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Academic-entrepreneurship Success: How Competences, Person-entrepreneurial Fit, Role Conflict and Coping Strategies Converge to Achieve It?

QIN Weihong

Doctor of Management

Supervisors:
PhD Nelson Ramalho, Associate Professor,
ISCTE University Institute of Lisbon
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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: 2023.12.30

Name: QIN Weihong

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Abstract

Since China's implementation of the innovation-driven strategy encouraging innovation and entrepreneurship, there has been a surge in academic entrepreneurship, but this topic is under-researched as regards the processes linking entrepreneurs' competences to entrepreneurial process entailing role conflict, person-entrepreneurship fit, and their coping strategies. This is in line with the call for more micro level research in academic entrepreneurship. Four research questions guide this research: (1) What are the role differences and challenges experienced in academic entrepreneurship? (2) What are the coping strategies for facing the challenges of academic entrepreneurship? (3) What competences do academic entrepreneurs need to be more successful? and (4) What are the influencing mechanisms of academic entrepreneurial competences on entrepreneurial success?

To answer the above questions, this research comprises three studies focusing on (1) a qualitative exploratory study intended to identify competences and coping strategies of academic entrepreneurs by conducting in-depth interviews, (2) a psychometric study developing two scales of academic entrepreneurship competences and coping strategies with a sample of 458 academic entrepreneurs, and (3) quantitatively testing a process model with a time-lagged data from 167 academic entrepreneurs entailing person-entrepreneurship fit, and role conflict as mediators and coping strategies as moderator.

Findings showed that: (1) The roles of scholars and entrepreneurs are very different. (2) The competences that academic entrepreneurs should possess include GeJu, research ability, leadership, self-awareness, motivation, and neoteny. (3) GeJu, leadership, and business knowledge are particularly important for academic entrepreneurs to succeed in their ventures. and (4) The adoption of resignation or persistence strategies by academic entrepreneurs is conducive to mitigating the negative effects of role conflict on entrepreneurial performance.

Findings add to extant micro level academic entrepreneurship state-of-art by profiling academic-entrepreneurial competences, making two new measures available for research and uncovering a sequential moderated mediation model that links academic-entrepreneurial competences to entrepreneurial performance.

Keywords: Academic entrepreneurship; academic entrepreneurial competences;

personal-environmental fit; role conflict; coping strategie

JEL: M1, M13

Resumo

Desde que a China implementou a estratégia orientada para a inovação, incentivando a inovação e o empreendedorismo, tem havido um aumento do empreendedorismo académico, mas este tópico é pouco estudado no que respeita os processos que ligam as competências dos empreendedores ao processo empreendedor, que envolve conflito de papéis, o ajustamento pessoa-empreendedorismo e as suas estratégias de coping. Isto é consonante com o apelo a mais investigação a nível micro no domínio do empreendedorismo. Quatro questões de investigação orientam este estudo: (1) Quais as diferenças de papel e os desafios sentidos no empreendedorismo académico? (2) Quais as estratégias de coping para enfrentar os desafios do empreendedorismo académico? (3) Que competências necessitam os empreendedores académicos para serem mais bem sucedidos? e (4) Quais são os processos que ligam as competências empreendedoras académicas ao sucesso empreendedor?

Para responder às questões, esta investigação inclui três estudos que se centram em: (1) um estudo exploratório qualitativo para identificar as competências e as estratégias de coping dos empreendedores académicos através da realização de entrevistas em profundidade; (2) um estudo psicométrico que desenvolve duas escalas de competências de empreendedorismo académico e estratégias de coping com uma amostra de 458 empreendedores académicos; e (3) um teste quantitativo de um modelo de processo com dados desfasados no tempo de 167 empreendedores académicos, e que inclui o ajustamento pessoa-empreendedorismo e o conflito de papéis como mediadores e as estratégias de coping como moderadoras.

Os resultados mostraram que: (1) Os papéis dos académicos e dos empreendedores são muito diferentes. (2) As competências que os empreendedores académicos devem possuir incluem GeJu, capacidade de investigação, liderança, autoconsciência, motivação e neotenia. (3) O GeJu, a liderança e o conhecimento empresarial são particularmente importantes para que os empreendedores académicos tenham sucesso. (4) A adoção de estratégias de resignação ou persistência por parte dos empreendedores académicos contribui para atenuar os efeitos negativos do conflito de papel no desempenho empresarial.

Os resultados contribuem para o estado da arte sobre o empreendedorismo académico a nível micro, traçando o perfil das competências académicas-empreendedoras, disponibilizando duas novas medidas para investigação e descobrindo um modelo de mediação sequencial

moderada que liga as competências académicas-empreendedoras ao desempenho empreendedor.

Palavras-chave: Empreendedorismo académico; competências empreendedor-académicas; ajustamento pessoa-meio; conflito de papel; estratégias de coping
JEL: M1, M13

摘要

自中国实施创新驱动战略并鼓励创新创业以来，学术创业活动明显增加。但对于创业过程中学术创业能力、个人-创业匹配、角色冲突及应对策略等因素对学术创业成功的影响过程的研究尚显不足。因此，本研究回应了学者们所呼吁的进行更多微观层面的学术创业研究，围绕四个研究问题展开：（1）学术创业过程中创业者体验到的角色差异和挑战是什么？（2）学术创业者角色冲突挑战的应对策略有哪些？（3）学术创业者需要具备哪些能力更容易成功？（4）学术创业能力对创业成功的影响机制是什么？

为回答以上问题，本研究包括三个方面的主要内容：（1）通过深度访谈，对学术创业能力和应对策略进行了定性的探索性研究；（2）以 458 名学术创业者为样本，开发了学术创业能力和应对策略两个测量量表；（3）以 167 名学术创业者的纵贯数据为基础，以角色冲突和个人-创业匹配为中介变量，以应对策略为调节变量，定量检验了一个影响过程模型。

研究结果表明：（1）学者和企业家的角色截然不同；（2）学术创业能力包括格局、研究能力、领导力、自我意识、动机和创新能力；（3）格局、领导力和业务知识对学术创业者的成功尤为重要；（4）学术创业者采取接纳或坚持策略有利于减轻角色冲突对创业绩效的负面影响。

本研究对学术创业能力的内容和维度进行了探索，为相关研究开发了两个测量工具，并揭示了学术创业能力影响创业绩效的有调节的中介模型，丰富了微观层面的学术创业研究。

关键词：学术创业；学术创业能力；个人-环境匹配；角色冲突；应对策略

JEL: M1, M13

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List of Acronym

CFA	Confirmatory Factor Analysis
GEM	Global Entrepreneurship Monitor
MIT	Massachusetts Institute of Technology
OECD	Organization for Economic Co-operation and Development
TMT	Top Management Teams
TTO	Technology Transfer Offices
EFA	Exploratory Factor Analysis
SDT	Self-Determination Theory
P-E	Person-Environment
D-A	Demand-Ability
N-S	Needs-Supplies

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Chapter 1: Introduction

1.1 Research background

1.1.1 China encourages scientific researchers' innovation and entrepreneurship

In order to accelerate the innovation-driven development appealed by the Central Committee of the Communist Party of China (CPC) and the State Council, deepen the talent development system and mechanism reform, and promote the policy of "mass entrepreneurship and innovation", a series of policies are issued by the government to encourage scientific researchers' innovation and entrepreneurship.

According to the Guidelines on Deepening the Reform of the Talent Development System and Mechanism issued (CPC Central Committee, 2016), talents should be encouraged in terms of innovation and entrepreneurship. It is required to study and formulate policies and measures for researchers in institutions such as universities, research institutes to leave their positions for entrepreneurship. After obtaining the consent of their organizations, scientific researchers of universities and scientific research institutes may work part-time in science and technology enterprises and receive remuneration within the regulations. Meanwhile, universities and research institutes are allowed to set up a certain proportion of mobile part-time positions to attract entrepreneurs and scientific and technological talents with innovative practice. Outstanding talents should be encouraged and guided to gather in enterprises. Private enterprises' experience in cultivating talents, attracting talents, and using talents should be absorbed. Various innovation and entrepreneurship incubation models should be summarized and promoted to create a batch of low-cost, convenient and open Maker Spaces.

According to the Guidance on Supporting and Encouraging the Inovation and Entrepreneurship of Professional and Technical Personnel in Public Institutions (Ministry of Human Resources and Social Security, 2017) and the Guidance on Further Supporting and Encouraging the Innovation and Entrepreneurship of Professional Researchers in Public Institutions (Ministry of Human Resources and Social Security, 2019), public institutions shall be supported and encouraged to send professional technical staff or scientific researchers to enterprises to take temporary posts, work or participate in project cooperation. Professional

technical staff of public institutions shall be supported and encouraged in innovation or entrepreneurship while on positions or after leaving positions. Public institutions shall be supported and encouraged to set up innovative positions.

This is not only a China's strategic priority as international literature also highlights the importance of innovation and entrepreneurship in civil service around the world (Hopkins, 2016; Jarvis & He, 2020).

1.1.2 The continuous growing of academic entrepreneur group greatly promotes the industrialization of research findings

With the support of the national innovation-driven strategy and the "mass entrepreneurship and innovation" policy, more and more entrepreneurship based on scientific and technological achievements and knowledge creation has emerged, and scientific researchers getting into the entrepreneurship have got much attention of society. With the continuous growing of the academic entrepreneurship group, a large number of well-known academic enterprises, such as DJI, Innocare, Gritscience, and Diao Group, have become an important force in the innovation-driven development in China. Academic entrepreneurship, which is based on the scholars' scientific achievements, is the process of creating enterprises and forming products through opportunity identification, utilization and resource integration (Goethner et al., 2012). In the forms of patent license, patent transfer, conversion into shares, and spin-off enterprises (Siegel & Wright, 2015), academic entrepreneurship has served as the bridge connecting scientific R&D with the research transformation, which has become an important social phenomenon in the new era.

To promote the scientific and technological achievements transformation, China has intensified the reform of the scientific and technological system since the 19th National Congress of the Communist Party of China, and has revised the Law of the People's Republic of China on Promoting the Industrialization of Scientific and Technological Achievements in 2015. Meanwhile, China has issued the Actions for Promoting the Transfer and Industrialization of Scientific and Technological Achievements (State Council, 2016). In 2020, Guidelines on Improving the Patent Quality of Colleges and Universities to Promote the Application of Transformation and Implementation Guidelines on the Construction and Development of Higher Education School's Technology Transfer Institutions (Ministry of Education et al., 2020) were issued, which further improved the transformation system of scientific and technological achievements in colleges and universities. However, as illustrated

in the 2020 Annual Report on the Industrialization of Scientific and Technological Achievements in China (Higher Education Institutions and Research Institutes) (National Science and Technology Assessment Center, 2020), problems still exist in the scientific and technological achievements transformation.

1.1.3 Entrepreneurs often face the dilemma of P-E misfit and role conflict during academic entrepreneurship

According to a study, compared with the characteristics of the institutions, the individual characteristics of scholars have a greater impact on the success of industrial cooperation (D'Este & Patel, 2007). Therefore, the success of academic entrepreneurship is closely related to the individual characteristics of scholars. In the actual entrepreneurial process, it is difficult for both domestic and foreign academic entrepreneurs to change the role from scholars to entrepreneurs, especially at the early stage of the academic entrepreneurship. Since the roles of scholars and entrepreneurs contain completely different or even mutually exclusive elements, there are obvious differences in their ways of thinking, methods and processes of problem-solving, value orientations, and knowledge required (Li et al., 2021). Scholars focus on the research and discovery of knowledge, while entrepreneurs pay attention to business management and profit return. Moreover, scholars attach importance to technological invention and scientific application, while entrepreneurs underline the use of products and customer needs (Yao & Wang, 2011).

Due to the differences between scholars and entrepreneurs, when domestic and foreign academic researchers leave the universities or research institutes and enter the field of business and society, from academic research to innovative entrepreneurship, they would encounter many difficulties and challenges of person-environment (P-E) misfit in the process of transforming scientific and technological achievements into practical applications. For example, they would realize that their organizational management ability, interpersonal skills, market sensitivity are insufficient (Dai et al., 2015), the definition and identification of their own role is vague, and the expectation and realization of return on investment are quite different. These problems often cause the failure of scientific researchers transforming into entrepreneurs, which arouses scholars' attention and interest in academic entrepreneur research.

1.2 Research gap and research questions

1.2.1 Research gap

Academic entrepreneurship, which is based on the scholars' scientific achievements, is the process of creating enterprises and forming products through opportunity identification, utilization and resource integration (Goethner et al., 2012). In the forms of patent license, patent transfer, conversion into shares, and spin-off enterprises (Siegel & Wright, 2015), academic entrepreneurship has served as the bridge connecting scientific R&D with the research transformation, which has become an important social phenomenon in the new era. In recent years, academic entrepreneurship is gradually becoming a research hotspot in the field of innovation and entrepreneurship.

However, studies on academic entrepreneurs have primarily focused on the macro level (Balven et al., 2018). While there is a growing body of studies that have focused more on individual scientists, there is a need to more explicitly take a micro level approach to better understand how academic entrepreneurship actually happens (Cunningham & Menter, 2020). There have been recent calls within the literature for more micro level studies and analysis (Albats et al., 2018; Cunningham & O'Reilly, 2018). As special entrepreneurs, what competences should academic entrepreneurs possess? What kind of academic entrepreneurs are more likely to succeed? What is the impact of academic entrepreneurial competences on entrepreneurial success? What are the intrinsic mechanisms and boundary conditions of this influence? These questions are yet to be answered. Furthermore, in recent years a lot of research is on how to improve P-E fit. However in reality, most employees are in a state of P-E misfit. And there are relatively few studies on the coping strategies of P-E misfit. Follmer et al. (2018) has conducted qualitative research on employees' coping strategies in dealing with P-E misfit. However, the research on academic entrepreneurs' coping strategy of P-E misfit is still limited. Therefore, this research could make up for the deficiency of the existing research on the explanatory mechanism of academic entrepreneurial competences on success from the individual perspective.

1.2.2 Research problem and questions

During academic entrepreneurship, the success of entrepreneurship depends on whether the entrepreneur can effectively deal with the P-E misfit caused by role transition. P-E misfit may have multiple levels, such as demand-ability misfit (D-A misfit) in the new work environment.

On the one hand, researchers have not undergone special management and leadership training, but these capabilities are required in the entrepreneurial process, which could be a misfit. On the other hand, theoretical research results transforming into actual products requires the observation and experience of the market, which also positions challenges for high-tech talents. In order to successfully realize the role transition, these misfits need scientific researchers to effectively cope with. Otherwise, the entrepreneurship may end in failure like many real cases.

In order to explore what competences academic entrepreneurs should possess and to reveal the mechanisms by which academic entrepreneurship competences affect entrepreneurial performance, based on the above research background and the practical problems of P-E misfit and role conflict faced by academic entrepreneurs, the thesis proposes the following research questions:

(1) What are the role differences and challenges experienced in academic entrepreneurship?

(2) What are the coping strategies for facing the challenges of academic entrepreneurship?

(3) What competences do academic entrepreneurs need to be more successful?

(4) What are the influencing mechanisms of academic entrepreneurial competences on entrepreneurial success?

To achieve this the thesis starts by presenting an overall literature review about entrepreneurship and academic entrepreneurship. Then, the thesis proceeds with the first study that starts with a brief literature review on role conflict, academic entrepreneurial competences and role conflict coping strategies to show the methodological options made and findings from the in-depth interviews. This chapter concludes with the specific content of academic entrepreneurial competences and role conflict coping strategies. The second study built on the first study explores the scale structure for academic entrepreneurial competences and role conflict coping strategies. It evolves by showing the methodological options, and all the psychometric testing and results concerning the two measures. This chapter ends by showing the structure of two scales including academic entrepreneurial competences and role conflict coping strategies. Lastly, the third study is introduced by reviewing P-E fit, role conflict and academic entrepreneurial success to sustain the conceptual model. The methods are shown and, after conducting path analyses, findings are explored and discussed with a focus on theory and applied value. After this, an overall conclusion is drawn pertaining to the four leading research questions while acknowledging limitations and future research opportunities.

1.3 Research significance

1.3.1 Theoretical significance

1.3.1.1 Uncovering the intrinsic mechanisms and boundary conditions of the impact of academic entrepreneurial competences on entrepreneurial success

In recent years, academic entrepreneurship, an important topic in entrepreneurship, is gradually becoming a research hotspot in the field of innovation and entrepreneurship. Scholars have conducted research on academic entrepreneurship from the perspectives of the triple helix model, knowledge spillover, academic entrepreneurship process, the influencing factors of academic entrepreneurship, and academic entrepreneurial motivations. As for the research content, there are abundant studies on the specific forms of entrepreneurial universities and academic entrepreneurship, such as spin-off enterprises, technology transfer. Meanwhile, there are rich researches on the influencing factors of academic entrepreneurship. However, there still lacks research on academic entrepreneurs, which is from the individual perspective (Yao et al., 2018). In the existing research, scholars have advised to conduct in-depth and systematic research in the fields of entrepreneurial motivation and role identification, and highlight the role of scholars in academic entrepreneurship. By encouraging scholars to lead or participate in academic entrepreneurship, the academic entrepreneurship performance could be improved and the conversion of university scientific and technological achievements could be promoted (Yao & Wang, 2011). Taking academic entrepreneurs during entrepreneurship as the research object could enrich the research on academic entrepreneurship from the individual dimension. Moreover, the study focuses on the competences that academic entrepreneurs should possess and their impact on entrepreneurial success. This will reveal the intrinsic mechanisms and boundary conditions of the influence of academic entrepreneurs' competences on entrepreneurial success and enrich the study of academic entrepreneurship from an individual perspective.

1.3.1.2 Narrowing the research gap on academic entrepreneurs' coping strategies of P-E misfit

P-E fit, a core research topic in organizational management, plays a unique role in acquiring suitable talents, giving full play to the talents, and ultimately improving organizational competitiveness. P-E fit has attracted much attention from both the theory and practice, and is regarded as the most important human resource management measure for organizations to

gain competitive advantage. Many studies have shown that good P-E fit is a vital source for companies to attract, recruit and retain outstanding talents, improve corporate organizational effectiveness, and help companies gain sustainable competitive advantages. Therefore, domestic and foreign research on how to achieve and improve P-E fit is rapidly rising in recent years. In reality, most employees are in a state of P-E misfit. However, there are relatively few studies on the coping strategies of P-E misfit. Scholars such as Follmer et al. (2018) have conducted qualitative research on employees' coping strategies in dealing with P-E misfit. These strategies are: resolution, which involves strategies including leaving and making adjustments to the self or environment; relief-seeking, which involves the use of strategies such as surface-level behavior change, buffering misfit with fit, and framing misfit as short-term; resignation, which involves distancing the self from work or reframing misfit as resulting from something negative about the organization, and unique and positive about themselves, and taking pride in misfit. However, the research on academic entrepreneurs' coping strategy of P-E misfit is still limited. Due to differences in knowledge and skills, role positioning, professional experience and different cultures, academic entrepreneurs' coping strategies of P-E misfit and role conflict should be different. Therefore, this research could make up for the deficiency of the existing research on academic entrepreneurs' coping strategies of P-E misfit in China.

1.3.2 Practical significance

1.3.2.1 Helping academic entrepreneurs improve the possibility of entrepreneurial success

From the individual perspective, the research focuses on the academic entrepreneurs during entrepreneurship, aims to describe the specific competences that academic entrepreneurs should have, find the manifestations of academic entrepreneurs' P-E misfit and role conflict, uncover the impact mechanism of academic entrepreneurial competences on entrepreneurial success, and propose the coping strategies of P-E misfit for academic entrepreneurs. The research conclusions obtained can help academic entrepreneurs during entrepreneurship understand what competences they should develop, the manifestations of P-E misfit and how to deal with it. Moreover, these conclusions could provide assistance for academic entrepreneurs to successfully and effectively achieve role transition and P-E fit, thereby improving the success rate of academic entrepreneurship.

1.3.2.2 Providing reference for investors while choosing academic entrepreneurial enterprises or academic entrepreneurs

Investors often face a question: What kind of entrepreneur is more likely to succeed in entrepreneurship? Entrepreneurs' personal background, ability and entrepreneurial behavior have a crucial impact on the success of entrepreneurship. These aspects not only attract attention from investors while finding investment objects, but also are important for academic entrepreneurs who transfer from academic researcher to entrepreneurs. This study will answer what competences academic entrepreneurs should have, what kind of academic entrepreneurs are more likely to succeed, what kind of impact of academic entrepreneurs' competences will be on entrepreneurial success, and what strategies academic entrepreneurs should adopt to deal with P-E misfit. So the research could help investors judge what kind of coping strategies should be adopted by academic entrepreneurs to achieve role transition and entrepreneurial success more easily, which provides a reference for investors to choose academic entrepreneurial enterprises or academic entrepreneurs.

1.3.2.3 Promoting the transformation of scientific and technological achievements into the driving force of economic development

In the scientific and technological innovation chain, researchers are the creator of the upstream scientific achievements. If the R&D work can be extended downstream, scientific researchers can greatly reduce the information loss during transforming scientific and technological achievements to commodity (Ju & Zhou, 2021; O'Shea, 2007). Meanwhile, researchers with market awareness or entrepreneurship would be more inclined to choose research topics from the perspective of market demand. Therefore, the initiative of entrepreneurs plays an important role in the industrialization of research achievements. In entrepreneurship, it is not easy to change the organizational system or policy environment in a short time, but entrepreneurs, a mobile factor in scientific research and social activity, can be changed through in-depth research and analysis. Consequently, it is of great practical significance to study how entrepreneurs could transform their roles during academic entrepreneurship to adapt to the new environment. Moreover, it is beneficial to improve the success rate of academic entrepreneurship and is also an important way to promote the transformation of scientific and technological achievements into the driving force of economic development (Audretsch, 2012).

