationships (such as neighbours, hobbies and community activities), please evaluate the following items. However, despite this attempt to incorporate various dimensions of job embeddedness, the global scale can only provide an overall measure of job embeddedness and fails to reveal the specific relationships between different dimensions of job embeddedness (such as community embeddedness and community sacrifice) and outcome variables. This limitation contradicts the theoretical structure and essence of the concept of

job embeddedness.

2. Composite scale

The indicators of the composite scale, proposed by Mitchell in 2001, have been widely used in the study of job embeddedness. Mitchell et al. (2001) defined job embeddedness as a combined multidimensional construct and developed a combined scale containing 40 items. The measurement of job embeddedness in the scale consists of six dimensions, and each dimension is composed of several items (constituent indicators). The complexity of these items necessitates a detailed discussion in this section. It is important to note that the correlation between indicators in the composite scale can vary, with some indicators showing positive correlations, others showing negative correlations, and some even having no correlation at all. This poses a challenge when selecting indicators based solely on the correlation matrix, as it may result in the exclusion of potentially effective measurement indicators. Consequently, the traditional measure of internal consistency coefficient is not applicable to the composite scale (Bollen & Lennox, 1991).

The composite scale, with its inclusion of non-attitude and non-job-related factors, offers a more comprehensive and nuanced understanding of job embeddedness compared to the global scale. According to Mitchell et al. (2001), the job embeddedness structure places significant emphasis on non-attitude characteristics, as evident in the link configuration dimension. This dimension comprises items that assess objective aspects such as the quantity of colleagues one interacts with on a regular basis. While adaptation and sacrifice dimensions capture the perceptions of individuals, the composite scale delves deeper into specific cognitive content. For instance, it considers the cognitive fit between the human capital of an employee and his or her job, even if he or she may not feel emotionally connected to the organization (“my job makes a good use of my skills and talents”). However, it is important to note that the relationship between the indicators of the composite scale and the latent variable can be influenced by the outcome variable, leading to low stability and limited external consistency across different samples. This lack of comparability between the same variables in different studies hinders the accumulation of knowledge in the field (Diamantopoulos, 2006; Bagozzi, 2007; Wilcox et al., 2008).

Nevertheless, when comparing the two scales, it is often difficult to determine which one is better because they both have obvious advantages and disadvantages. The benefits of the composite scale include its theoretical richness, which allows for a comprehensive understanding of job embeddedness. However, as mentioned earlier and will be discussed in more detail below, the composite scale needs improvement in two areas: first, it should meet

the requirements of formative measurement models, and second, it needs to be tested for effectiveness in different research environments. On the other hand, the global scale offers statistical advantages as it is based on the reflection measurement model. This model provides a reliable and efficient way to measure job embeddedness. Additionally, the compactness of the global scale is advantageous when there are limitations on survey length, as it allows for simplicity and ease of administration. However, the global scale does not emphasize the non-attitude and non-job-related (off-the-job) factors as much as the composite scale does.

Therefore, the choice between the composite scale and the global scale may depend on the specific goals of a given study. If the study aims to explore the relationship between job embeddedness and various outcome variables, then the composite scale may be a suitable choice as it focuses on the predictive power of job embeddedness. On the other hand, if the study aims to test a model using latent constructs, such as in the case of structural equation modelling (SEM), then the global scale would be a more appropriate choice. Ultimately, the decision should be based on the specific research objectives and the measurement needs of the study.

2.4.3 The mechanism of the action of job embeddedness

1. Antecedent variables of job embeddedness

The first systematic study on the antecedent variables of job embeddedness was carried out by Giosan (2004) in terms of empirical research on the subject. He empirically drew the following conclusions: age and number of children predict community fit, perception of marital opportunity in community predicts community fit and community loss, age predicts organizational fit, and conscientiousness of the big five personality traits, job investment, organizational support, perception of choice opportunity and perception of promotion opportunities in the organization strongly predict organizational fit. After that, Holtom and Inderrieden (2006) analysed the practical activities adopted by Fortune 100 enterprises in the United States across the six dimensions of job embeddedness, which lays a foundation for exploring the antecedent model of job embeddedness.

Inspired by the career development theory of Super, Ng and Feldman (2007) linked career stage with job embeddedness, and analysed the influencing factors of job embeddedness. They believed that the influencing factors of job embeddedness vary in different career development stages. Later, Burton et al. (2010) integrated job embeddedness into the unfolding model of voluntary turnover and proposed that “shock” is a variable that links the unfolding model with job embeddedness. The results showed that there is a negative

correlation between job embeddedness and voluntary turnover. The job embeddedness of individuals who have resigned after experiencing “shock” is higher than that of individuals who have not experienced “shock”. Khalid et al., (2021) evaluated how transformational leaders improve the sense of job embeddedness of employees. The results supported that transformational leaders have a significant impact on shaping job embeddedness and that job characteristics play a moderating role in describing the relationship between transformational leadership and job embeddedness.

2. Moderating and mediating effects of job embeddedness

Some studies have pointed out that the impact of job embeddedness on employee behaviour is mostly indirect (Y. Li & Liu, 2009). Many studies try to introduce the impact of job embeddedness into the existing “human resource management measures-turnover relationship model” and “employee attitude-employee performance model”, and use job embeddedness as an intermediary variable or mediating variable to open the black box of related research (Allen et al., 2016; Fasbender et al., 2019; Elsaied, 2020; Dechawatanapaisal, 2018; Y. Wang & Lu, 2018).

First, in terms of research that uses job embeddedness as a moderating variable, T. W. Lee et al. (2004) conducted a study that revealed the moderating effect of on-the-job embeddedness on the relationship between “citizenship behaviour-active absence”, “active absence-turnover”, and “performance-turnover”. Additionally, they found that both on-the-job embeddedness and off-the-job embeddedness play a moderating role in the relationship between “citizenship behaviour-turnover”. Building on this research, Chetty et al. (2016) explored the moderating role of job embeddedness in the context of work stressors and cognitive acceptance of change. However, it is important to note that recent studies have shed light on the potential “double-edged sword” effect of job embeddedness. For instance, Allen et al. (2016) have found that when workers are in an unpleasant workplace, job embeddedness makes it difficult for them to leave unpleasant circumstances. Similarly, Peltokorpi (2022) investigated the moderating effect of job embeddedness on the relationship between work-family conflict and various outcomes such as voluntary turnover, emotional exhaustion, guilt, and hostility. The findings of this study indicated the existence of a moderating effect of job embeddedness, which may not always be positive. While individuals with a high level of on-the-job embeddedness exhibited a lower voluntary turnover rate, they also experienced higher levels of emotional fatigue, guilt, and hostility.

Second, research has also explored the role of job embeddedness as a mediating variable in various contexts. For instance, Dechawatanapaisal (2018) found that the association

between a fulfilling work and career satisfaction is partially mediated by job embeddedness. This indicates that the job embeddedness of an individual is a major factor in improving their job happiness and career fulfilment. Additionally, Allen (2006) conducted a study that revealed the mediating role of on-the-job embeddedness between social strategies (such as collectivization strategy, serialization strategy, and support strategy) and turnover. This implies that social strategies impact employee turnover decisions through a mechanism of job embeddedness. Moreover, Haider and Akbar (2017) found that job embeddedness serves as a mediator between internal marketing efforts and employee innovation behaviour. This shows that innovative behaviours, which can support the success and expansion of an organization, are more likely to be exhibited by individuals who feel deeply embedded in their work. At the same time, Ferreira et al., (2017) explored the association between work features and turnover intention at the individual and hotel levels, as well as the mediating roles of job satisfaction and job embeddedness. Their findings indicate that job satisfaction and job embeddedness fully mediate the relationship, highlighting the importance of these factors in influencing turnover intentions. Besides, Huang et al. (2021) focused on the phenomenon of excessive overtime in China and its impact on turnover intention among knowledge workers. They discovered a positive correlation between overtime and turnover intention, with job embeddedness playing a significant mediating role. The study revealed that overwork reduces the degree of job embeddedness among knowledge workers, thereby increasing their turnover intention.

3. The outcome variable of job embeddedness

Job embeddedness is built upon on the turnover model, the fundamental purpose of which is to study employee turnover from the perspective of various factors that lead to employee retention.

The early empirical study of job embeddedness mainly focuses on the outcome variables of employee turnover. For instance, Mitchell et al. (2001) conducted their research on employees of chain stores and community hospitals, providing valuable insights into the relationship between job embeddedness and turnover. Their findings revealed a negative correlation between job embeddedness and the turnover intention and behaviour of employees, indicating that higher levels of job embeddedness are associated with lower turnover rates. Based on the data obtained from the European survey, Tanova and Holtom (2008) proved the predictive effect of traditional turnover model and job embeddedness model on employee turnover. It was found that employee turnover depends not only on work attitude and market opportunities, but also on job embeddedness. Even after controlling the variables of employee

attitude and job opportunity, job embeddedness can predict turnover well. Mai et al. (2009) based their research on the "embeddedness" of previous work experience and analysed the formation of turnover motivation and the identification and development of entrepreneurial opportunities. Their research then revealed how job embeddedness affects the formation of entrepreneurial decisions of high-tech personnel. In a more recent study, C. M. Porter et al. (2019) found that the positive link between informal job search and turnover intention and behaviour is suppressed by on-the-job embeddedness, whereas the correlation between informal job search and turnover decision-making is promoted by on-the-job embeddedness. Moreover, Sender et al. (2018) conducted a comparative analysis of survey data from Chinese and Swiss employees. They found that when the non-work embeddedness of employees is low, there is a stronger correlation between unsolicited job offers and turnover. This suggests that the buffering effect of non-work embeddedness plays a crucial role in mitigating turnover.

However, it is important to note that not all scholars agree on the significance of job embeddedness in predicting turnover. Van Dijk and Kirk-Brown (2003) studied the relationship between job embeddedness and turnover intention, and included gender and family responsibility as potential moderating variables. Their research showed that there is no significant correlation between job embeddedness and turnover intention, and the moderating effect of gender and family responsibility is not shown. Furthermore. It is suggested that the meaning and measurement of construct of job embeddedness should be further improved. L. Wang and Shi (2007) highlighted the need for further improvement in the meaning and measurement of the job embeddedness construct, particularly in the Chinese context. They argued that the community items in the job embeddedness scale did not demonstrate a strong predictive effect on employee turnover. In conclusion, job embeddedness has been extensively studied in relation to employee turnover, with various researchers providing valuable insights into its impact and predictive power. While some studies have shown a strong negative correlation between job embeddedness and turnover, others have highlighted the need for further refinement in the measurement and understanding of this construct.

In addition to turnover variables, researchers have also explored the impact of job embeddedness on various aspects of employee attitudes and behaviours in the workplace, with a particular focus on behaviour. For instance, Wijayanto and Kismono (2004) conducted a study and found that job embeddedness can significantly predict the engagement of employees in organizational citizenship behaviour, indicating that employees who are more embedded in their jobs are more likely to exhibit positive behaviours that benefit the organization as a whole. Similarly, Halbesleben and Wheeler (2008) conducted research that

confirms the high predictive effect of job embeddedness on the in-role performance of employees, suggesting that employees who are deeply embedded in their jobs are more likely to fulfil their job responsibilities effectively. Furthermore, Holtom et al. (2014) examined data from the US Air Force and identified several factors that are significantly negatively correlated with turnover, including job satisfaction, emotional commitment, on-the-job embeddedness, and person-organization fit. This research highlights the importance of job embeddedness in reducing turnover intentions and behaviours, as employees who feel more embedded in their jobs are less likely to consider leaving the organization. A comprehensive review and analysis of existing literature conducted by L. Wu et al. (2021) further supports the significant impact of job embeddedness on various aspects of the employee experience. Their findings indicate that job embeddedness has a substantial influence on internal relationships, such as the leadership-subordinate relationship, as well as employee work attitudes, job performance, and turnover intention. This research suggests that job embeddedness plays a crucial role in shaping employee behaviour and outcomes beyond turnover, emphasizing its importance in understanding and managing employee engagement and performance in the workplace.

2.5 Research review

1. The topic of turnover, one of the central concerns in organizational behaviour study, has evolved over many years but is still relevant today and continues to draw interest from academics due to several reasons.

Firstly, the complexity of turnover itself contributes to its significance as a research field. Employee turnover is influenced not only by personal factors but also by organizational, family, environmental, and other factors. The study of these various factors makes turnover an important and multifaceted area of research.

Secondly, the complex context of turnover adds to its importance. Numerous contextual elements, such as nation, area, culture, generational divide, and organizational history, play crucial roles in turnover studies and contribute to the differences observed in research findings. Understanding how these contextual factors interact with turnover provides valuable insights into the dynamics of employee retention and attrition.

Thirdly, the rich theoretical perspectives of turnover contribute to its ongoing relevance. Theories such as social interaction theory, social cognitive theory, job embeddedness theory, human capital theory, work-role dependence theory, and planning behaviour theory offer

diverse lenses through which turnover can be examined. These theoretical frameworks provide researchers with a range of perspectives to explore and understand the complex phenomenon of turnover. Overall, the complexity of turnover, the diverse contextual factors influencing it, and the availability of various theoretical perspectives make turnover a compelling and enduring topic of study in the field of organizational behaviour.

Lastly, there are various research methods for studying the issue of resignation. Due to the fact that resignation is an individual behaviour, it is difficult to control and observe through experiments. Researchers often collect data through methods such as questionnaire surveys, interviews, and case studies. Additionally, it is also challenging to directly obtain data that can be used as research subjects. There are many areas that need to be explored in terms of data processing and analysis, as well as interpreting the conclusions.

Given the complexity of turnover research, it is evident that conducting a comprehensive exploration of this phenomenon is challenging. Therefore, researchers need to focus on their research questions, determine appropriate research contexts, and conduct in-depth investigations into specific phenomena or issues in order to make theoretical contribution to the existing turnover research and enhance empirical evidence.

2. The theory of job embeddedness, which focuses on the study of turnover, emerged relatively late but has already demonstrated advantages in terms of perspective and comprehensiveness, resulting in numerous research achievements. However, due to its relatively short research history, there are still many gaps and limitations, which can be seen in the following aspects.

Firstly, there is insufficient exploration of the theoretical connotations of job embeddedness itself. Job embeddedness is divided into on-the-job embeddedness and off-the-job embeddedness. Is there a more appropriate classification method to gain a deeper understanding of its theoretical concept? Does the current framework of job embeddedness, which includes fit, links, and sacrifice, fully reflect its theoretical framework?

Secondly, the measurement methods of job embeddedness itself are not mature enough. Both overall measurement and composite measurement have obvious limitations. Moreover, due to the short research history of job embeddedness, the current measurement methods and the application of measurement items are insufficient. More scholars need to make more extensive attempts and research to form a more thorough measurement method for job embeddedness, which also relies on the clarification and breakthrough of its theoretical connotations.

Thirdly, there are many gaps in the research on the mechanisms of job embeddedness.

Whether it is studied as an antecedent variable, outcome variable, or mediating/moderating variable, the overall research is still weak, with sporadic achievements and even contradictory phenomena.

Fourthly, the research on the influencing factors of job embeddedness is not comprehensive enough. Currently, the focus is mainly on individual and organizational characteristics, while other possible influencing factors, such as work environment and leadership style, are overlooked. This limits the explanatory and predictive ability of job embeddedness.

Fifthly, the research on job embeddedness is mainly concentrated in Western countries, with limited studies on job embeddedness in other cultural backgrounds. Job embeddedness may vary in different cultural contexts, so more cross-cultural research is needed to gain a deeper understanding of the nature and impact of job embeddedness.

Lastly, the research on the long-term effects of job embeddedness is not sufficiently comprehensive. Current research mainly focuses on the short-term effects of job embeddedness on employee satisfaction, job performance, etc., while more research is needed on the long-term effects of job embeddedness on employee development and organizational performance.

Considering the relatively short period of research on the theory of job embeddedness, it is a more practical and effective approach to conduct exploratory studies and focus on specific aspects of the theory. These studies may even have a ripple effect, leading to a more comprehensive and in-depth understanding of the theory and enhancing its overall value.

3. Professional training, as a component of training categories, has always been overlooked and has not received sufficient attention in the field of theoretical research. There have been no significant breakthroughs in related research, and the implementation of professional training in organizational practices has been limited in terms of determination and intensity. This can be seen in the following aspects:

Firstly, there is the emphasis on overall research on training and a lack of focus on research on training classification. Both general training and professional training have not been thoroughly studied. The results of research on their respective mechanisms, conceptual implications, and influencing factors are limited, especially in the case of professional training. Comparative studies between these two types of training are also lacking.

Secondly, there is a lack of comprehensive understanding of measurement methods for training. The measurement of training needs to consider both subjective evaluation results and objective indicator data, and neither should be neglected.

Thirdly, the lack of professional training research based on applied scenarios has led to contradictory findings in different studies, greatly undermining the value of the theory.

Research on training can be approached from a holistic perspective or by focusing on specific categories, especially considering the time and financial costs associated with implementing training programs. Therefore, it will help to obtain valuable research outcomes and contribute to the development of training theory by focusing on professional training，setting the research context and emphasizing comprehensive measurement dimensions. It not only provides a new angle for research but also reduces the complexity of the study.

In summary, this study is based on the context of technology-based small and medium enterprises (SMEs) in China, with a focus on investigating the impact of professional training on the job embeddedness and turnover intention of employees. In the subsequent chapters, we will provide a detailed account of the research design.

Chapter 3: Research Hypotheses and Construction of Theoretical Model

In the first and second chapters, this dissertation discussed research questions, related theoretical basis and research progress. On such basis, by further reviewing relevant literature and scrutinizing the relationship between variables involved in the research, this chapter proposes corresponding research hypotheses and builds an influence mechanism model on the impact of professional training in technology-based SMEs on job embeddedness and turnover intention of R&D to provide guidance for subsequent empirical research.

3.1 Professional training and turnover intention

In the era of rapid development of information technology and changing external environment, it is crucial for enterprises, especially technology-based enterprises, to obtain and maintain competitive edge through effective human resource measures (Barney, 1991). Abundant evidence shows that many companies are willing to increase their investment in human resources through various employee trainings (Guan & Frenkel, 2019). Employee training is defined as training activities conducted in various ways in accordance with the actual work requirements of the organization (Noe, 2012). Scholars have confirmed that training can improve both economic performance and non-economic performance, including the promotion of the innovative behaviour and job performance of employees via improving their knowledge, ability, and skills, which will bring direct economic benefits to enterprises (Phillips, 2012; Guan & Frenkel, 2021) and the enhancement of the morale, satisfaction, loyalty and other psychological factors of employees, which will bring greater non-economic performance (Hanaysha & Tahir, 2016). Although the positive impact of training on enterprises has been widely recognized, while increasing their training investment, organizations may also face the risk of employee turnover (Noe, 2012). It is expected that employees who have received training in the organization and whose overall quality has been improved may leave the company for various reasons. As such, the investment of the organization cannot be recovered and this is even more unacceptable for technology-based SMEs that are already facing the dilemma of lack of resources. Therefore, exploring and

validating the relationship between training investment and employee turnover behaviour can help management better understand training investment and avoid the risk of employee turnover.

In the process of exploring the relationship between training and turnover, an important question naturally arises, that is, how different types of training affect the turnover of employees. Generally speaking, the trainings provided by enterprises to employees fall into two categories, namely general training and professional training. General training refers to the training that provides employees with skills and knowledge with universal value and portability (Loewenstein & Spletzer, 1999), while professional training refers to the one provided to employees on corporate culture and systems as well as job skills in the current organization, which is specific and unique to the enterprise (G. S. Becker, 1994). Research points out that the knowledge and skills that employees acquire through general training not only add their own value in the current organization but also in other external organizations, meaning that employees will improve their potential productivity while working for other employers and employers who provide general training may not receive any future returns (G. S. Becker, 1994). In technology-based SMEs, due to the relatively weak resource base, business owners often hope to exchange smaller investments for visible benefits for the organization. In this context, the role of general training is further weakened, or it even plays an opposite role. On the contrary, the mechanism of action of professional training becomes more prominent. However, existing studies tend to treat training as a holistic concept and few studies have empirically explored the mechanism of the action of professional training on employee retention behaviour (Sieben, 2007; Ahn & Huang, 2020), which becomes an important theoretical breakthrough of this research.

From the perspective of human capital, human capital capabilities are considered as one of the most valuable assets of an organization, because without effective human capital, the strategy and operation of an organization will be incomplete and may lead to institutional collapse (Noe et al., 2021). Today, more and more organizations use human capital as a competitive edge over their competitors (Sanders et al., 2014), and training is also regarded as an investment in improving the human capital of employees. Compared with general training, the skills acquired by employees through professional training are only applicable to the organization. In terms of generating specific skills, professional training enhances the specificity of the human capital of employees, which in turn will lead to more restrictions for employees in the process of job hunting. For example, when the matching relation between employer and employee disappears, the reward of professional training disappears too.

Therefore, professional training reduces turnover rate and turnover intention from the perspective of specificity of human capital (De Winne & Sels, 2010).

From the perspective of professional training effectiveness, first, providing professional training to R&D can enhance their knowledge, skills and abilities in the professional sector, reducing their anxiety or frustration when presented with unfamiliar tasks that cannot be managed properly with insufficient skills (T. Y. Chen et al., 2004). According to research, employees who feel they lack the necessary skills to complete a task are more likely to look for other employment opportunities or, if they stay, will not be as productive (T. Y. Chen et al., 2004). Professional training of employees can just take on the role of improving skills and enhancing self-efficacy at the same time. Ability is the comprehensive quality reflected in the completion of a goal or task. Professional training of human resources allows staff members to learn new techniques, technologies, and rules by imparting knowledge and skills. This enhances the abilities of R&D, continuously improves the quality and efficiency of their work, positively influences the accomplishment of objectives and tasks, and makes them happy to remain in the organization and continue to work (Birdi et al., 2008; T. Liu et al., 2019). Second, professional training can also deepen the understanding of employees of the organization and make them quickly identify with the organization (Noe, 2012). When employees find that the skills acquired through the professional training provided by the organization can be fully applied to their current jobs, and the acquisition of human capital is more likely to be embedded in the current job or organization, they are more likely to develop a sense of dependence on the organization, thereby reducing their turnover intention (Lazear, 2009; White & Knight, 2018).

Finally, from a psychological perspective, employers who are willing to provide professional training to their employees show that they are “investors of people”. Employees perceive these employers as attractive to work because training not only improves their employability and career opportunities (Groot & de Brink, 2000), but also satisfies their intrinsic motivation to learn (Ocen et al., 2017). As a result, employees will be more inclined to stay with companies that provide attractive training opportunities, and they may interpret training as a signal from the employers about the nature of their relationship (Nguyen & Duong, 2020). Professionally trained employees get the impression that employers view them as important members of the organization, fostering loyalty to the company. In other words, employees may see training as a sign of the willingness of the organization in investing in and caring about them.

As mentioned earlier, a major shortcoming of studies on training and turnover to date is

that they usually only consider one aspect of training, such as training incidence (Gritz, 1993; Krueger & Rouse, 1998), on-the-job and turnover—on-the-job training (Royalty, 1996), or employer-provided and self-financed training (Winter-Ebmer & Zweimüller, 2000). Although most of these indicators, being representative to some extent, take the perspective of enterprises and use investment in training as the measurement standard, they ignore the perspective of employees in some aspects (Sieben, 2007). From the perspective of employees, this research analysed professional training from two aspects. The first is the intensity of professional training. This study examined the frequency and length of professional training that R&D receives. Stronger intensity of professional training means that R&D receives more professional trainings and the knowledge and skills acquired through professional training also increase. This will further enhance the sense of identity of employees with the company and they will be further embedded in the work, thereby reducing the tendency to leave. The second is the perceived quality of professional training. An important prerequisite for whether training can have an effect on employees is the effectiveness of the training itself, that is, the results of the perception of training quality of employees. If R&D perceives better results after receiving professional training, the effect of professional training will be further magnified, the various benefits that employees obtain from professional training will be more prominent, and their turnover intention will also be reduced.

All in all, in the era of knowledge economy, R&D needs to continuously update knowledge and skills through professional training. If this need can be supported by the organization or can be realized within the organization, according to the social exchange theory, when employees perceive the human capital of organization in training, based on the principle of reciprocity, employees will choose to stay and create value as a return to the organization (Ling & Zhang, 2020). Therefore, this dissertation proposed the following assumptions.

H1: Professional training has a significant negative impact on the turnover intention of R&D.

H1A: The higher the intensity of professional training, the lower the turnover intention of R&D.

H1B: The better the perceived professional training, the lower the turnover intention of R&D.

3.2 Professional training and job embeddedness

Job embeddedness is defined as the influence of a wide range of psychological, social and financial factors on employee retention, generally including three dimensions of link, fit and sacrifice (T. W. Lee & Mitchell, 1994). The key to whether the professional training provided by technology-based SMEs to R&D can affect their job embeddedness is whether professional training has an impact on the above-mentioned three dimensions. This thesis will also analyse the relationship between professional training and job embeddedness from the three aspects.

First, from the perspective of link, the relationship built between R&D and their colleagues in technology-based SMEs can greatly affect whether they want to stay or not. As an important social capital, the relationship between colleagues plays a positive role in promoting later career development. In terms of the professional training provided by technology-based SMEs, because of limited resources, companies seldom choose external experts but senior personnel or experts within the company as training instructors, offering more communication opportunities between trainers and trainees. Therefore, participating in professional training provides a good platform for R&D to strengthen the connection with colleagues. Through professional training, R&D can not only communicate about expertise and form a work network, but also strengthen personal network through informal communication (H. Jiang et al., 2017). Professional training promotes the formation of these constantly intertwined networks, strengthens the organizational link of R&D, and reduces their turnover intention.

Second, from the perspective of fit, the reason why R&D can be embedded in the organization is that their career goals and development opportunities are matched with organizational development and planning. Whether R&D can realize their career vision and goals of life are the keys to organizational fit. Professional training provides R&D with a channel to improve their expertise, skills and abilities, meets their needs of continuous improvement, and gives them a sense of self-realization, thus greatly reducing their turnover intention.

Third, from the perspective of sacrifice, R&D must weigh the sacrifice brought by resignation while leaving their jobs. Professional training offers employees specialized human capital that is only applicable to the organization and specific skills. This specialized human capital is likely to fail when employees look for new jobs, which further increases the cost of their turnover (G. S. Becker, 1994), thereby enhancing their job embeddedness. To sum up,

professional training strengthens the organizational link of R&D, promotes organizational fit, and increases the cost of employee turnover, thereby affecting the overall job embeddedness of employees. As such, this thesis proposed the following hypothesis on the relationship between professional training and job embeddedness.

H2: Professional training has a significant positive effect on job embeddedness.

3.3 Job embeddedness and turnover intention

Since T. W. Lee and Mitchell (1994) put forward the concept of job embeddedness, a large number of scholars have analysed the reasons for employee turnover from the perspective of job embeddedness, believing that analysing turnover from the perspective of job embeddedness is more convincing and explanatory than traditional attitude variables such as job satisfaction, organizational commitment and so forth (Coetzer et al., 2019; Martdianty et al., 2020). Job embeddedness is defined as "various forces that prevent individuals from leaving work". From the perspective of employee retention, it comprehensively analyses the internal and external factors that make employees stay on the job, including work unit, community input, marriage, family, work tenure and so forth. These factors can also be roughly divided into three dimensions, namely link, fit and sacrifice. This thesis will analyse the relationship between job embeddedness and turnover intention of employees of technology-based SMEs from these three perspectives.

First, from the perspective of link, organizational link includes relationships between employees and individuals and groups within the organization (Mitchell et al., 2001). This relationship enables individuals to integrate into their work. Research indicates that SMEs favour "word-of-mouth" recruitment because new employees are likely to come from the family network and friends of the current employees, meaning that it has the potential to create a strong link among employees (Cardon & Stevens, 2004; Coetzer et al., 2019). As a result, close social link among employees may arises through "word-of-mouth" recruitment. In addition, the informality of management specific to SMEs (Storey et al., 2010) promotes the formation of a satisfactory working relationship between employees and managers and helps to foster a "family-like" workplace culture that encourages informality and flexibility (Coetzer et al., 2019).

Second, from the perspective of fit, on-the-job fit refers to the perception of compatibility with the organization of an individual. Job embeddedness theory indicates that job embeddedness increases when the characteristics of an individual and an organization fit each

other (Mitchell et al., 2001). When the personal values of employees are highly aligned with widely shared values within the organization, employees tend to show good attitudes toward the organization and will stay for such reason (Arthur Jr et al., 2006).

Finally, in terms of sacrifice, on-the-job sacrifice refers to the financial, social, or psychological losses associated with leaving, which may include salaries, benefits, close social ties, and status (Mitchell et al., 2001). Job embeddedness increases if the perceived cost of sacrificed material and intangible benefits is high when leaving the job (Mitchell et al., 2001). Therefore, this thesis proposed the following hypothesis.

H3: Job embeddedness has a significant negative effect on turnover intention.

3.4 The mediating role of job embeddedness

Most of the previous studies have only emphasized the direct relationship between training and turnover intention, and few have studied the process or mechanism of the influence of training on the change of the behaviour of employees. As a result, existing research has not fully opened the black box of the relationship between training and turnover. Specifically, previous research has paid little attention to the roles of the attitudes and behaviours of employees in this process (Ashforth & Mael, 1998; Coetzer et al., 2019).

In this regard, this study hypothesized that the job embeddedness of employees can intervene between the professional training and turnover of employees. The reason behind this is that SMEs provide R&D with important resources in the form of professional training (Rollag & Cardon, 2003). Through continuous professional training, SMEs quickly integrate R&D into various innovation activities of the organization, provide meaningful job training for newcomers, and create ability improvement and career promotion opportunities for senior staffs (W. Wu & Tang, 2016; Kotey & Folker, 2007). Therefore, technology-based SMEs can quickly and extensively incorporate R&D into the organization through professional training, improving their job embeddedness and preventing them from leaving. In addition, professional training can help R&D recognizes the attention from the organization and their importance to the organization, thereby forming an emotional link or a sense of identity (Mai et al., 2009; Beynon et al., 2015). Employees are more likely to adhere to organizational standards and culture if they have a strong sense of identity, which encourages them to stay and advance with the company. Therefore, this study believed that job embeddedness can work as a mediating variable for the relationship between professional training and turnover intention, and following hypothesis was proposed.

H4: Job embeddedness mediates the relationship between professional training and turnover intention.

3.5 The moderating effect of the characteristics of employees

In the study of organizational behaviour, individual characteristics are often considered as an important influencing factor in the design of the research. Scholars have also roughly distinguished two types of individual characteristics. The first is the characteristics at the demographic level, namely gender, age, position, tenure, race, nationality, and so forth. The second is the characteristics at the psychological level, including their self-intensity, control points, personality and so forth. These characteristics at different levels reflect the differences between individuals. But relatively speaking, the characteristics of employees at the psychological level are difficult to measure and have the problem of inaccurate measurement, while the characteristics at the demographic level can be directly distinguished and are easy to be measured. In this study, given that the different individual characteristics of different employees will affect the research results, the researcher included the characteristics of employees as moderating variables into the research model. In addition, because corporate training has universal characteristics, the study concentrated on how the characteristics of employees at the demographic level affect the research model to draw a more general conclusion. Specifically, this thesis selected three moderating variables from the characteristics of employees, namely gender, educational level and employee hierarchy.

First, the moderating effect of gender. Research in both psychology and organizational behaviour has pointed out that men and women show significant differences in the workplace, such as stress resistance, work-life balance, organizational commitment and so forth. In terms of research on turnover intention, some previous studies have pointed out that when faced with some new career choices, men are more likely to have turnover intention than women (X. Fan & Zheng, 2016). In the workplace, women with formal training are less likely to quit, which, however, has no effect on men (Elias, 1994; Sieben, 2007). When technology-based SMEs provide R&D with professional training, female R&D employees may have better job embeddedness, lessening their intention to leave, whereas the impact of professional training may be relatively weak for male R&D. To this end, this thesis proposed the following assumption.

H5: Compared with male R&D, professional training has a more significant effect on female R&D.

Second, the moderating effect of educational level. Educational level is a good indicator of the competence and knowledge of an individual to a certain extent. People with different educational levels may have different perceptions of the effects of professional training (Johnson & Johnson, 2000). First, employees with higher educational backgrounds may be sceptical of professional training methods. Higher educated workers typically have more extensive academic backgrounds and knowledge stores. Highly educated workers may feel that professional training is not demanding enough or does not utilize their full ability when they receive it, which could result in negative feelings that impair their performance and productivity. Employees with lower educational levels will not have this idea. Instead, they may feel that the professional training provided by the enterprise has improved their professional skills, thus creating a sense of identification with the enterprise. Second, highly educated employees have strong self-motivation. Highly educated employees usually have strong self-motivation and learning ability, and they are more willing to actively seek new knowledge and skills (Y. Y. Wu et al., 2023).

Therefore, the professional training provided by the enterprise may not improve the professional skills of highly educated employees and is instead a waste of their time. This is less likely to occur among workers with lower educational levels, and professional training might be more effective. In summary, this thesis put forward the following hypotheses regarding the moderating effect of the educational background of employees.

H6: The effect of professional training is gradually weakened as the educational level of R&D increases.

Third, the moderating effect of the employee level. Within an organization, the levels of employees represent their different status and job content. In the case of R&D, higher job levels (such as technical director and senior engineer) represent to some extent their professional skills and the level of working ability. The higher position of the R&D, the stronger their professional skills. Therefore, professional training has limited influence on the improvement of the professional ability and business level of these senior R&D, weakening the positive effect and even arousing the resentment of senior R&D to a certain extent, resulting in a negative impact. For the lower-level R&D, since they are often newcomers who have just entered the workplace and are in the critical stage of improving their expertise, professional training provides them with opportunities to improve their own capabilities and work performance. They will make an ample use of the professional training, making it more profitable. Accordingly, this thesis proposed the following assumption.

H7: The effect of professional training is gradually weakened as the position hierarchy of

R&D increases.

3.6 The proposal of theoretical model

Based on reference to social cognitive theory, job embeddedness theory and related research and combined with the current situation of turnover of R&D in technology-based SMEs, a theoretical model of "professional training, job embeddedness and turnover intention" was constructed to explore the mechanism of the impact of professional training on job embeddedness and turnover intention of R&D and to deduce hypotheses. In this process, this thesis innovatively characterized professional training from the two dimensions of professional training density and perceived training quality from both subjective and objective perspectives, and proposed the theoretical model shown in Figure 3.1.

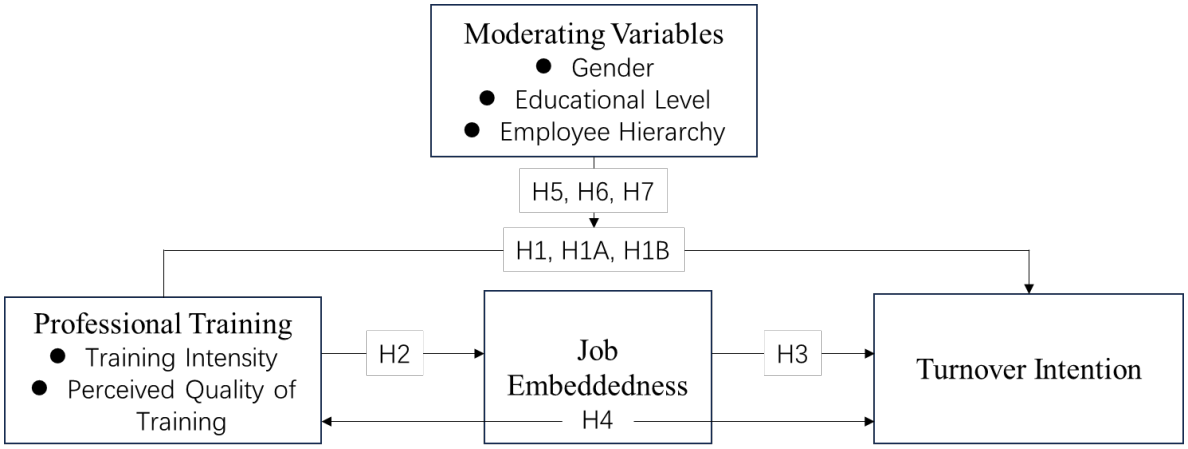

Figure 3.1 Theoretical model

By sorting out the research hypotheses proposed in this chapter, a summary is presented in Table 3.1.

Table 3.1 Summary of research hypotheses

Main Effect
H1: Professional training has a significant negative impact on the turnover intention of R&D
H1A: The higher the intensity of professional training, the lower the turnover intention of R&D
H1B: The better the perceived professional training, the lower the turnover intention of R&D
H2: Professional training has a significant positive effect on job embeddedness
H3: Job embeddedness has a significant negative effect on turnover intention
Mediating Effect
H4: Job embeddedness mediates the relationship between professional training and turnover intention
Moderating Effect
H5: Compared with male R&D, professional training has a more significant effect on female R&D
H6: The effect of professional training is gradually weakened as the educational level of R&D increases
H7: The effect of professional training is gradually weakened as the position hierarchy of R&D increases

3.7 summary

This chapter theoretically deduced and summarized the relationship between professional training and turnover intention, professional training and job embeddedness and job embeddedness and turnover intention, and put forward relevant research hypotheses from the perspective of R&D in technology-based SMEs. On such basis, this chapter put forward the mediating role of job embeddedness between professional training and turnover intention and proposed relevant hypotheses. Finally, three individual characteristics of gender, educational level, and employee hierarchy were introduced as moderating variables to further construct a complete research theoretical model.

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Chapter 4: Research Design and Questionnaire Pretreatment

Based on the theoretical model and research hypotheses put forward in Chapter Three, this chapter focused on research design, research method and research idea that would be adopted in follow-up research. Furthermore, questionnaires were distributed to collect data, and the feasibility of the questionnaire was determined through reliability and validity analysis, laying the foundation for the next step of data analysis. This study used the empirical research method of quantitative analysis to further test the research model to improve the universality of the research findings. Specifically, the main research content of this chapter is as follows. First, the introduction of research idea and method, namely the method of questionnaire survey and the principles and process of questionnaire design. Secondly, the explanation of measurement method of the main variables involved in the research, including professional training, job embeddedness, turnover intention and so forth, and the design of the initial questionnaire. Thirdly, the reliability and validity test of the initial questionnaire through a small-sample pre-survey, the revision of the questionnaire in accordance with the results of the pre-survey data analysis, and the determination of the final research questionnaire which laid a foundation for follow-up empirical research. Fourthly, the initiating of the formal questionnaire survey, and the collecting of feedback data from the target respondents through online and offline methods. Fifthly, the evaluation of the collected questionnaires, and the selecting of the effective ones. Finally, the organization of the data from effective questionnaires for reliability and validity analysis.

4.1 Research idea and research methods

4.1.1 Research idea

The core purpose of this thesis is to explore the mechanism of professional training in technology-based SMEs on the turnover intention of R&D personnel. According to the theoretical research model and hypotheses put forward in Chapter Three, the research idea of this study is as follows.

First, the author determined the main research methods used in this study, namely questionnaire survey, statistical analysis, reliability and validity analysis, regression analysis

and so forth.

Secondly, the author determined the research sample of this study and collected data. In this process, it is important to pay attention to the design of questionnaire and the collection of data. For the design of scale in the questionnaire, this study referred to domestic and foreign mature research scales in related fields to design the preliminary questionnaire, analysed data from a small-sample pre-survey and expert interviews in related fields to revise and improve the questionnaire, and determined the final survey questionnaire. In terms of data collection, this study intended to distribute questionnaires through offline field research, Wenjuanxin, a professional online questionnaire survey platform, and other channels to collect data.