1.4 Research methods

The empirical research comprehends three studies. Because there is no clear model that makes dimensions more explicit within the context of China, we designed Study 1 that consists of an inductive qualitative approach to identify coping strategies and extract the dimensions of misfit, which is done through a primary data collection via in-depth interviewing with a sample of academic entrepreneurs, from a multiple individual-focused case study. The contents analysis of data suggests a framework with dimensions that is intended to explain patterns of association between individual competences, coping strategies, role conflict and entrepreneurial performance. This provides the basis for the second and third studies. As there is an intention to deploy a quantitative hypothetic-deductive research, we designed Study 2 that develops two scales, one of which is the academic entrepreneurial competences scale and the other is the coping strategies scale, based on qualitative information from the previous study 1. By using these scales, Study 3 empirically tests the relationship between academic entrepreneurial competences, P-E fit, role conflict, coping strategies, and entrepreneurial performance, and it is based on primary data collected via survey by questionnaire. Associations are analyzed with path analysis to test the model.

1.4.1 Case study through interview

As there are few scales on academic entrepreneurship competences, it is necessary to explore the components and scales of academic entrepreneurship competences. Therefore, the case study through interview method was used to explore the competences that academic entrepreneurs should possess by focusing on four personal cases. It also lays the foundation for the later development of the academic entrepreneurial competences scale. Thus, the research adopts one-to-one in-depth interviews with academic entrepreneurs and TMT members, keeps detailed interview records during the interview process, conducts in-depth exploration of the interview records, and analyzes the role differences between researcher and entrepreneur, P-E misfit, role conflict and the role conflict coping strategies adopted by academic entrepreneurs.

1.4.2 Survey

Based on case study through interview, in order to further explore the two scales of Academic Entrepreneurial Competences and Coping Strategies and to conduct an empirical study on the

mechanisms by which academic entrepreneurial competences influence entrepreneurial success, two surveys are deployed. First, in Study 2, an online survey is used to collect a sample of 458 participants for the two scales (academic entrepreneurial competences and coping strategies) to be developed, in order to validate the developed scales for the two variables. Secondly, in Study 3, a questionnaire survey with a two-wave data collection originates a 167 sample of academic entrepreneurs to empirically test the proposed theoretical research model.

Chapter 2: Literature Review

2.1 Entrepreneurship

2.1.1 What is entrepreneurship

Originating in the 1960s and emerging in the 1980s, entrepreneurship research, as an independent field of study, has made great strides and progress to date (Carlsson et al., 2013). There are many definitions of entrepreneurship. The Organization for Economic Co-operation and Development (OECD, 1998) published a report entitled Fostering Entrepreneurship, defining entrepreneurship in more exploitative terms and closer to outcomes at the aggregate level as follows: Entrepreneurship is central to the functioning of market economies. Entrepreneurs are agents of change and growth in market economy and they can act to accelerate the generation, dissemination and application of innovative ideas. In doing so, they not only ensure that efficient use is made of resources, but also expand the boundaries of economic activity. Entrepreneurs not only seek out and identify potentially profitable economic opportunities but are also willing to take risks to see if their hunches are right. While not all entrepreneurs succeed, a country with a lot of entrepreneurial activity is likely to be constantly generating new or improved products and services. Some researchers think "entrepreneurship refers primarily to an economic function that is carried out by individuals, entrepreneurs, acting independently or within organizations, to perceive and create new opportunities and to introduce their ideas into the market, under uncertainty, by making decisions about location, product design, resource use, institutions, and reward systems. The entrepreneurial activity and the entrepreneurial ventures are influenced by the socioeconomic environment and result ultimately in economic growth and human welfare" (Carlsson et al., 2013).

To sum up, entrepreneurship is a dynamic process in which entrepreneurs establish new ventures or provide new products and services by identifying, evaluating and developing opportunities and integrating resources, so as to achieve value creation or profit (Shane & Venkataraman, 2000). It is now generally recognized that entrepreneurial activity is one of the primary drivers of industrial dynamism, economic development, and growth.

2.1.2 Stages of entrepreneurial ventures

Different scholars divide the entrepreneurial stage differently. Scholars generally agree that entrepreneurship is a complex and dynamic process. For example, from a network embedding perspective, Larson and Starr (1993) argue that entrepreneurship is a dynamic developmental process in which entrepreneurs must search, scan, and select relationships in response to the complex and changing entrepreneurial environment at different entrepreneurial stages in order to follow the business domain of the new venture and create new network resources using existing networks of relationships. Typically, based on the research of the Global Entrepreneurship Monitor (GEM), Reynolds et al. (2005) divided the entrepreneurial process into four stages, namely, entrepreneurial opportunity identification stage (gestation period), entrepreneurial opportunity development stage (less than 3 months), new enterprise growth stage (less than 42 months) and enterprise stability stage (more than 42 months). This division of entrepreneurial stages has been accepted and adopted by many scholars. Coviello (2006) divided the entrepreneurial stage into entrepreneurial opportunity identification period, entrepreneurial opportunity development period, and new enterprise growth period. Butler and Hansen (1991) divided the start-up creation process into three stages: creation, start-up growth, and sustained growth, and identified priority resources for the different stages. In addition to this, Klyver (2007) divided the start-up cycle into three stages: the exploration stage, the start-up stage and the new enterprise stage. In general, entrepreneurship can be divided into four stages: opportunity identification, opportunity development, starting a business, and stable growth.

2.2 Academic entrepreneurship

2.2.1 The rise of academic entrepreneurship

In recent years, China has vigorously promoted the policy of “mass entrepreneurship and innovation”, and a series of policies have been issued by the country to encourage scientific researchers’ innovation and entrepreneurship. Under this macroscopic background, traditional universities and academic organizations are no longer satisfied with the discovery and dissemination of knowledge, but pay more and more attention to the transfer and application of knowledge. Therefore, the academic entrepreneurial community has been growing and greatly promoted the transformation of scientific and technological achievements and the development of national economy. In foreign countries, with the demonstration effect of a

number of entrepreneurial universities such as the Massachusetts Institute of Technology (MIT) and Stanford University on knowledge capitalization, more and more universities and scholars are also engaged in academic entrepreneurship.

2.2.2 The definition of academic entrepreneurship

Research attention to academic entrepreneurship has been booming since the mid-1990s. Academic entrepreneurship was first proposed by American scholar Roberts (1991) in his book Entrepreneurs in High Technology: Lessons from MIT and Beyond. In the book, Roberts considered academic entrepreneurship to be a process in which researchers of academic institutions establish new companies based on scientific research results. In the book Academic Entrepreneurship: University Spin-offs and Wealth Creation, Shane (2004) defines academic entrepreneurship as the process in which the owner (academic institutions) of intellectual property rights uses intellectual property to start a company. Accordingly, academic entrepreneurs are defined as scholars who launch an entrepreneurial project and work in academic departments where the knowledge is created (Zhang et al., 2021). In fact different scholars give various definitions to academic entrepreneurship. In general, scholars' definitions of academic entrepreneurship can be summarized into the following three types.

2.2.2.1 Definition of academic entrepreneurship with an academic focus

This definition emphasizes the subjectivity of academics, academic organizations, or scholars in academic entrepreneurship, and its focus is on the interior of the university. University administrators, professors, and academics favor this definition. They see entrepreneurship as a way to enhance academics, ultimately serving academics and focusing on academic outcomes. For example, Chrisman et al. (1995) suggest that academic entrepreneurship is the activity of creating a business at any institution within a university through his analysis of the University of Calgary in Canada. Glassman et al. (Glassman et al., 2003) see academic entrepreneurship as the pursuit of opportunities by every employee within a university to improve the activities of the university. They also suggest that individual scholars, project managers, department chairs support entrepreneurial activities at universities by creating opportunities, cultivating opportunity recognition skills, accessing resources, and building a culture. O'Shea et al. (2007) regard academic entrepreneurship as an activity undertaken by universities and their industrial partners in order to enable the industrialization of academic research. Furthermore, the prerequisite for this activity is that there is a large amount of scientific research produced within the university and that a portion of it has commercialization potential. Abreu and

Grinevich (2013) think academic entrepreneurship refers to the founding of a company by an academic scientist who previously worked in a laboratory or an academic department where the technology originated. In general, this type of definition of academic entrepreneurship emphasizes that the subject of the venture is the university researchers and that the purpose of academic entrepreneurship is primarily to enhance the academic research output of the scholars and the universities.

2.2.2.2 Definition of academic entrepreneurship with an entrepreneurship focus

This definition emphasizes the results of entrepreneurship and commercialization, and focuses more on the outside of the university. Entrepreneurs and practitioners prefer this definition. They believe that academic results and theoretical knowledge should serve entrepreneurship and eventually lead to commercial results and earn additional profits. For example, Louis et al. (1989) propose five types of academic entrepreneurship through a survey of scholars in life sciences disciplines: participation in externally funded research, earning additional income, obtaining industrial support for university research, obtaining patents or generating trade secrets, and commercialization. Klofsten and Jones-Evans (2000) consider academic entrepreneurship as all commercialized activities outside of the normal research and teaching functions of the university. Albats et al. (2018) think academic entrepreneurship refers to the commercialization process of university intellectual property or technology transfer. In general, this type of definition of academic entrepreneurship places more emphasis on the process of commercialization of intellectual property or technology outside the universities.

2.2.2.3 Definition of academic entrepreneurship integrated with academy and entrepreneurship

As universities and industry have become more connected and collaborative, there are some scholars who have integrated both of these definitions. For example, Brennan and McGowan (2006) consider academic entrepreneurship as an organizational creation and strategic renewal within and outside the university. Hayter et al. (2018) define academic entrepreneurship as the establishment of new spinoff companies by faculty, professors, students, or affiliated personnel based on university technology. Czarnitzki and Toole (2010) explore whether academic entrepreneurs can strike a balance between academic research and entrepreneurship by conducting an empirical analysis of U.S. bio-scientists. The results suggest that these scientists will experience a decline in their academic output if they pursue entrepreneurship in the private sector. Moreover, when these scientists return to academic research, they will not

be as productive as before. This study reveals the paradoxical nature of academia and entrepreneurship and reflects the importance of integrating and balancing academia and entrepreneurship. However, Van Looy et al. (2004) conduct an empirical study in Belgian universities in response to the suspicion that academics and entrepreneurship interfere with each other. The results find that the two reinforce each other. Moreover, a Matthew effect occurs as resources increase, and the balance between the two depends largely on policy formulation. It follows that the integration of academics and entrepreneurship helps the discipline to be in a better competitive position and to have access to significant resources. In general, this type of definition of academic entrepreneurship places more emphasis on the entrepreneurial process based on the results of academic research.

In summary, the large-scale involvement of universities in academic entrepreneurship after the 1980s is no accident. From the endogenous aspect, the direct involvement of universities in the transformation and application of knowledge products eliminated the intermediary between the product and the end user, in line with the historical trend of the continuous extension of universities in the knowledge production chain. In terms of external factors, the reduction of financial investment in higher education in major Western countries in the 1970s and 1980s objectively contributed to the integration of universities with the market, and with the advent of the knowledge economy, further pushed universities to the center of economic society. Academic entrepreneurial activities have become a common phenomenon in the existence of contemporary universities, and also play a non-negligible role in the economic and social development of the national region. A typical American-style entrepreneurial university is MIT, where a very large number of enterprises have been started by MIT faculty and students, and these university-derived enterprises have created a large number of jobs and tax revenues. This study argues that academic entrepreneurship is the process of converting knowledge resources into intellectual capital by extending the traditional work of knowledge discovery and transfer to the commercialization of knowledge output by researchers in the process of academic production. The main ways of academic entrepreneurship include technology consulting, technology transfer and licensing, and the establishment of spin-off enterprises. Academic entrepreneurial activities as individual acts of scholars may be both academically oriented and entrepreneurially oriented, and may be oriented to a combination of both academics and entrepreneurs.

In terms of the nature of academic entrepreneurship, first of all, academic entrepreneurship is the process of transforming knowledge from resources to capital. Universities have always been an important bastion of knowledge in human society. With the

development and growth of university organizations, knowledge has gradually become the source of university power, and the profound and professional characteristics of knowledge labor have become the main basis for universities to acquire autonomous power that other organizations in society do not have. With the advent of the knowledge economy, knowledge has risen to become a basic resource. Academic entrepreneurship is the process of breaking the established pattern of resource dependence and transforming its own knowledge resources into realistic intellectual capital that can promote economic development through market-oriented activities. Secondly, academic entrepreneurship is a natural extension of the university's knowledge production chain. Universities are societies built around the discovery, dissemination, and application of knowledge, and the organization engaged in knowledge labor is the most essential characteristic of university organizations. One of the development trends of universities is the continuous extension from point to line in the knowledge production chain. In this way, universities integrate the discovery, transmission, and application of knowledge throughout the chain of knowledge production. Therefore, the emergence and prosperity of academic entrepreneurship is a natural extension of universities in the knowledge production chain. From the exploration and discovery of knowledge until the completion of knowledge capitalization, universities finally open up the whole process of the knowledge production chain.

2.2.3 The characteristics of academic entrepreneurship

Academic entrepreneurship is different from other entrepreneurship. Based on the definitions and literature of academic entrepreneurship, we conclude that academic entrepreneurship has the following main characteristics.

2.2.3.1 The diversity of academic entrepreneurship

Compared with other kinds of entrepreneurship, the main participants of academic entrepreneurship are researchers engaged in academic research and possessed intellectual property rights. Generally, the objects of academic entrepreneurship are products with recognized academic or economic value obtained by researchers through complex intellectual work. The purposes of academic entrepreneurship are not only obtaining economic rewards, but also advancing the academic research. In addition, the forms of academic entrepreneurship are more diversified, including patent license, patent transfer, conversion into shares, spin-off enterprise (Yusof & Jain, 2010). Patent license and patent transfer are often the primary means of realizing the commercial value of technology patent rights. The

creation of spin-off enterprises is the main form of academic entrepreneurship.

2.2.3.2 The multi-layered nature of academic entrepreneurship

The direct subject of academic entrepreneurship is the individual scholar, but the individual scholar does not carry out entrepreneurship as an independent identity. On the one hand, the property rights of intellectual products, the most important resource invested in the process of entrepreneurship, are shared between individuals and schools. For example, according to the Bayh-Dole Act of the United States, the ownership of university inventions produced with federal government funding can be vested in the university, and the inventor is entitled to share the patent licensing revenue. On the other hand, the management of entrepreneurial projects often involves the university level. After the Bayh-Dole Act, most U.S. research universities established Technology Transfer Offices (TTO) to commercialize technological achievements. TTO is fully involved in the process of finding partners, formulating project contracts and project operation, which can effectively make up for the limitations of scholars' individual capabilities. Studies by Rasmussen et al. (2014) found that regardless of the level of policy support at the university level, the incidence of academic entrepreneurship would be significantly affected in the absence of support from grassroots academic organizations.

2.2.3.3 The dynamic process nature of academic entrepreneurship

Friedman and Silberman (2003) believe that academic entrepreneurship is not a single event, but a dynamic process composed of a series of events. Wood (2011) pointed out that academic entrepreneurship can be divided into four stages: innovation disclosure and intellectual property protection stage, awareness and acquisition of industrial partnership stage, commercialization mechanism selection stage (technology certification and licensing, creation of derivative enterprises, driving mechanism selection), and commercialization stage. Qian et al. (2018) put forward the sustainable innovative academic entrepreneurship process model, which includes eight phases: idea generation, developing the experimental prototype, deciding to commercialize, creating the product prototypes, creating and developing the new venture, producing the product, and generating sales. Xia et al. (2018) propose a model of academic entrepreneurship from the perspective of system dynamics that seeks to explore key features of this complex process within the boundaries of a spinoff company, and they develop a framework that includes four main phases: recognition, commitment, credibility, and sustainability. By dividing the various stages of the dynamic process of academic entrepreneurship, scholars can help to identify the entrepreneurial activities, subjects,

difficulties and main influencing factors in different stages, so as to improve the performance of academic entrepreneurship.

2.2.4 Factors influencing academic entrepreneurship: from macro to micro

From macro to micro, the current literature on factors influencing academic entrepreneurship can be classified into three levels: the environmental or system level (government, institution, and local-context), the organization or university level, and the individual level (Li et al., 2021; Zou et al., 2019). Next, this study will analyze the research on academic entrepreneurship from the macro, medium, and micro levels.

2.2.4.1 Factors influencing academic entrepreneurship from macro level

At the macro level, academic entrepreneurial activities are influenced by the environment and policies of the region as well as the country. For example, researchers study the impact of university technology transfer on the economy (Siegel & DelaPotterie, 2003), and the types of spin-off companies and the impact of external resources on spin-off business performance (Wright et al., 2004). Some scholars focus on the social effects and incentive mechanism of the scientific knowledge commercialization (Audretsch & Keilbach, 2004), and the institutional arrangements for the transformation of academic organizations into industry (Farsi & Modarresi, 2014). The main influencing factors include the intellectual property system, entrepreneurial ecosystem, regional infrastructure environment, and government support.

The national-level intellectual property rights regime for university intellectual products largely influences the incentive for university academic entrepreneurship, for example, the impact of the Beyer-Dole Act on university academic entrepreneurship in the United States. The Act grants intellectual property rights to research results from state-funded projects to universities rather than to individual researchers, and encourages the commercialization of research results by universities. After the implementation of the Act, almost all research universities have established specialized agencies such as TTOs to manage related matters. The Act has greatly facilitated the commercialization of research results at U.S. universities.

Some scholars have also focused on the impact of entrepreneurial ecosystems on academic entrepreneurship. For example, some researchers view the academic entrepreneurial activities of an entrepreneurial university and its surrounding environment as a complex ecosystem, and argue that there are interactions between the entrepreneurial university and its environment. Hayter et al. (2018) review the extant literature to understand how academic

entrepreneurship is conceptualized and the extent to which it adopts an ecosystem approach from the ecosystem perspective, and the findings suggest that the academic entrepreneurial ecosystem includes complex elements and their interconnections. These elements include “Human capital: entrepreneur”, “TTOs”, “Entrepreneur support programs”, “Technology”, “National Programs and Policies”, “Organizational Networks”, “Human Capital: Team”, “Individual Characteristics”, “Motivation and Self Efficacy”, and “Research Discipline”.

The regional infrastructure environment is also considered to be one of the most important factors influencing academic entrepreneurship. For example, Saxenian (1993) noted that academic entrepreneurial activity has a higher chance of occurring in high-technology industry cluster regions. This is because these regions tend to have more established innovation networks. It has also been shown that regions with a concentration of venture capital firms have a greater chance of venture capital investment for startups. For example, Franklin et al. (2001) found after a study that universities with a higher incidence of academic entrepreneurship tend to create more opportunities for the university’s spin-offs to engage with venture capital firms.

In addition, some researchers focus on how the government support programs contribute to promote academic entrepreneurship. For example, from the principal–agent perspective, Rasmussen and Gulbrandsen (2012) point out that how the government should support academic entrepreneurship, and they think the key tasks include collecting and sharing information, engaging in long-term relationships with principals and agents, developing strategies and specific contractual relationships, taking higher risks for risk-averse agents and using multiple indicators.

In general, at the macro level, academic entrepreneurial activities are influenced by environmental factors in the region where the university is located as well as in the country and region. Scholars have analyzed the impact of factors such as intellectual property rights system, regional infrastructure environment, entrepreneurial ecosystem, and government support policies on academic entrepreneurial activities.

2.2.4.2 Factors influencing academic entrepreneurship from medium level

The second research perspective is entrepreneurial universities from the medium organizational level. For example, scholars have analyzed: Why are some universities more entrepreneurial (Etzkowitz, 2003; Henrekson & Rosenberg, 2001)? What obstacles exist in the formation of entrepreneurial universities (Schmiemann & Durvy, 2003)? What are the contradictions and conflicts in the process of transforming to entrepreneurial universities

(Rothaermel et al., 2007) and how to resolve these conflicts (Debackere & Veugelers, 2005)? What's the impact of entrepreneurial universities on academic entrepreneurship willingness (M. Wang & Guo, 2020)? How could business school support academic entrepreneurship (Walsh et al., 2021)?

Some researchers provide a systematic review of a recent research stream addressing the development, growth, and performance of university spin-offs and present a conceptual framework outlining the variety of outcomes used in the literature to assess the development, growth and performance of university spin-offs, as well as the determinants of these outcomes at different levels of analysis (Mathisen & Rasmussen, 2019). Di Gregorio and Shane (2003) found that academics from top universities were more likely to launch successful start-ups, partly due to the influence of the school's prestige. Their findings show that for every point increase in graduate school ranking, there is a concomitant 68% increase in the rate of university-derived business start-ups. Some scholars note that most of the spin-offs from MIT between 1980 and 1996 were related to the biochemical industry (Shane & Venkataraman, 2000). Similarly, some scholars note that more than half of Columbia's spin-off firms were related to the biopharmaceutical industry, while the rest were mainly related to the electronic software industry (Golob, 2003).

In addition to this, whether the university has established a TTO to support academic entrepreneurial activities is also of interest to scholars. It has been argued that the presence of TTOs is a key factor affecting university technology transfer and university-derived enterprises (Jefferson et al., 2017). When the role of TTOs is analyzed from the perspective of academic entrepreneurs, scholars have different views and attitudes about the effectiveness of TTOs. Some scholars' studies have found that TTOs are effective in promoting academic entrepreneurial activities. TTOs play a key role in stimulating academic entrepreneurial activities and strengthen academics' ties with venture capitalists, professional managers, and entrepreneurial advisors. TTOs are also directly involved in the development of business plans, the raising of venture capital, and the formation of entrepreneurial teams. The findings of O'Gorman et al. (2008) suggest that the main benefit of TTOs is that they put external resource providers in contact with scientists who are committed to commercialization. This access to individuals with market knowledge is critical for scientists to identify commercialization opportunities.

However, the findings of some scholars suggest that although TTOs provide scientists with external resources to enable technology licensing and technology transfer, they in fact play a limited role for university-derived enterprises and scientists' entrepreneurial behavior.

Huyghe et al. (2016) found that only a few researchers were aware of the existence of TTOs. Awareness of the existence of TTOs was somewhat stronger among researchers who had entrepreneurial experience, had numerous research and consulting contracts with industry partners, were engaged in medical, engineering, or life science research, or were doing postdoctoral work. The findings of Clarysse et al. (2011) suggest that the activities of TTOs play only a marginal and indirect role in promoting academic entrepreneurship. That is, the role of TTOs on scientists' involvement in entrepreneurial activities is relatively limited or even non-existent. They argue that the efficiency or presence of TTOs is then very important for the spin-off firms that arise from formal technology transfer. However, if a large range of start-ups is considered, then TTOs play only a very weak role in the formation of entrepreneurial ventures.

Overall, at the medium level, scholars have analyzed the impact of universities on academic entrepreneurial activities. This includes the impact of the university's reputation and image on academic entrepreneurship, the impact of the university's research nature and research area on academic entrepreneurship, and the impact of the university's TTO play on academic entrepreneurship.

2.2.4.3 Factors influencing academic entrepreneurship from micro perspective

The third perspective is the factors influencing academic entrepreneurship from individual level. Scholars have mainly focused on the impact of academic entrepreneurs' demographic characteristics, human capital, social capital, entrepreneurial motivation, and entrepreneurial competence on academic entrepreneurship.

(1) Demographic characteristics influencing academic entrepreneurship

In terms of demographic characteristics, age, gender, family background, and personality character affect academic entrepreneurship. In terms of the effect of age on academic entrepreneurship, some studies have shown that academic entrepreneurship increases with age, because older scholars have richer social networks, and they are conducive to implementing academic entrepreneurship through more collaboration (Oehler et al., 2015). But some studies argue that scientists are less likely to start a business the older they are, because older scientists are closer to retirement age, and they are usually less likely to start a new business (Karlsson & Wigren, 2012). It has also been argued that the age of scientists is not related to the propensity to become entrepreneurs (Aldridge et al., 2017). The gender of academic entrepreneurs is also an aspect that affects academic entrepreneurship. Studies have found that academic entrepreneurship is predominantly male-centered (Bergmann et al., 2016). Most

studies concluded that female researchers do not find scientific commercialization through starting a business attractive compared to male researchers. There are even studies that have found a negative correlation between female gender and entrepreneurial behavior (Abreu & Grinevich, 2013). And they find that female academics are less likely to be involved in entrepreneurial activities than their male colleagues, but that the gender gap is larger for informal activities, particularly for consultancy and contract research. This result is consistent with previous findings in the literature that show that female academics are more risk averse, and lack the experience and external contacts needed to effectively engage with external organizations. There are also studies that show that family background is also a factor that influences academic entrepreneurship. It has been noted that entrepreneurial parents, entrepreneurial family members, or family history of entrepreneurship are predictors of involvement in academic entrepreneurial activities (Bergmann et al., 2016). In addition, another research result suggests that the basic entrepreneurial personality character of a person contributes to the shaping of his or her entrepreneurial passion, which is relevant for actual entrepreneurial activity (Obschonka et al., 2019). Vega-Gómez et al. (2020) propose the use of the paradigm known as Big Five, which proposes as personality variables that are recognized by the acronym OCEAN (openness, conscientiousness, extraversion, agreeableness, and neuroticism) to recognize if they are determinants of entrepreneurial skills and entrepreneurial intent, and the results were verified.

(2) Human capital influencing academic entrepreneurship

Several scholars have analyzed the impact of the human capital of academic entrepreneurs on academic entrepreneurship, including entrepreneurial experience, personal knowledge, habits, and abilities (Clarysse et al., 2011). Entrepreneurial experience includes patent applications, product development, and early involvement in spin-off companies. Findings indicate that entrepreneurial experience largely exerts a positive influence on the subsequent entrepreneurial intentions and entrepreneurial behavior of academic entrepreneurs (Klofsten & Jones-Evans, 2000). This is because entrepreneurial experience enhances entrepreneurs' self-efficacy, improves their ability to identify market opportunities, increases their entrepreneurial knowledge, and also helps them build relationships with external stakeholders. It has also been argued that the combing of published researches by academic entrepreneurs is also associated with academic entrepreneurship (Aldridge et al., 2017). Ding and Choi (2011) find that the number of researches published and the number of citations to researches by scientists were positively associated with business start-up and business consulting activities, this might be because scientists who found companies attempt to capture

the scientific opportunities in their recent surge of scientific discoveries. Hence, when a scientist has a good run of research and has made some discoveries with commercial potential, he is likely to capitalize on the scientific breakthrough and make the transition into entrepreneurship. In comparison, advisors are sought after for their deep expertise and academic reputation. Hence, when a scientist enjoys a high level of research publication stock, it makes him an attractive scientific advisor candidate. It has also been noted that the number of publications shows an inverted U-shaped relationship with academic entrepreneurial behavior (Haeussler & Colyvas, 2011) or no relationship (Karlsson & Wigren, 2012). In addition, using unique data collected from 480 life sciences researchers in Switzerland and Germany, some scholars provide evidence that scientists with more diverse and balanced skills are more likely to have higher entrepreneurial intentions, but only if they also balance their working time and are in contact with entrepreneurial peers (Moog et al., 2015). Therefore, to encourage the entrepreneurial intentions of life scientists, it must be ensured that scientists are exposed to several types of work experience, have balanced working time allocations across different activities, and work with entrepreneurial peers, e.g., collaborating with colleagues or academic scientists who have started new ventures in the past.

(3) Social capital influencing academic entrepreneurship

Scholars' findings consistently indicate that the amount of social capital possessed by academic entrepreneurs positively affects their academic entrepreneurial activities. The social capital of academic entrepreneurs is one of the important factors affecting academic entrepreneurship, especially at the early stages of the entrepreneurial process (Gubbins et al., 2020; Samuelsson & Davidsson, 2009). This is because social capital helps academics prepare to start a business by exposing them to new and different ideas and worldviews, providing them with a broader frame of reference, and nurturing the idea of starting a new venture. Rasmussen (2011) found that contact and interaction with companies is critical for scientists trying to start a business to develop personal competences, networks and experience. Contact and interaction with companies can lead to the acquisition of knowledge outside of the university that can improve the ability to articulate business concepts clearly. Krabel et al. (2012) also found that scientists born and educated abroad were more likely to engage in starting new businesses than those born and educated at home, due to the broader social capital that can be built through international experience.

(4) Entrepreneurial motivation influencing academic entrepreneurship

The impact of entrepreneurial motivation on the innovative behavior and entrepreneurial performance of academic entrepreneurs has been the focus of scholarly attention.

Entrepreneurial motivation can be classified into two types: intrinsic and extrinsic motivation. Intrinsic motivation often comes from the work itself and includes perceived independence, experienced increased self-esteem, feelings of control and pleasure from the work environment, challenging work, and expanding knowledge. These intrinsic motivations play a decisive role in promoting entrepreneurial behavior among scientists (Lounsbury et al., 2012). Extrinsic motivation refers primarily to perceived external incentives to complete tasks, including monetary compensation, access to research support, and promotion. Lam (2010) argues that scientists' motivations for commercialization include curiosity, funding, reputation, and personal income. By analyzing the motivations of scientists in UK universities to engage in technology commercialization, she finds that traditional scientists' entrepreneurial motivations are mainly motivated by research funding and reputational benefits; hybrid scientists' entrepreneurial motivations are mainly knowledge application with puzzle and reputation; and entrepreneurial scientists' entrepreneurial motivations are driven by money and puzzle. Hayter (2015) found that the entrepreneurial motivations of academic entrepreneurs include using spin-offs as a platform to access Small Business Innovation Research Program grant programs and other types of research funding, increased accountability for traditional university teaching and research, concern for students and employees, university technology diffusion, product development and commercialization, avoidance of university bureaucracy, and financial gain. In addition, some scholars explore the effect of entrepreneurial identification on academic entrepreneurship (Guo et al., 2019b; M. Wang & Guo, 2020). Some researchers focus on the academic entrepreneurship founder motivations, and the findings show that founder motives related to self-realization, necessity and an increased financial income increase the likelihood of completing venture creation activities, whereas work-life balance motivations and the drive to make better use of one's professional knowledge decrease that likelihood (Hossinger et al., 2021). It is thus clear that academic entrepreneurship is the result of a complex mix of intrinsic and extrinsic motivations, and that different individuals have different motivations.

(5) Entrepreneurial competence influencing academic entrepreneurship

Entrepreneurial competence is an indispensable factor that influences academic entrepreneurs to carry out entrepreneurial behavior. Research has shown that academic entrepreneurs have many skill barriers to creating and sustaining start-ups, and many researchers are reluctant to acquire the skills needed for commercialization and are therefore unsuitable to become entrepreneurs (Vohora et al., 2004). These skill barriers include: entrepreneurship requires technological breakthroughs with multiple business applications;

entrepreneurs may not have the skills or knowledge to identify opportunities; entrepreneurs may lack the skills or knowledge needed to capitalize on opportunities; and the traditional non-business environment of the university has a limited level of support for creating and growing entrepreneurial ventures. Currently, research on the entrepreneurial competences of academic entrepreneurs has been limited to opportunity recognition (Clarysse et al., 2011). Clarysse et al. (2011) conclude that entrepreneurial opportunity recognition of academic entrepreneurs significantly increased their entrepreneurial behavior, with each percentage point increase in entrepreneurial competences increasing entrepreneurial behavior by 1.57 percentage points. Vega-Gómez et al. (2020) studied the influence of entrepreneurial skills on the entrepreneurial intention of academics. The results show that of the Big Five components, only three are influential on entrepreneurial skills. Openness, extroversion, and the absence of neuroticism are antecedents of such entrepreneurial skills. Entrepreneurial skills are the prime determinants of attitude and perceived control, and attitude is the decisive factor that determines the intention to go into business.

2.3 Summary of literature review on academic entrepreneurship

Academic entrepreneurship is a special type of entrepreneurship with characteristics of diversity, multi-level, and dynamic process. Scholars have studied academic entrepreneurship from the macro-environmental level, the university organizational level, and the individual entrepreneur level. In all, studies about influencing factors on academic entrepreneurs have primarily focused on the macro level which has advanced our understanding of how different entrepreneurship and innovation ecosystems perform with various configurations of resources, assets and policy instruments. Bozeman et al. (2013) acknowledge this tension between studies either focusing on the micro level and not taking account of contextual issues or not taking account of the role of individual dynamics. Academic entrepreneurs play a critical role in the success or failure of entrepreneurship. Therefore, there have been recent calls within the literature for more micro level studies and analysis (Albats et al., 2018; Cunningham & Menter, 2020; Cunningham & O'Reilly, 2018).

An important topic worth exploring in micro-level studies on academic entrepreneurship is the competences of academic entrepreneurs. Literature informs on which competences researchers need to have (Albareda-Tiana et al., 2018; Lambrechts & Van Petegem, 2016; Marrs et al., 2022; Torres Delgado & Hernández-Gress, 2021) as well as those that entrepreneurs must have (Bolzani & Luppi, 2021; Kyndt & Baert, 2015; Rivera-Kempis et al.,

2021). But literature on competences academic entrepreneurs should possess to be successful is lacking. The divergent list of competences suggests they are not sufficient to guarantee success in academic-entrepreneurship as in such sort of endeavors obstacles must be overcome, another topic of research on academic-entrepreneurship that deserves attention from the micro-level concern coping strategies.

Chapter 3: Study 1: Academic Entrepreneurs' Competences, Challenges and Coping Strategies: An Exploratory Study

3.1 Introduction

Academic entrepreneurship, which is based on the scholars' scientific achievements, is the process of creating enterprises and forming products through opportunity identification, utilization and resource integration (Goethner et al., 2012). In the forms of patent license, patent transfer, conversion into shares, and spin-off enterprises (Siegel & Wright, 2015), academic entrepreneurship has become an important social phenomenon in the new era. Colyvas (2007) shows that academic entrepreneurship adds both economic and social value to society while providing more income to universities (Hmieleski & Powell, 2018) which logically should bring direct benefits to the scholars and researchers (Fini & Toschi, 2016). This is an important reason to understand why academic-entrepreneurship is now an important research topic deserving much attention within the field of innovation research and entrepreneurship (Abreu & Grinevich, 2013; Grimaldi et al., 2011).

Academic entrepreneurs are the key actors during the process of academic entrepreneurship. Academic entrepreneurs are academic faculty members who undertake technology commercialization, using formal modes of entrepreneurial engagement, that capitalize on specific market opportunities (Miller et al., 2018). Academic entrepreneurs are different from ordinary entrepreneurs, because they move from the familiar academic field towards the unfamiliar field of entrepreneurship. Since the roles of scholars and entrepreneurs contain completely different or even mutually exclusive elements, there are obvious differences in their ways of thinking, methods and processes of problem-solving, value orientations, and knowledge required (Li et al., 2022). During the process of academic entrepreneurship, many academic entrepreneurs find it challenging to balance these two roles and often encounter daily conflict in the face of such a balance, and academic entrepreneurs often ask themselves (Zou et al., 2019).

At present, literature about academic entrepreneurship primarily incorporates macro level ideas and tools from fields such as economics, sociology, strategy, and public policy (Balven et al., 2018). There have been recent calls within the literature for more micro level studies

and analysis (Albats et al., 2018; Cunningham & O'Reilly, 2018; Li et al., 2021; Qian et al., 2018). Despite this relatively small research amount, the literature on the individual level mainly focuses on individual characteristics associated with academic entrepreneurship (Perkmann et al., 2013; Rothaermel et al., 2007), scholars' motivation, engagement, and preferences of entrepreneurial activities (Bercovitz & Feldman, 2008; George et al., 2005; Libaers & Wang, 2012; Moutinho et al., 2016). Furthermore, only a few scholars paid attention to the role conflict problems of academic entrepreneurship, but they mainly analyzed the role differences (Bartunek & Rynes, 2014), the process of role identity modification (Jain et al., 2009), and how they may interact (M. Wang et al., 2022). However, the specific challenges experienced by academic entrepreneurs and the effective coping strategies remain unexplored. Thus, based on Role Identity Theory (Stets & Burke, 2000), the main purpose of this study is to explore the following two questions: What are the role differences and challenges experienced in academic entrepreneurship? What are the coping strategies to deal with P-E misfit during academic entrepreneurship?

By answering these research questions, the present study is intended to make several contributions. First, it is designed to empirically investigate the role differences and challenges experienced in academic entrepreneurship. In addition, it also explores the coping strategies to deal with P-E misfit during academic entrepreneurship. This study intends to enrich research on academic entrepreneurs' role identity, and also, by exploring the coping strategies to deal with P-E misfit during academic entrepreneurship, this research can help academic entrepreneurs during entrepreneurship to understand the dynamic process of role transition and the manifestations of P-E misfit. Moreover, conclusions can provide assistance for academic entrepreneurs to successfully and effectively achieve role transition and P-E fit, thereby improving the success rate of academic entrepreneurship.

This study is organized as follows. We first provide the theoretical background and present the relevant literature review. We then describe our method, including research approach, procedure, samples, instruments, and data analysis. And we follow up with the findings discussing them and concluding, highlighting the implicit theory academic-entrepreneurs hold on their role clarity, role conflict, and coping strategies.

3.2 Literature review

3.2.1 Academic entrepreneurship

Academic entrepreneurship, as a new field that focuses on the process of creating, discovering and developing social or technological opportunities, has gradually attracted wide attention from researchers. The specific forms of academic entrepreneurial activities include patent operation and licensing, technology transfer office, campus incubator, university derivative enterprises (Siegel & Wright, 2015). Academic entrepreneurship reflects the commercialization process of university intellectual property or technology transfer. Universities can promote academic entrepreneurship by cultivating knowledge and technology transfer capacity, which can generate considerable economic and social benefits (Colyvas, 2007), help regional social development (Fini et al., 2011), and provide new sources of income for universities (Hmieleski & Powell, 2018).

Literature on academic entrepreneurship can be classified into three levels: systems level, university level, and individual level (Rothaermel et al., 2007; Schmitz et al., 2017). First, at the macro system level, researchers mainly examine the effects of government behavior, institutional allocation, and local context external environmental factors affecting technology transfer and industrialization (Rasmussen & Gulbrandsen, 2012). Secondly, at the level of university, researchers mainly evaluate the influence of university policy, system, and culture on the commercialization of technological achievements (Thursby et al., 2001). Finally, at the micro individual level, scholars pay attention to how individual characteristics, entrepreneurial tendency, previous experience, social capital and other factors affect the outcome and output of academic entrepreneurship (Clarysse et al., 2011).

On the whole, most literature is focused on the first two levels and research on the individual level of academic entrepreneurship is a topic that needs to be further developed (Albats et al., 2018; Balven et al., 2018; Cunningham & O'Reilly, 2018; Grimaldi et al., 2011; Jain et al., 2009; Li et al., 2021; Qian et al., 2018; Yusof & Jain, 2010; Zou et al., 2019). In fact, academic entrepreneurs differ from traditional entrepreneurs in that they are both scientists and entrepreneurs. Facing norms in different fields will lead to a high degree of individual uncertainty (Sinell et al., 2015) and therefore, it is a major challenge for most academic entrepreneurs to deal with and reconcile the conflicts and pressures arising from different norms, beliefs and value propositions in academic and business circles.

3.2.2 Role identity

Role is defined as a kind of social status, which is a relatively stable morphological component in the social structure. It carries the expectation of behavior and obligation to other actors, and represents a group with similar characteristics. Role identity is defined in social psychology as a self-view or a sense of self-attribution related to a specific role, highlighting the close connection between social definition elements as the basis of role and individual understanding of role (Jain et al., 2009).

Different role identities require different abilities, beliefs and priorities (Jain et al., 2009). Entrepreneur role identity and scientist role identity are usually regarded as opposite to each other, the conflict of dual roles makes the boundary between roles blurred, with overlapping boundaries, and struggling to integrate divergences. Bartunek and Rynes (2014) delineate several tensions associated with the academic–practitioner gap, including differing logics, time dimensions, communication styles, rigor and relevance, and interests and incentives, and show how such tensions are valuable themselves for research and theorizing.

What exactly is the role of academic entrepreneurs? Is an academic or an entrepreneur or a combination of these two? According to the research of Jain et al. (2009), scientists invoke rationales for involvement that are congruent with their academic role identity. Academic entrepreneurs typically adopt a hybrid role identity that comprises a focal academic self and a secondary commercial person. The researchers delineate two mechanisms – delegating and buffering – that these individuals deploy to facilitate such salience in their hybrid role identity. Overall, these patterns suggest that university scientists take active steps to preserve their academic role identity even as they participate in technology transfer.

Role identity can integrate the thoughts, feelings, and beliefs of individuals as academic entrepreneurs, and is an important predictor of decision-making and action of academic entrepreneurs and the main source of behavioral motivation (Cardon et al., 2009). Role identity is the main source of motivation for individual behavior. In commercial activities, individuals inject the meaning of personal identity expression and self-concept. Therefore, it is of great significance to explore the formation path and mechanism of academic entrepreneurship.

3.2.3 Competences to become an academic entrepreneur

3.2.3.1 Research competences

Academic entrepreneurs are a special group of entrepreneurs who use knowledge or

technology as capital to start their own businesses, and they need to have both research and entrepreneurial competences. Competence is defined as an underlying characteristic in the individual that is causally related to a standard of effectiveness and/or superior performance in a job or situation, and in general, competences have three dimensions: knowledge, skills, and attitudes and values (Rivera-Kempis et al., 2021).

Research competences are essential and professional transferable skills, including those in scientific leadership, knowledge transfer, and science management, are also necessary for scientists building research careers (Casamitjana et al., 2022). In the study of Lambrechts and Petegem (2016), research competences contain 10 aspects: acquiring disciplinary knowledge in a multi-, inter-, and transdisciplinary framework; reformulating a research question; defining a research plan; collect, select and organize information, data and suitable source material; determine the relevance, value, usefulness and representativeness of the obtained information, data and data sources, and using them correctly; processing data; drawing reasoned and argued conclusions; evaluate and assess the research; determine and argue a position or opinion; and systematically report about (describe) and present (transfer).

Albareda-Tiana et al. (2018) develop research competences and put forward that it includes 4 aspects. RC (research competence) 1: The theoretical framework or introduction and the objectives are well elaborated. Correct research method. RC 2: They justify the results obtained and use charts in an appropriate way. RC 3: They communicate correctly in written form. RC 4: Correct bibliography. Good quotations. They take care of the formal aspects of the figures, margins.

Some researchers adopted the Research Competence questionnaire to measure research competence across multiple disciplines, a self-report measure of one's research competence, which has five dimensions: skills in reviewing the state of research, methodological skills, skills in reflecting on research findings, communication skills, and content Knowledge (Marrs et al., 2022). The resulting instrument consisted of five factors, one for each dimension of research competence.

By employing a mixed two-stage sequential design, Torres and Hernández-Gress (2021) developed a self-assessment model of research professors' competences with four domains and six competences. Domain 1: Updated and linked (The professor is a recognized trainer in the discipline, constantly renewing and evolving, generating research that benefits society, integrating learning quickly into students' transformation process, through both professional activities and research.), including two competences, Transformation of society, Researcher training. Domain 2: Innovative (The professor generates high impact research, models,

policies, products, and services in an accelerated manner for the benefit and transformation of society.), including one competency, Originality and innovation. Domain 3: Inspirational (The professor is a respected trainer who develops relationships with students and transmits to them passion for research and discovery, thus developing in them deep and meaningful learning.), including two competences, Teaching as well as Ethics and citizenship. Domain 4: Information Technology User (The professor uses technology as an element that enables and empowers the transformation processes of people and the research they conduct.), including one competency, Teacher' digital Competence.

Specifically, Pizzi et al. (2020) focused and established the Health Economics and Outcomes Research Competences Framework, which consists of 41 competences organized into 13 domains: Business Management, Career Development, Communication & Influence, Economic Evaluation, Health Policy & Regulatory, Health Service Delivery & Process of Care, Study Approaches, Patient-Centered Research, Methodological & Statistical Research, Clinical Outcomes, Health Technology Assessment, Epidemiology & Public Health, and Organizational Practices. Q. Chen et al. (2020) used The Research Competence Scale for Clinical Nurses (RCSCN) of a Chinese self-evaluation instrument to measure the nursing research competence of clinical nurses. The scale includes 30 items and six subscales, namely Problem Identification and Research Question Formulation, Literature Search and Review, Research Design, Research Implementation, Data Analysis, and Research Reports Writing.