Finally, the author sorted out and analysed the research data obtained from multiple channels, verified the research hypotheses and theoretical model proposed in the previous chapter through descriptive statistical analysis, reliability and validity analysis, regression analysis and other methods, and put forward research findings. The specific research idea of the empirical part is shown in Figure B.3.

4.1.2 Research method

In terms of empirical research, the main research methods used in this study include questionnaire survey, descriptive statistical analysis, reliability and validity analysis, factor analysis, OLS regression analysis and so forth.

1. Questionnaire survey method—an important research method in empirical research. Through questionnaire survey, it is possible to quantify behaviours that cannot be directly observed, including psychological variables such as turnover intention and job embeddedness, or behaviours that can only be measured with the help of measurement tools, that is, to collect specific sample information through questionnaires, to describe the overall sample quantitatively. The purpose of questionnaire survey is to describe a specific phenomenon and test hypothesis. In this study, due to the limitation of research topic, many variables were difficult to quantify, such as the quality of the professional training—provided by technology-based SMEs, perceived by the employees, the job embeddedness of employees in technology-based SMEs, and the degree of turnover intention. Therefore, it is necessary to use questionnaire to collect relevant data. Although there is some subjectivity in the data obtained by questionnaire survey, and there are maybe deviations in the findings, the combination of various methods can properly make up the shortfall.

2. Descriptive statistical analysis is used mainly to control the overall situation of the collected sample data, to further understand the demographic characteristics of the respondents

and the basic information of the surveyed enterprises. General statistical indicators include mean, standard deviation, proportion, cumulative proportion and so forth. The measurement of these indicators can reflect the overall tendency of the sample.

3. Reliability analysis refers to the analysis of the effectiveness of the questionnaire measurement indicators. Generally, the Cronbach's Alpha coefficient method is used to test the reliability of variables. Based on the size of the statistical value and the comparison with the preset standard, each variable is judged for its reliability level to test whether the collected data can be used for regression analysis. For example, the general Cronbach's Alpha coefficients need to be greater than 0.8.

4. Validity analysis refers to the analysis of the accuracy of the questionnaire measurement indicators. There are many methods of validity analysis, among which item analysis, criterion validity analysis and factor analysis are often used in communication research. For newly designed questionnaires, factor analysis is generally used to analyse validity, while mature questionnaires are measured by AVE, chi-square to degrees of freedom ratio, RMSEA, IFI, TLI, CFI and other indicators.

5. Factor analysis mainly uses a few factors to express the difference and connection between the measurement indicators, that is, to classify the measurement indicators that are relatively closely related, and each type of variable that expresses a unique meaning becomes a factor. As a result, most of the information of the measurement indicators can be reflected with the fewest factors. Factor analysis generally includes exploratory factor analysis and confirmatory factor analysis. Exploratory factor analysis is mainly used to judge the degree of internal consistency of a newly developed questionnaire, while confirmatory factor analysis is mainly used to analyse data obtained from mature scales and judge the validity of such data. Commonly used tools are SPSS and AMOS.

6. OLS regression analysis method is a multiple linear regression analysis method in a broad sense. The OLSM is adopted to find the best function matching of the data by minimizing the square sum of the errors. It is used to test the causal relationship between multiple variables. After the regression equation model is operated, the obtained statistical index value will be compared with the preset fitting value. If the value range requirements are met, the model fitting is considered to be good, and the model is acceptable. After that, the research hypotheses will be verified by observing the significance index of the variables, and the research conclusion will be reached. The commonly used analysis tool is Stata16.0.

4.2 Questionnaire design

4.2.1 Principles for questionnaire design

Questionnaire survey is one of the commonly used data collection methods in management research. To collect the required survey data, researchers utilize this tool to precisely measure the social activity process. They then apply sociological statistical methods to quantitatively describe and analyse the results. To ensure that the questionnaire design in this study is science-based and logical, the author referred to the existing questionnaire design methods and designed the questionnaire according to the following principles:

1. Referring to and learn from mature scales. Base on existing mature scales and research, this thesis has taken into consideration relevant interviews and investigation and the special situation of the research, such as the situation of technology-based SMEs in this study and the condition in China, to appropriately supplement and improve the scale.

2. Scientific and appropriate language expression. The topics involved in the questionnaire should be readable, and the expression of the questions should be both academic and easy to understand. When more professional terms are involved, timely annotations are required, such as professional training in this study.

3. Logical questions in the questionnaire. The questions in the questionnaire need to be set in a certain order, such as from easy-to-understand questions to difficult questions and from antecedents to consequences, so that the respondents of the questionnaire can answer the research questions more smoothly. In this study, questions are arranged in ascending difficulty, with basic information of the respondents and companies at first, and academic questions at second. This gradient questionnaire design allows the respondents to complete it more smoothly.

4. Respect for privacy. The setting of the questions should not involve the privacy of the respondents or the confidentiality of the company, such as the name of the company, so that the respondents can express their true thoughts without pressure.

5. Appropriate number of items in the questionnaire. Given the concentration and endurance of the respondents, it is necessary to avoid designing invalid questions in the questionnaire. Reverse questions can be set but their number should be controlled. At the same time, controlling the number of questions in the questionnaire can reduce the possibility of respondents being disturbed by fatigue or other factors.

4.2.2 Process of questionnaire design

This study referred to the general questionnaire design process proposed by domestic and foreign scholars. The questionnaire design process includes the following steps:

1. The author referred to mature research scales at home and abroad and combined case studies to preliminarily determine the research scales. Base on sorting out relevant domestic and foreign literature on social cognitive theory, job embeddedness theory, employee training, turnover intention and so forth, this study drew on mature scales which were proposed in existing studies and were widely used to develop a semi-structured interview outline and a survey questionnaire. Several technology-based enterprises were interviewed using the semi-structured interview outline, and items of the initial questionnaire were deleted and added in accordance with the interview results. For example, most of the existing measurement scales for "professional training" focus on the objective measurement of participation time, yet this study specially considered the perceived professional training of the respondents, added the question of "perceived professional training quality", and supplemented and improved related items. To sum up, based on applying mature scales with high reliability and validity in existing research and by combining enterprise interviews and case analysis, the first draft of the questionnaire was developed.

2. Management professors and experts in related fields are invited to make the first revision of the questionnaire. Base on the first draft of the questionnaire, the researcher, by communicating with the supervisor and classmates for many times, has introduced and explained the research model, research variables and research questionnaire, and invited the supervisor, many teachers and doctoral students in management to discuss related issues. Some items, expressions, and the logical structure of the questionnaire were modified because of numerous conversations. In addition, the researcher also invited some experts in the field of human resource management to revise the questionnaire by virtue of the cooperative relationship between these experts and the college and the Chinese tutor. Based on the opinions of these experts, the first revision of the questionnaire was developed.

3. Industry experts and heads of human resource management departments of technology-based enterprises were invited to make a second revision to the questionnaire. The researcher invited 3 human resource managers working in technology-based enterprises to review the questionnaire after the first revision. These managers all maintained sound relationships with the researcher, and their own educational backgrounds were relatively high, with all of them holding a master's degree or above. More importantly, they have observed the

content of this research for a long time and have deep insights. According to the opinions of several enterprise managers who reviewed the questionnaire, this thesis has revised some parts of the questionnaire where their opinions are relatively concentrated. For example, the measurement of "job embeddedness" and "perception of professional training" has considered additional Chinese contexts as well as the status of technology-based SMEs. In addition, there were many academic terms in the first draft of the questionnaire, and the invitees suggested modifying some sentences to make the questionnaire easier to understand. Base on fully listening to the opinions of industry experts, the author consulted relevant literature again and developed a second revised draft of the questionnaire after repeated revisions.

4. The contents of the questionnaire were revised through pre-survey and result analysis, and the final version of the questionnaire was formed. After completing the sample questionnaire, the researcher conducted offline delivery to the R&D personnel of three technology-based SMEs in Chengdu at the end of 2022, and also distributed questionnaires to the R&D personnel of several enterprises through online means. Face-to-face field surveys and Wenjuanxing online surveys were used to disseminate 89 questionnaires. After the collection and deletion of invalid questionnaires, 65 valid questionnaires were obtained. The pre-survey data set for this study was created on this basis. The researcher then used SPSS22.0 software and AMOS24.0 software to analyse the results of the pre-survey questionnaire data, and adopted exploratory factor analysis to measure factor loading, Cronbach's Alpha coefficient, CITC, KMO and other indicators of the items in the questionnaire to determine whether the reliability and validity of the existing items are reliable. According to the analysis results of the pre-survey data, the researcher revised and improved the content of the questionnaire again and generated the final survey questionnaire of this study (see the appendix for details).

4.3 Measurement of variables

4.3.1 Explained variable: turnover intention

In recent years, turnover intention has been widely used as an effective proxy variable to explore employee turnover. Turnover intention expresses the likelihood that an employee will leave his or her current job or organization, and because this possibility is frequently reflected as turnover behaviour, it is generally more significant to use turnover intention instead of turnover behaviour. This study referred to the research of scholars such as Mitchell et al., (2001), Ghasempour Ganji et al., (2021) and Wang et al., (2020) to measure the turnover

intention of employees using the four items shown in Table 4.1.

Table 4.1 Measurement scale of turnover intention

Variable	No.	Items	Item source reference
Turnover Intention	TI1	I often feel like quitting my current job	Mitchell et al., (2001); Ghasempour Ganji et al., (2021); H. Wang et al., (2020)
	TI2	I may leave the company for another job after a while	
	TI3	I have no plans for long-term career development at my current company	
	TI4	If I continue to stay in my current company, my prospects will not be good	

4.3.2 Explanatory variable: professional training

Professional training refers to the training on work-related professional knowledge, skills, organizational workflow, rules and systems, organizational culture and so forth. It reflects the assistance provided by enterprises to employees in improving their professional skills. Given the particularity of training as an activity, this research specifically measured professional training from two dimensions, subjective and objective. The objective dimension refers to whether employees have received professional training and their description of the length of professional training received. The subjective dimension refers to the perceived quality of professional training that employees have received or their subjective evaluation of the effectiveness of the professional training on them, that is, whether employees believe the professional training they have received is valuable and can benefit them. Obviously, the professional training time in the objective dimension does not need to be measured by a scale, but for the professional training perception in the subjective dimension, this thesis mainly referred to the studies of scholars such as Ling and Zhang (2020), Noe and Kodwani (2018) and Sesen and Ertan (2022) to measure it using the following five items shown in Table 4.2.

Table 4.2 Measurement scale of professional training perception

Variable	No.	Items	Item source reference
Perceived Quality of Professional Training	PT1	The training contents covered the specific skills, job specifications, processes, goals, and responsibilities required for my position	Ling and Zhang (2020); Noe and Kodwani (2018); Sesen and Ertan (2022)
	PT2	Gained skills through professional training can meet my job requirements	
	PT3	Training helps me apply my trained skills to my job	
	PT4	Professional training helps improve my job performance	
	PT5	Training has played a positive role in my career	

4.3.3 Mediating variable: job embeddedness

The concept of embeddedness emphasizes examining the potential factors that affect the

turnover intention of employees from a broader perspective. Since job embeddedness was proposed, it has quickly become a hot topic in related research. Job embeddedness is defined as "all kinds of forces that prevent individuals from leaving their jobs". From the perspective of employee retention, it comprehensively analyses the internal and external factors that make employees retain their jobs. Given the factors of research sample and questionnaire filling, this study made a trade-off between the overall measurement and the combined measurement of job embeddedness and decided to adopt the former for questionnaire design. This thesis mainly referred to the research of scholars such as Crossley et al. (2007) and Martdianty et al., (2020) to measure job embeddedness using the seven items presented in Table 4.3.

Table 4.3 Measurement scale of job embeddedness

Variable	No.	Items	Item source reference
Job Embeddedness	JE1	I am very attached to my current company	Crossley et al., (2007); Martdianty et al., (2020)
	JE2	I feel connected to the company I am currently working for	
	JE3	Leaving my current company is difficult for me	
	JE4	I cannot leave my current company easily	
	JE5	I am already embedded in my current company and it is hard to leave	
	JE6	I am closely tied to my current company	
	JE7	I will face a great loss if I leave my current company	

4.3.4 Control variable

Relevant studies have pointed out that there are various factors that affect the turnover of employees. In addition to the key elements of professional training and job embeddedness involved in this study, there are also a variety of other influencing variables. These variables need to be controlled to make this study more scientific. Therefore, this study focused on controlling the influencing variables at the individual level and the enterprise level.

1. In terms of individual level, this study mainly observed four features, namely gender, age, educational background, and employee hierarchy. This study believed that these four characteristics that describe individuals would affect the results of professional training, that is, employees with different individual characteristics would have varying degrees of acceptance of professional training or would be influenced differently after receiving professional training. For example, in terms of gender, compared with women, male employees may be more willing to receive professional training and improve their organizational embeddedness through professional training. In terms of age, older employees may have lower overall willingness to receive professional training than younger employees because they have been in the industry for a longer period, so their degree of job embeddedness will be lower. About educational

background, employees with a lower educational background may gain more from professional training and, as a result, have a lesser intention to leave. From the perspective of employee hierarchy, employees in higher positions may think that professional training is less effective, while employees in lower positions may believe that they can benefit more from professional training, leading to their higher job embeddedness and lower turnover intention. In summary, it is necessary to observe these elements at the individual level.

However, in specific measurement and analysis, this study used the three characteristics of gender, educational background, and employee hierarchy as grouping variables to examine the effect of professional training on the turnover intention of employees with different characteristics. The age characteristic is not suitable for measurement, because the data of age is continuous, and classifying it according to any classification method would be subjective, so it is only collected as data.

2. This research mainly observed factors such as the years of establishment of the enterprise, the number of employees in the enterprise, and the annual turnover of the enterprise at the enterprise level.

First, the years of establishment of the enterprise is the age of the enterprise, which represents the development cycle of the enterprise. According to the standards of the CEM Global Entrepreneurship Research Survey, companies that have been established for less than 8 years are considered startups, while companies that have been established for more than 8 years are considered mature companies. Compared with mature enterprises, new enterprises obviously have higher development uncertainty, and employees working in these enterprises may have a lower sense of security. As a result, such employees may have a higher turnover intention. This study divided the establishment years of enterprises into three categories, namely “less than 3 years”, “3 to 6 years”, and “more than 6 years”.

Secondly, the number of employees reflects the size of the enterprise to some extent. It also represents the strength of the enterprise and is a key resource for technology-based SMEs, which affects the strategic decision-making and innovation of such enterprises. This factor also has an impact on the employees of the enterprise: the more employees in the enterprise, the higher the job embeddedness of employee may be. Employee turnover in the enterprise may also influence the turnover intention of employees. The research samples in this study were divided according to the standards of “less than 50 people”, “50 to 100 people”, “100 to 300 people”, and “more than 300 people”.

Finally, the annual turnover index of the enterprise reflects the income of the enterprise. Relatively speaking, enterprises with higher annual turnover have better benefits and better

development conditions, meaning that employees may also earn higher advantages from these enterprises, which to some extent influences their turnover intention. According to the standard of the yearly turnover of enterprises, namely “below 10 million yuan”, “10 to 50 million yuan”, “50 to 100 million yuan”, and “more than 100 million yuan”, the research samples in this study were split into four groups.

4.4 Pre-survey and questionnaire revision

4.4.1 Pre-survey data collection

The researcher used his personal network to collect pre-survey data through the following two channels. First, based on the cooperative relationship between the researcher and many enterprises, the researcher entrusted the human resource managers of these enterprises to conduct an anonymous survey on employees. Second, through colleges and universities, an anonymous survey was performed among students who have graduated. The pre-survey questionnaires were issued from July 2022 to August 2022. As of August 31, 2022, 89 pre-survey questionnaires have been collected. After eliminating invalid questionnaires and questionnaires with missing data, 65 valid questionnaires have been obtained, with a valid questionnaire rate of 73%. The descriptive statistical analysis of the pre-survey data is shown in Table 4.4.

Table 4.4 Descriptive statistical analysis of pre-survey samples

Content of the Questionnaire	Group	Frequency	Relative Frequency	Cumulative Frequency
Gender of Respondent	Male	51	78.5%	78.5%
	Female	14	21.5%	100.0%
Age of Respondent	25 Years Old and below	9	13.8%	13.8%
	26 to 35 Years Old	35	53.8%	67.7%
	36 to 45 Years Old	21	32.3%	100.0%
Educational Background of Respondent	College Degree and below	15	23.1%	23.1%
	Bachelor Degree	43	66.2%	89.2%
	Master Degree	7	10.8%	100.0%
	Doctorate	0	0	100.0%
Respondent Hierarchy	Technical Staff at the Grassroots Level	37	56.9%	56.9
	Middle-level Technical Staff	22	33.8%	90.8
	Senior Technical Staff	6	9.2%	100.0
Years of Establishment of the Enterprise	1 to 3 Years	5	7.7%	7.7%
	3 to 6 Years	12	18.5%	26.2%
	Above 6 Years	48	73.8%	100.0%
Number of Employees in the Enterprise	Less than 50 People	9	13.8%	13.8%
	50 to 100 People	7	10.8%	24.6%
	100 to 300 People	32	49.2%	73.8%
	More than 300 People	17	26.2%	100.0%

Sales Revenue of the Enterprise	Less than 10 million Yuan	8	12.3%	12.3%
	10 to 50 million Yuan	17	26.2%	38.5%
	50 to 100 million Yuan	19	29.2%	67.7%
	More than 100 million Yuan	21	32.3%	100.0%

First, based on the 65 valid questionnaires collected, the researcher conducted a descriptive statistical analysis on the basic information of respondents and enterprises, mainly including the hierarchy, gender, age, and educational background of respondents as well as the years of establishment and the size of enterprises.

Descriptive statistics show that just 14 (21.5%) of the pre-survey respondents are female, while 51 respondents (78.5%) are male. Most of the respondents are grassroots-level (56.9%) and middle-level technical personnel (33.8%) aged 26 to 35 years old (53.8%) with a Bachelor degree (66.2%). In terms of enterprises, the majority of respondents work in enterprises that have been established for more than 6 years (73.8%), and more respondents work in enterprises with 100-300 employees (49.2%). Seventeen respondents work in enterprises（26.2%）that report a sales revenue of 10 to 50 million yuan, nineteen respondents work in enterprises (29.2%) present a sales revenue of 50 to 100 million yuan, and twenty-one respondents work in enterprises (32.3%) have a sales revenue of over 100 million yuan.

4.4.2 Pre-survey data analysis

To ensure the reliability of the research data, the author used SPSS22.0 software and AMOS24.0 software for reliability and validity analysis. Specifically, this study adopted the SPSS22.0 software to test the reliability of the core variables involved in the study (professional training, job embeddedness, and turnover intention) and examined CITC and Cronbach's Alpha coefficient. According to the results, CITC is greater than 0.35 and Cronbach's Alpha coefficient is greater than 0.8, meaning that the questionnaire has sound reliability. At the same time, AMOS24.0 software was used to test the validity and examine factor loading and KMO. The findings indicated that the factor loading is greater than 0.7, and the KMO is greater than 0.7, demonstrating that the questionnaire has good validity.

1. Professional Training

The amount of time spent participating in professional training and the perceived quality of professional training were both measured in this thesis.

First, due to the wide variations in the amount of time spent engaging in professional training among individuals, this thesis employed the method of categorization to divide the participation time of professional training into multiple intervals. The results of descriptive statistical analysis are as follows (Table 4.5). According to the results, most of the employees

spent less than 48 hours (53.8%) and 48 to 120 hours (32.3%) in professional training.