In all, research competences are comprehensive professional competences that researchers accumulate over time as they are developed in the research process. Although scholars have not reached a consensus on what competences researchers should possess, most researchers summarize and conclude researcher competences in terms of the research process, including the competences that should be possessed before the research begins, during the research process, and in the communication and presentation of research results.

3.2.3.2 Entrepreneurial competences

Entrepreneurial competences are important factors that influence academic entrepreneurs to carry out academic entrepreneurial behavior. Entrepreneurial competences are something which a person should be able to demonstrate or achieve to successfully exercise entrepreneurship (Mitchelmore & Rowley, 2010). The concept of entrepreneurial competences is not unitary in social sciences because the notion of competences is complex – comprising components that are deeply rooted in a person's background (traits, personality, attitudes, social role and self-image) as well as those that can be acquired at work or through

training and education (skills, knowledge and experience) (Man et al., 2002).

What competences should an entrepreneur have? Bolzani and Luppi (2021) developed a framework and practical proposal for the teaching and assessment of entrepreneurial competences, and they assessed the impact of participation in a business model challenge with regard to five entrepreneurial competence areas: Positive attitude and initiative; Communication and interaction; Team-work and collaboration; Critical and analytical thinking or problem solving, including risk assessment; Creativity and innovation. Positive attitude and initiative competence area including such specific competences: Self-assessment, Growth mindset, Emotional intelligence, Perseverance, Coping strategy; Communication and interaction competence area including such specific competences: General communication, Interaction, Presentation, Negotiation and persuasion; Team-work and collaboration competence area including such specific competences: Group work and team management, Conflict resolution; Critical and analytical thinking or problem solving, including risk assessment competence area including such specific competences: Problem solving attitude, Recognizing opportunities, Risk management; Creativity and innovation competence area including such specific competences: Creativity and lateral thinking, Adaptability, Innovation.

Kyndt and Baert (2015) consider these twelve competences are important for entrepreneurs, including perseverance, ability to plan ahead, insight into the market, orientation towards learning, ability to identify and seize these opportunities, aware of potential returns, decisiveness, independence, self-knowledge and justified self-confidence, building networks, ability to persuade, social and environmentally conscious. Moreover, they examine the predictive value of these competences for being active as an entrepreneur, and the results indicate that perseverance and insight into the market contributed positively to being and remaining active as an entrepreneur.

According to Rivera-Kempis et al. (2021), entrepreneurial competences include three dimensions: knowledge, skills, and attitude and values. Knowledge refers to the ability to mentally represent sets of data, facts, concepts, notions, information, propositions, and categories acquired in one or more disciplines through experiences or learning that are necessary for adequate performance; Skills refer to the ability to act and intervene in reality through the use of procedures or processes that are necessary for the ideal performance in any activity, whether physical or mental; Attitudes and values consist of the disposition and motivation of the individual to action and the implementation of values in professional and life situations that is based on their autonomy, self-esteem, and ethical life project. In addition, it corresponds to the system of beliefs and stable effective dispositions that the person

assumes as referential guidelines to act in a certain way. In terms of knowledge, it includes such specific competences: autonomous learning, previous experience, critical thinking, possession of information; in terms of skills, it includes such specific competences: exploit opportunities, development of contact networks, creativity and innovation, leadership, persuasion, decision making and problem solving; and in terms of attitude and values, it includes such specific competences: self-efficacy, competitiveness, confidence, nonconformity and individualism, legitimacy, internal locus of control, motivation, persistence, tendency to take risks, tolerance for failure and uncertainty.

In short, entrepreneurial competences are broad and comprehensive competences that entrepreneurs accumulate over time as they develop during the entrepreneurship process. From the comprehensive research results of scholars, the competences that entrepreneurs need to possess include both positive character and attitude, such as persistence, self-confidence, and independence; also include broad knowledge, such as continuous learning, rich experience; and include a variety of skills, such as communication, interpersonal relations, leadership, innovation.

3.2.4 Coping strategies and fitting in roles of entrepreneurs

Coping is the process of managing taxing circumstances, expending efforts to solve personal and interpersonal problems, seeking to master, minimize, reduce or tolerate stress induced by unpleasant and stressful situations and the coping strategies have been divided into two type, the problem-based coping strategy and the emotion-based coping strategy (Drnovšek et al., 2010). First, problem-based coping strategy refers to a cognitively-based response behavior that includes efforts to alleviate stressful circumstances. This coping strategy includes defining the problem, generating alternative solutions, determining the costs and benefits of such solutions, and actions taken to solve the problem. Second, emotion-based coping strategies involve behavioral responses to regulate the affective consequences of stressful events, which may include avoidance, minimization and distancing oneself from the problem. Furthermore, the overall results of their study suggest that entrepreneurs who engage in problem-based coping strategy report higher personal well-being and venture performance. There was no empirical support for the relationship between emotion based coping strategy and personal well-being and venture performance. They also found that problem-based coping strategy was more strongly related to personal well-being and venture performance; entrepreneurs who used more adaptive problem-solving strategies were more likely to remain

in business longer than their less adaptive colleagues. Hence, a coping strategy of taking on challenging expectations through the venting of emotions might not be a preferable path. It seems that problem-based coping strategies are more instrumental than emotion-based ones for attaining successful entrepreneurial outcomes. This implies that entrepreneurs who are more inclined toward emotion-based coping strategy could be trained to employ more problem-based coping strategy, since coping can be learned just like any other competence.

Hall (1972) identified three types of strategies for coping with role conflict: First is structural role redefinition, which involves actively engaging with role senders to reduce role conflict by reaching mutual agreements on a new set of expectations; second is personal role redefinition, which involves altering personal concepts of role expectations received from others; and third is reactive role behavior, which involves an effort to improve role performance without attempting to alter either structural or personal concepts of role expectations.

Based on Hall (1972), Örtqvist et al. (2007) later develop and test four coping strategies, including structural role redefinition, personal role redefinition, reactive role behavior, and passive role behavior. Role redefinition refers to responding to role conflict by changing other people's (structural role redefinition) or one's own (personal role redefinition) expectations for the role. Role behavior refers to responding to role conflict by adjusting one's behavior through either working harder (reactive role behavior) or diverting attention in a belief that meeting the role demands is impossible (passive role behavior). With the structural role redefinition strategy, the entrepreneur tries to alter external, structurally imposed expectations of the role by negotiating those expectations with role senders. The personal role redefinition coping strategy is activated when the entrepreneur changes his or her personal perceptions of role senders' expectations. This strategy involves changing priorities, dismissing some already-planned activities and declining additional responsibilities. Reactive role behavior corresponds to behavioral changes that result in increased role performance in the eyes of the stakeholders. In this mode, the entrepreneur focuses more on carrying out tasks by working longer hours to meet stakeholder expectations. Passive role behavior results in diversions when unable to alter expectations. Although the entrepreneur realizes that expectations must be met, they cannot be met only through increased role performance. Furthermore, the empirical findings indicate that coping strategies based on structural role redefinition and/or reactive role behavior positively affect new venture performance; coping strategies that suppress perceived challenging expectations by personal role redefinition have a significant, negative effect on new venture performance.

In order to answer the question of how do female entrepreneurs in developing countries cope with role conflict, Hundera et al. (2021) conduct a survey that involved 307 female business owners in Ethiopia. Results show that the commonest coping strategies identified were negotiation, committing to the entrepreneurial role, committing to social roles, pleasing all, seeking social support, and hiring outside support. Negotiation includes negotiating with role senders to alter their role expectations and reduce role conflict. Commitment to entrepreneurial roles means the focus was on prioritizing one's entrepreneurial role by postponing social role expectations (e.g. a woman's responsibilities in the family and community), including making sacrifices on family and community roles to accommodate business demands. Commitment to social roles includes prioritizing social role expectations and behavior by postponing entrepreneurial role demands and making sacrifices in one's entrepreneurial role to accommodate family and community roles (e.g. canceling a business meeting to socialize with neighbors, friends, and extended family). Pleasing all refers to react to all roles, plan and organize and integrate roles. Seeking social support includes seeking emotional and instrumental support from one's spouse, extended family, friends and neighbors to manage multiple role demands and reduce role conflict. Hiring outside support includes employing household help or hiring employees and delegating responsibilities to them in one or more domains. Moreover, female business owners with high levels of personal resources (such as optimism, self-efficacy, and resilience) committed more to their entrepreneurial roles than to their social roles.

In summary, scholars have proposed coping strategies that general entrepreneurs should adopt in the face of role conflict in the entrepreneurial process, such as the problem-based coping strategy and the emotion-based coping strategy; structural role redefinition, personal role redefinition, reactive role behavior, and passive role behavior; negotiation, committing to the entrepreneurial role, committing to social roles, pleasing all, seeking social support and hiring outside support. These strategies provide references and lessons for academic entrepreneurs on how to deal with role conflict in the academic entrepreneurship process.

3.3 Summary of literature review

Academic entrepreneurship has attracted the attention of researchers and policy makers as it reflects the commercialization of university intellectual property with expected benefits at different social and economic levels.

Research on academic entrepreneurship has adopted differing perspectives with

publications highlighting the systems levels (macro), university level (medium), and individual level (the academic-entrepreneur) with the scarcer outputs being produced in the last one. As regards this level, the dual nature of academic-entrepreneurship (as the name per si indicates) suggests the need to reconcile both roles as their nature is conspicuously different. The process through which this complex role identity is formed is not known. Likewise, both roles entail different competencies and although literature on research competencies as well as on entrepreneurial competencies, there is a void about academic-entrepreneurial competences. Lastly, as inferable from such divergences, any individual that needs to deal with divergent requirements and with the intrinsic uncertainty involving entrepreneurial activities should deploy coping strategies to overcome the challenges. Literature on coping strategies is very much developed but the focus on academic-entrepreneurial coping strategies is still lacking research.

3.4 Method

3.4.1 Research approach

3.4.1.1 Case study

Case study research is an empirical inquiry that examines contemporary phenomenon in real-life contexts; in such a research context, the boundaries between the phenomenon themselves and their contexts are not obvious, and the research is conducted with extensive use of anecdotal evidence (Yin, 1984). Case study investigates the case or cases conforming to the above mentioned definition by addressing the “how” or “why” questions concerning the phenomenon of interest (Yin, 1984). Case study method has long been a contested terrain in social sciences research (Yazan, 2015).

We opted for an in-depth case study approach (Yin, 1984) to enhance our knowledge of academic entrepreneurs’ role challenges and coping strategies during entrepreneurship. As the study aims to answer why academic entrepreneurs experience a mismatch in the role transition process and how this mismatch can be resolved, a multiple-case study was chosen as the main research method. The case analysis in this study is divided into two parts: the first part is an in-case analysis specifically analyzing some challenges confronting academic entrepreneurs in their role transition process in each case and proposing some solutions and countermeasures. The second part is a cross-case analysis, analyzing and comparing the differences in the understanding of role transition challenges and solutions among different

academic entrepreneurs.

3.4.1.2 The grounded theory

The grounded theory is a qualitative research method that uses formulaic rules, inspirational tools, and systematic procedures to collect and analyze qualitative data and construct theories rooted in the data (Glaser et al., 1968). Compared with other qualitative research methods, the grounded theory is based on primary data inquiry, with more emphasis on the extraction and distillation of common factors on the ground of the comparison of differences between cases, focusing mainly on the interaction between social situations and individual behavior (Rothwell, 1980). Through deep analysis and continuous interpretation of primary sources, the grounded theory explores the key concepts of research propositions, and establishes some logical connections between different concepts to construct a scientific theory.

In previous studies on academic entrepreneurship, not enough attention was paid to the key academic entrepreneurial competences and no complete theoretical construction was proposed for the key academic entrepreneurial competences; therefore, to explore the academic entrepreneurial competences simply by relying on the literature is hardly persuasive. Hence, this study approaches the research questions from a grounded theory perspective, as the choice to explore the key academic entrepreneurial competences by conducting in-depth interviews with academic entrepreneurs and their executive team members, to construct a model of academic entrepreneurial competences.

3.4.2 Procedure

In recent years, semiconductor chip and new energy vehicles, the key developing industries in Chengdu-Chongqing economic circle, China, have attracted and gathered many excellent entrepreneurs. Therefore, this study selects founders of enterprises in these industries as the research subjects. In addition, since the study targets academic entrepreneurs, those entrepreneurs who create new companies based on scientific research results or intellectual property rights are chosen as the subjects of the case studies.

In this case study, the information about the research subjects was mainly obtained from field research, interviews with entrepreneurs as well as with their executive teams (Top Management Teams, TMT). The interviews include informal and formal ones. From October 2021 to March 2022, the leading researcher first used her social connections to contact academic entrepreneurs of the target enterprises and to understand the basic situation of these enterprises by conducting field research there. Then, relevant information was collected in

some informal conversations for the interviewees' basic information. This preliminary groundwork of field research and informal interviews were intended to facilitate deeper communication in the subsequent formal interviews.

The interview outline was sent to the interviewees (including the founder of each company and a member of the TMT) via email or Wechat before the formal interview. The semi-structure interviews generally followed, yet were not limited to, the outline, offering interviewees a certain space for more relevant information. Each interviewee was interviewed for 40-120 minutes; the interviews were recorded with the consent of the interviewees; and after the interviews were completed, the recordings were transcribed. In the process of collating the information, any unclear points were confirmed by telephone to ensure their accuracy. To protect anonymity, pseudo names were used for all intervening parts, individuals as well as companies.

3.4.3 Sample

In this study, the enterprises surveyed are all SMEs at the development stage founded by academic entrepreneurs in recent years, belonging to semiconductor industries, power supply, and new energy vehicle, with a few dozen employees respectively. In addition, in order to understand the basic situation of the enterprises and the academic entrepreneurs from another perspective, the study conducted formal interviews with one member of each TMT, some of whom joined the team right after the startup and some after the enterprise was established, and their management task division varied. The basic information of the four enterprises, the academic entrepreneurs and interviewed TMT is shown in Table 3.1 below:

Table 3.1 Surveyed enterprises, interviewed founders and TMT members

Code	Founder A	Founder B	Founder C	Founder D
Current Age	39	36	36	55
Education	PhD	Master	PhD	PhD
Registered Capital (10,000 RMB)	884	1000	5500	3206
Founding Time (year)	2018	2016	2017	2014
Members of Founding Team (number)	4	3	6	3
Founder's Equity	21.09%	51%	90%	50%
Current Number of Employees	40-50	30-40	50-60	60-70
Current Sales Volume (million	10	20	30	10-20

RMB)				
Industry	chip	power supply	new energy vehicle	new energy vehicle
Code	TMT-A	TMT-B	TMT-C	TMT-D
Current Age	38	36	36	45
Education	Bachelor	Bachelor	Master	Bachelor
Joining phase	Joined at start-up phase (1st year)	Joined at start-up phase (1st year)	Joined at start-up phase (3rd year)-part time job in the first two years	Joined at start-up phase (1st year)
Role or main responsibility in the company	finance, procurement and external relations (CFO+)	external relations and the market	finance, administration, investment and financing, HR, and government relations	overall management

3.4.4 Interview protocol

Minding the core issue of "challenges and suggestions for academic entrepreneurs in the process of role transition", the study designed the interview outline for academic entrepreneurs and TMTs respectively, drawing on existing research findings. (See Annexes A and B for the interview outlines)

Interviews for academic entrepreneurs (founders) firstly started by asking entrepreneurs to present the basic information about their enterprises, their motivation for starting the business, the pre-start experience, and the profile of the entrepreneurial team. Next, the entrepreneurs were asked to analyze how the roles of technologists and entrepreneurs differed, and whether they positioned themselves as technologists or entrepreneurs or otherwise. Then, the entrepreneurs were asked to describe challenges they faced in their role transitioning during the entrepreneurial process and how they dealt with them. Finally, they were asked to offer advice on strategies and suggestions to entrepreneurs who are in the role transition stage, to facilitate their transition from technologists to entrepreneurs.

Interviews for the TMTs first asked for a brief overview of themselves, the basic situation of the enterprises, their main motivation for joining the enterprises, and a basic overview of the entrepreneurial teams. Next, the TMTs were asked to analyze how the roles of technologists and entrepreneurs differ. They were then asked to describe what challenges those academic entrepreneurs around them faced in transitioning their roles and how they handled these challenges. Finally, similarly to the founders, the TMTs were asked to offer some advice on strategies and suggestions to entrepreneurs who are in the role transition stage to facilitate their transition.

3.4.5 Content analysis

Content analysis is a summarizing, quantitative analysis of messages that follows the standards of the scientific method (including attention to objectivity–intersubjectivity, a priori design, reliability, validity, generalizability, replicability, and hypothesis testing based on theory) and is not limited as to the types of variables that may be measured or the context in which the messages are created or presented (Neuendorf, 2017).

Human coding is adopted in this quantitative content analysis in line with procedures put forward by Neuendorf (2017), including theory and rationale, conceptualization, operationalizations (measures), coding schemes, sampling, training and pilot reliability, coding, final reliability, tabulation and reporting. Following Neuendorf's (2017) recommendation that coding should be done independently, with at least a 10% overlap for the reliability test, we have asked two experts in the field to independently code all the data. This means, coding 48 items total, divided by blocks of qualitative nature, namely competences (3 items), entrepreneur's motivations (5 items), top team member motivations (5 item), role differences (8 items), role transitions (6 items), coping strategies (11 items), and advices (10 items). In this research the result of coding by two coders has an average of 92.7% overlap (ranging from 90.6% to 100% depending on the block), with an average Fleiss Kappa of 0.843 ($p<.001$) and Kendall's W statistic of concordance of 0.928 ($X^2(47)=174.487$, $p<.001$) ranging from 0.833 to 1.000 thus indicating high interrater agreement. The consistency analysis result of coding is shown in Table 3.2.

Table 3.2 Consistency analysis of coding

Parameters	Competences	Entrepreneur's motivation	Top Team member motivation	Role differences	Role transition	Strategies	Advices	Overall items rating
Fleiss's kappa	1.000***	.748***	1.000***	.784***	.799***	.832***	.833***	.843***
Kendall's W	1.000*	.934**	1.000**	.892**	.962**	.965***	.833***	.928***
Absolute agreement	100%	90%	100%	90.6%	91.7%	90.9%	92.5%	92.7%
X^2(df)	$X^2(2)=8.000$	$X^2(4)=14.937$	$X^2(4)=16.000$	$X^2(7)=24.976$	$X^2(4)=19.245$	$X^2(10)=38.584$	$X^2(9)=29.995$	$X^2(47)=174.487$

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

3.5 Results

This section will develop by characterizing each case separately and reporting the categories, its conceptual nature, and frequency with which they emerged in the data collection process. For each case, the results are reported as answers to the two guiding questions. Namely, "What are the role differences and challenges experienced in academic entrepreneurship" and "What are the coping strategies to deal with P-E misfit during academic entrepreneurship".

3.5.1 Results of four cases

3.5.1.1 Case 1: Mr. DY

Mr. DY is 39 years-old and holds a PhD degree in electronic engineering from USA. He is tall, handsome and sunny. With experience working in General Electronics and Qualcomm for three and a half years, he launched his own business in 2018 when he spotted the market opportunity. The founder's deep motivation to become an entrepreneur was to give back to society, challenge himself, grab the opportunity in the market and also for career prospects but more importantly, his main driving force was wealth freedom improve his family life conditions.

The company's main products are RF modules for smart phones. With a background in electronic engineer his self-reported characteristics are hard-working, high need for achievement, setting high standard goals for own performance, and seizing opportunities and before venturing Mr. DY had no experience whatsoever in either entrepreneurship or management as his working life was exclusively in research and teaching. Now he is also a professor in a university.

Currently, Mr. DY can count on three more members in his TMT, namely the CEO (also from a university), a COO (chief operations officer) that is in charge of the market, and a VP (vice president). Mr. DY himself is the chairman and holds responsibility as CTO (chief technology officer). According to the VP, who joined in at an early stage of the startup as a co-founder, he holds competences in finance, management, operations management and also some entrepreneurial experience and leadership experience, while he sees Mr. DY as holding expertise in technology. He decided to join the venture because of the positive industry prospects, also because he found Mr. DY to have a virtuous personality and the project to be ambitious. Lastly, he believed to have complementary skills and felt his contribution was helpful to the success of the project. Now Mr. DY and the CEO work part-time, while the

COO and the VP full-time. For Mr. DY, the time spent in university and in company is about 50:50. At weekends, he is basically in the university, and on workdays in the company.

Now, the company has still no profit, and is in the loss state, mainly depending on financing to survive. The company revenue is close to 10 million RMB, it grew to more than 40 employees, and has the capital of about 200 million RMB. The main goal of the company is to go public by 2025, and to improve the quality of the product. The main challenge is to attract funding as its main income is investment capital and the company also aspires to affirm itself in a highly competitive market with already low prices. The VP also adds that one of the challenges for the company is to find the right talents as there is difficult to recruit professionals with the right profile.

RQ1.What are the role differences and challenges experienced in academic entrepreneurship?

The founder acknowledged differences between the roles of expert technologist and entrepreneur. He thinks that the technologist mainly focuses on R&D while the entrepreneurial role will be constantly making decisions, dealing with massive information, planning, multitasking, mobilizing high interpersonal skills, and gaining higher social recognition which translates into a profile of skills that involve deciding, planning, multitasking, relating with people, and building reputation. He depicts himself as someone that performs both roles, interchangeably, in different situations. The TMT member independently converged on this ambidextrous role performing by the founder.