Table 4.5 Descriptive statistical analysis of the amount of time spent participating in professional training

	Group	Frequency	Ratio	Grand Mean	Variance
The Amount of Time Spent on Participating in Professional Training	Less than 48 Hours	35	53.8		
	48 to 120 Hours	21	32.3		
	120 to 240 Hours	6	9.2	1.65	0.837
	Above 240 Hours	3	4.6		

Secondly, the reliability and validity analysis results of the variable of perceived professional training quality in the pre-survey questionnaire are shown below.

The results of the validity test on the measurement scale of perceived training quality (Table 4.6) demonstrated that the KMO value of perceived professional training quality is equal to 0.875 (higher than 0.700) and the value of the Bartlett's test is 345.675, with a significance level below 0.001, indicating that the eight question items of perceived training quality are suitable for factor analysis.

Furthermore, the results of the exploratory factor analysis showed that the minimum value of the five factor loadings of perceived training quality is 0.759 (higher than 0.7) and the explained variance of perceived training quality is 84.383%.

In summary, the results of factor analysis for perceived training quality achieved an expected effect, and the construct validity of perceived training quality reached an ideal level.

Table 4.6 Validity of perceived training quality and results of exploratory factor analysis (N=65)

Variable	No.	Descriptive Statistics		Factor Loading	KMO	Bartlett's Test
		Mean Value	Standard Deviation			
Perceived Training Quality	PT1	4.00	0.901	0.856	0.875	345.675***
	PT2	3.85	0.939	0.759		
	PT3	4.00	0.866	0.878		
	PT4	3.95	0.874	0.886		
	PT5	3.94	0.864	0.841		

Table 4.7 shows the results of reliability analysis of perceived training quality. The results indicated that the minimum value of CITC for the five measurement items of perceived training quality is 0.805, which is much higher than 0.35; at the same time, the Cronbach's Alpha coefficient of the entire measurement scale is 0.953, which is higher than 0.8. After the item is removed, the Cronbach's Alpha coefficients for PT1 to PT5 are all lower than 0.953, demonstrating good internal consistency of the scale of perceived training quality.

Table 4.7 Reliability test results for the measurement scale of perceived training quality (N=65)

Variable	No.	CITC	Corrected Item-Total Correlation (CITC)	Cronbach's Alpha If Item Deleted	Cronbach's Alpha Coefficient

Perceived Training Quality	PT1	0.882	0.939	0.953
	PT2	0.805	0.952	
	PT3	0.895	0.937	
	PT4	0.904	0.936	
	PT5	0.865	0.942	

2. Job Embeddedness

The results of the validity test on the measurement scale of job embeddedness (Table 4.8) showed that the KMO value of job embeddedness is equal to 0.971 (higher than 0.700) and the value of the Bartlett's test is 561.894, with a significance level lower than 0.001, indicating that the seven question items of job embeddedness are suitable for factor analysis.

Furthermore, except for one item, all factor loading coefficients of job embeddedness are higher than 0.7 (given the small sample size of the survey, it is acceptable for an individual item to be higher than 0.6), and the explained variance of job embeddedness is 81.307%.

To sum up, the results of factor analysis for job embeddedness achieved a desired outcome, and the construct validity of job embeddedness reached an ideal level.

Table 4.8 Validity of job embeddedness and results of exploratory factor analysis (N=65)

Variable	No.	Descriptive Statistics		Factor Loading	KMO	Bartlett's Test
		Mean Value	Standard Deviation			
Job Embeddedness	JE1	3.74	1.004	0.753	0.971	561.894***
	JE2	3.88	0.976	0.649		
	JE3	3.35	1.124	0.873		
	JE4	3.48	1.017	0.902		
	JE5	3.42	1.044	0.925		
	JE6	3.60	1.012	0.804		
	JE7	3.32	1.161	0.786		

Table 4.9 shows the reliability analysis results of job embeddedness. The results suggested that the minimum value of CITC for the seven measurement items of job embeddedness is 0.744, which is much higher than 0.35; meanwhile, the Cronbach's Alpha coefficient of the entire scale is 0.961, which is higher than 0.8. After the item is deleted, the Cronbach's Alpha coefficients for JE1 to JE7 are all lower than 0.961, indicating good internal consistency of the scale of job embeddedness.

Table 4.9 Reliability test results for the measurement scale of job embeddedness (N=65)

Variable	No.	CITC	Corrected Item-Total Correlation (CITC) Cronbach's Alpha If Item Deleted	Cronbach's Alpha Coefficient
Job Embeddedness	JE1	0.819	0.958	0.961
	JE2	0.744	0.960	
	JE3	0.907	0.951	
	JE4	0.930	0.949	
	JE5	0.945	0.948	
	JE6	0.856	0.955	
	JE7	0.843	0.957	

3. Turnover Intention

The reliability and validity analysis results of the variable of turnover intention in the pre-survey questionnaire are shown below.

The validity test results for the measurement scale of turnover intention (Table 4.10) showed that the KMO value of turnover intention equals to 0.768 (higher than 0.700) and the value of the Bartlett's test is 174.130, with a significance level lower than 0.001, demonstrating that the four question items of turnover intention are suitable for factor analysis.

Moreover, the results of the exploratory factor analysis suggested that the minimum value of the four factor loadings of turnover intention is 0.716 (higher than 0.7) and the explained variance of turnover intention is 77.822%.

In conclusion, the results of factor analysis for turnover intention were in line with expectations, and the construct validity of turnover intention has realized an intended level.

Table 4.10 Validity of turnover intention and results of exploratory factor analysis (N=65)

Variable	No.	Descriptive Statistics		Factor Loading	KMO	Bartlett's Test
		Mean Value	Standard Deviation			
Turnover Intention	TI1	2.37	1.009	0.831	0.768	174.130***
	TI2	2.45	1.031	0.735		
	TI3	2.43	0.984	0.831		
	TI4	2.42	0.998	0.716		

Table 4.11 shows the reliability analysis results of turnover intention. The results indicated that the minimum value of CITC for the four measurement items of turnover intention is 0.730, which is much higher than 0.35; at the same time, the Cronbach's Alpha coefficient of the entire measurement scale is 0.904, which is higher than 0.8. After the item is removed, the Cronbach's Alpha coefficients for TI1 to TI4 are all lower than 0.904, showing good internal consistency of the scale of turnover intention.

Table 4.11 Reliability test results for the measurement scale of turnover intention (N=65)

Variable	No.	CITC	Corrected Item-Total Correlation (CITC) Cronbach's Alpha if Item Deleted	Cronbach's Alpha Coefficient
Turnover Intention	TI1	0.832	0.859	0.904
	TI2	0.749	0.890	
	TI3	0.831	0.860	
	TI4	0.730	0.895	

4.4.3 Revision of questionnaire

This study collected data in the form of questionnaire survey. To ensure the reliability and validity of the core variables involved in this study, including professional training, job embeddedness, and turnover intention, this thesis first referred to mature scales in related

research both domestically and internationally, and amended the content of the questionnaire in accordance with the opinions of management experts and industry experts. Second, the author conducted a pre-survey using the questionnaire that had been roughly developed and analysed the reliability and validity of the pre-survey results. According to the data analysis results shown above, the author deleted unqualified items and simplified some of the expressions that the respondents thought were too obscure and difficult to understand during the survey. During this process, this thesis mainly found three problems, which were revised accordingly to form a formal questionnaire:

First, the pre-survey results on the educational background of respondents showed that the number of respondents with a doctoral degree was 0, which proved that the scale did not objectively reflect the educational background of the respondents. Therefore, the relevant items in the questionnaire were changed to “Below Bachelor’s Degree”, “Bachelor’s Degree”, and “Master’s Degree and Above”.

Second, the pre-survey results on the amount of professional training time showed that only 3 respondents received “more than 240 hours” of professional training, accounting for 4.6%, while the number of respondents who received “less than 48 hours” of professional training was 35, accounting for 53.8%. This finding suggested that the scale failed to accurately reflect the distribution of the amount of time the respondents received professional training. Therefore, by taking into account relevant interviews, this research modified relevant items into “24 hours and below”, “24 to 48 hours (including 48 hours)”, “48 to 120 hours (including 120 hours)”, and “more than 120 hours”.

The third problem is about the influencing factors at the enterprise level. In the Chinese context, the nature of enterprises is different, and there are significant cultural, operational, and working environment variances within Chinese enterprises. For example, the overall working environment of private enterprises is poor, while state-owned enterprises can offer greater job security, both of which may have an impact on the turnover intention of employees. Therefore, by integrating interviews and research information, this study increased the collection of information on the nature and characteristics of enterprises, and divided enterprises into four categories, namely state-owned enterprises, private enterprises, joint ventures, and foreign-funded enterprises.

In addition, the researcher eliminated or revised questions that were difficult to answer based on the relatively professional and objective evaluation of the respondents on the questionnaire. Finally, under the premise of ensuring the reliability and validity of the revised questionnaire, the final draft of the questionnaire “Survey on The Working Conditions of

Employees in Technology-based SMEs" was formed (see the appendix for details).

4.5 Data collection and descriptive statistics

4.5.1 Data collection

This study focuses on the impact of professional training on the turnover intention of R&D personnel in technology-based small and medium-sized enterprises (SMEs). To achieve the research objectives, two requirements must be ensured for the survey participants: technology-based SMEs and R&D personnel. Therefore, based on the experience from a preliminary small-scale survey, the following steps were taken before the formal survey:

First, technology industries such as information technology, electronics, bioengineering, new materials, and new energy were identified for the surveyed companies.

Second, efforts were made to select small and medium-sized enterprises from the initially identified surveyed companies.

Third, to address concerns about personal information disclosure, the distribution of questionnaires was primarily conducted through forwarding among R&D employees, avoiding involvement of the human resources department and department managers.

Lastly, due to the vast size and significant regional differences in China, the regional environment and level of economic development of the companies may have a significant impact on the research results. Therefore, this study distributed questionnaires through different channels in multiple provinces and regions to obtain a more diverse research sample.

The data collection of this study has gone through small sample survey and formal investigation. In the first stage, a combination of paper questionnaires and Wenjuanxing electronic questionnaires is used for data collection. This is mainly done to collect data and also to obtain feedback and suggestions from the survey participants through interviews. In the second stage, all data collection is done through Wenjuanxing online platform by distributing electronic questionnaires. The specific data collection process is as follows.

In the first stage (the field research and pre-survey phase, July to August 2022), this study investigated a number of enterprises in Chengdu, such as Chengdu Hermes Technology Co., Ltd and Junhao Technology through field research. While conducting research on these case enterprises, by virtue of the collaborative relationship between the researcher and some park administrative committees, the researcher was able to conduct questionnaire surveys on technology-based enterprises in several science and technology parks, including Tianfu

Software Park and UESTC Industrial Park. In addition, relying on the University of Electronic Science and Technology of China, where the researcher studied, questionnaires were distributed to graduates majoring in computer, electronic information, and communication. During this process, 89 questionnaires were distributed and collected through offline questionnaire surveys and an online questionnaire platform Wenjuanxing. After excluding invalid questionnaires, 65 valid questionnaires were obtained, with a questionnaire recovery rate of 73.0%.

In the second stage (the large-scale questionnaire survey stage, September to November 2022), this research mainly collected questionnaires in three ways. The first is to entrust technical personnel of enterprises in different regions (including Chengdu, Beijing, Shanghai, and other cities) to distribute questionnaires among colleagues. The second is to rely on the alumni groups of UESTC, Sichuan University, Chengdu University of Information Technology and other universities to conduct a questionnaire survey on graduates majoring in science and engineering. Students of these majors often work in technology-based companies and can answer the questionnaire well. The third is to work with professional research institutions. The author entrusted a professional market research organization to issue questionnaires.

Through the above data collection methods, 715 questionnaires were finally recovered in this study, and 623 valid questionnaires were collected after excluding invalid questionnaires. The technology-based enterprises involved in these questionnaires come from first-tier and second-tier cities across the country. The demographic characteristics of respondents who filled out the questionnaires also demonstrated a certain degree of heterogeneity. The overall sampling was relatively good, with a certain degree of breadth and universality.

4.5.2 Descriptive statistical analysis

In this part, the author performed descriptive statistical analysis on the 623 valid questionnaires that were gathered, focusing primarily on individual and organizational data, including the gender, age, educational background, and hierarchy of the respondents, the nature and years of establishment of the enterprises, as well as the number of employees and annual turnover of the enterprises. Table 4.12 displays the descriptive statistical analysis of the survey data.

Table 4.12 Descriptive statistics of sample data

Content of the Questionnaire	Group	Frequency	Relative Frequency	Cumulative Frequency
Gender of Respondent	Male	495	79.45%	79.45%
	Female	128	20.55%	100.0%
Age of Respondent	25 Years Old and below	33	5.3%	5.3%
	26 to 35 Years Old	316	50.72%	56.0%

	36 to 45 Years Old	274	43.98%	100.0%
Educational Background of Respondent	Below Bachelor's Degree	48	7.7%	7.7%
	Bachelor's Degree	284	45.59%	53.3%
	Master's Degree and Above	291	46.71%	100.0%
Respondent Hierarchy	Technical Staff at the Grassroots Level	296	47.51%	47.51%
	Middle-level Technical Staff	225	36.12%	83.6%
	Senior Technical Staff	102	16.37%	100.0%
Nature of the Enterprise	State-owned Enterprise	111	17.82%	17.82%
	Private Enterprise	453	72.71%	90.5%
	Joint Ventures	30	4.82%	95.3%
	Foreign-funded Enterprise	29	4.65%	100%
Years of Establishment of the Enterprise	Less than 3 Years	60	9.63%	9.63%
	3 to 6 Years	93	14.93%	24.5%
	More than 6 Years	470	75.44%	100.0%
Number of Employees of the Enterprise	Less than 50 People	109	17.5%	17.5%
	50 to 100 People	89	14.29%	31.7%
	100 to 300 People	105	16.85%	48.4%
	More than 300 People	320	51.36%	100.0%
Annual Turnover of the Enterprise	Less than 10 million Yuan	96	15.41%	15.4%
	10 to 50 million Yuan	107	17.17%	32.6%
	50 to 100 million Yuan	80	12.84%	45.3%
	More than 100 million Yuan	340	54.57%	100.0%

Descriptive statistics show that just 128 (20.55%) of the respondents are female, while 495 respondents (79.45%) are male. The majority of the respondents are aged between 26-35 years old (50.72%) and 36-45 years old (43.98%). The educational background is mainly undergraduate (45.59%) and master's degree (46.71%). Among the surveyed individuals, the majority are grassroots technical personnel (47.51%) and middle-level technical personnel (36.12%). In terms of the companies, most of the respondents come from private enterprises (72.71%), and most of respondents work in enterprises that have been established for more than 6 years (75.44%). More than half of the respondents work in enterprises with more than 300 employees (51.36%), and more than half of the respondents work in enterprises with a scale of more than 100 million yuan (54.57%).

At the same time, the author conducted descriptive statistical analysis on the main variables involved in the study, including professional training, job embeddedness, and turnover intention. This study used the Likert five-point scale to describe the values, skewness and kurtosis of professional training, job embeddedness, and turnover intention. By sorting out the questionnaire data, the maximum, minimum, and mean value of each variable were counted. The results are shown in Table 4.13.

Table 4.13 Descriptive statistics of variables

Variable	N	Maximum	Minimum	Mean Value	Standard Deviation	Skewness	Kurtosis
PT1	623	5	1	3.71	1.055	-0.556	-0.067
PT2	623	5	1	3.65	1.027	-0.471	-0.095
PT3	623	5	1	3.69	1.005	-0.430	-0.187
PT4	623	5	1	3.71	1.019	-0.473	-0.150
PT5	623	5	1	3.70	.989	-0.409	-0.145
JE1	623	5	1	3.46	1.018	-0.260	-0.214
JE2	623	5	1	3.44	1.049	-0.227	-0.345
JE3	623	5	1	3.30	1.060	-0.106	-0.447
JE4	623	5	1	3.35	1.085	-0.187	-0.501
JE5	623	5	1	3.17	1.137	-0.038	-0.621
JE6	623	5	1	3.35	1.069	-0.195	-0.331
JE7	623	5	1	3.26	1.106	-0.131	-0.392
TI1	623	5	1	2.65	1.123	0.228	-0.482
TI2	623	5	1	2.80	1.153	0.072	-0.691
TI3	623	5	1	2.70	1.126	0.227	-0.532
TI4	623	5	1	2.69	1.085	0.295	-0.240

4.6 Reliability and validity analysis of the questionnaire

To ensure the reliability of the research data, the author used SPSS22.0 software and AMOS24.0 software for reliability and validity analysis. Specifically, this study applied SPSS22.0 software to test the reliability of the core variables involved in this study (professional training, job embeddedness, and turnover intention) and to examine the CITC and Cronbach's α coefficients. At the same time, AMOS24.0 software was used for confirmatory factor analysis and the examination of factor loading, Chi-square ratio, CFI, RMSEA, AVE and other coefficients.

4.6.1 Reliability analysis

Reliability analysis is mainly used to evaluate the reliability of the questionnaire, judge the consistency and stability of the questionnaire results, and whether the questionnaire can reliably and effectively measure related variables. In reliability analysis, the author mainly examined the two major indicators of CITC and Cronbach's α coefficient. The questionnaire is considered to have good reliability when the CITC is higher than 0.35 and the Cronbach's α coefficient is higher than 0.8.

1. Perception of Professional Training Quality

The scale of the perception of professional training quality was measured with 5 items after a small sample test and revision, among which PT1 and PT2 were used to describe the content of professional training perception, and PT3, PT4 and PT5 were mainly used to describe the

effect of professional training perception.

The results of reliability analysis showed that all of the CITC coefficients are greater than 0.35, the Cronbach's Alpha coefficient of the entire measurement scale is 0.943, which is higher than 0.8, and after the item is removed, the Cronbach's alpha coefficients for all measurement items are less than 0.943, meaning that the measurement scale of professional training perception met the reliability requirements.

The results are shown in Table 4.14.

Table 4.14 Reliability analysis of perceived professional training quality

Variable	Item	CITC	Corrected Item-Total Correlation (CITC) Cronbach's Alpha If Item Deleted	Cronbach's Alpha Coefficient
Professional Training Perception	PT1	0.789	0.940	0.943
	PT2	0.869	0.925	
	PT3	0.892	0.921	
	PT4	0.839	0.930	
	PT5	0.837	0.931	

2. Job Embeddedness

The scale of job embeddedness was measured with 7 items after a small sample test and revision. Items JE1 to JE6 were used to describe the embeddedness, dependence, and integration of employees into the enterprise; item JE7 was mainly used to describe the possible impact of the resignation of employees.

The reliability analysis results demonstrated that all of the CITC coefficients are greater than 0.35, the Cronbach's α value of the entire measurement scale is 0.952, which is higher than 0.8, and after the item is removed, the Cronbach's alpha coefficients for all measurement items are less than 0.952, indicating that the measurement scale of job embeddedness met the reliability requirements.

The results are shown in Table 4.15.

Table 4.15 Reliability analysis of job embeddedness

Variable	Item	CITC	Corrected Item-Total Correlation (CITC) Cronbach's Alpha If Item Deleted	Cronbach's Alpha Coefficient
Job Embeddedness	JE1	0.816	0.946	0.952
	JE2	0.814	0.946	
	JE3	0.822	0.946	
	JE4	0.878	0.941	
	JE5	0.884	0.940	
	JE6	0.877	0.941	
	JE7	0.766	0.951	

3. Turnover Intention

The scale of turnover intention was measured with 4 items after a small sample test and revision. Items TI1 to TI4 were used to measure the satisfaction of employees with the current

job and their possibility of leaving the current job.

The results of reliability analysis showed that all of the CITC coefficients are higher than 0.35, the Cronbach's α value of the entire measurement scale is 0.912, which is higher than 0.8, and after the item is removed, the Cronbach's alpha coefficients for all measurement items are less than 0.912, meaning that the measurement scale of turnover intention met the reliability requirements.

The results are shown in Table 4.16.

Table 4.16 Reliability analysis of turnover intention

Variable	Item	CITC	Corrected Item-Total Correlation (CITC) Cronbach's Alpha If Item Deleted	Cronbach's Alpha Coefficient
Turnover Intention	TI1	0.795	0.887	0.912
	TI2	0.828	0.876	
	TI3	0.797	0.887	
	TI4	0.779	0.893	

4.6.2 Validity analysis

The purpose of validity analysis is to judge whether the questionnaire questions can effectively measure the variables that researcher need to measure, that is to measure the correctness of the variables. In this study, the author used AMOS24.0 software to measure the validity of related variables, mainly involving several key indicators, including AVE (>0.5), chi-square to degrees of freedom ratio (3-5), RMSEA (<0.1), NFI (>0.9), TLI (>0.9), CFI (>0.9), and factor loading (>0.7). Meeting the standards of these indicators means that the validity of the questionnaire is high.

1. Validity of Professional Training Quality Perception

It can be seen from Table 4.17 that the chi-square to degrees of freedom ratio of professional training quality perception is 4.275, which is less than 5 and at an acceptable level; RMSEA is 0.097, which is less than 0.1, meaning that the parameter test criteria were met.

Secondly, the variable indicators NFI=0.929, TLI=0.920, and CFI=0.939, which are all higher than 0.9, indicating that the results of model fitting were good.

Finally, the standard factor loadings corresponding to each item of professional training perception are higher than 0.7, with a significance level of $p<0.001$; AVE is 0.769, higher than 0.5, which is at an acceptable level.

Therefore, the measurement items of professional training perception had good convergent validity.

Table 4.17 Validity test results of perceived professional training quality

Variable	Item	Standard Loading	Factor	Standard Error	Critical Ratio	AVE
Perception of Professional Training	PT1	0.819***				0.769
	PT2	0.904***		0.038	28.470	
	PT3	0.932***		0.036	29.916	
	PT4	0.866***		0.038	26.572	
	PT5	0.861***		0.037	26.319	
Goodness of fit index	χ^2 / df=4.275，RMSEA=0.097，NFI=0.929，TLI=0.920，CFI=0.939					

2. Validity of Job Embeddedness

It can be seen from the results in Table 4.18 that the chi-square to degrees of freedom ratio of job embeddedness is 4.264, which is less than 5 and at an acceptable level; RMSEA is 0.091, which is less than 0.1, meaning that the parameter test criteria were met.

Secondly, the variable indicators NFI=0.937, TLI=0.927, and CFI=0.943, which are all higher than 0.9, indicating that the model fitting had a good result.

Finally, the standard factor loadings corresponding to each item of job embeddedness are all higher than 0.7, with a significance level of p<0.001; AVE is 0.696, higher than 0.5, which is at an acceptable level.

Therefore, the measurement items of job embeddedness exhibited sound convergent validity.

Table 4.18 Validity test results of job embeddedness

Variable	Item	Standard Loading	Factor	Standard Error	Critical Ratio	AVE
Job Embeddedness	JE1	0.834***				0.696
	JE2	0829***		.040	25.725	
	JE3	0.844***		.040	26.492	
	JE4	0.904***		.039	29.823	
	JE5	0.912***		.040	30.327	
	JE6	0.908***		.038	30.082	
	JE7	0.791***		.043	23.913	
Goodness of fit index	χ^2 / df=4.264，RMSEA=0.091，NFI=0.937，TLI=0.927，CFI=0.943					

3. Validity of Turnover Intention

It can be seen from the results in Table 4.19 that the chi-square to degrees of freedom ratio of turnover intention is 3.682, which is less than 5 and at an acceptable level; RMSEA is 0.096, which is less than 0.1, meaning that the parameter test criteria were met.

Secondly, the variable indicators NFI=0.929, TLI=0.928, and CFI=0.939, which are all higher than 0.9, indicating that the model fitting results were good.

Finally, the standard factor loadings corresponding to each item of turnover intention are all higher than 0.7, with a significance level of p<0.001; AVE is 0.721, higher than 0.5, which is at

an acceptable level.

Therefore, the measurement items of turnover intention enjoyed good convergent validity.

Table 4.19 Validity test results of turnover intention

Variable	Item	Standard Factor Loading	Standard Error	Critical Ratio	AVE
Turnover Intention	TI1	0.846***			0.721
	TI2	0.893***	0.039	28.022	
	TI3	0.842***	0.039	25.713	
	TI4	0.813***	0.038	24.349	
Goodness of fit index	χ^2 / df=3.682，RMSEA=0.096，NFI=0.929，TLI=0.928，CFI=0.939				

4.7 Summary

This chapter describes the research ideas and methods for the subsequent study, and carries out questionnaire design and modification, Then, the data was collected through a large-scale questionnaire survey. Descriptive analysis and reliability and validity analysis were performed based on the selected valid questionnaires to verify data quality, preparing for the empirical stage of the research. After item design, questionnaire design and statistical analysis of small sample survey in this chapter, the research hypotheses and model from previous chapters are transformed into a survey questionnaire that can obtain quantitative data through large-scale surveys. The appropriate survey objects and methods are determined, the analysable data are obtained and significant progress is made from conceptualization to model to data in the research work. Therefore, the research content of this chapter plays a pivotal role in linking the previous and subsequent work.

Specifically, the researcher first clarified the research methods to be used, such as survey questionnaires and statistical analysis, for conducting this study. Then, the initial draft of the survey questionnaire was composed of items on perceived quality of professional training and mature domestic and international questionnaires based on professional training, job embeddedness, turnover intention, and related moderating variables. Subsequently, multiple rounds of interviews with scholars and experts were conducted, taking into account the application context of the respondents. Based on the principles of questionnaire design, a small-sample survey questionnaire was completed. After the small-sample survey, the items were analysed for reliability and validity. Based on the analysis results and feedback from the respondents, the items and questionnaire were further refined to form the final version of the survey questionnaire. At the same time, based on observations and communication with the respondents, appropriate methods and channels for distributing the questionnaire were

determined, and relevant taboos and precautions were identified. Upon completing all preparatory work for the survey, the formal questionnaire survey was initiated. After conducting a preliminary assessment of the collected questionnaires, valid questionnaires were confirmed. Descriptive analysis was then performed on the valid questionnaires to examine the overall data quality. Subsequently, a reliability and validity analysis was conducted to further confirm that the items and their data meet the standards for regression analysis. The subsequent research work will officially enter the stage of empirical quantitative analysis.

Chapter 5: Empirical Analysis and Results

This chapter tested the research hypotheses and research models through the data, providing the basis for drawing research conclusions. First, based on STATA16.0 software, OLS regression model was used to test the relationship among professional training, job embeddedness and turnover intention. After that, multiple regression analysis was adopted to further test the group effects of the three categorical variables of employee gender, employee educational background, and employee hierarchy.

5.1 Test of professional training, job embeddedness and turnover intention hypotheses

5.1.1 Analysis of the effect of professional training on turnover intention

Based on the STATA16 software, the OLS regression model was employed to analyse data in this study. First, this thesis tested the main effect of professional training on turnover intention, that is, the regression analysis of the impact of professional training time (X1) and perceived professional training quality (X2) on turnover intention. The results are shown in Table 5.1.

Table 5.1 Regression analysis results of professional training on turnover intention

Main Effect Test		
	TI	TI
	(1)	(2)
X1	-0.090**	
	(-2.576)	
X2		-0.123**
		(-2.499)
Gender	0.083	0.091
	(0.768)	(0.839)
Age	0.068	0.051
	(0.837)	(0.625)
Educational Background	0.104	0.081
	(1.456)	(1.127)
Employee Hierarchy	-0.319***	-0.316***
	(-5.000)	(-4.973)
Nature of the Enterprise	0.084	0.094
	(1.409)	(1.571)
Years of Establishment of the Enterprise	-0.019	-0.038
	(-0.270)	(-0.547)
Number of Employees of the Enterprise	0.075	0.081
	(1.322)	(1.452)

Annual Turnover of the Enterprise	-0.055	-0.066
	(-0.960)	(-1.172)
Constant Term	2.771***	3.150***
	(7.716)	(7.933)
N	623	623
r2_a	0.060	0.062
F	5.399	5.589

According to the results of the regression analysis model, the Adjusted R^2=0.06 and F=5.399 of model 1, and the Adjusted R^2=0.062 and F=5.589 of model 2 indicated that the overall model fitting was good.

According to the results of the significance analysis, the direct effect and its effectiveness showed that professional training time had a significant negative impact on turnover intention (β=-0.090, P<0.005) and perceived professional training quality has a significant negative effect on turnover intention (β=-0.123, P<0.005). It meant that the longer the professional training time received by employees of technology-based SMEs, the better the perceived quality of professional training, and the lower the turnover intention of employees.

Hypothesis H1 (H1A, H1B) passed the empirical test.

5.1.2 Analysis of the effect of professional training on job embeddedness

This thesis examined the effect of professional training on job embeddedness, that is, the regression analysis of the impact of professional training time (X1) and professional training quality perception (X2) on job embeddedness.

The results are shown in Table 5.2. According to the results of the regression analysis model, the Adjusted R^2=0.06 and F=5.349 of the model 3, and the Adjusted R^2=0.274 and F=28.640 of the model 4 demonstrated that the overall model fitting was good.

According to the results of the significance analysis, the direct effect and its effectiveness showed that professional training time had a significant positive impact on job embeddedness (β=0.127, P<0.001) and perceived professional training quality has a significant positive effect on job embeddedness (β=0.504, P<0.001). It meant that the longer the professional training time received by employees of technology-based SMEs, the better the perceived quality of professional training, and the greater the job embeddedness of employees.

Hypothesis H2 passed the empirical test.

Table 5.2 Regression analysis results of professional training on job embeddedness

Main Effect Test		
	JE	JE
	(3)	(4)
X1	0.127***	
	(3.807)	

X2		0.504***
		(12.721)
Gender	0.157	0.087
	(1.645)	(1.086)
Age	0.140*	0.182***
	(1.818)	(2.879)
Educational Background	-0.041	0.022
	(-0.585)	(0.370)
Employee Hierarchy	0.190***	0.170***
	(3.135)	(3.214)
Nature of the Enterprise	-0.123**	-0.162***
	(-2.112)	(-3.262)
Years of Establishment of the Enterprise	-0.060	-0.020
	(-0.882)	(-0.337)
Number of Employees of the Enterprise	-0.037	-0.080*
	(-0.686)	(-1.745)
Annual Turnover of the Enterprise	0.053	0.065
	(1.025)	(1.498)
Constant Term	2.645***	1.009***
	(7.419)	(3.424)
N	623	623
r2_a	0.060	0.274
F	5.349	28.640

5.1.3 Analysis of the effect of job embeddedness on turnover intention

This thesis tested the effect of job embeddedness on turnover intention, that is, the regression analysis of the impact of job embeddedness (JE) on turnover intention (TI). The results are shown in Table 5.3.

According to the results of the regression analysis model, the Adjusted R^2=0.06 and F=5.399 of model 5, and the Adjusted R^2=0.145 and F=10.325 of model 6 indicated that the overall model fitting was good.

According to the results of the significance analysis, the direct effect and its effectiveness showed that job embeddedness has a significant negative effect on turnover intention (β=-0.320, P<0.001), which suggested that the higher the sense of job embeddedness of employees in technology-based SMEs, the lower their intention to leave.

Hypothesis H3 passed the empirical test.

Table 5.3 Regression analysis results of job embeddedness on turnover intention

Main Effect Test		
	TI	TI
	(5)	(6)
JE		-0.320***
		(-5.671)
Gender	0.083	0.133
	(0.768)	(1.297)

Age	0.068	0.113
	(0.837)	(1.396)
Educational Background	0.104	0.091
	(1.456)	(1.313)
Employee Hierarchy	-0.319***	-0.258***
	(-5.000)	(-4.166)
Nature of the Enterprise	0.084	0.044
	(1.409)	(0.742)
Years of Establishment of the Enterprise	-0.019	-0.038
	(-0.270)	(-0.560)
Number of Employees of the Enterprise	0.075	0.063
	(1.322)	(1.200)
Annual Turnover of the Enterprise	-0.055	-0.038
	(-0.960)	(-0.686)
Constant Term	2.771***	3.618***
	(7.716)	(9.287)
N	623	623
r2_a	0.060	0.145
F	5.399	10.325

5.1.4 Analysis of the Mediating Effect of Job Embeddedness

This thesis examined the mediating role of job embeddedness between professional training and turnover intention. The author used the Sobel test to analyse this effect, and the results are shown in Table 5.4.

Table 5.4 Regression analysis results of the mediating effect of job embeddedness

	Mediating Effect Test					
	Mediating Effect of X1			Mediating Effect of X2		
	TI	JE	TI	TI	JE	TI
	(7)	(8)	(9)	(10)	(11)	(12)
X1	-0.090**	0.127***	-0.049			
	(-2.576)	(3.807)	(-1.459)			
X2				-0.123**	0.504***	0.056
				(-2.499)	(12.721)	(1.302)
JE			-0.320***			-0.357***
			(-5.671)			(-6.724)
Gender	0.083	0.157	0.133	0.091	0.087	0.122
	(0.768)	(1.645)	(1.297)	(0.839)	(1.086)	(1.192)
Age	0.068	0.140*	0.113	0.051	0.182***	0.116
	(0.837)	(1.818)	(1.396)	(0.625)	(2.879)	(1.426)
Educational Background	0.104	-0.041	0.091	0.081	0.022	0.088
	(1.456)	(-0.585)	(1.313)	(1.127)	(0.370)	(1.256)
Employee Hierarchy	-0.319***	0.190***	-0.258***	-0.316***	0.170***	-0.255***
	(-5.000)	(3.135)	(-4.166)	(-4.973)	(3.214)	(-4.136)
Nature of the Enterprise	0.084	-0.123**	0.044	0.094	-0.162***	0.036
	(1.409)	(-2.112)	(0.742)	(1.571)	(-3.262)	(0.607)
Years of Establishment of	-0.019	-0.060	-0.038	-0.038	-0.020	-0.046

the Enterprise						
	(-0.270)	(-0.882)	(-0.560)	(-0.547)	(-0.337)	(-0.672)
Number of Employees of the Enterprise	0.075	-0.037	0.063	0.081	-0.080*	0.053
	(1.322)	(-0.686)	(1.200)	(1.452)	(-1.745)	(0.999)
Annual Turnover of the Enterprise	-0.055	0.053	-0.038	-0.066	0.065	-0.043
	(-0.960)	(1.025)	(-0.686)	(-1.172)	(1.498)	(-0.784)
Constant Term	2.771***	2.645***	3.618***	3.150***	1.009***	3.510***
	(7.716)	(7.419)	(9.287)	(7.933)	(3.424)	(8.523)
N	623	623	623	623	623	623
r2_a	0.060	0.060	0.145	0.062	0.274	0.144
F	5.399	5.349	10.325	5.589	28.640	11.120
Sobel-Z		-3.428***			-6.783***	

First, the mediating role of job embeddedness between professional training time (X1) and turnover intention was analysed. The regression analysis of Models 7, 8, and 9 revealed that professional training time has a significant negative impact on the turnover intention of employees (β=-0.090, P<0.005), yet a significant positive impact on the job embeddedness of employees (β=0.127, P<0.001). After job embeddedness was added to the model, professional training time shows no significant effect on the turnover intention of employees, while job embeddedness shows a significant negative impact on turnover intention (β=-0.320, P<0.001). Besides, the Sobel-Z coefficient of the entire model is -3.428, with a significance level of p<0.001, indicating that job embeddedness played a significant mediating role between professional training time and turnover intention. In addition, the Adjusted R^2 and F coefficients of Models 7, 8, and 9 were good, suggesting a high level of model stability.

Second, the mediating role of job embeddedness between professional training quality perception (X2) and turnover intention was analysed. The regression analysis of Models 10, 11, and 12 showed that perceived professional training quality has a significant negative impact on the turnover intention of employees (β=-0.123, P<0.005), yet a significant positive impact on the job embeddedness of employees (β=0.504, P<0.001). After job embeddedness was added to the model, perceived professional training quality shows no significant effect on the turnover intention of employees, while job embeddedness shows a significant negative impact on turnover intention (β=-0.357, P<0.001). The Sobel-Z coefficient of the entire model is -6.783, with a significance level of p<0.001, indicating that job embeddedness had a significant mediating effect between perceived professional training quality and turnover intention. In addition, the Adjusted R^2 and F coefficients of Models 10, 11, and 12 were good, indicating a high level of model stability.

To sum up, job embeddedness played a significant mediating role between professional

training time (X1), perception of professional training quality (X2) and turnover intention. Hypothesis H4 passed the empirical test.

5.2 Group effect test of the characteristics of employees

5.2.1 Analysis of group effect of employee gender

As mentioned above, this thesis believed that employees of different genders in technology-based SMEs might have different recognition for professional training, or that professional training showed different effects on employees of different genders, thus producing differential effect of gender. Based on this hypothesis, this thesis conducted a regression test of group effect, assigning a value of 1 to men and 2 to women, and performing regression analysis respectively. The results are shown in Table 5.5.

Table 5.5 Group effect analysis results of employee gender

	Gender Grouping			
	Gender=1	Gender=1	Gender=2	Gender=2
	TI	TI	TI	TI
	(1)	(2)	(3)	(4)
X1	-0.078**		-0.120	
	(-2.036)		(-1.392)	
X2		-0.147***		-0.015
		(-2.827)		(-0.105)
Age	0.022	-0.003	0.229	0.226
	(0.261)	(-0.039)	(1.019)	(1.005)
Educational Background	0.079	0.064	0.224	0.192
	(0.992)	(0.807)	(1.350)	(1.180)
Employee Hierarchy	-0.276***	-0.265***	-0.483**	-0.494**
	(-4.073)	(-3.942)	(-2.424)	(-2.510)
Nature of the Enterprise	0.096	0.117*	0.083	0.085
	(1.457)	(1.735)	(0.584)	(0.621)
Years of Establishment of the Enterprise	-0.008	-0.027	-0.076	-0.106
	(-0.113)	(-0.370)	(-0.398)	(-0.528)
Number of Employees of the Enterprise	0.072	0.083	0.075	0.068
	(1.165)	(1.373)	(0.540)	(0.487)
Annual Turnover of the Enterprise	-0.030	-0.034	-0.113	-0.142
	(-0.454)	(-0.538)	(-0.890)	(-1.167)
Constant Term	2.798***	3.230***	2.916***	2.963***
	(7.888)	(8.236)	(3.690)	(3.207)
N	495	495	128	128
r2_a	0.053	0.066	0.033	0.018

F	4.312	4.894	1.649	1.445

The regression results of male employees indicated that professional training time (β=-0.078, P<0.005) and perceived professional training quality (β=-0.147, P<0.001) have a significant negative impact on turnover intention. This suggested that the longer the professional training time received by male employees in technology-based SMEs, the higher the quality of professional training they perceive, the greater the effect of professional training on them, and the lower their turnover intention. The regression results of female employees showed that professional training time and perceived quality of professional training had no significant impact on their turnover intention. Although the β coefficient of the regression result is negative, the significance result falls short of the required level, indicating that female employees did not recognize professional training as highly as male employees did and that professional training did not significantly affect female employees.

5.2.2 Group effect analysis of employee educational background

This thesis argued that employees with different educational levels in technology-based SMEs might have different needs and recognition for professional training, and the benefits of professional training for employees with different educational backgrounds might differ, resulting in the differential effect of educational background. Based on this hypothesis, this thesis conducted a regression test of the group effect. According to the difference in educational background, employees with an education level below a bachelor's degree were assigned a value of 1, those with a bachelor's degree were assigned a value of 2, and those with a master's degree or above were assigned a value of 3. Employees were divided into 3 groups for regression analysis, and the results are shown in Table 5.6.