The founder stated that the biggest challenges in role transition from academic-technologist to academic-entrepreneur concerned some managerial key functions such as making decisions, dealing with multitask, and holdings meetings, as well as socializing and motivating people. Likewise, having the energy to work and travel was mentioned as another challenge and lusty, shifting the mindset towards the collective, i.e., thinking about the group success instead of one’s own individual success, was a substantial challenged that deserved mention. As a technologist, the founder also reported to have been challenged on how to learn to do fundraising, balancing work with family, adapting and distancing himself from the university. The other challenge he felt concerned recruiting people and managing time. This is largely convergent with the TMT opinion that the role transition from an academic-technologist to academic-entrepreneur requires developing competences in both management and leadership.

RQ2. What are the coping strategies for facing the challenges of academic entrepreneurship?

The founder is very laconic in exploring this topic as he highlighted the role that having had mentor guidance would play in helping him to cope with the role transition challenges. As a complement, the TMT member reported that the founder took some management courses and put effort into integrating with the industry while bringing.

When asked about which advices, the founder would offer to other academic-entrepreneurs to deal with role transition, and he stated that one should keep the focus on technology, while learning to delegate (using collective organs to solve conflict), keep control over managers, and share dividends as a way to commit individuals with the project through equity. The TMT member elaborated more by advising in four domains of competence, namely: intrapersonal competence (be calm and steady), interpersonal (ability to deal with people and keeping good relations with corporations), entrepreneurial competence (keeping high efficiency in time-to-market by bringing products to the market as much as possible), and managerial competence (have a sense of cost reduction and leading employees).

An implicit strategy that has not been approached but is patent in the profile of the interviewees is the complementary competences both have in making the venture successful. Namely, the TMT is depicted as two main players, one in charge of the operations (COO) and the other of finance (CFO) which also cumulates other procurement and external relations. The founder has a co-founder that is currently the CTO. This indicates that the original founding team was joined by two specialized managers in critical areas for entrepreneurial ventures.

3.5.1.2 Case 2: Mr. Y

Mr. Y is 36 years old and has a master's degree in electronics. He has a simple and competent look and a sincere and down-to-earth attitude. Before founding the company, the founder had working experiences in many companies in the industry, from an ordinary engineer to a technical director to a head of the marketing, and then to the VP of a company. He has rich industry experience, cherishes every opportunity, puts himself in customers' shoes, and is skillful. The company's development takes the road of "specialization, precision, exclusion, and originality", plows deep in a niche area, gains good profits and maintains well-established customer cooperation. The founding time of the company was July 2016, its main product is power supply, and the registered capital was 10 million RMB. Mr. Y's motivation for founding the business is to achieve personal value, realize social usefulness, and get reward and wealth freedom.

Currently, there are two more members in Mr. Y's TMT, one in charge of market development and marketing, mainly outward business, and the other responsible for internal management and production management, mainly inward business. Mr. Y is the CEO and is in charge of finance, HR, and technology. Each member has a respective focus.

The company currently has over 30 employees, 14 among whom are engaged in research and development. The company's output value is 20 million RMB this year, and the set goal for the next three years is to exceed 50 million RMB as well as to become a leading supplier of the power supply industry. The company's current predicament is mainly around capital and resources, with its cash flow relatively strained, and social resources as well as customer resources to be expanded. The TMT, who is responsible for the outward contacts, added that the company's goal is mainly to expand the scale and increase the output value, while the challenge is mainly in personnel recruitment and technological innovation.

RQ1.What are the role differences and challenges experienced in academic entrepreneurship?

The founder acknowledged differences between the roles of expert technologist and entrepreneur. He thinks that the technologist mainly focuses on the product itself and its technological bases while the entrepreneurial role will be focused on the market, profit, and income. He depicts himself as someone that performs both roles but predominantly the entrepreneurial role, and that these roles are adversarial.

The founder stated that the biggest challenges in role transition from academic-technologist to academic-entrepreneur concerned marketization of products, i.e. how to transform an idea into a marketable product and likewise that although a product might be technically perfect, it is the customer demands and change in demands that ultimately determine its success in the market. This has been solved. As a technologist, the founder also reported to have been challenged by deciding what was the best TMT structure be, technical partnering, and to keep his own determination.

RQ2. What are the coping strategies for facing the challenges of academic entrepreneurship?

The founder elaborated on this topic and stated that he coped with challenges by communicating with customer and using persuasive communication with technicians so to guarantee a closer fit to market demands. He also offered much advice for a successful venture. Namely, those entrepreneurs should be very knowledgeable about the industry, know the policies and contact with governmental authorities. Additionally, one must have a clear development strategy and a good governance structure (shareholder and TMT structure) while

learning to delegate, empower and trust people. He also highlighted that importance of having solid financial knowledge, and being able to continuously learn and upgrade products. Lastly, he highlights the importance of keeping a humble attitude which means communicating more and being more open to learning.

The founder is depicted by the TMT member as having a balanced set of competences in both technical and managerial domains, being experienced also in leading and capable of good learning. Although this is a more balanced profile, the composition of the TMT also suggests complementary competences as an implicit strategy. Namely, the two TMT members are in charge of external relations, and technology & production, with the interviewed member highlighting his language skills on English as an added value to the team.

3.5.1.3 Case 3 Mr. C

Mr. C is 36 years old, with a doctorate degree from Tsinghua University and post-doctoral experience in the USA. He has the demeanor of a leader, is cheerful, optimistic, and humorous, and exhibits an entrepreneurial spirit. During his postdoctoral years in the USA, he mastered the original core technology of electric vehicle gear shifting and reached the advanced technology level in China. He returned to Sichuan Province to found the company, mainly because the city it's located is his hometown and the local government offered the company great financial and policy support. The founding time of the company was 2017. Mr. C's motivation for starting the company is, on one hand, because the industry is in need for his technology and he can make a bigger fortune after the technology is industrialized. On the other hand, the founder regards himself as a very talented man and has a positive self-concept. Additionally, the founder wants to contribute to the industry in boosting Chinese people's confidence with his efforts, and has a sense of mission for improving the national strength. The company's major business is as a supplier of multi-gear electric drive system for electric vehicles, with two related supporting side businesses. Prior to the company, Mr. C had no experience in entrepreneurship or management, and he went directly from a researcher to an entrepreneurial role. However, the founder is very skilled at soliciting support from external resources. The local government has been very supportive and the founder values good relations with the government.

Currently, there are four more members in Mr. C's TMT, among whom three have their PhDs and are mainly responsible for technology, and one is VP for finance, administration, investment and financing, legal issues, HR, and guanxi with the government. The VP joined the company late in the venture, and has over ten years of working experience in the banking

and investment management industry. He decided to join the company because, on the one hand, the industry has a promising future and, on the other hand, he knew and trusted the founder and believed that his technology and personality could ease the industry's pain points. Mr. C, the founder, is the CEO, and his main task is now to conduct talent search, funding search, directing, and guanxi with clients (B2B).

The company is currently valued over 500 million RMB and is undergoing Round A financing. The company's goal is to go public in 2026, so that more electric vehicles can use the company's gearing system. The annual output value of the company this year is over 30 million RMB, with more than 50 employees, half of whom are R&D staff. The company's current strategy is to "keep feet on the ground + look up to the stars". The company's current challenges include the unsatisfactory control over cost and the supply chain, as well as its failure to achieve super performance and super low prices, with its demand for super low prices being the biggest problem. The company's VP added that the company's challenges also include the optimization of the supply chain system, cost reduction, the lack of talents, and the need to integrate more market resources.

RQ1.What are the role differences and challenges experienced in academic entrepreneurship?

The founder acknowledged differences between the roles of expert technologist and entrepreneur. He thinks that the technologist should be like engineers while the entrepreneurial role will be focused on profit seeking. He depicts himself as an engineer, and he thinks he should use the thinking of engineers to consider the company's strategy and product orientation. He thinks entrepreneurs must have engineer's mindset like Steve Jobs or Elon Musk, and entrepreneurs in the transitional period should be product-driven, pursuing good performance and good price. To meet these two conditions, the CEO plays an engineer role, and in the future, he wants to play the role of product manager. However, the TMT member thinks the change of the founder from scholar to entrepreneur is very obvious and successful, and now he regards the founder as playing an entrepreneurial role.

The founder stated that the biggest challenges in role transition from academic-technologist to academic-entrepreneur concerned marketization of products after careful market research, which segment to go, the way for technology transformation and how to gain credibility. As a technologist, the founder also reported to have been challenged by non-stop financing and integrative industrialization in proper scenarios. As a complement, the TMT member reported that the challenges include being more realistic, not taking most things for granted, and gaining knowledge about market.

RQ2. What are the coping strategies for facing the challenges of academic entrepreneurship?

The founder stated that he coped with challenges by the corporate philosophy of “feet on the ground and looking up to the stars”, keeping close relationship with investors and complementary TMT structure, equity participation, no-over financing and developing entrepreneurial knowledge of all. At the same time, an external facilitator factor worth mentioning is that although the local government provided seed capital and thus participated in the company, it followed a policy of providing support while avoiding to directly interfering with the business decisions. As a complement, the TMT member reported that the founder hired a professional sales team and had the awareness of his own shortcomings.

When asked about which advices the founder would offer to other academic-entrepreneurs to deal with role transition, he stated that one should contact closely with the party and the government to look for local government sponsorship, integrate with industry and try to industrialize the technology. As a complement, the TMT member suggested that TMT must include tech experts and management knowledge and form the alignment of the core team about technology and management.

3.5.1.4 Case 4 Mr. F

Mr. F, aged 55, has a doctorate in management and a master’s degree in electronics in prestigious universities in China. He founded the family business with his wife. He is elegant, talkative, and professional. The founding year of the company was 2014, and the motivation of starting the business was to make the finale and prove him. The company is in the new energy vehicle industry, which is developing very fast and is a government-led industry. Since graduation, the founder had worked in the government, once as a department-level official, and later a manager in a large SOE, with rich management experience. Now, in his spare time, he works as a guest professor in colleges, follows the industry dynamics, and has strong academic expression ability.

There are four more members in Mr. F’s TMT, and the company currently holds multiple businesses, with each member in charge of a business unit linked to specific products or services. The founder, Mr. F, is the CEO, and one of the TMT members is responsible for the management of two business units, the communication among all units, as well as assisting the founder in some issues. He joined the company at its start-up phase, and the main motivation was the personal charisma of the founder.

The company is a holding company of a variety of businesses, covering a wide range and

now focusing on one industry, offering upstream and downstream comprehensive services in the energy vehicle industry. At present, the company's annual sales volume is10 to 20 million RMB, it has 60 to 70 employees, and its goal includes: developing ecological chain services for new energy vehicles, expanding businesses, maturing within one year or two, and realizing the company chain and a public company's acquisition within three to five years. The company's current challenges include funding, some local policy changes along the process, the lack of local acceptance of new energy in the city and prefecture markets, the lack of management technology and talents, and the business model itself that requires brushing up. Both the TMT member and the founder stressed the lack of talents and capital as main challenges.

RQ1.What are the role differences and challenges experienced in academic entrepreneurship?

The founder acknowledged there are big differences between the roles of expert technologist and entrepreneur. He thinks that tech experts are only responsible for a certain technical feasibility, which requires expertise. But entrepreneurs are the life-or-death decision makers of the whole business, who need comprehensive competences. He thinks that a good entrepreneur is more valuable than a tech expert and should be paid more. He depicts himself between these two roles. But he thinks in the future, he would like to hire better talents after the business reaches a certain stage, and he can just manage strategy, direction and funding. As a complement, the TMT member reported that the founder led an easier life when he was doing engineering technology. But after starting the business, he's been exhausted with more on his shoulder and he has no day off, also working as long as there're needs. He thinks the founder did well in combining these two roles, and has very high emotional intelligence, and the founder is an entrepreneur.

The founder stated that the biggest challenges in role transition from academic-technologist to academic-entrepreneur concerned dealing with different things. He said that technologists mainly face things, while entrepreneurs mainly deal with people, and it is difficult to select and manage people. And he said technologists may not have a broad vision and are used to looking at specific matters, while entrepreneurs should unite people, do well in team building, be more tolerant, and help and encourage others, which is a challenge in the process of transformation. The founder said he had slowly learned this through personal growth. As a complement, the TMT member reported that the biggest challenge tech experts face at the beginning of their entrepreneurship is to step outside universities and institutes with scarce social experience or emotional intelligence, which they could not learn from

textbooks, especially on personal relations. Likewise, it can be bothering dealing with governments.

RQ2. What are the coping strategies for facing the challenges of academic entrepreneurship?

The founder stated that entrepreneurs should have the spirit of craftsmanship. Thus, entrepreneurship requires an extensive array of qualities, including intelligence, emotional intelligence, courage or audacity, stamina, and luck, and they should learn to seize the venture capital and opportunities. Convergently, the TMT member reported that the founder should learn all-round knowledge.

When asked about which advice the founder would offer to other academic-entrepreneurs to deal with role transition, he stated that they should know themselves, be patient, prepare for failure, identify technological real potential in industry and have clear goals. As a complement, the TMT member suggested that academic entrepreneurs should be courageous, take action and have executive force, and know when to grasp opportunities.

3.5.2 Results of crossing cases

In this section we intend to compare the case studies in looking for commonalities and differences among the four success reports. The dimensions used to focus on the analyses pertain to past-experience of founders, their entrepreneurial motivations, and competences.

3.5.2.1 Past experience and competences

All four cases concern highly qualified individuals that have both an academic professional background while venturing into a technology entrepreneur activity. As regards their past experiences, there is no visible pattern that is common to all founder interviewees. Two reported having no experience at all in either management or entrepreneurship since their experience was solely that of studying or researching. The other interviewees had some managerial experience, one as a company manager and the other as a government official in a SOE. In highlighting the competences that the founders acknowledge to have played a role in their venture, the expertise in R&D in engineering together with social skills and being able to spot opportunities were mentioned. The result of founder competences is shown in Table 3.3.

Table 3.3 Founder competences

Competences	Illustration	Freq.
R&D in engineering	"I spent ten years researching electric vehicle transmission" (I3)	3
Social Skills	"My major duty now is…and dine with clients". (I3)	2
Opportunity spotting	"I was hard-working and good at seizing opportunities." (I1)	1

3.5.2.2 Entrepreneurial motivations

The motivations to become an entrepreneur varied greatly, but the three most mentioned are the search for self-realization and high need for success, having financial independence, and being socially useful. The result of founder and TMT members motivations is shown in Table 3.4.

Table 3.4 Founder and TMT members motivations

Founder Motivation	Illustration	Freq.
Self-realization	"The motivation for starting the business is to realize personal values" (I2) "I had already reached the ceiling in the industry field then." (I1)	4
High success motivation	"There I (…) wanted to challenge myself." (I1)	4
Social usefulness	"I felt it would be a greater contribution to give back to society." (I1)	3
Wealth freedom	"I wanted to achieve financial freedom." (I1)	3
Opportunity in market	"There was a senior who sold a company to restart business." (I1)	1
TMT Motivation		
Challenge myself	"my main motivation was the thought that my previous job was not challenging at all" (I2)	4
Founder's virtuous personality	"I joined …mainly motivated by the personal charm of the founder." (I4)	3
Own boss	"I wanted to do something on my own" (I3)	2
Industry prospects	"I thought this was a very promising industry" (I1)	2
Skills complem. fit	"it complements with the founder's strength" (I1)	1

3.5.2.3 Role differences

Founders clearly distinguished between the technological expert role and the entrepreneur role. For the first role they all converged into giving it an all-encompassing nature while their views of the entrepreneur role show more nuances. Founders differentiate the entrepreneur role into four sub-roles where people (interpersonal relations) and tasks (decision making) were the most mentioned, followed by a commercial role (focus on market need) and fund raising (looking for investments). When thinking about how much they identified with each role, most interviewees stated they identified with both with prevalence of the entrepreneurial. Only one founder stated he kept only with the technological expert (engineer) role. The result

of role differences is shown in Table 3.5.

Table 3.5 Role differences

Role differences and founder role performing	Illustration	Freq.
Tech Expert Role		
Technical expert	"Technology focuses on the products" (I2)	4
Entrepreneur Role		
People	"Entrepreneurs … and high-quality interpersonal relationship is also required." (I1)	2
Task	"Entrepreneurs have to make decisions constantly" (I1)	2
Commercial	"Technology focuses on the products, while entrepreneurs on the need and how to meet it."(I2)	1
Funding seeking	"My major duty now is …looking for investments" (I3)	1
Founder Role performing		
Both, entrepreneurial prevails	"I guess I play both roles, probably more toward the role of entrepreneur currently and in the future" (I2)	2
Both	"I believe I'm both a tech expert and an entrepreneur" (I1)	1
Engineer	"I prefer positioning myself as an engineer" (I3)	1

3.5.2.4 Role transition challenges

In line with the idea that founders tend to feel pressure to perform both the technological expert and the entrepreneur roles, a certain number of challenges was identified. The most mentioned challenges pertain to the capacity to meet the customers' demands, despite of the technical quality of the product, and likewise, to cope with the time pressure on decision making about managing the company. Less mentioned, but still, central in the speech is the challenge of building a reputation with a significant network of stakeholders together with finding the stamina to keep on with the intense life rhythm, namely, to travel. Lastly, there is a social-oriented domain where interviewees acknowledge it is challenging to deal with people and keep in mind the primacy of the company interest over one's own interests. The result of role transition challenges of academic entrepreneurs is shown in Table 3.6.

Table 3.6 Role transition challenges

Role transition challenges	Illustration	Freq.
Marketing	"We would feel annoyed when our products were good from the technical point of view, but could not meet customers' evolving requirements" (I2)	3
Management	"Entrepreneur is a hard job; there are too many decisions to make and the time is fragmented." (I1)	3
Political-Reputation	"Entrepreneurs have a lot of social activities with the government, customers, investors."(I1)	2
Energy	"Entrepreneurs often travel on business, which is tiring…also requires tremendous energy"(I1)	2
HRM	"Entrepreneurs mainly deal with people, and it is difficult to select and manage people."(I4)	1

Attitude	"Entrepreneur's efforts and achievements are more for the company."(I1)	1

3.5.2.5 Role transition strategies

When asked about the coping strategies to overcome challenges and obstacles, the founder interviewees conveyed several types of information that can be divided into role transition facilitators, used strategies, and advice they would provide to newcomers.

The strategies interviewees report to have used to cope with challenges mostly concern individual attitudes linked to continuously being open to learning. Also frequently mentioned is the need for the new company to count on a robust shareholder structure and being endowed with people that have financial expertise, namely a good TMT, i.e., a team that incorporates highly committed individuals that have a match among themselves. Within this list of strategies, interviewees also mentioned the importance of having a clear leader with a strategy. As regards facilitators for the role transition, interviewees did not converge on any freely mentioned but they cover individual assets and attitudes, namely leadership, relationship skills, management knowledge, and a sense of idealism without losing a sense of realism.

As to the advice, interviewees very closely follow previously mentioned coping strategies and they can be grouped as: learning (open mind, humbleness, keep abreast of new technological breakthroughs), guaranteeing third-party commitment to the company (commit TMT through equity, bridging with government and industry, delegate), keeping a focus (focusing on technology, and having clear goals), self-consciousness (knowing one-self), and power (keeping authority and control). Among these, interviewees mostly acknowledged the importance of bridging with government, and knowing one-self. The result of role transition facilitators, strategies and advice is shown in Table 3.7.

Table 3.7 Role transition facilitators, strategies and advice

Role transition facilitators /adopted strategies /Suggestions	Illustration	Freq.
Role transition facilitators (4)		
Management knowledge	"I am studying, like reading books about…and corporate management."(I1)	1
Leadership	"I am more concerned about enhancing the leadership and influence."(I2)	1
Relationship	"Talking with the cooperators and the customers"(I1)	1
Realistic-Pragmatism	"Looking to the stars and feet on the ground"(I3)	1
Adopted strategies (14)		
Continuous learning	"We should keep improving and learning"(I2)	3
Strategy clarity	"There should be a leader …makes the right development	2

	strategy for the company."(I2)	
Shareholder	"There should be a good shareholder structure"(I2)	2
TMT structure	"There should be…senior executive structure with a reasonable team match."	2
TMT commitment	"In the future, we will allow these managers to have their shares."(I4)	2
Financial expertise	"We should …know the financial knowledge to avoid risks"(I2)	2
Industry knowledge	"There should be a leader who knows the industry"(I2)	1
Suggestions (16)	"It's necessary to contact with governments and know policies"(I2)	
Bridge with Government		3
Self-conscious	"Entrepreneurs should…know themselves"(I4)	3
Bridge with industry	"Empowering traditional manufacturing industry with new technology"(I3)	2
Delegate	"Don't try to do everything yourself. Learn to delegate and let go, and to trust each other"(I2)	2
Control	"Have the authority to change managers at any time"(I1)	1
Commit through equity	"It is better to put the motivated on the shareholding platform. They can enjoy dividends but have no decision-making power."(I1)	1
Technology focus	"Invest more and focus on technology."(I1)	1
Learn	"CEOs transformed from tech experts must absorb knowledge in addition to technology like the sponge"(I2)	1
Open mind	"Most of the technical staff are stubborn, feeling that they are always right."(I2)	1
Clear goals	"Entrepreneurs should… know what they want"(I4)	1

3.6 Discussion

There seems not to be a requirement of past experiences of the founder to become a successful entrepreneur. However, almost all interviewees acknowledged that a deep understanding of technology, namely of R&D in engineering was required. Its sufficiency seems to be contested by having also mentioned social skills and a well-known entrepreneurial competency – opportunity spotting or entrepreneurial alertness (Chavoushi et al., 2021). So, technical, social, and entrepreneurial skills are depicted in the mind of the interviewees. Still many competences have not emerged although they may be embedded in these overarching categories, e.g. awareness of potential returns, insight into the market, building networks, and social and environmental conscious conduct (Kyndt & Baert, 2015).