Table 5.6 Results of group effect analysis of employee educational background

	Grouping of Educational Background					
	EB=1	EB =1	EB =2	EB=2	EB =3	EB =3
	TI	TI	TI	TI	TI	TI
	(1)	(2)	(3)	(4)	(5)	(6)
X1	-0.332*		-0.112**		-0.058	
	(-1.733)		(-2.212)		(-1.107)	
X2		0.114		-0.175***		-0.102
		(0.502)		(-2.642)		(-1.288)
Gender	0.029	-0.041	0.021	0.070	0.108	0.098
	(0.071)	(-0.100)	(0.128)	(0.437)	(0.681)	(0.622)
Age	0.450	0.438	0.084	0.025	-0.033	-0.033
	(1.491)	(1.382)	(0.689)	(0.211)	(-0.301)	(-0.300)
Employee Hierarchy	-0.250	-0.471	-0.196**	-0.178*	-0.381***	-0.376***
	(-0.622)	(-1.283)	(-1.974)	(-1.781)	(-4.372)	(-4.328)
Nature of the	0.032	0.005	0.050	0.066	0.138*	0.142*

Enterprise						
	(0.069)	(0.011)	(0.575)	(0.763)	(1.829)	(1.842)
Years of Establishment of the Enterprise	-0.165	-0.304	-0.147	-0.146	0.130	0.104
	(-0.490)	(-0.953)	(-1.431)	(-1.419)	(1.435)	(1.176)
Number of Employees of the Enterprise	-0.024	-0.085	0.184**	0.181**	-0.011	-0.003
	(-0.106)	(-0.325)	(2.201)	(2.175)	(-0.135)	(-0.032)
Annual Turnover of the Enterprise	-0.106	-0.177	-0.069	-0.070	-0.035	-0.044
	(-0.419)	(-0.704)	(-0.765)	(-0.787)	(-0.437)	(-0.561)
Constant Term	3.339*	3.355*	2.975***	3.392***	3.048***	3.351***
	(1.853)	(1.924)	(6.769)	(7.374)	(6.878)	(6.074)
N	48	48	284	284	291	291
r2_a	0.069	0.005	0.037	0.049	0.085	0.089
F	2.685	1.414	2.460	2.921	4.399	4.216

The regression results of employees with an education level below a bachelor's degree showed that professional training time (β=-0.332, P<0.01) has a significant negative impact on turnover intention, while perceived professional training quality has no significant impact on turnover intention. The regression results of employees with a bachelor's degree showed that professional training time (β=-0.112, P<0.005) and professional training quality perception (β=-0.175, P<0.001) have a significant negative impact on turnover intention. The regression results of employees with a master's degree or above suggested that both professional training time and perceived professional training quality have no significant impact on turnover intention.

The results of group regression analysis displayed that professional training had a significant impact on employees with a bachelor's degree or below in technology-based SMEs and providing more and better professional training for these employees (especially with a bachelor's degree) could make their turnover intention lower.

5.2.3 Analysis of group effect of employee hierarchy

This thesis argued that employees at different hierarchy in technology-based SMEs might have different needs and recognition for professional training, and the benefits of professional training for employees at different position levels might differ, resulting in the differential effect of position hierarchy. Based on this hypothesis, this thesis conducted a regression test of the group effect. According to the position levels of employees, employees who were grassroots technical personnel were assigned a value of 1, those who were middle-level technical personnel were assigned a value of 2, and those who were senior technical personnel were

assigned a value of 3. Employees were divided into 3 groups for regression analysis, and the results are shown in Table 5.7.

Table 5.7 Results of group effect analysis of employee hierarchy

	Grouping of Employee Hierarchy					
	EH=1	EH=1	EH=2	EH=2	EH=3	EH=3
	TI	TI	TI	TI	TI	TI
	(1)	(2)	(3)	(4)	(5)	(6)
X1	0.008		-0.203***		-0.125	
	(0.150)		(-3.470)		(-1.407)	
X2		-0.035		-0.221***		-0.073
		(-0.463)		(-2.757)		(-0.602)
Gender	0.112	0.120	0.033	0.034	-0.043	-0.053
	(0.802)	(0.863)	(0.176)	(0.180)	(-0.131)	(-0.177)
Age	0.026	0.027	0.018	-0.014	0.298	0.314
	(0.224)	(0.232)	(0.145)	(-0.107)	(1.047)	(1.088)
Educational Background	0.213**	0.209**	0.014	0.031	-0.117	-0.105
	(1.993)	(2.020)	(0.118)	(0.262)	(-0.677)	(-0.619)
Nature of the Enterprise	0.095	0.098	0.085	0.114	-0.081	-0.069
	(1.111)	(1.137)	(0.959)	(1.357)	(-0.371)	(-0.277)
Years of Establishment of the Enterprise	-0.085	-0.085	0.156	0.151	-0.213	-0.256*
	(-0.772)	(-0.765)	(1.469)	(1.367)	(-1.414)	(-1.728)
Number of Employees of the Enterprise	-0.005	0.001	0.012	0.021	0.449***	0.437***
	(-0.066)	(0.010)	(0.124)	(0.222)	(3.295)	(3.173)
Annual Turnover of the Enterprise	-0.066	-0.064	-0.023	-0.044	-0.254*	-0.248*
	(-0.809)	(-0.785)	(-0.239)	(-0.443)	(-1.829)	(-1.783)
Constant Term	2.481***	2.590***	2.409***	2.786***	2.408**	2.427**
	(4.492)	(4.282)	(4.643)	(4.969)	(2.304)	(2.130)
N	296	296	225	225	102	102
r2_a	0.004	0.005	0.033	0.025	0.059	0.044
F	1.203	1.193	2.142	1.405	2.398	2.507

The regression results of grassroots technicians showed that professional training time (β=0.008) and perceived professional training quality (β=-0.035) have no significant impact on turnover intention. The regression results of middle-level technical personnel suggested that both professional training time (β=-0.203, P<0.001) and perceived professional training quality (β=-0.221, P<0.001) have a significant negative impact on turnover intention. The regression results of senior technical personnel demonstrated that professional training time (β=-0.125) and perceived quality of professional training (β=-0.073) have no significant effect on turnover intention.

This indicated that professional training had the greatest effect on the middle-level

technical personnel in technology-based SMEs, and could significantly reduce their turnover intention. However, it had no significant effect on grassroots technical personnel and senior technical personnel.

5.3 Summary

This chapter completes the empirical analysis of the research, including the use of analytical tools to study the relationship effects between professional training and turnover intention, the relationship effects between professional training and job embeddedness, the relationship effects between job embeddedness and turnover intention, and the effect of job embeddedness as a mediating variable. Finally, using analytical tools to study the group effects of employee characteristic variables, the results of hypothesis testing were obtained.

The entire empirical analysis process is evaluated and the researchers adhere to a scientific and rigorous attitude, thus obtaining results that can withstand verification. In the next chapter, the research will transition from the discussion of data analysis results to research conclusion and the exploration of reasons, and from this, extract research contributions and future prospects, and reflect the limitation to propose the prospect of future research.

Chapter 6: Conclusion and Outlook

This chapter summarizes the research conclusions based on the summary of all the results of hypothesis testing and preliminary discussion and analysis, presents theoretical contributions and practical implications, reflects on the limitations of the study, and suggests future research directions. Specifically, it includes: firstly, based on the regression analysis in the previous section, the actual results of the research hypotheses are summarized, and preliminary discussions on the reasons are conducted, focusing on the hypotheses that were not supported. This lays a foundation for the summary of the research; secondly, explaining the value of the research conclusions and interpreting the research conclusions, including the impact of professional training on turnover intention, the mediating role of job embeddedness between professional training and turnover intention, and the moderating effects of employee gender, education level, and job level on the main variables; thirdly, detailing the academic value and practical value of the research. The academic value includes professional training, professional training and turnover intention, employee characteristics, social cognition and job embeddedness theory, as well as the Chinese context. The practical value is reflected in three levels: enterprises, industries, and government departments; fourthly, summarizing the limitations of the study, involving data collection, model construction, and research perspective, and mentioning the flaws and influences of the research methods in data collection; finally, providing suggestions for future research in terms of expanding the research subjects, expanding the influencing variables, and expanding the research methods.

6.1 Hypotheses test results and discussion analysis

6.1.1 Summary of hypotheses test results

The test results for hypotheses proposed in this research after empirical testing were summarized in Table 6.1.

Table 6.1 Summary of hypotheses tests

Research Hypotheses	Result
H1: Professional training has a significant negative impact on the turnover intention of R&D	Supported
H1A: The higher the intensity of professional training, the lower the turnover intention of R&D	Supported

H1B: The better the perceived professional training, the lower the turnover intention of R&D	Supported
H2: Professional training has a significant positive effect on job embeddedness	Supported
H3: Job embeddedness has a significant negative effect on turnover intention	Supported
H4: Job embeddedness mediates the relationship between professional training and turnover intention	Supported
H5: Compared with male R&D, professional training has a more significant effect on female R&D	Not Supported
H6: The effect of professional training is gradually weakened as the educational level of R&D increases	Partially Supported
H7: The effect of professional training is gradually weakened as the position hierarchy of R&D increases	Not Supported

6.1.2 The impact mechanism of professional training on job embeddedness and turnover intention

Based on the regression analysis method of empirical research, this thesis tested the relevant hypotheses on the mechanism of professional training affecting job embeddedness and turnover intention. Based on the empirical research results, the author conducted in-depth discussions on the research results. Through research and discussion, the author verified and compared the results with findings in existing research, making up for the shortcomings in existing research and contributing to related theories. Besides, this thesis could inspire future related research in this field and provide reference for scholars.

Based on the empirical analysis results, this thesis drew a diagram of the mechanism of the impact of professional training on job embeddedness and turnover intention. The mechanism is shown in Figure B.4.

First, professional training time (β=-0.090, P<0.005) and perceived quality of professional training (β=-0.123, P<0.005) both have a significant negative effect on the turnover intention of employees in technology-based SMEs. This result showed that in technology-based SMEs, the longer the professional training time provided by the enterprise to technical employees, the higher the quality of professional training, the greater the utility of professional training, and the lower the turnover intention of employees. This result once again verified the idea proposed by G. S. Becker (1962) when he divided training into different types, that is, the value of specific training is useful to the enterprise.

Technical professionals typically possess a high level of independence and autonomy, professional expertise, a strong drive for success, great job flexibility, and the desire to advance their careers quickly. Professional training can satisfy their needs, and because it is focused and targeted, it has a much greater impact on the professional abilities of employees than their general skills. As a result, technical employees are more embedded in their jobs, which

increases the cost of them leaving the current enterprise, thereby reducing their turnover intention.

The results of this research dispelled, to a certain extent, the doubts of technology-based SMEs, who hope to provide training for technical personnel to improve their technical capabilities but worry that this practice will accelerate their turnover, and provided practical evidence for technology-based SMEs to carry out professional training.

Second, professional training time (β=0.127, P<0.001) and perceived quality of professional training (β=0.504, P<0.001) have a significant positive effect on the job embeddedness of employees in technology-based SMEs. This result showed that professional training time and perceived professional training quality could significantly improve the sense of job embeddedness of employees, which verified the research results of H. Jiang et al., (2017) and other scholars.

Professional training for technical staff enables technology-based SMEs to improve the connection and communication among employees, encourage employees to align their career development with the growth of the enterprise, and strengthen the sense of identity of employees with the enterprise to feel more successful in life. Besides, professional training further improves the professional skills of employees, making their job embeddedness greater.

Through the implementation of professional training, the connection between employees and the company has become closer, while also strengthening the alignment between employees and the company. It has also increased the economic and non-economic costs for employees to leave the company. If the company continues to carry out professional training to continuously promote the development of employee capabilities to meet the needs of the company, the connection between employees and the company will continue to be enhanced, and the cost for employees to leave the company will also become increasingly significant.

Third, job embeddedness (β=-0.320, P<0.001) has a significant negative effect on the turnover intention of employees in technology-based SMEs. This result suggested that job embeddedness could significantly reduce the turnover intention of employees, which is consistent with the research conclusions of Mitchell et al., (2001) and other scholars.

By strengthening job embeddedness of employees, technology-based SMEs can enhance the connection between employees and the enterprise, including enterprise development, salary, colleague relationship, job security and so forth. Meanwhile, it improves the matching between employees and the organization, which is reflected in employees adapting to organizational culture, job requirements and other changes. Moreover, it increases the possible losses of employees leaving their jobs and the enterprise, including but not limited to economic losses

and non-economic losses such as personal brand, personal connections, and psychological security.

All of the aforementioned factors would have an impact on how employees think about resignation, causing them to experience psychological emotions of worry and panic and increasing their tendency to stay on the job. This conclusion also implies that companies should enhance employee job embeddedness by implementing various appropriate measures, such as conducting professional training, organizing team activities, designing diversified career development paths, improving working conditions, and establishing a culture of respect and fairness that addresses the immediate interests and various demands of employees. By doing so, there is no need to excessively worry about employee turnover.

Finally, the study concluded that job embeddedness played a mediating role between professional training and turnover intention. The significant negative effect of professional training time (β=-0.090, P<0.005) and perceived professional training quality (β=-0.123, P<0.005) on turnover intention, and the significant positive effect of professional training time (β=0.127, P<0.001) and perceived professional training quality (β=0.504, P<0.001) on job embeddedness were verified respectively and the overall test was conducted. It can be seen from Table 5.12 that in the overall test, job embeddedness shows a significant negative impact on turnover intention, yet the effect of professional training time and perceived professional training quality on job embeddedness is no longer significant, meaning that job embeddedness played a mediating role between professional training and turnover intention, and this mediating effect is full mediation.

This result indicated that professional training in technology-based SMEs could affect the turnover intention of technical employees by affecting their job embeddedness. At the same time, this conclusion also demonstrates that professional training can serve as an antecedent variable for job embeddedness, and job embeddedness can act as an antecedent variable for turnover intention. Of course, job embeddedness is also the outcome variable of professional training, while turnover intention is the outcome variable of job embeddedness.

6.1.3 Analysis of group effect results for the characteristics of employees

1. Discussion on the Group Effect Analysis Results of Employee Gender

The regression results in Table 5.13 showed that the professional training time (β=-0.078, P<0.005) and the perceived quality of professional training (β=-0.147, P< 0.001) of male technical personnel in technology-based SMEs have a significant negative effect on turnover

intention. However, for female technical personnel, the effect of professional training is not significant. This result overturned the hypothesis H5 proposed in this thesis, and the research conclusion was just opposite to the hypothesis.

Based on this finding, this thesis engaged in careful consideration and combined pertinent research for following analysis.

First, compared with women, male technical personnel in workplace may have a stronger desire for achievement or self-motivation, and hope to achieve better work performance to gain the affirmation of others. When they receive professional training, they may regard it as a signal of personal training and even a sign of promotion. Since they are more open to receiving professional training as a result, professional training ends up producing greater benefits and significantly lowering their turnover intention.

Second, women are more likely to pursue career stability than men, which means that their tendency to leave is generally lower. Female technical personnel also embody this psychological characteristic. Therefore, their turnover intention is weakly related to whether they receive professional training, the duration of training, and the perceived quality of professional training. So professional training showed no significant impact on their turnover intention.

Thirdly, women tend to have more reserved and passive personalities, with a slightly weaker inclination to express their true thoughts or feelings compared to men. As a result, questionnaires filled out by female researchers may not fully reflect the actual situation, leading to discrepancies between survey results and assumptions.

Lastly, judging from the results of descriptive statistics in this thesis, there were only 128 female R&D personnel, accounting for 20.55% of the total sample. The sample size was small, and the lack of representativeness of the sample led to differences in research results.

2. Discussion on the Group Effect Analysis Results of Employee Educational Background

The regression results in Table 5.14 displayed that the professional training time (β=-0.332, $P<0.01$) received by technical employees with an education level below a bachelor's degree in technology-based SMEs has a significant negative impact on turnover intention. The professional training time (β=-0.112, $P<0.005$) and the perceived professional training quality (β=-0.175, $P<0.001$) of technical employees with a bachelor's degree have a significant negative impact on turnover intention. As the education level of technical personnel rises, professional training cannot significantly affect the turnover intention of technical personnel with a master's degree or above. This finding mostly supported the research hypothesis H6 of this thesis, that is, the effect of professional training is gradually weakened as the educational

level of R&D increases.

For this result, first, most of the hypotheses that have been supported could provide practical suggestions for the organization of professional training in many technology-based SMEs. Specifically, as the education level of technical personnel rises, the level of their professional skills and work ability rises, and the lower the utility of professional training, which may even have a negative effect. Therefore, for technology-based SMEs, it is necessary to focus on technical personnel with lower education levels in professional training, and strive to improve the professional skills of these employees to reduce their turnover intention. Higher educated technical staff may be given access to a wider range of participation options to allow for better selectivity.

Second, the author analysed some of the hypothetical results that have not been supported. Specifically, the perceived professional training quality of technical employees with an education level below a bachelor's degree has no significant impact on turnover intention. This thesis believed that there might be two reasons behind it. First, technical employees who have less schooling than a bachelor's degree have no obvious perception of the quality of professional training. This might be a result of the inadequate technical proficiency of these employees and their lower participation in professional technical training, which could therefore result in the inaccurate judgment of professional training quality, and render the research findings insignificant. Second, judging from the results of descriptive statistics in this thesis, there were only 48 technical employees who have less schooling than a bachelor's degree, accounting for 7.7% of the total sample. The sample size was small, and the lack of representativeness of the sample led to differences in research results.

But in general, the results of the group effect analysis of the educational background of employees generally supported the research hypothesis of this thesis, and called for technology-based SMEs to selectively provide technical employees with professional training in accordance with their different education levels.

3. Discussion on the Group Effect Analysis Results of Employee Hierarchy

The regression results in Table 5.15 showed that both the professional training time (β=-0.203, P<0.001) and the perceived professional training quality (β=-0.221, P<0.001) of middle-level technical personnel in technology-based SMEs have a significant negative impact on turnover intention, while the professional trainings of grassroots and senior technical personnel have no significant effect on turnover intention. This result did not support hypothesis H7 proposed in this study.

Based on this phenomenon, this thesis made the following analysis.

First, compared with grassroots and senior technical personnel, professional training might be more effective for middle-level technical personnel. Since technical personnel at the grassroots level are engaged in relatively basic technical work, professional training mainly improves their working ability instead of their job satisfaction and job embeddedness, so it is difficult to reduce the turnover intention of grassroots employees. Additionally, grassroots technical personnel may not have a high level of recognition for the future development of the enterprise, their personal career development plans may not be clear, and they may not have enough self-awareness. As a result, the function of professional training on grassroots technical personnel was limited because it could not increase their sense of organizational identity and job embeddedness and reduce their turnover intention. Senior technical staff, however, have relatively high technical levels and working abilities, so they receive limited benefits from professional training, which may in some cases even be a waste of their time. Senior technical staff consequently do not have strong opinions of professional training, which naturally will not reduce their turnover intention. Middle-level technical personnel, on the contrary, exhibit higher levels of cognition, a stronger sense of organizational identity, and stronger desires for self-realization and career advancement than grassroots technical personnel. At the same time, they are also more willing to advance their skills than senior technical staff because of the technical competence disparity. Therefore, professional training meets the needs of the middle-level technical personnel. These employees believe that professional training can satisfy their demand to improve their technical capabilities and serve as a signal of affirmation and even promotion from the organization, so they pay more attention to participating in professional training. To sum up, professional training had the highest effect on middle-level technical personnel and could significantly reduce their turnover intention.

Second, as a result of the promotion of technical staff, the content of their work will go through major changes. Grassroots technical personnel are mostly engaged in repetitive and basic work with simple and burdensome content. As a result, professional training may not be of much use to them and may even be seen as a burden by them, leading to their lack of appreciation for it. Senior technical employees typically oversee the entire system design and take on challenging issues. In addition to profound technical knowledge, rich engineering practice and excellent comprehensive quality are also indispensable. However, the professional training provided by enterprises cannot cover these aspects or help them solve work problems effectively, which causes these employees to have a low opinion of professional training. Middle-level technical staff typically deal with moderately tough professional tasks. To meet the challenges, continuous learning is required and participating in professional training is an

effective way. Therefore, these employees will take a more active role in professional training programs to suit their needs for work and self-realization.