The motivations to become an entrepreneur converge with those frequently mentioned in the literature (Estay et al., 2013; Hossinger et al., 2021), namely, pursuing a sense of self-realization, gaining financial independence, and being socially useful. These three closely match the fundamental motivations of the self-determination theory (SDT, Deci & Ryan, 2008), where competence is represented by the self-realization and high motivation for success, autonomy by financial independence and affiliation by a sense of belonging to

society through actively contributing to it. The TMT motivations differ but they are largely caught by SDT as the need to challenge one-self is logically attached to the search for a sense of competence, the willingness to become own boss is an expression of autonomy and the idea of having complementary skills of those of the founder is, albeit remotely, an expression of the relatedness dimension in SDT. The second most mentioned motivation ("founder's virtuous personality") falls outside this theory as it is mostly linked to leadership theory that advocates transformational leaders should provide a sense of charisma, especially within the context of entrepreneurship (Schlosser & Todorovic, 2006) that inspires a vision, and therefore provides a sense of security and meaning to the followers. Therefore, TMT satisfies this need by working under the guidance of a transformational leader. Lastly, although it is not directly related to personal motivation, the sense of industry prospects seems quite logical as the risk-taking decision must consider how plausible it to be successful in the whole industry is.

Founders have an understanding about the technological expert role and entrepreneur role, as being distinct in nature in line with Zou et al. (2019) and Li et al. (2021). Their understanding about the entrepreneur role is quite comprehensive as they mention the focus on products linked to market needs (O'Shea, 2007; Yao & Wang, 2011), fund raising (Qian et al., 2018), making constant decisions (Shepherd et al., 2015), and also developing interpersonal relations role, which is a domain that is yet awaiting further research (Balven et al., 2018). Although these roles might be competitive (Li et al., 2021), most of the interviewees see themselves as performing both roles, predominantly the technological expert role, but still, performing both. This is in line with Bartunek and Rynes (2014) hybrid role putting together academic with commercial. There may be no contradiction as roles can be performed interchangeably but this indicates more cognitive complexity on entrepreneurs. All the speeches indicated such role performing was challenging.

Academic entrepreneurship in high-tech venturing is not without challenges. The most mentioned challenges by the interviewees concern both the success in meeting customer demands as well as dealing with fast-paced and multitask management decisions. This is in line with Jain et al.'s (2009) report that it is the skills in market knowledge and execution (management) that academic entrepreneurs usually do not master. Another challenge concerns the need to keep up with the level of stamina and endurance such intense activity entails (Khanin et al., 2021) and building positive relations with the stakeholders by social networking (Greve & Salaff, 2003) which in the Chinese context is even more valued (Zhu, 2015). Lastly, the emergence of a social dimension challenge comprehending both people

skills and altruism is in line with the recognition of the non-cognitive assets for entrepreneurial success, namely emotional intelligence (Ngah & Salleh, 2015). Interestingly, interviewees did not mention the social identity conflict where the role transitions are seen as a threat to professional identity (Zou et al., 2019). The absence of this reference is surprising because one of the known factors that contribute to mitigate this role conflict experience is having previous entrepreneurial experience (H. Zhang et al., 2021) but most of the interviewees do not report having such experience. Naturally such role conflict can be more strongly felt in the early stages when the entrepreneur cannot yet count on the complementary contribution of the TMT.

The advice given by the interviewees are mostly in line with literature as they highlight the main emerging issues academic entrepreneurs may pay attention to. As a natural extension of the academic role, it is no surprise that interviewees highlight the need to continuously learn, especially technological breakthroughs, which they expand into keeping an open mind to facilitate learning (Secundo et al., 2017). At the intrapersonal level, they also highlighted the importance of self-consciousness, once the recognition of one's own strengths and weaknesses is generally valued in literature as indication of cognitive meta competency (Ustav & Venesaar, 2018). These two aspects are comprehended in the larger construct of expansiveness proposed by London and Diamante (2002). According to these authors, expansive behavior refers to the individual efforts to grow in a specific area of interest, and comprehends three aspects: high intrinsic energy (Schindehutte et al., 2006), the need for continuous learning and producing new knowledge, and an applied orientation on knowledge, i.e. a willingness to apply knowledge. Expansiveness has been identified as expressing into "technology-focused expansiveness" and "self-awareness expansiveness" which refers to a passion and thirst for learning about technology, and oneself, respectively. These are structured as a sequence, as once technology stabilizes, the entrepreneurs' attention moves from technology itself to oneself and knowing their teams (Bell, 2015). This theory is built on several theories of motivation (SDT, Deci & Ryan, 2008); learning (learning orientation, Dweck, 1986; Hurtz & Donovan, 2000), and personality (curiosity; conscientiousness, and openness to experience traits, Hurtz & Donovan, 2000; Mikulincer, 1997), and brings together several constructs into the larger one of expansiveness (Palumbo et al., 2022).

3.7 Conclusion for the four cases

The motivating research questions pertain to the identification of role differences and

challenges experienced by academic entrepreneurs, as well as the coping strategies they devise to deal with role conflict.

Findings show that entrepreneurs have a clear idea about such roles and how they differ. The entrepreneur role is to focus on providing viable answers to market needs, to attract investment capital, and to develop interpersonal relations both within the company as with outside stakeholders. This all requires a fast-paced rhythm, multitasking, and constant decision making. Conversely, the expert / scholar role is mostly focused on becoming scientifically proficient, having high expertise on technology and this does not really require neither to be focused on establishing high-quality interpersonal relationship, nor to be concerned with the anticipated utility of the researched technology considering market needs, nor to make constant decisions, nor to look for investment. It is all about using intellectual ability to discover, develop, and test technologies.

Albeit roles are depicted as being competitive, and therefore having a potential for role conflict, such conflict is not experienced to the point of being felt as a threat to social identity by the entrepreneurs nor by the top team members that work with them. This could be due to the alternating role performing by entrepreneurs which allow them to identify with both roles without a sense of conflict, but it can also be motivated by the interviewees profile because these are the ones that opted to venture while all the others that might have decided otherwise were not targeted at this stage of the research. Thus, it is reasonable to expect some underestimation on role conflict.

Although not directly related to the first research question, the motivational drivers can also help explain the reported experiences. The founders do report most of the main known entrepreneurial motivations, which suggest they have high intrinsic motivation thus being more resilient and enduring harsher situations without quitting. A high level of intrinsic motivation can also help develop suitable coping strategies to overcome obstacles in the process of fund attraction, issue selling, team building, refining technology, market research, reaching out stakeholders.

As regards the second research question, pertaining to the coping strategies to deal with role conflict, some of the information provided (formulated as challenges or advice) offers directions. Some of the strategies highlight the entrepreneur him / herself as the main target. Namely, they all express a need for self-development to gain the right set of skills and mindset, e.g. by putting stress on continuous learning and gain self-awareness keeping an open mind. Without losing the focus on technology (which is more in line with the expert role), it is also required that the entrepreneur strives to have the greater goal and strategy clarity as possible.

Another focus targeted the need to pay special attention to gaining knowledge on finance and the industry itself. This matched another set of strategies that can be framed within RBV (Resource-Based View). When entrepreneurs reported that it is important to pay attention to the TMT structure and guarantee TMT member commitment (e.g. through equity or delegation) they are in fact looking for a way to leverage their personal resources thus extending their reach and finding complementary resources (e.g. knowledge in finance and industry) in such TMT members.

Overall, the key competencies that emerged from this study are organized within intrapersonal assets and interpersonal assets as follows: Intrapersonal assets: competences (KSA): 1) expert knowledge; market knowledge; 2) Expansiveness - high energy/physical and psychological endurance (e.g. constant decision making), open mindedness, applied orientation on knowledge; 3) self-awareness and emotional intelligence, 4) continuous learning orientation, 5) Motivations - SDT autonomy (e.g. financial independence), relatedness (e.g. being socially useful), competence (e.g. sense of self-realization), and Interpersonal assets: social skills, ability to social networking, emotional intelligence, focus on market needs, fund raising, reaching out. Their relationship with the dual roles of academic entrepreneurs is shown in Table 3.8.

Table 3.8 Competences-role differences

Possible predictors of role conflict		Expert role	Entrepreneurial role
	Intrapersonal level		
Knowledge	Technological knowledge	*	
	Market knowledge		*
Expansiveness	High stamina (multiple & fast decision making, physical)		**
	Open mindedness	*	**
	Applied orientation knowledge		*
Self-awareness	Knowing own strengths and weaknesses		*
	Emotional intelligence (self)	*	*
Continuous learning	Continuous learning orientation	**	*
Motivations	Autonomy (financial independence)		**
	Relatedness		**
	Competence	*	*
Personality	Reaching out / proactivity		*
	Interpersonal level		
Social skills	Interpersonal relations	*	**
	Emotional intelligence (other)	*	**
Market orientation	Focus on market needs		***
Resource orientation	Fund raising		***
Leadership skills	Teambuilding		*
	Providing inspiration / sense giving		*

	Empowerment	*
	Authority	*
Broad mindedness (*GeJu*)	Getting along with other people with different personalities, will not envy other's achievements, will share benefits to others, caring about others.	*

Still at the cognitive level, the strategic focus and having a clear idea of the objectives is critical to successful entrepreneurial ventures (Cooper, 2000). As a natural challenge, leading people is one of the most mentioned aspects and thus, it is naturally included in the advice interviewees gave, both in its form of keeping control over third parties or providing a sense of strategy and goal (Baron & Markman, 2000). This goes in line with the last type of advice that focused on gaining commitment from important players, namely the TMT, governmental agencies, and industry. The specific means that could be deployed to promote such commitment have emerged as either the compensation system (e.g. equity sharing, Balkin & Swift, 2006), delegation of decisions (Picken, 2017), and reaching out authorities that have the funding and political means (Jeng & Wells, 2000; Wright et al., 2006).

Overall, this discussion on role conflict and tensions stemming from the competitive tasks and how individual features, competences, motivation, and coping strategies can all be placed under the umbrella of person-environment (P-E) fit theory (Kristof, 1996) where better fit should imply less role-conflict, less need to deploy coping strategies, and higher chances of success. This person-environment fit approach has set a foot in entrepreneurship research under the label of person-entrepreneurship fit (Markman & Baron, 2003) acknowledging that personal attributes, and how individuals perceive their needs can be fulfilled by entrepreneurship determine their entrepreneurial intention and fit (Hsu et al., 2019).

These conclusions are bounded by the small number of case interviews which provide an account that may not cover some representations academic-entrepreneurs hold on the whole experience. This is not only due to the small size but mostly because the four cases are successful academic entrepreneurs (or have positive outlook) and therefore the unsuccessful ones would add value but were not considered because the intention was also to uncover effective coping-strategies. Still the sample was purposively made to represent typical domains of academic-entrepreneurial activity in China and the interview informational value is more based on its in-depth character rather than on the sheer number of interviews. Future studies may benefit from conducting larger number of in-depth interviews also with less successful academic-entrepreneurs so to have a better understanding not only on which coping strategies are successful but also which ones are linked to failure, and the same is valid to contrast person-entrepreneurship fit factors.

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Chapter 4: Study 2: Development of Two Scales on Academic-entrepreneurial Competences and Coping Strategies

4.1 Introduction

To design this study, we have built on the categories extracted in the first qualitative study pertaining to the competences that and academic entrepreneur must have to cope with both roles. According to Mirabile (1997) competences refer to a cluster of related knowledge, skills and abilities and other attributes that are associated with high job performance in a given occupation. As reported by Kormanik et al. (2009) in searching for literature to offer a general model of scholar competences, the volume of literature focused on this searched with "scholar competences", "researcher competences", "professor competences", or "educator competences" yielded a modest number of results, focusing on either healthcare or student academic success.

Literature that motivates this study overlaps with the one presented in the previous study and for parsimony's sake we will not be redundant on this. The development and psychometric test of this scale is a complement to the 1st study. Therefore, we opt to immediately present the methodological choices made and proceed to empirical testing and findings.

4.2 Method

This section will start by showing the procedure deployed, the sample description, measures used, and data analysis strategy.

4.2.1 Procedure

An online questionnaire was designed in Wen Juan Xin, a popularly used questionnaire platform in China that allows for a professional design of the survey and the link it produces was sent out via WeChat, which is a convenient and widely used social network in China, together with an informed consent. The individuals first contacted were directly linked to the academic entrepreneurs through professional relations and ask to pass on the invitation via a

snowball strategy. Also, an online group of entrepreneurs was contacted, and the invitation was sent with the promise of a small reward given to those that participate (a flash drive). In total 600 individuals were reached by these means.

4.2.2 Sample

Of these 600 samples, 133 samples without complete responses were deleted, and 467 questionnaires were recovered in full. Nine of the samples were suspected of having quality problems, so they were deleted and 458 valid questionnaires were retained. The useable sample comprises 458 entrepreneurs that were requested to have either research experience or teaching experience in Academia while having a startup build by themselves, and it represents an estimated response rate of 77.8% (which was an effective rate of 76.3% after removal of invalid answers). It mostly comprises male individuals (56.8%), with a large distribution of age groups (12% below 30 years old, 49% in 30 to 39 years old, 22.9% in 40 to 49 years old, 13.4% in 50 to 59 years old and only 2.7% above 60 years old). The vast majority have a master's degree (72.9%) followed by Doctorate degree (18.1%) and bachelor's degree (9%).

The teaching experience of the sample varies considerably from those that only have research functions in Academia (18.8%) and thus do not teach, to those that have at least 10 years teaching experience (16.8%). In-between 10.7% has less than one year teaching experience, 24% has between 1 to 3 years, 18.1% has 3 to 5 years, and 11.6% has 5 to 10 years teaching experience. The research experience of the sample also varies considerably with 3.9% stating they have no experience at all, 7.9% stating they have less than one year research experience, 32.1% have from 1 to 3 years' experience, 22.3% have 3 to 5 years, 11.1% have 5 to 10 years, and 22.7% report having at least 10 years research experience. More than one third of the sample (36%) reported having simultaneously teaching and research duties for at least 3 years, and if the time frame is extended to having at least 1 year conducting both duties, the sample percentage goes up to 63%.

As regards business experience, most participants report having less than 3 years (52.6%), with an extra 18.1% reporting to have 3 to 5 years, 9.2% five to 10 and 20.1% at least 10 years in business experience. The startups mostly have less than 50 employees (39.3%), while 20% has 50 to 100 employees, 22.9% up to 200 employees, and the remaining 17.8% report employing 201 or more employees (among which 5.1% have 500 or more). These startups are mostly operating in the IT industry (30.7%), manufacture (21.5%), scientific research and technology services (10.5%), Finance (6.3%), and Education (5.6%), and the remaining have

all less than 5% representation in the sample and vary from agriculture, commodities, construction, hospitality, real estate, leasing services, health, and culture.

The respondents reported to be one of the co-founders of the startup (64.9%), a partner that joined later after founding (17.1%), a single independent founder (16.6%), or another role (1.5%). Currently, respondents are mostly assuming the role of General manager (33.7%) or senior manager (33.7%). Middle level manager (31%), or Basic manager (1.2%).

From the professional strategy viewpoint, respondents mostly stated they primary focus is on research with academic entrepreneurial activities (35.9%), academic entrepreneurial activities with research activities (27.1%), academic entrepreneurial activities only (19%), focused mainly on teaching activities (11%) or on scientific research activities (7.1%).

4.2.3 Measures

Sociodemographic and organizational variables were collected, namely: gender (1=Male, 2=Female), age group (1=below 30, 2=31-39, 3=40-49, 4=50-59, 5=60+), education (1=BSc, 2=MSc, 3=PhD), teaching work tenure (1=none, 2= <1 year, 3=1-3 years, 4=3-5 years, 5=5-10 years, 6=10+), research work tenure (1=none, 2= <1 year, 3=1-3 years, 4=3-5 years, 5=5-10 years, 6=10+), business work tenure (1=none, 2= <1 year, 3=1-3 years, 4=3-5 years, 5=5-10 years, 6=10+), managerial experience, position in startup, and industry of the startup (20 items according to the Chinese Industry Classification, namely 1=Agriculture, forestry, animal husbandry, fisheries, 2= Mining industry, 3= Manufacturing, 4= Electricity, heat, gas and water production and supply, 5= Construction, 6= Wholesale and retail trade, 7= Transportation, storage and postal services, 8= Accommodation and catering, 9= Information transmission, software and information technology services, 10= Finance industry, 11= Real estate industry, 12= Leasing and business services, 13= Scientific research and technology services, 14= Water, environment and public facilities management industry, 15= Residential services, repair and other services, 16= Education, 17= Health and social work, 18= Culture, sports and entertainment, 19= Public administration, social security and social organizations, 20= International organizations), startup size (how many people hired).

Academic competences were measured based on the categories extracted from the 1st qualitative study which comprehend 12 items aggregated in three components, Research ability (3 items, RA1 I am effective into designing rigorous research methodology, RA2 I establish networks with researchers to join in common international projects, RA3 I lead research projects in my field of expertise), Teaching ability (3 items, TA1 I am effective

helping others develop their expertise in my field, TA2 When explaining an idea, I provide many examples, TA3 Around me, people learn and grow), and Attitudes-*GeJu* (Moral character and bearing) which comprises 4 items (GJ1 I get along well with people with very different personalities, GJ2 I find myself happy when I see someone around me having a success, GJ3 I am willing to share the benefits of my success and create public value with others to help others and contribute to social progress, GJ4 I take into account the needs of others and society when considering my own needs and those of my business, and have a win-win mindset) and 2 items about Personality, Reaching out / proactivity (PE1 I find myself taking initiative most of the time - attitude), and stress resilience (PE2 I am resilient to stress, disposition). Participants answered with a 6-point Likert scale (1=strongly disagree; 6=strongly agree).

Entrepreneurial competences were measured based on the categories extracted from the 1st qualitative study which comprise competences stricto sensu but also attitudinal, motivational drivers, and personality traits. Participants were asked to consider their own level of expertise and normal ways of thinking and behaving to signal in which extent the items suitably describe them. Participants answered with a 6-point Likert scale (1=strongly disagree; 6=strongly agree). The baseline scale comprises 20 items as follows: Market knowledge (3 items, cognitive), High stamina (1 item, multiple & fast decision making, physical), Open mindedness (1 item, personality), Applied orientation knowledge (1 item, attitude), Self-awareness (3 items, Knowing own strengths and weaknesses, cognitive; emotional clarity, emotions; health status, self / trait / competence), Continuous learning orientation (1 item, attitude), Motivation (3 items, autonomy; relatedness; competence, SDT / motivation), Interpersonal relations (1 item, skill), Emotional intelligence (1 item, other) (trait / competency), Focus on market needs (1 item, attitude), Fund raising (1 item, skill), Leadership (3 items, teambuilding, inspiring / sense giving, empowering; skill).

Coping strategies were measured based on Follmer et al. (2018) classification of coping strategies that comprises 16 items distributed by eight factors. It is shown in Table 4.1.

Table 4.1 Coping strategies scale items

Approach	Strategy	Items	Scale 1-5
Relief-seeking approach– strategies to reduce the pain associated with misfit, without	Surface-level behavior change –	Whenever I feel I am not fitting in the role of being an entrepreneur… I make minor adjustments in my outward behavior so that others see myself as fitted to the current responsibilities I have in this venture I act so that other people do not realize when I am uncomfortable with playing the entrepreneur role	

changing its underlying sources.	Buffering	Whenever I feel I am not fitting in the role of being an entrepreneur… I focus in some activities I like the most so to compensate for the things I do not really enjoy doing in this venture I always take time off to relieve from the pressure of having to do things I do not feel at ease or that I dislike in this venture
	Temporal framing	Whenever I feel I am not fitting in the role of being an entrepreneur… I always remember the things I do not like doing as an entrepreneur are only temporary I believe that with time I will learn to like to do the things I dislike now
Resignation approach – strategies to accept misfit as painful but unavoidable	Distancing	Whenever I feel I am not fitting in the role of being an entrepreneur… I remember there is a clear frontier between who I am and what my work role is. They are separated realities. I remember I am not truly an academic-entrepreneur. I am more an academic that happens to be now an entrepreneur
	Taking pride in misfit	Whenever I feel I am not fitting in the role of being an entrepreneur… I always think only a good scholar and researcher will experience such misfit I take pride for being a good scholar or researcher much more that being an entrepreneur
	Leaving - Exit	Whenever I feel I am not fitting in the role of being an entrepreneur… I think about quitting or selling this venture to someone else I think about looking for someone that can replace me totally here
Resolution approach - strategies aimed at reducing the sources of misfit	Leaving – Internal transfer	Whenever I feel I am not fitting in the role of being an entrepreneur… I think about changing my current responsibilities within the venture and perform different duties from the ones I have I think about hiring people that can directly assist me or to whom I can delegate some of my responsibilities I am less found of
	Adjusting	Whenever I feel I am not fitting in the role of being an entrepreneur… I work to adapt the jobs of other people or their behavior in this venture so to increase my own fit to it I put effort to adjust myself so to increase my own fit to the responsibilities I have today in this venture.

4.2.4 Data analysis strategy

Data was first screened for quality concerning monotonous answers or speedy answers which most likely imply rushing through the items. Nine of the 467 complete recovery samples cases were removed due to inconsistent responses thus leaving a 458 usable sample. After this, psychometric quality was assessed especially due to the novel nature of academic and

entrepreneurial competences scale. To do this we have conducted exploratory factor analysis (EFA) which considers technical criteria to gauge the existence of shared variance to justify the extraction of factors (namely KMO, and Bartlett test of sphericity). Technically, a valid scale implies KMO values above 0.500 with an associated significant ($p<.01$) Bartlett's test of sphericity chi-square and MSA values above 0.500 for all items. Additionally, commonalities should be above 0.500 and the factor solution after rotation should be able to account for 60% variance or at least 50% if a general factor is found (Nunnally & Bernstein, 1994). Due to the need for conceptual clarity between the components we opted to apply a Varimax rotation, and thus only items with no cross loadings are retained. We consider there is cross loading whenever an item loads in the principal component and in another one with more than 0.400 (as long as the own factor loading distances from this one in more than 0.200).

4.3 Results

As regards the academic competences scale, a Principal Components Analysis showed four cases of low commonality (TA2, TA3, GJ1, PE2) which were removed to find a valid solution (KMO=0.826; 0.791<MSAs<0.851; $X^2(28)=792.488$, $p<.001$) with the minimum commonality at 0.465 (which is slightly below the 0.500 cutoff but generally the solution has average 0.550 commonality). This solution showed two components accounting for 55% or variance and with good loadings (see Table 4.2).