Third, technical employees in various positions play diverse roles in professional training, resulting in varied training benefits and a subsequent differential effect. Grassroots technical employees are new to their positions and do not have a deep understanding of technical work. They are the main trainees of professional training, and generally receive knowledge and information in one direction. Besides, the benefits of them participating in training activities are relatively limited, so professional training cannot have a significant effect on their turnover intention. Senior technical personnel, with their qualifications and professional abilities, are generally trainers of professional training, who mainly output knowledge and information in one direction. Although they can obtain certain benefits in the course preparation process, their time and energy are consumed and the benefits of participating in training activities are generally limited. Therefore, professional training cannot have a significant effect on their turnover intention. On the contrary, middle-level technical personnel can be both trainers and trainees, and because they have certain professional capabilities, they can also interact well with the other two types of personnel. For this type of personnel, relevant knowledge and information flow in both directions and the benefit obtained from participating in professional training is undoubtedly greater. As a result, professional training might have a significant effect on their turnover intention.

6.2 Conclusion

Against the backdrop of knowledge-driven economy, the ability to innovate and adapt to technological advancements is crucial for the success of technology-based SMEs. These companies, often facing challenges due to limited resources and a high turnover rate, must focus on continuously improving their products and technologies to establish a competitive edge and ensure sustainable growth. Central to this process are the R&D personnel who are responsible for driving innovation within these SMEs. Their expertise and creativity are invaluable assets that contribute to the development of new and improved products, as well as the implementation of cutting-edge technologies. Technology-based SMEs that rely on core research and development personnel must not only attract but also retain these individuals due to their importance. For technology-based SMEs to succeed in the long run, it is imperative that they retain their key R&D personnel. With limited resources, these companies cannot afford to keep hiring new employees and lose their best ones. Therefore, it is essential to implement

strategies that foster employee loyalty and motivation.

Relevant studies have pointed out that training is an effective way to improve the overall quality of R&D personnel and enhance their sense of organizational identification and organizational embeddedness, thus reducing their turnover rate. However, some studies have suggested that while employee training improves the work ability of R&D personnel, it may also contribute to an increase in turnover rate to some extent. This dilemma is particularly evident in technology-based SMEs when it comes to implementing training practices. On one hand, technology-based SMEs recognize the importance of training in enhancing the technical and management capabilities of their core R&D staff. They hope that by investing in training, they can achieve the dual objectives of improving corporate performance and retaining their valuable R&D personnel. On the other hand, there is a concern that providing comprehensive training may inadvertently accelerate the resignation of these highly skilled employees. Consequently, many technology-based SMEs find themselves hesitant to provide extensive training due to their own limitations and concerns.

Unfortunately, there is a lack of research specifically focused on the relationship between staff turnover and training in technology-based SMEs. This is primarily due to the limited number of studies conducted in this context, and even those that do exist often lack in-depth analysis, particularly regarding the effects of professional training. As a result, it is challenging to use the findings of current research to effectively guide the practice of technology-based SMEs.

In conclusion, while training has been recognized as an effective means to enhance the quality of R&D personnel and foster organizational identification and embeddedness, its impact on turnover rate is not yet fully understood, especially in the context of technology-based SMEs. To enable technology-based SMEs to make well-informed decisions about their training practices and staff retention strategies, further research is required to provide a thorough understanding of the relationship between training and turnover in these organizations.

In response to this problem, this thesis took the R&D personnel of technology-based SMEs in China as a research sample, collected data through questionnaires, and incorporated factors such as professional training, job embeddedness, and turnover intention into the research framework to construct a theoretical model of “professional training, job embeddedness and turnover intention”. Based on the social cognitive theory and job embeddedness theory, this thesis attempted to explore the impact mechanism of professional training on the turnover intention of R&D personnel in technology-based SMEs. The research conclusions of this study

were of great value.

First, this thesis explained the impact mechanism of training on the turnover intention of R&D personnel from the perspective of professional training, which made up for the lack of attention to professional training in existing research.

Second, it revealed the mediating effect of job embeddedness and clarified the path through which professional training would affect turnover intention.

Third, this thesis advanced the application of social cognition theory, job embeddedness theory, and other theories in technology-based SME and served as a reference for human resource practices of associated businesses.

To investigate the relationship between professional training of technology-based SMEs and the turnover intention of R&D staff, this thesis specifically adopted questionnaire survey, statistical analysis, regression analysis, and other methods, and thoroughly addressed the following questions. First, what is the mechanism by which professional training in technology-based SMEs affects turnover intention? Second, what role does job embeddedness play in the relationship between professional training and turnover intention? Third, do the three personnel characteristic variables of gender, educational level and employee hierarchy have certain moderating effects? To answer these questions, this thesis drew the following conclusions through empirical analysis.

1. Professional training could significantly reduce the turnover intention of R&D personnel in technology-based SMEs.

The professional training provided by technology-based SMEs to R&D personnel could significantly reduce their turnover intention, and the longer the professional training time, the better the perceived professional training quality, and the more significant the effect of reducing the turnover intention of R&D staff. By reviewing relevant literature, this thesis measured professional training from two dimensions, namely objective professional training time and subjective perception of professional training quality. Based on a questionnaire survey of 623 R&D staff in technology-based SMEs and by conducting OLS regression analysis, it was verified that professional training time and perceived professional training quality had a significant negative impact on the turnover intention of R&D personnel. This result showed that technology-based SMEs could improve the capabilities of R&D personnel while reducing their turnover intention by providing professional training. This conclusion provided important references and suggestions for the management of human resources in technology-based SMEs.

2. Job embeddedness mediated the relationship between professional training and turnover intention

Professional training in technology-based SMEs could improve the job embeddedness of R&D personnel and reduce their turnover intention. In terms of the essential effectiveness of professional training, it is a management measure of human resources implemented to improve the professional quality and comprehensive ability of technical personnel. As for how professional training is related to turnover intention, it is necessary to explore the impact mechanism of professional training and find an effective way for professional training to have an effect. Therefore, the author investigated the path effect of job embeddedness on the relationship between professional training and turnover intention by reading and analysing pertinent literature and applying the long-term and practical experience of the author in human resource management. The research results confirmed that job embeddedness completely mediated the relationship between professional training and turnover intention. This indicated that the major pathway for professional training to contribute was the improvement of job embeddedness. Professional training not only improved the professional capabilities of R&D personnel, but also strengthened their connection to the work, allowing them to become more fully integrated into the organization and work. Besides, this embeddedness and connection enhanced the organizational identification of R&D personnel, increased their cost of leaving, and reduced or even eliminated their intention to leave. This conclusion provided important references for human resource managers in technology-based SMEs.

3. As the education level of R&D personnel improved, the negative effect of professional training on turnover intention was gradually weakened.

This thesis explored the moderating effects of three factors, namely gender, educational level, and employee hierarchy. It came to the conclusion that the effects of professional training on R&D personnel with different characteristics varied significantly. First, the research results regarding the moderating variable of educational level were significant; as the educational level of R&D personnel improved, the negative effects of professional training time and perceived professional training quality on turnover intention steadily diminished. Second, contrary to the research hypothesis, the research results of gender—a moderating variable showed that when compared with female R&D staff, the turnover intention of male R&D staff in technology-based SMEs was significantly impacted by the professional training time and their perceived professional training quality in a negative way. Finally, the results of the moderating variable—employee hierarchy suggested that professional training time and perceived professional training quality only had a significant negative impact on the turnover intention of middle-level R&D personnel, whereas their impacts on the turnover intention of grassroots and senior R&D personnel were not significant. Based on the group effect tests of different

personnel characteristics, the author further developed and expanded research conclusions and provided more precise working suggestions for human resource managers in technology-based SMEs. For instance, technology-based SMEs might decide which employees need to receive professional training given different employee characteristics. This would reduce the cost of the enterprise and maximize the effectiveness of professional training.

6.3 Contribution

6.3.1 Theoretical contribution

This thesis adopted the social cognitive theory, job embeddedness theory and other related theories to construct a theoretical model, with professional training as an independent variable, job embeddedness as a mediating variable, gender, educational level, and employee hierarchy as moderating variables, and turnover intention as a dependent variable. Based on the management of human resources in technology-based SMEs in China, this thesis systematically analysed the impact mechanism of professional training on the turnover intention of R&D personnel. Theoretical contributions of this thesis were mainly reflected in the following aspects.

First, this study was based on the context of technology-based SMEs. It focused on exploring the impact mechanism of professional training on the turnover intention of R&D personnel, made up for the lack of focus on professional training in existing research on human resource management in technology-based SMEs, and offered strong empirical evidence for related research. Despite the fact that training has been researched for many years with positive outcomes, there were still few studies on this topic, particularly when it comes to professional training, and there was no general agreement on the results. Because of this, pertinent theoretical research was unable to offer theoretical direction for business practice. In addition, most of the previous measurements of training either used the two variables of 0/1 to determine whether employees had participated in training, or they focused on the measurement of training duration while ignoring the subjective feelings of participants. This thesis incorporated this issue into the research design and explored the impact of the objective measurement (duration) and subjective measurement (perception of quality) of training on turnover intention. The research conclusions provided more references and the measurement method offered new ideas for the studies of later scholars.

Second, this study developed a theoretical framework of “professional training, job

embeddedness, and turnover intention" from the viewpoint of job embeddedness, offering fresh theoretical perspectives and practical evidence to help unravel the mystery of "professional training and turnover intention". This study pointed out that the discrepancies in theoretical perspectives and research contexts were what prevent previous studies from thoroughly comprehending the relationship between "professional training and turnover intention". For example, research based on the perspective of human capital proposed that training will increase the human capital of employees, which in turn increases the possibility of their turnover. Another example is that conclusions from studies on SMEs differ significantly from those obtained from research on the training efficacy of large firms. By centring around the context of technology-based SMEs, and based on the perspective of job embeddedness, this thesis proposed that professional training could not only improve the skills of R&D personnel, but also enhance their organizational embeddedness. To be more specific, it might strengthen the bond between the R&D employees, their work and their organizations, and enable them to have a stronger sense of identity and be more dependent on the organization, thus reducing their turnover intention. This result offered fresh theoretical support for research based on the perspective of job embeddedness. Additionally, it broadened the application scenarios of job embeddedness theory in technology-based SMEs. At the same time, it demonstrated that professional training could be used as an antecedent variable of job embeddedness.

Third, this thesis further analysed the differential effects of professional training on employees with different characteristics, which contributed to related research and inspired scholars to carry out further studies. This study analysed the group effects of three characteristics, namely gender, educational level, and employee hierarchy. The results showed that with the improvement of the educational level of R&D personnel, the negative effect of professional training on turnover intention was gradually weakened. At the same time, professional training had a more significant effect on male R&D personnel than on female R&D personnel. As for middle-level R&D personnel, professional training time and perceived professional training quality had a significant negative impact on their turnover intention. These differentiated conclusions not only demonstrated that professional training had different effects on different types of employees, but also called on researchers in related fields to take into account the influence of various factors, such as individuals, organizations, and regions while conducting similar research.

Fourth, this study has contributed to job embeddedness theory and social cognitive theory. It not only enlarged and strengthened the use of these two theories in technology-based SMEs, but also verified their universality in the Chinese context. This thesis was supported by data

from 623 questionnaires completed by R&D personnel from technology-based SMEs in China. By using the OLSM, this study verified the impact mechanism of professional training on turnover intention and obtained some inspirational research conclusions. These research results further verified the effectiveness of social cognitive theory, job embeddedness theory and other theories in the human resource management of Chinese technology-based SME, enriched the theoretical connotation of relevant theories and broadened the application scenarios of these theories. Additionally. this study demonstrated the effectiveness of these theories in elaborating new questions in new research scenarios.

Fifth, this research was based on the Chinese context. While providing human resource management suggestions for the vast number of technology-based SMEs in China, it also contributed to the formation of a management theory with Chinese characteristics. In recent years, there have been increasing calls for Chinese scholars to carry out research based on Chinese context and on Chinese issues. This thesis actively responded to this call by focusing on the common problem faced by the vast majority of Chinese technology-based SMEs, that is, how to retain the core R&D personnel. Although the research perspective of this thesis had certain limits, it did make certain theoretical contributions by providing practical supports and an observational viewpoint for the development of human resource management theory with Chinese characteristics.

6.3.2 Practical implications

This study offered certain implications for policymakers in government agencies as well as managers in technology-based SMEs and other related businesses.

1. The research conclusions of this thesis clarified the work direction and offered work recommendations for managers of technology-based SMEs and the heads of human resource department.

First, the conclusions of this thesis pointed out that professional training could significantly reduce the turnover intention of R&D personnel, which clarified the concerns of technology-based SMEs who want to offer training for employees to advance their professional and technical capabilities but are worried that these employees will have a higher turnover intention after receiving such training. The result of this research supported the idea that the professional training provided by technology-based SMEs to technical personnel could improve the ability and work performance of such personnel, and promote the sustainable development of the enterprise. Besides, professional training could improve the possibility of enterprises retaining core technical personnel.

Second, this thesis further demonstrated that job embeddedness played an important role between professional training and turnover intention; the core of reducing the turnover intention of employees in technology-based SMEs was to improve the job embeddedness of technical personnel so that they could be more deeply integrated into the enterprise and their work, and professional training was an effective way to improve job embeddedness. In addition, this conclusion implied that managers of technology-based SMEs and the primary heads of human resource departments could also take into account other strategies to improve the job embeddedness of employees, such as offering employees a variety of promotion channels and bolstering organizational culture building, aside from providing professional training for R&D personnel.

Finally, the conclusion indicated that there were significant differences in what professional training could produce for employees with different characteristics. For example, professional training had a more significant effect on male R&D personnel. Meanwhile, as the educational level of R&D personnel improved, the effect of professional training was gradually weakened. Moreover, professional training significantly impacted middle-level R&D staff, but not grassroots or senior R&D staff. These results could inspire managers of technology-based SMEs and primary heads of human resource departments to selectively carry out professional training for employees based on their characteristics. For instance, providing more professional training to middle-level R&D personnel and R&D personnel with a lower educational level could maximize the effectiveness of professional training. Additionally, it might help technology-based SMEs relieve some of their financial strain while achieving efficient resource allocation and long-term business growth.

Of course, the above conclusions could even be extended to non-R&D personnel of technology-based SMEs. Specifically, managers and human resource departments of technology-based SMEs could carry out professional training and other tasks that are beneficial to increasing the embeddedness of all employees of the enterprise. Based on differences in personnel gender, educational level and employee hierarchy, appropriate and differentiated trainings should be carried out. These training would enhance the cohesion and stability of the team, improve the professional capabilities of all employees, and allow the enterprise to achieve better performance.

2. For SMEs in other industries, conclusions of this thesis could provide certain implications. For enterprises with relatively poor resource bases, how to retain core personnel must be a key issue for them to achieve sustainable development in the context of fierce competition in the modern market. This research provided a reference solution for enterprises

facing similar problems. To be specific, improving the job embeddedness of employees through professional training could not only strengthen their organizational identity and embeddedness, but also reduce their turnover intention. Besides, it could enhance both the productivity of businesses and their workforce.

In addition, the conclusions of this thesis served as a guide for managing human resources of enterprises alike. The organizational identification and job embeddedness of employees are vital components for the planning of the human resource department, and important factors affecting employee retention regardless of the type of enterprise. Finally, inadequate resources limit the development and growth of many SMEs. The solution to this issue lies in figuring out how to allocate business resources, particularly human resources, effectively. SMEs shall not blindly pursue capital operation, business growth and market expansion. Human resource management is also an important focus.

3. For policymakers in government departments, technology-based SMEs are the backbone of technological innovation and the micro-foundation for ensuring high-quality economic development in China. Policymakers need to take into account how to encourage and guarantee the healthy development of technology-based SMEs. In recent years, due to the recurrence of COVID-19 pandemic and the turbulence of the international environment, the survival and development of technology-based SMEs have not been optimistic. Relevant policies need to be formulated to protect and promote the development of technology-based SMEs.

Specifically, the conclusions of this study provided some suggestions for government agencies. First, to help technology-based SMEs retain core R&D personnel, government departments could provide them with training subsides or tax incentives for training fees to encourage them to carry out internal professional training and participate in external professional training.

Second, government departments could establish a platform for cooperation between schools and enterprises as well as between training institutions and enterprises. Through such collaboration, technology-based SMEs could train their own lecturers for professional training, invite outside professional trainers to teach at the enterprises, carry out professional training on a wider scale, and enhance the effectiveness of training.

Finally, to improve the training environment for technology-based SMEs, government departments could mobilize various social resources, establish various professional training websites and professional training applications, and provide a sizable number of audio and video professional training courses and courseware.

4. For relevant social institutions and organizations, especially training companies or

educational units engaged in training services, they can consider their own development strategies and business positioning based on the conclusions of this research, and formulate targeted plans. On one hand, they should focus on customer groups and segmented markets, and on the other hand, strengthen their service capabilities in professional training. Starting from enhancing customer value, they can assist technology-based small and medium-sized enterprises in establishing professional training systems. They can choose and leverage their own advantages in various aspects such as curriculum design and courseware development, faculty training, training implementation and effectiveness assessment, provision of teaching aids and internship training venues, and digital learning platforms, as well as building training management systems, to achieve a win-win situation with technology-based small and medium-sized enterprises.

At the same time, manufacturing companies, information technology providers, and venue operators related to the aforementioned needs can also conduct in-depth market analysis, combine their own conditions and resources, and actively engage in sales and capacity building, in order to promote the healthy development of the professional training market and enterprise operations.

6.4 Limitations and future prospects

In general, the analysis of employee turnover has always been one of the hot topics in the evolution of human resource management theory over the years. The key to the longevity of this topic lies in the complexity, dynamics, context and diversity of employees of human resource management. Research in this area holds both theoretical significance and practical value, as it provides insights into different situations and contexts. This particular study focused on technology-based SMEs. From the perspective of professional training, this research focused on the mechanism by which professional training affected the turnover intention of R&D personnel. Additionally, it attempted to shed light on the relationship between professional training and turnover intention from the perspective of job embeddedness. To achieve this, a comprehensive model of "professional training, job embeddedness and turnover intention" was developed. However, it is important to acknowledge the limitations of this study.

1. It is important to note that the research data collected in this study may be subject to certain limitations.

First, in terms of the source of the research data, the samples had distinct geographical features because of some challenges in data collection. Although this study collected 623

questionnaires, most of the questionnaire fillers came from Chengdu, Chongqing and other places, and a small number of them came from places such as Beijing, Shanghai, and Guangdong. This unbalanced sampling could potentially introduce bias and limit the generalizability of the research findings. Given the vast territory of China, there are obvious differences in economic development and technological innovation among regions. The situations of technology-based SMEs in various regions might differ too. Factors such as the availability of R&D talents, the level of technological innovation, and other regional characteristics might influence the research outcomes. Therefore, future studies should consider incorporating regional differences to provide a more comprehensive understanding of the topic.

Additionally, the data collection and research method employed in this study have certain limitations. The use of questionnaires to assess whether respondents had received professional training and to evaluate the quality of such training may not have captured the full extent of their training experiences. Specifically, the study did not delve into the specific time frame in which the respondents received their professional training. It is possible that some respondents underwent training a considerable time ago, leading to potential inaccuracies in their responses due to fading memories. This could compromise the quality of the questionnaire data and subsequently affect the validity of the research findings.