Table 4.2 PCA rotated solution for academic skills

	Component	
	1	2
GJ4 I take into account the needs of others and society when considering my own needs and those of my business, and have a win-win mindset	**.753**	.136
GJ2 I find myself happy when I see someone around me having a success	**.736**	.106
GJ3 I am willing to share the benefits of my success and create public value with others to help others and contribute to social progress	**.733**	.233
PE1 I find myself taking initiative most of the time	**.661**	.165
RA2 I establish networks with researchers to join in common international projects	.052	**.781**
RA3 I lead research projects in my field of expertise	.144	**.741**
RA1 I am effective into designing rigorous research methodology	.195	**.721**
TA1 I am effective helping others develop their expertise in my field	.294	**.616**
Cronbach alpha	.726	.717
Full scale Cronbach alpha	.770	

A Confirmatory Factor Analysis of this solution showed valid fit indices ($X^2(19)=31.096$, $p=0.039$; Normed $X^2=1.637$, CFI=0.984; TLI=0.977; RMSEA =.037 CI90 [0.008, 0.060] PClose=0.801; SRMR=0.0343) but also a strong covariance between the components which suggests a subjacent second order factor. This solution was also tested to find identical fit

indices as well as good reliability (CR=0.753) and convergent validity (AVE=0.608). Figure 4.1 depicts the solution.

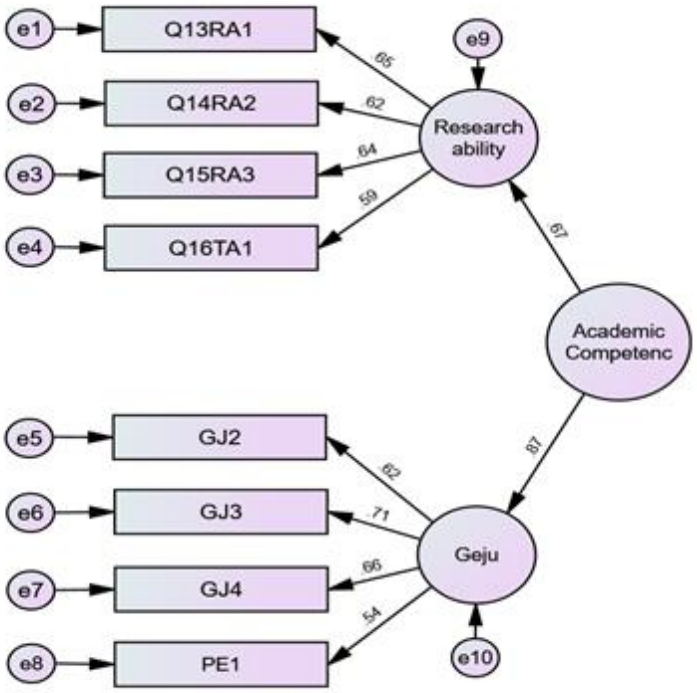

Figure 4.1 CFA for academic competences

As regards the entrepreneurial competences scale, a Principal Components Analysis showed cases of low commonality as well as low loadings and cross loadings. After removal of these cases we found a valid solution (KMO=0.900; 0.831<MSAs<0.941; $X^2(91)=1741.660$, p<.001) with the minimum commonality at .448 and average commonality at 0.591. This solution showed four components accounting for 59% or variance after rotation: F1 (leadership), F2 (self-awareness), F3 (neoteny), and F4 (motivation). The PCA result is shown in Table 4.3.

Table 4.3 PCA rotated solution for entrepreneurial competences

	Component			
	1	2	3	4
RO1 I am effective into getting funds to support company development activity if I need to	**.769**	.080	.142	.049
LS1 I bring people together and turn them into a highly performing and cohesive work team	**.714**	.218	.176	.115
LS2 I inspire other people and motivate them to achieve more	**.710**	.216	-.100	.195
LS4 People look up to me to make important decisions and be their role model	**.692**	.170	.222	.091
SS2 I am aware of other people emotions and able to manage them well	**.636**	.394	-.069	.108
LS3 I delegate important professional tasks to people around me	**.597**	.014	.348	.030
SS1 I have positive and effective interpersonal relations in my professional activity	**.516**	.239	.288	.203

SA2 I am aware of my own emotions and able to manage them well	.201	**.762**	.093	.093
SA3 I am aware of my own health status and able to manage it well	.183	**.717**	.029	-.030
SA1 I am aware of my own strengths and weaknesses	.183	**.632**	.222	.157
EX1 I have a fast pacing live that requires me to make any important decisions on a short time	.197	-.008	**.766**	.128
EX[2] I keep an open mind to new ideas even when they challenge my current beliefs	.121	.310	**.723**	.048
MO1 I feel motivated by pursuing my own financial freedom	.175	-.073	.079	**.860**
MO3 I feel motivated by being recognized as a highly competent professional	.145	.359	.129	**.679**
Cronbach alpha / r_{SB}	.840	.646	.504	.503
Full scale Cronbach alpha	.849			

Note: Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.a. Rotation converged in 6 iterations.

A Confirmatory Factor Analysis of this solution showed valid fit indices ($X^2(75)=148.035$, $p<.001$; Normed $X^2=1.974$, CFI=0.956; TLI=0.947; RMSEA =0.046 CI90 [0.035, 0.057] PClose=0.706; SRMR=0.0422) but also strong covariances between the components which suggests a subjacent second order factor. This solution was also tested to find identical fit indices as well as good reliability (CR=0.862) and convergent validity (AVE=0.610). Figure 4.2 depicts the solution.

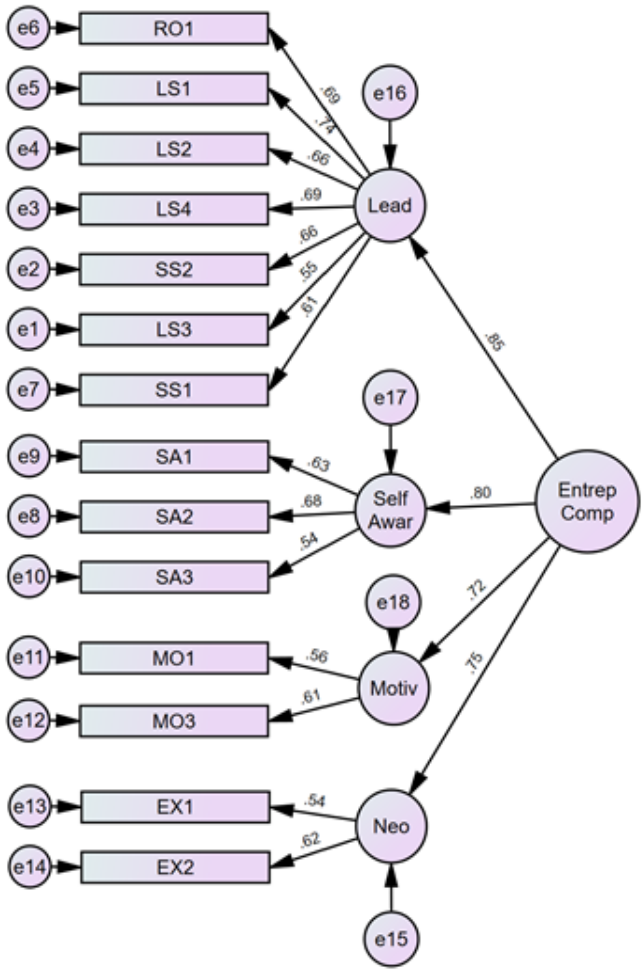

Figure 4.2 CFA for entrepreneurial competences

A CFA of the joint academic-entrepreneurial competences solutions showed valid fit indices ($X^2(205)=415.573$, $p<0.001$; Normed $X^2=2.027$, CFI=0.928; TLI=0.919; RMSEA=0.047 CI90 [0.041,0.054] PClose=.736; SRMR=0.0478) and the composite reliability is also good (CR=0.909) as well as the convergent validity test (AVE=0.629). The result is shown in Figure 4.3.

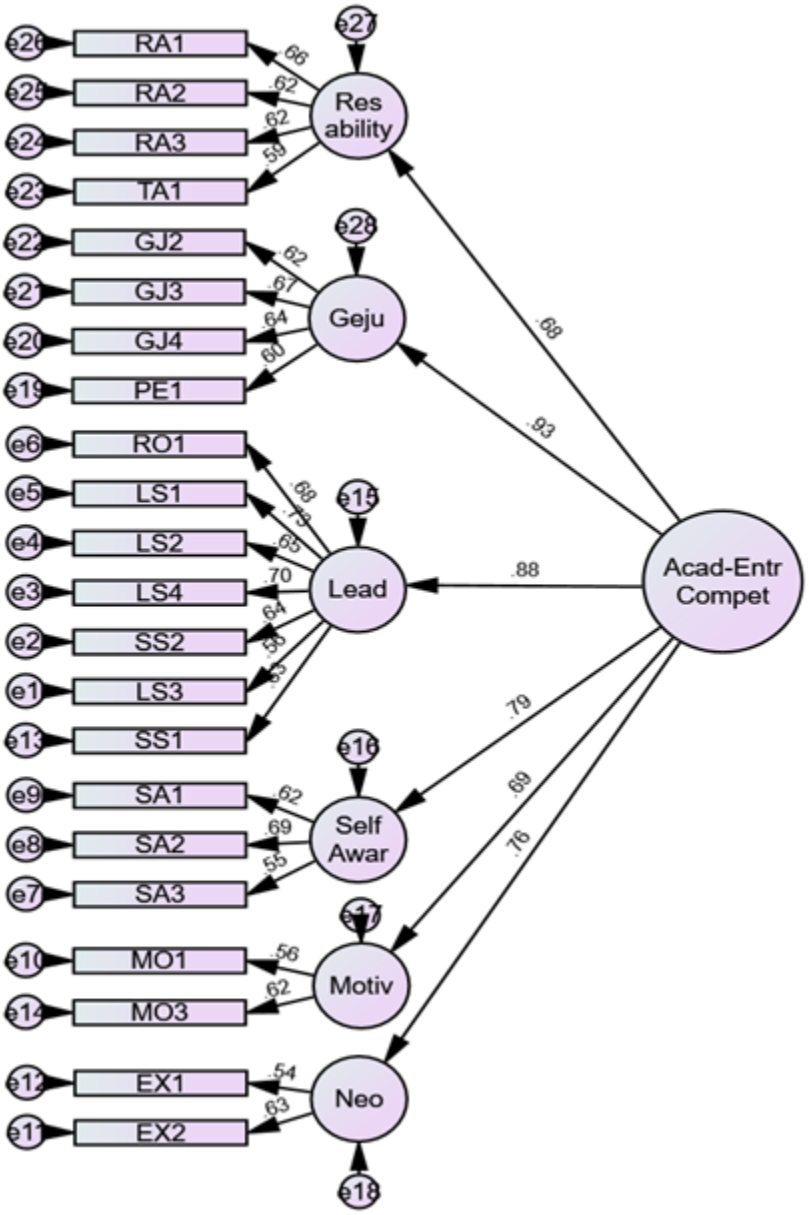

Figure 4.3 CFA for academic-entrepreneurial competences

As regards coping strategies scale, the CFA for the original structure matching Follmer et al. (2018) factor structure showed poor fit indices both for the 2nd order factor structure ($X^2(102)=515.761$,$p<0.001$; Normed $X^2=5.056$; CFI=0.791; TLI=0.754; RMSEA =0.094 CI90 [0.086,0.102] PClose=0.0001; SRMR=0.1232) as proposed originally by the author, and even when one removes the 2nd order, the single order factor structure remains poorly fitted

($X^2(84)=311.935$,$p<0.001$; Normed $X^2=3.714$, CFI=0.885; TLI=0.835; RMSEA =0.077 CI90 [0.068,0.086] PClose=0.000; SRMR=0.0741).

From an EFA and bivariate correlation matrix analyses a solution of three first-order factors emerged, with some items that showed below acceptable commonalities. After removal of these items a valid solution was found (KMO=0.833; 0.700<MSAs<0.890, Bartlett's $X^2(55)=1370.939$, $p<.001$) accounting for 60% variance after varimax rotation (see Table 4.4).

Table 4.4 PCA of coping strategies

	Component		
	1	2	3
S8a I worked hard to adapt to the way the other executive team members worked during the start-up process to achieve a better bonding effect and to make myself more competent in my role as a start-up entrepreneur	**.770**	.055	.035
S1a I make minor adjustments in my outward behavior so that others see myself as fitted to the current responsibilities I have in this venture	**.715**	.221	.078
S3b I believe that with time I will learn to like to do the things I dislike now	**.684**	.245	.162
S3a I always remember the things I do not like doing as an entrepreneur are only temporary	**.659**	.266	.160
S5b I take pride for being a good scholar or researcher much more that being an entrepreneur	.090	**.745**	-.142
S2b I always take time off to relieve from the pressure of having to do things I do not feel at ease or that I dislike in this venture	.129	**.724**	.347
S1b I act so that other people do not realize when I am uncomfortable with playing the entrepreneur role	.299	**.669**	.081
S2a I focus in some activities I like the most so to compensate for the things I do not really enjoy doing in this venture	.387	**.648**	.101
S6b I think about looking for someone to replace me totally here (rev)	.131	.065	**.841**
S6a I think about quitting or selling this venture to someone else (rev)	.231	-.021	**.787**
S7b I think about hiring people that can directly assist me or to whom I can delegate some of my responsibilities I am less found of (rev)	-.003	.129	**.754**
Cronbach alpha / r_{SB}	.736	.727	.740
Full scale Cronbach alpha	.789		

A CFA of this solution showed acceptable fit indices ($X^2(41)=101.295$,$p<0.001$; Normed $X^2=2.471$, CFI=0.955; TLI=0.939; RMSEA =0.057 CI90 [0.043,0.071] PClose=0.201; SRMR=0.0473). The first latent construct refers to Relief-seeking temporal framing strategies and comprehends four items (S1a "I make minor adjustments in my outward behavior so that others see myself as fitted to the current responsibilities I have in this venture", S3a "I always remember the things I do not like doing as an entrepreneur are only temporary", S3b "I believe that with time I will learn to like to do the things I dislike now", and S8a "I worked hard to adapt to the way the other executive team members worked during the start-up process to achieve a better bonding effect and to make myself more competent in my role as a start-up entrepreneur"). The second latent construct refers to Relief-seeking buffering strategies and comprehends also four items (S1b "I act so that other people do not realize when I am

uncomfortable with playing the entrepreneur role", S2a "I focus in some activities I like the most so to compensate for the things I do not really enjoy doing in this venture", S2b "I always take time off to relieve from the pressure of having to do things I do not feel at ease or that I dislike in this venture", and S5b "I take pride for being a good scholar or researcher much more that being an entrepreneur"), and the third latent construct refers to Resolution leaving strategies and comprehends three items (S6a "I think about quitting or selling this venture to someone else (rev)", S6b "I think about looking for someone that can replace me totally here (rev)", and S7b "I think about hiring people that can directly assist me or to whom I can delegate some of my responsibilities I am less found of (rev)"). Figure 4.4 shows the CFA.

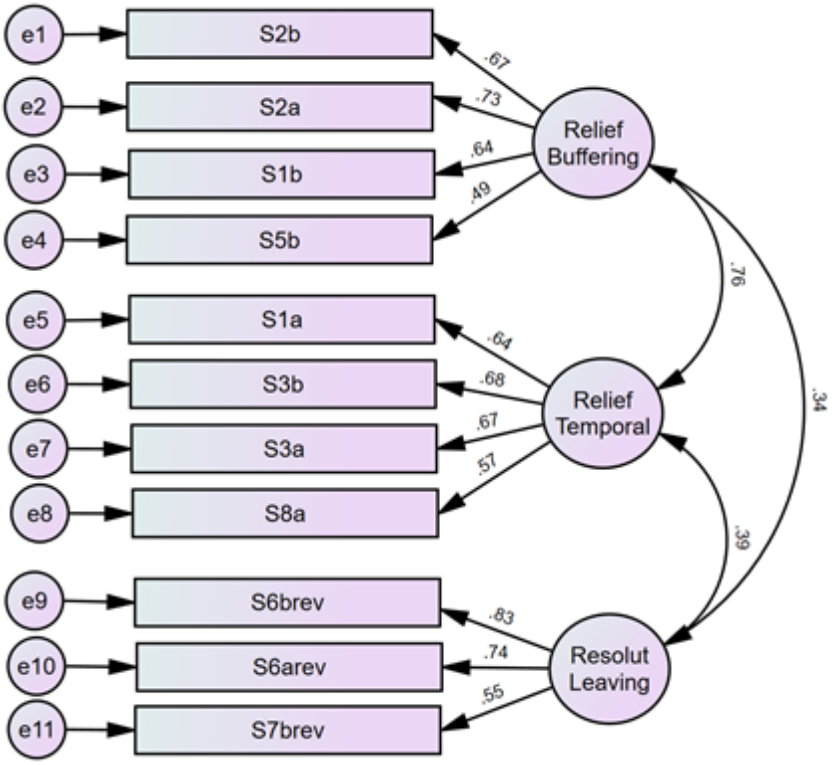

Figure 4.4 CFA for coping strategies

All latent constructs have good reliability (CRbuffering=0.729; CRframing=0.737; CRleaving=0.756) but with varied indication about convergent validity (AVEbuffering=0.407; AVEframing=0.414; AVEleaving=0.514). The solution has good divergent validity (the highest HTMT was found between "Relief seeking buffering" and "Relief seeking framing" and is 0.736, well below the 0.850 threshold).

AVE indicator shows two cases that fail to converge which, together with the previous changes made in the factor structure, may suggest coping strategies are not readily available as a construct in the mind of participants. We trust this can originate from some conceptual

nuances while Academic-Entrepreneurship being an activity with blurred frontiers. Therefore, coping strategies may be better treated as a theoretically-based formative construct using the larger constructs as proposed by Follmer et al. (2018), namely: relief-seeking (referring to strategies used to reduce psychological discomfort associated with misfit), resignation (referring to strategies used to accept misfit as painful but unavoidable), and resolution (referring to strategies used to remove the sources of psychological discomfort).

4.4 Discussion and conclusion

In terms of the Academic Entrepreneurship Competences Scale, the Academic Competences Scale was initially envisioned to include four dimensions: research ability, teaching ability, *GeJu*, and reaching out / proactivity reflecting literature that focused on them individually or jointly (Albareda-Tiana et al., 2018; Lambrechts & Van Petegem, 2016; Marrs et al., 2022; Torres Delgado & Hernández-Gress, 2021). After EFA and CFA, the results showed that the Academic Competences Scale included only the dimensions of Research ability and *GeJu*, and the dimensions of teaching ability and reaching out / proactivity were excluded. This may be because for academic entrepreneurs, most of their time and energy is put into research rather than teaching, and being proactive may not be an important aspect of academic competences. The Entrepreneurial Competences Scale was initially envisioned to include many dimensions in line with literature (Bolzani & Luppi, 2021; Kyndt & Baert, 2015; Mitchelmore & Rowley, 2010): Market knowledge, High stamina, Open mindedness, Applied orientation knowledge, Self-awareness, Continuous learning orientation, Motivation, Interpersonal relations, Emotional intelligence, Focus on market needs, Fund raising, and Leadership. These dimensions encompass several broad aspects of cognition, personality, attitudes and skills that may be clear to the mind of the scholars that research this topic but may be blurred to the minds of individuals not having expertise in this field of research.

After EFA and CFA, the results showed that the Entrepreneurial Competences Scale included four components, named Leadership, Self-awareness, Motivation, and Neoteny. Obviously, leadership is one of the most important component of entrepreneurial competences, and it is also typical of the competences profile reported in literature as it provides the much needed inspiration and vision on entrepreneurial endeavors (Schlosser & Todorovic, 2006). Self-awareness reflects the personality component of entrepreneurial competences. Motivation is the cognitive component of entrepreneurial competences. Neoteny reflects the attitude of entrepreneurial competences. Thus, integrated, the academic entrepreneurship

competences scale developed in this study consists of six dimensions, which are Research ability, *GeJu*, Leadership, Self-awareness, Motivation, and Neoteny.

One of the novelties in this study concerns the validation of the *GeJu* construct. In a general sense, *GeJu* refers to structure and format. In the managerial sense, *GeJu* refers to a leader's moral character and bearing, including vision, horizon, ambition, inclusiveness, and temperament, which is a comprehensive mental concept (Sun & Zhou, 2021). This may bring stronger fit to future research conducted in China.

In terms of the Coping Strategies Scale, the Coping Strategies Scale from Follmer et al. (2018) was initially envisioned to include three dimensions: Relief-seeking approach, Resignation approach, and Resolution approach. After EFA and CFA, the results showed that the Coping Strategies Scale included three components: Relief-seeking buffering strategy, Relief-seeking temporal framing strategy, and Resolution leaving strategy. The new scale is more simplified than the previous one. Resignation approach (including distancing and take pride in misfit) dimension has been excluded. This may indicate that academic entrepreneurs do not alienate themselves as entrepreneurs or take pride in misfit or that in our sample they are underrepresented (by the sheer fact that they stand greater chances of having quitted and could not be sampled or simply were not motivated to participate in the study). Academic entrepreneurs generally use buffering, temporal framing and leaving strategies to cope with role conflict.

The development of the Academic Entrepreneurship Competences Scale in this study was based on questionnaire items extracted through interviews in Study 1, and the development of the Coping Strategies Scale was based on previous scholarly research. The aim of development of the Academic Entrepreneurship Competences Scale and the Coping Strategies Scale is to provide measurement tools for the subsequent empirical research. At the same time, the development of these two scales also suggests a research basis for future academic entrepreneurship research albeit we acknowledge that this is still a very exploratory study in nature.