Moreover, the absence of a control group in the questionnaire survey posed another limitation. Without a comparison group of R&D professionals who did not receive professional training, it became challenging to draw conclusions about the impact of training on the variables under investigation. A control group would have provided a basis for comparison and allowed for a more robust analysis of the effects of professional training on the outcomes of interest. In light of these limitations, it is crucial to interpret the research conclusions with caution. While the study provided valuable insights into the relationship between professional training and the performance of technology-based SMEs, the aforementioned limitations should be acknowledged. Future research endeavours should address these limitations by incorporating a more balanced and representative sample, considering the timing of professional training, and including appropriate control groups for comparison.

2. In terms of the design of research model, this thesis focused on exploring the impact of professional training on the turnover intention of R&D personnel in technology-based SMEs, and analysing the mediating effect of this variable from the perspective of job embeddedness.

Although a theoretical model of “professional training, job embeddedness, and turnover intention” was developed, it is worth considering that there are other factors within the

organizational context that could potentially influence the relationship between professional training and turnover intention. For instance, leadership style is a crucial aspect of the organizational context that can significantly impact employee attitudes and behaviours. Different leadership styles, such as affiliative leadership and strategic transformational leadership, may have varying effects on the turnover intention of R&D personnel. These leadership styles could potentially enhance or weaken the effect of professional training in influencing turnover intention. Additionally, organizational justice and corporate culture are significant variables that may also mitigate the relationship between professional training and turnover intention. The term "organizational justice" describes the perceived equity in the allocation of resources and rewards, as well as the equity of policies and relationships inside the organization. Corporate culture, on the other hand, refers to the common conventions, values, and beliefs that influence the attitudes and conduct of employees. While these organizational context variables were not included in the research model of this thesis due to limitations in terms of length and research focus, it is essential for future researchers in related fields to consider incorporating these elements into their research frameworks. By doing so, a more comprehensive understanding of the factors influencing turnover intention among R&D personnel in technology-based SMEs can be achieved, leading to more thorough and insightful models.

3. In terms of research perspective, this thesis explored the effect of professional training based on the context of technology-based SMEs.

It should be noted, however, due to the narrow research perspective, the conclusions of this research might not be applicable to other types of enterprises. For example, does professional training in large enterprises affect employee job embeddedness? How does general training compare to professional training in terms of its impact on employee job embeddedness? Does it reduce employee turnover intention? These are still unresolved questions that require follow-up by future research. In addition, the research perspective and research design of this thesis were also relatively static, not taking into account the possible role of continuous, layered, and in-depth professional training or the time-sweeping effect of professional training due to the limitations of the research conditions and the research abilities of the author. The research would be more scientifically founded if temporal factors were included in the research design. The aforementioned difficulties could be thoroughly discussed in future studies.

4. There are limitations in the measurement of variables in this study.

Although the survey items were derived from established scales and passed tests of reliability and validity, there are still doubts about their explanatory power. On one hand, the

measurement of job embeddedness used a general approach, which may have insufficient theoretical basis and requires further observation and testing. On the other hand, the inclusion of the variable "perceived quality" in professional training is based on subjective evaluations and is used for the first time in this thesis, which may lack depth of research and carry the risk of distorted results. Additionally, using turnover intention as a substitute variable for actual turnover, although it is a necessary measure and has strong theoretical support, it is still a substitute relationship and there is a probability of mismatch.

5. In terms of research method, the questionnaire survey conducted in this study lacks a control group, making it difficult to compare the situation of research and development personnel who have not received professional training.

This may result in certain flaws in the research conclusions. Specifically, without a comparison, it is possible to draw the conclusion that the impact of general training on the turnover intention of research and development personnel is the same as or even greater than that of professional training. However, considering that general training is much easier to implement and has lower costs compared to professional training, for technology-based small and medium-sized enterprises, implementing general training is undoubtedly a better choice when considering the factors influencing turnover intention.

To sum up, this thesis only verified the impact of professional training on the turnover intention of employees in a specific circumstance. Although it has supplemented related research to some extent, it had the aforementioned shortcomings. Future research could explore from the following aspects.

1. Consider employee characteristics in the research object. Although the impact of employee gender, educational level, and employee hierarchy on the effect of professional training is analysed , it is not in-depth and lacked solid data support. It is worth further research, especially the effects of professional training on grassroots employees and on employees of different genders, in order to comprehensively and objectively discuss the reasons for its effects. Of course, the research can also involve other employee characteristics, such as age.

2. Consider regional characteristics in the research object. Taking into account the effect of professional training under regional differences, the research conclusions can be more comprehensive and universal. This is because different regions have differences in economic conditions, cultural customs, educational levels, population structures, and so forth. These factors may all have an impact on the research model, thus warranting in-depth investigation and professional analysis. Specifically, research can be conducted based on the regional differences in China, or on different countries and regions as backgrounds, such as analysing

the differences between developed and developing countries, or comparing Southeast Asia, Africa, and Europe. It is also possible to analyse the differences between countries with different cultural backgrounds.

3. Consider the characteristics of enterprises in the research object. Taking into account the effects of professional training in different types of enterprises can enrich and expand research conclusions. Specifically, research can be conducted on the relationship between professional training and turnover intention in large enterprises, the relationship between professional training and turnover intention in non-technology-based enterprises, and the relationship between professional training and turnover intention in enterprises of different sizes and industries. This will contribute to a more universal understanding of the impact of professional training.

4. Consider organizational context in the research model. Take into account the effect of professional training in the context of organizational settings to make the research findings more practical. Organizational context includes factors such as organizational culture, leadership style, and team atmosphere, all of which can have different impacts on the research model. One can choose to incorporate one or more of these factors into the research framework and explore them as different types of variables, in order to comprehensively examine the mechanisms of professional training in different types of organizations and their respective environments.

5. Consider other mediating variables in the research model. Consider the explanatory power of different mediating variables in the relationship between professional training and turnover intention, and explore the optimal pathway through which professional training influences turnover intention. Possible mediating variables to consider include, but are not limited to, employee satisfaction, organizational citizenship behaviour, and organizational commitment. A research model with single or multiple mediating variables can be established to analyse the mechanisms between variables and make the relationship network between professional training and turnover intention explicit.

6. Consider using quasi-experimental methods in research. By considering quasi-experimental methods to study the effects of professional training, the research findings may be more objective. This involves providing professional training to a subset of employees and comparing the research results of this group with those who have not received any professional training. By using an approach that approximates randomization and controlling for other confounding factors, the true effectiveness of professional training can be discovered.

7. Consider optimizing the survey items in research methodology. Explore the use of

different survey items to find better ways to measure variables. Conduct a comprehensive review of the literature and create survey questionnaires based on established items or scales. Compare the reliability, validity, factor analysis, and regression analysis results of different survey items using analytical tools to select the best items. Additionally, consider designing new survey items and compare them with established items using the aforementioned methods to identify superior items.

Of course, it is also possible to expand the research to include general training in addition to professional training. This would allow for the investigation of the mechanisms through which general training affects turnover intentions. Comparative studies could also be conducted to examine the effects of professional training and general training within the same organization or across different organizations, in order to draw conclusions about the overall effectiveness of training and gain insights into the mutual reinforcement mechanisms between general training and professional training.

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Annex A: Survey on the Working Conditions of Employees in Technology-based SMEs

Dear Sir/Madam:

First, thank you for your strong support of this survey! This survey aims to investigate the factors that influence the turnover intention of employees in technology-based SMEs. The survey is anonymous, and there is no right or wrong answers to the questions. All information is used for research purposes only. Please feel free to answer according to the actual situation. Your time and assistance are critical to the success of this research!

Thank you for your time and cooperation! Wish you all the best!

Part One Basic Information

Note: Just put "√" on the corresponding option. Please fill in carefully and do not miss items.

Your Gender	□Male □Female
Your Age	□25 Years Old and Below □26 to 35 Years Old □Above 36 Years Old
Your Education Background	□Below Bachelor's Degree □Bachelor Degree □Master Degree and Above
Your Position	□Ordinary Technical Staff (Technical Staff at the Grassroots Level) □Technical Supervisor/Manager (Middle-level Technical Staff) □Technical Director/Chief Engineer (Senior Technical Staff)
Years of Establishment of the Enterprise	□1 to 3 Years □3 to 6 Years □Above 6 Years
Number of Employees of the Enterprise	□Less than 50 People □50 to 100 People □100 to 300 People □More than 300 People
Sales Revenue of the Enterprise	□Less than 10 Million Yuan □10 to 50 Million Yuan □50 to 100 Million Yuan □More than 100 Million Yuan
Nature of the Enterprise	□State-owned Enterprise □Private Enterprise □Joint Ventures □Foreign-funded

Part Two Variable Measurement

1. Professional Training

Have you participated in the professional skill training organized by your company?

If so, what is the approximate time of your professional training?

A. Less than 24 hours

B. 24 to 48 hours

C. 48 to 120 hours

D. More than 120 hours

Note: Professional training refers to the training of work-related professional knowledge, skills, organizational workflow, rules, regulations, etc.

2. Perception of Professional Training

Items	Strongly Disagree → Strongly Agree
1.The training covers the specific skills, job specifications, processes, goals and responsibilities required for my job	1 2 3 4 5
2. Skills acquired after professional training can meet the requirements of my job	1 2 3 4 5
3. Training helps me apply my trained skills to the job	1 2 3 4 5
4. Professional training helps improve my job performance	1 2 3 4 5
5.Training plays a positive role on my future career	1 2 3 4 5

3. Job Embeddedness

Items	Strongly Disagree → Strongly Agree
1. I am very attached to the company I work for	1 2 3 4 5
2. I feel like I have a close relationship with this company	1 2 3 4 5
3.It is difficult for me to leave this company	1 2 3 4 5
4.I cannot leave the company I work for easily	1 2 3 4 5
5. I am embedded in this company and it is hard to leave	1 2 3 4 5
6. I am closely related to the company I work for	1 2 3 4 5
7.I will face huge losses if I leave the company	1 2 3 4 5

4. Turnover Intention

Items	Strongly Disagree → Strongly Agree
1. I often want to quit my current job	1 2 3 4 5
2. I may leave the company and find another job after a while	1 2 3 4 5
3. I have no plan for long-term career development in the company	1 2 3 4 5
4. If I continue to stay in this company, my prospects will not be promising	1 2 3 4 5

Annex B: Other Figures

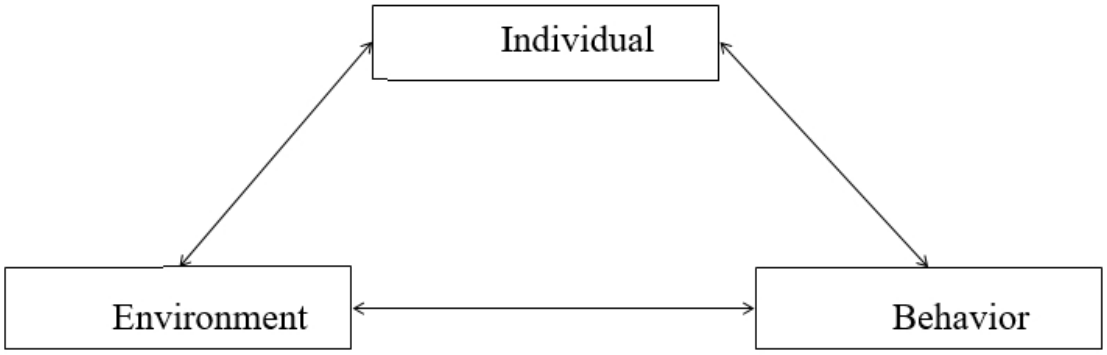

Figure B.1 Social cognitive theory model

Source: Bandura (1986)

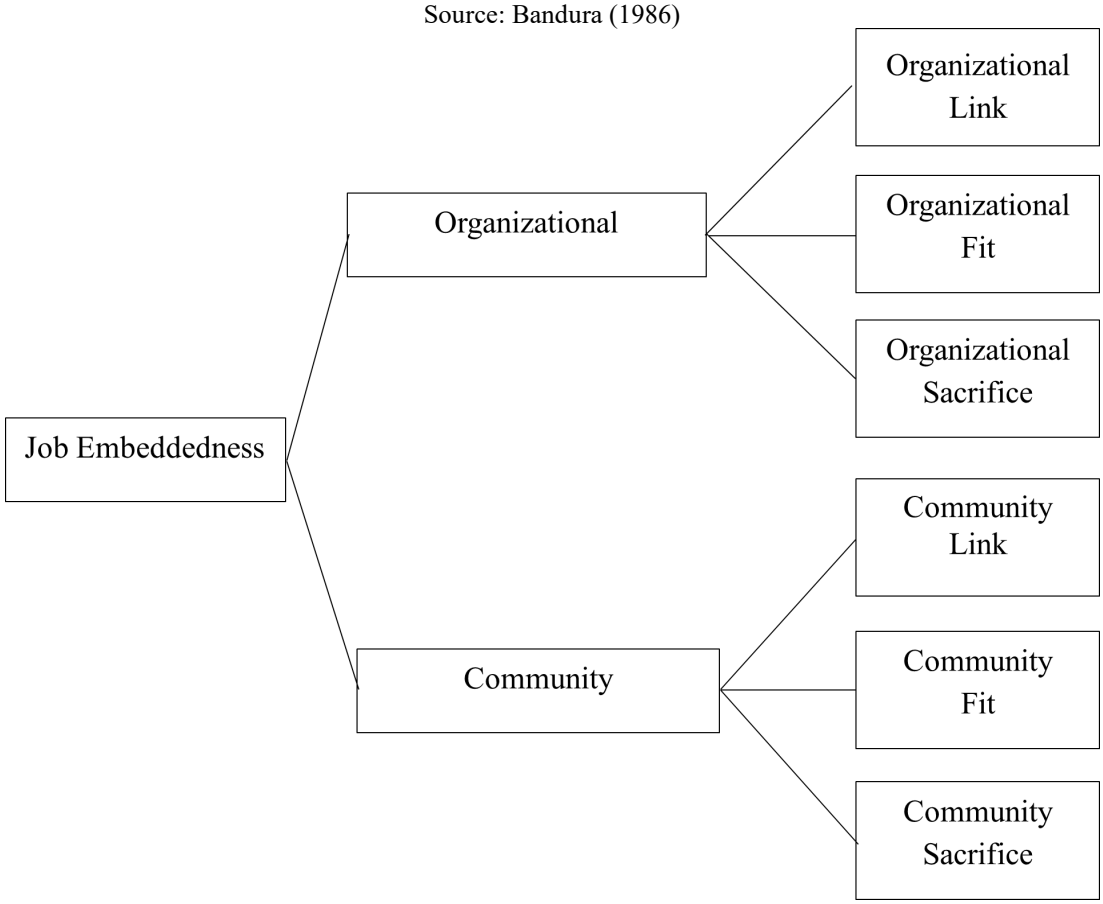

Figure B.2 The dimensions of job embeddedness

Source: Mitchell (2001)

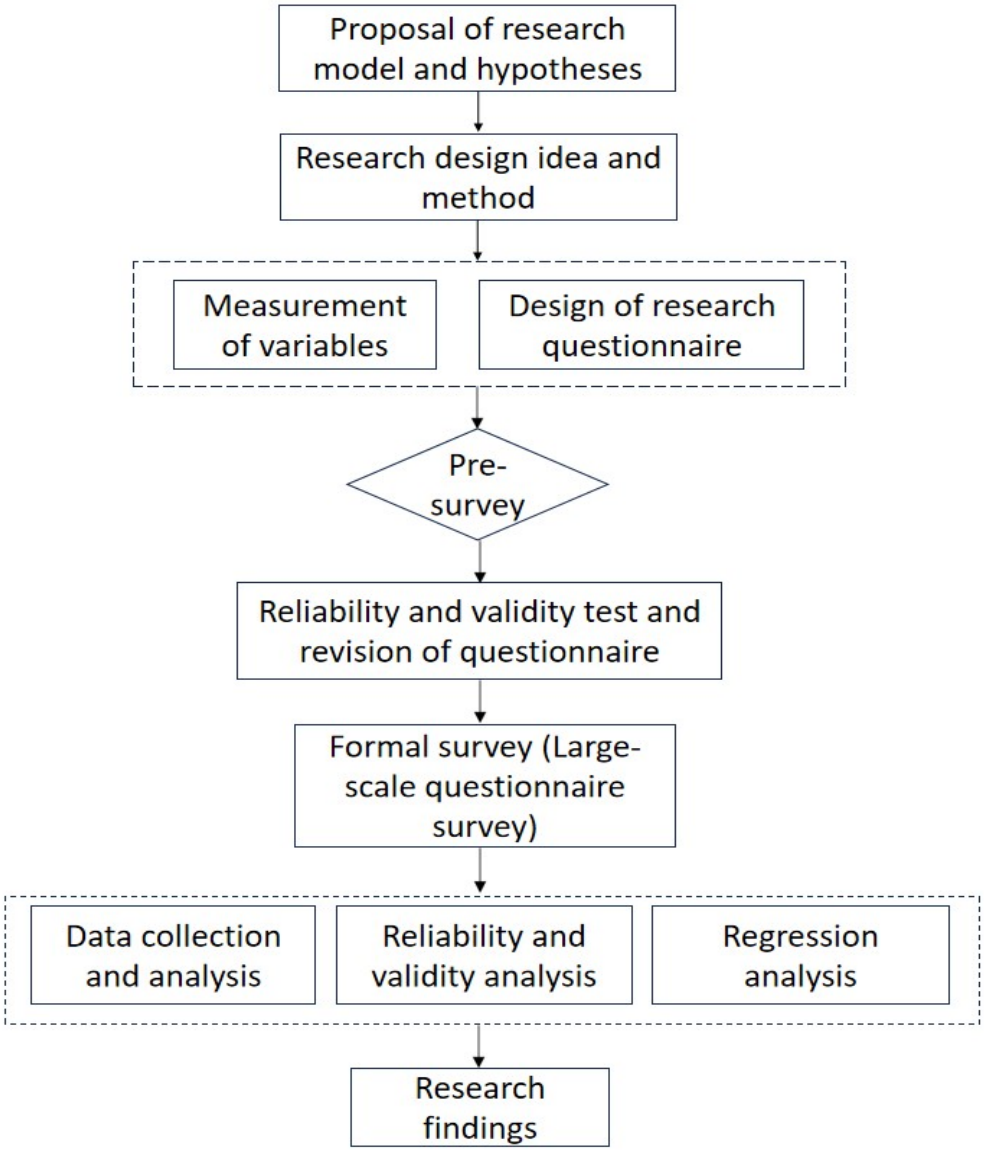

Figure B.3 Design idea for empirical research

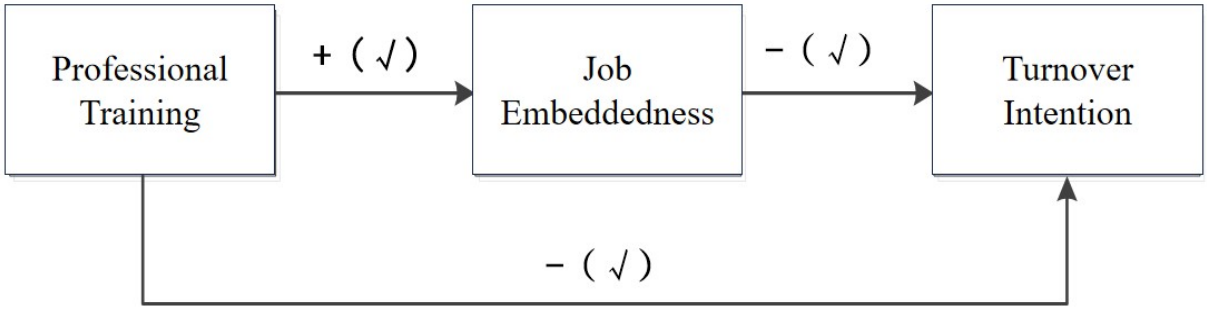

Figure B.4 The impact mechanism of professional training on job embeddedness and turnover intention

Note: "√" in the figure means that the path has passed the significance test