Overall, despite some divergences in the empirical findings to those suggested in the theory and previous scholars, this study can show a logical mental representation of academic-entrepreneurial competences as well as a set of empirically supported coping strategies that the individuals in the sample can recognize and structure together. Future research must depart from our acknowledgment that this is an exploratory study and that it may be sensitive to the nature of the sample. We thus think that before adopting only the items that were retained in the CFAs, future research should deploy the original item list and redo

the analyses so to verify to which extent the items retained overlap with the ones reported in this study. After independent replications, if there is convergence – at least regarding the constructs – we believe to have taken a first step towards a more informative and robust measure of academic-entrepreneurial competences that can leverage quantitative empirical research in this domain.

Chapter 5: Study 3: Explanatory Process of Academic Entrepreneurial Competences on Entrepreneurial Performance

5.1 Introduction

This study 3 is motivated by the third and fourth research questions: RQ3. What competences do academic entrepreneurs need to be more successful? and RQ4. What are the influencing mechanisms of academic entrepreneurial competences on entrepreneurial success?

Some scholars have studied the impact of academic entrepreneurs' demographic characteristics, human capital, social capital, entrepreneurial motivation, and entrepreneurial competences on academic entrepreneurship intention or behavior. However, relatively little research has been conducted by scholars on the factors influencing the success of academic entrepreneurship. Although some researchers have explored the impact of role conflict (Zou et al., 2019), entrepreneurial identification (Guo et al., 2019b), and the interactions between effectuation logic and role innovation (Li et al., 2021) on academic entrepreneurship success, there is still relatively little research on the factors influencing academic entrepreneurial success at the individual level. Research on factors influencing academic entrepreneurial success, rather than on factors influencing academic entrepreneurial intentions or behaviors, would be more useful in guiding academic entrepreneurs' entrepreneurial practices.

The fact that academic entrepreneurs play two roles, a scholar and a practitioner at the same time must be considered. Some scholars point out that there are several tensions between academic and entrepreneurial competences like differing logics, time dimensions, communication practices, rigor and relevance, interests and incentives (Bartunek & Rynes, 2014; Zou et al., 2019). However, the competences that academic entrepreneurs should possess should not be the simple addition of the competences of researchers and entrepreneurs.

In this regards, Zou et al. (2019) empirically analyzed the relationship between role conflict and academic entrepreneurship performance, and the results suggest that role conflict is negatively related to academic entrepreneurship performance. Guo et al. (2019a) explored the positive effect of entrepreneurial identification on academic entrepreneurship. Li et al. (2021) found that the interactions between effectuation logic and role innovation are related to

academic entrepreneurship performance. However, we do not yet know the impact of academic entrepreneurial competences on entrepreneurial success.

This should consider a fit approach where P-E misfit and role conflict are huge challenges for academic entrepreneurs during the entrepreneurial process. Some scholars have studied the coping strategies of academic entrepreneurs in the face of role conflicts. For example, Follmer et al. (2018) identify three broad responses to the experience of P-E misfit, including resolution, relief and resignation. Jain et al. (2009) put forward that academic entrepreneurs typically adopt a hybrid role identity that comprises a focal academic self and a secondary commercial person, and they delineated two mechanisms, delegating and buffering. Lam (2010) examines how scientists seek to protect and negotiate their positions, and identified four different orientations and different coping strategies for each type of scientist. Zou et al. (2019) think academic entrepreneurs should try to accept their hybrid identity first and foster a higher-level identity—the "scholar-entrepreneur meta-identity"—later through the adjustment of self-concept and the sense-making process. Zhang et al. (2021) point out the important way to deal with this challenge is to learn entrepreneurial norms and skills to modify their extent of scholarly values and behavior patterns. Since the ability of academic entrepreneurs to take steps to cope well with this misfit and role conflict is important to their entrepreneurial success, what effective measures academic entrepreneurs should take to cope with conflicts and challenges during entrepreneurship is crucial and needs more in-depth research. Such researches are also of great practical significance for guiding academic entrepreneurs to achieve entrepreneurial success.

Because of the above-mentioned shortcomings in academic entrepreneurship research, this study will combine the findings of the existing literature in the field of academic entrepreneurship with the perspective of individual academic entrepreneurs. Before answering both research questions, literature review is called for to explore how academic-entrepreneurial competences produce tension that relates both to P-E fit, and role conflict. Then it is timely to explore exactly what is academic-entrepreneurial success (so to understand how to conceive and measure academic-entrepreneurial performance) and how literature motivates the process that links academic-entrepreneurial competences to academic-entrepreneurial performance. Finally, literature on coping strategies and how they may cushion the tensions and foster stronger academic-entrepreneurial performance is called to devise a comprehensive conceptual model.

5.2 Literature review

5.2.1 Bringing together academic and entrepreneurial competences

Since academic entrepreneurs play two roles, a scholar and a practitioner at the same time, there is significant tension between the two groups (Zou et al., 2019): First, academics and practitioners have different ways of defining and tackling problems, which means differences in logic and strategy. Second, academics' and practitioners' time horizons are different. Third, academics and practitioners' modes of communication are also very different. Finally, academics and practitioners represent different interests and incentives.

Previous research has also indicated that the two role identities necessitate varieties in many realms such as logic, value, time horizons, interests and incentives (Jain et al., 2009). For example, although rigor is an important criterion for scholars, it might be inappropriate for businessmen as they must be flexible to cope with a changing environment. Moreover, an entrepreneurial orientation typically requires intense single-mindedness of effort, a short-term focus, and an emphasis on execution with products and profit representing the key outcomes. But for academics, while the prospect of taking on a role identity that is more commercially focused might sound attractive, it needs to be balanced against the prospect of giving up an existing role identity that is cherished, more stable, and dramatically different to the new one. Bartunek and Rynes (2014) also think that there are several tensions between academic and entrepreneurial competences, including differing logics, time dimensions, communication practices, rigor and relevance, interests and incentives. As for different logics, the logics of academics and practitioners often differ, including the ways in which they formulate questions for inquiry. As one simple example, practitioners rarely (if ever) begin with literature reviews as a way to frame their questions, while academics do so as a matter of course. As for time dimensions, there is agreement that academics' and practitioners' time horizons differ, with academics' timelines being much longer than practitioners'. As for communication practices, there are multiple potential communication difficulties between academics and practitioners, sufficiently so that there are frequent discussions of the necessity for knowledge translation between them. As for rigor and relevance, the bulk of the literature addressing academic–practitioner gaps focuses on the alleged rigor of academic research (with a positivist approach to rigor often taken for granted) as contrasted with the perceived need for relevance on the part of practitioners. As for interests and incentives, many scholars suggest that academics and practitioners have differing interests and incentives.

In general, academic and entrepreneurial competences are different in many ways, such as the way they think and approach problems, the way they communicate, the time dimension, their values, interests and motivations. So generally during the process of academic entrepreneurship, many academic entrepreneurs find it challenging to balance these two roles and often encounter much conflict in face of such a balance (Zou et al., 2019).

The whole idea of tensions generated by divergent needs, role, and competences makes P-E (mis-) fit a relevant construct in researching academic-entrepreneurship.

5.2.2 P-E misfit during academic entrepreneurship

5.2.2.1 P-E fit

Person-Environment Fit (P-E fit) is a key variable that operates precisely at the individual level, and it has always been the core issue of career psychology and organizational management research. The earliest discussion on P-E fit can be traced back to the book Choosing a Vocation by Parsons (1909). Parsons (1909) is a pioneer in American career guidance. In his book, Parsons describes the three principles of career choice: understand yourself, understand the workplace, and reasonably fit. Since then, researchers have conducted thousands of studies on P-E fit and developed various theoretical models including career interests, values, job adaptation, and career anchors.

Regarding the concept of P-E fit, different scholars have put forward different views. Some scholars hold that P-E fit refers to the compatibility between an individual and a work environment that occurs when their characteristics are well matched (Kristof et al., 2005). On the basis of the previous research, Kristof (1996) divides P-E fit into supplementary fit and complementary fit. Among them, supplementary fit refers to the degree of fit between the basic characteristics of the individuals (such as personality, values, goals, and attitudes) and the organization (such as culture/climate, values, goals, and norms). Complementary fit refers that the needs of the organization (individual) are met by the supply of the individual (organization). Based on Kristof's research, Cable and Edwards (2004) argue that besides supplementary fit, complementary fit can be subdivided into demand-abilities fit (D-A Fit) and needs-supplies fit (N-S Fit). D-A Fit refers to the fit between employee's abilities and a job's demands. N-S Fit refers to the fit between employee's needs and the organization's supplies. Some scholars further divided N-S Fit into over-qualification and under-qualification, and analyzed the management change process of the executive team members of two types of misfits (Ferguson et al., 2016). Under-qualification means that the

skill requirements of the organization are not being met relative to the current role structure. Conversely, over-qualification means that the qualifications reflected in the current role structure are too high.

As for the measurement, P-E fit can be measured directly or indirectly. Direct measurement is mainly based on the subjective perception of the individual, such as direct scoring to evaluate the overall fit between the individual and the environmental characteristics (e.g., my values are very similar to other organization members). Indirect measurement measures the characteristics of people and the environment separately, and calculates the fit values through complex statistical analysis, such as difference scores, correlation coefficients. In terms of the measurement of P-E fit, scholars held different opinions about which measurement is the most objective and effective and whether different measurement should be used when situation varies, which is to be further studied (Y. F. Wang & Sun, 2013).

In terms of the impact of P-E fit, research on P-E fit suggests that attitudinal and behavioral outcomes are influenced by how one personal attributes fit the external environment. P. Chen et al. (2016) used hospital employees as respondents, and the results of the empirical study found that P-E fit can reduce employees' job stress and increase their job satisfaction. Jung and Takeuchi (2014) compared two countries, Korea and Japan, and found that good P-E fit enhances employees' commitment to the organization. Individuals who experience fit are more committed and satisfied, perform better, and have lower intentions to quit their jobs or organizations (Kristof et al., 2005). However, these outcomes are weakened or even non-existent for those who perceive a misfit (Chi et al., 2020). In all, P-E fit theory posits that stress arises from a poor match between characteristics of the individual employee and of the job situation.

5.2.2.2 P-E misfit

The complex and changing internal and external business environment faced by modern organizations and the increasing number of P-E misfit employees in the workplace have become a challenge for many organizations. Although the literature on P-E fit has proliferated, P-E misfit has been relatively ignored, and these misfits have proved to be a challenge for many organizations and individuals (Williamson & Perumal, 2021). Some scholars define misfit as the negative end of the fit continuum, and is associated with discomfort or incompatibility (Follmer et al., 2018). Some scholars conceptualize misfit as a qualitatively distinct construct from that of low fit or the absence of fit (derived quantitatively through P-E difference scores), where employees' experiences were solicited through face-to-face,

semi-structured, in-depth interviews (Williamson & Perumal, 2021). In recent years, there has been a misfit turn in organizational fit research as researchers have become more interested in the problems and remedies associated with the misfit of people and organizations rather than the benefits of fit (De Cooman et al., 2019). In the field, a few influential researches have explored how people deal with misfit and make adjustments in their life to cope with the weakened sense of belonging in their organization and job that accompanies misfit (Bermiss & McDonald, 2018; Follmer et al., 2018; Vogel et al., 2016).

To measure P-E misfit, Vogel et al. (2016) took an indirect approach and calculated misfit using a 24-item value scale. Bermiss and McDonald (2018) took a categorical approach and assessed people and organizations as either liberal or conservative. Follmer et al. (2018) took a direct approach and assessed perceived misfit through a simple screen and during an interview. Misfit was then determined to be a liberal in a conservative organization or vice versa. These used approaches suited these particular studies, but they were, in part, adopted due to a curious absence of simpler and validated ways to determine whether someone is a misfit (De Cooman et al., 2019).

In the review research, the consequences of the effects of P-E misfit are summarized (De Cooman et al., 2019). Specifically, interpersonal misfit is associated with task and relationship conflict. The bullying and social isolation literature demonstrates that misfit can relate to ostracism. Some forms of misfit emanate from social communication disorders and may follow people from place to place. Some studies of misfit have surfaced forms of misfit that are merely uncomfortable and can be easily ameliorated (Follmer et al., 2018; Vogel et al., 2016), whereas others have surfaced much more painful forms that are not easily lived with (Follmer et al., 2018). According to the research of Williamson and Perumal (2021) based on a two-stage sampling approach, the results revealed that the consequences of misfit were in two main areas: firstly causing negative reactions in individual employees undergoing this experience, and in turn, these employees, by their attitudes and behaviors, were enablers of secondly producing organizationally directed detrimental outcomes. This study showed that the effects of misfit are much more penetrating, extreme and pervasive than what had been shown in previous quantitative research. In addition to this, some other scholars' findings suggest that P-E misfit also reduces job engagement and decreases task performance and organizational citizenship behavior (Vogel et al., 2016).

As for how to deal with P-E misfit, different scholars have proposed many solutions based on their findings. Bermiss and McDonald (2018) explore how to deal with an individual's political ideological misfit with an organization's prevailing ideology impacts

departure. They offer some suggestions for managers to respond based on the study's findings. At the macro level, managers ought to consider the value of diverging ideologies—even creating forums where the risk of advocating for a minority political position is mitigated. Ideological misfits exist along a spectrum from those destined to leave to sources of productive tension who force others in the organization to examine and question their own beliefs. From a managerial standpoint, nurturing and retaining as many of the latter group as possible seems like a worthy goal. At a micro level, managers with knowledge of a particular person / firm context (e.g., a high-performing employee considering leaving), may wish to encourage the ideological misfit to frame choices in a different way—to find a way to productively engage with and harness the tension between his or her own political views and the firm's consensus viewpoints, rather than leave for an environment that eases the tension. In addition, the results from the field study of employees from diverse organizations and industries suggest that both job crafting and leisure activity do indeed act as a buffer, mitigating the otherwise negative effects of value incongruence on employee engagement and job performance (Vogel et al., 2016). This study provides evidence that job crafting can help people compensate for significant pitfalls of their jobs—in other words, not only can job crafting make a good situation better, but it may also help make a bad situation tolerable. In an economy where value in congruence has become more prevalent, this use of job crafting may be particularly constructive. Furthermore, leisure activity can compensate for a negative work experience—add to the growing evidence that work and leisure pursuits can exist in harmony. Moreover, the specific pattern of this relationship demonstrated that leisure activity could go beyond buffering the negative effects of misfit on performance to even improving the performance of some misfits.

In summary, P-E misfit mainly refers to the incompatibility between individuals and their jobs. For its measurement, scholars have mainly adopted some direct or indirect measurement methods. P-E misfit has been proven in numerous studies to have negative effects, such as reducing employee satisfaction, reducing job engagement, increasing the propensity to leave, increasing employee frustration, and increasing counterproductive work behaviors. Of course, managers can also take a number of steps to mitigate or reduce the negative effects of P-E misfit, such as increased training and job crafting.

5.2.2.3 P-ENT fit: P-E fit in academic entrepreneurship

Although research on P-E fit is diverse and rich, little effort has been made in the past to integrate its various conceptualizations, operationalizations, or measurement strategies with

the field of entrepreneurship. In order to answer the basic question of why are some entrepreneurs more successful than others, fit theory has been applied to entrepreneurship by Markman and Baron (2003), and they use person-entrepreneurship fit (P-ENT fit) as a framework to articulate the importance of individual attributes, such as self-efficacy to entrepreneurship. They suggest that to the extent that entrepreneurs are high on a number of distinct-difference dimensions (e.g., self-efficacy, opportunities recognition, perseverance, human and social capitals, and social skills) relevant to the entrepreneurial role (e.g., evaluate opportunity, deploy to market, and exploit technology-based opportunities via firm formation), the closer will be their person–entrepreneurship fit and, consequently, the greater their success. Therefore, in order to enhance the likelihood of entrepreneurial success, entrepreneurs should improve as much as possible the qualities and abilities closely related to entrepreneurship, including self-efficacy, opportunities recognition, perseverance, human and social capitals, and social skills.

Some scholars have analyzed the moderating effects of person-entrepreneurship fit between entrepreneurial self-efficacy and entrepreneurial intention. Because needs fulfillment is an important motivational driver, the level of fit with entrepreneurship depends on the extent to which individuals perceive that their needs can be fulfilled through the entrepreneurial process (Hsu et al., 2019). They think there are two content dimensions of P-ENT fit. The first content dimension of P-ENT fit is needs-supplies. The second content dimension of P-ENT fit is demands-abilities. And they point out that actual P-ENT fit is unknown prior to engagement in the entrepreneurship process, as such, it is the perception of fit that motivates the person to enter entrepreneurship, and the closer the person-entrepreneurship fit, the greater the likelihood or magnitude of business success (Hsu et al., 2019). Based on empirical research, Hsu et al. (2019) introduce perceived person-entrepreneurship fit to entrepreneurship and shows that it moderates the relationship between entrepreneurial self-efficacy and entrepreneurial intention. The findings indicate that when a strong perception of fit with entrepreneurship is achieved, entrepreneurial intention is strongly predicted by entrepreneurial self-efficacy. The findings suggest that entrepreneurship education should help students learn more about the person-side of the P-ENT fit, i.e., their personality, needs, and values. Educators should also emphasize the supplies of entrepreneurship in different contexts – monetary income, job autonomy, and opportunities for self-achievement.

In addition, some researchers have also studied person-entrepreneurship misfit and its influence. For example, some researchers illustrated a moderated mediation model to explore

how misfit between entrepreneurs and their entrepreneurship affects entrepreneurs' intention to exit their current business, and the results indicated that person-entrepreneurship misfit was positively related to entrepreneurial burnout, which was in turn associated with entrepreneurial exit intention (H. Zhao et al., 2021). Based on the results, several suggestions for entrepreneurs have been put forward to reduce the person-entrepreneurship misfit. Firstly, some strategies, such as practical entrepreneurial experience, entrepreneurial training, and exposure to entrepreneurial role models, are effective ways for entrepreneurs to resolve their misfit with their entrepreneurship and prevent entrepreneurial burnout that can lead to the entrepreneurial exit. Secondly, increasing job control, training, and other strengths-based interventions, can help entrepreneurs reduce the possibility of suffering entrepreneurial burnout. Thirdly, if entrepreneurs are chronically highly inconsistent with their entrepreneurship, especially when signs of entrepreneurial burnout emerge, entrepreneurs can devote themselves to finding the most compatible working environment (e.g., participating in other entrepreneurship and being employed by other organizations) as a protection strategy for preventing further valued resource loss.

In all, there is a great deal of research related to P-E fit, but there is still relatively little research related to the entrepreneurial field. Although perceived, P-ENT fit is an important, yet overlooked construct in entrepreneurship (Hsu et al., 2019). Only a few scholars have analyzed the importance of P-ENT fit and its impact on entrepreneurial intention. P-ENT fit and misfit studies especially in academic entrepreneurship are even less common.

Relating P-ENT fit with the academic-entrepreneurial competences devised in Study 1 and tested in Study 2, we hypothesize that:

H1: Academic-entrepreneurship competences (AEC) have a direct positive effect on P-ENT fit

H1a: AEC *GeJu* has a direct positive effect on P-ENT fit.

H1b: AEC Leadership has a direct positive effect on P-ENT fit.

H1c: AEC Research ability has a direct positive effect on P-ENT fit.

H1d: AEC Motivation has a direct positive effect on P-ENT fit.

H1e: AEC Business knowledge has a direct positive effect on P-ENT fit.

A closely-related construct with the idea of tension and divergent pressures stemming from misfit is role conflict.

5.2.2.4 Role conflict in academic entrepreneurship

A role is defined as a particular set of norms that is organized about a function (Biddle, 1986).

Roles mean specific expectations for values and beliefs, which drive individuals' interactive behaviors in different social contexts (Stets & Burke, 2000). Role conflict occurs when those roles put forward substantially different requirements in regard to physical, temporal, emotional and obligatory values (Balven et al., 2018). Role conflict will lead to cognitive dissonance, consequently increases the psychological and physical costs such as emotional, time, cognitive and space cost of role management (Zhang et al., 2021). Academic entrepreneurs are typically defined as academic scientists who are involved in the processes of opportunity pursuit and technology transfer. Academic entrepreneurs are different from traditional entrepreneurs, as they move from the familiar academic field to the unfamiliar field of entrepreneurship. Accordingly, academic entrepreneurs have two roles, a scholar role identity and an entrepreneur role identity. The different norms and requirements of the two fields lead to high personal uncertainty (Sinell et al., 2015). Therefore, academic entrepreneurs, often face the challenges of role conflict. For academic entrepreneurs, role conflicts also refer to conflicting time arrangements and role behavior patterns between academia and entrepreneurship that are incompatible in ways such that participation in one role is made more difficult by virtue of participation in the other (Zhang et al., 2021).

During the process of academic entrepreneurship, role conflict has become one of the most common problems faced by academic entrepreneurs. For example, rigidity contributes to the research work of scholars, and it might not be inappropriate for entrepreneurs, as they must be flexible and commercial enough to cope with the dynamic business environment. Entrepreneurs pay more attention to short-term goals, mercantilism and currency profits while academic orientation typically claims to focus more on long-term goals, rigidity and peer recognition (Jain et al., 2009). Although scholars have the advantage in a knowledge economy of having specialized knowledge, technology and patents and also access to research equipment that provides a competitive advantage in innovation and research (Druilhe & Garnsey, 2004), scholars are known to usually have a poor understanding of business and also being poorly experienced in managing, especially finance, people and being challenged to think in marketization and technological transfer to commercial products (Müller-Wieland et al., 2019). Bartunek and Rynes (2014) argue that the research orientations, value judgments, codes of conduct, institutional norms, and competency requirements embedded in the two roles of academics and entrepreneurs do not coincide and sometimes have irreconcilable and contradictory relationships, resulting in tensions that make it difficult for individuals to form a complete self in terms of self-perception. Lam (2010) argues that academic scientists are active agents seeking to shape the relationships between science and business, and shows

continued diversity in their work orientations. Drawing on neo-institutional theory and the notion of "boundary work", the study examines how scientists seek to protect and negotiate their positions, and also make sense of their professional role identities. It identifies four different orientations: the "traditional" and "entrepreneurial", with two hybrid types in between. The hybrids are the dominant category and are particularly adept at exploiting the ambiguities of "boundary work" between academia and industry.

Some researchers focus on the challenges faced in academic entrepreneurship, and put forward that the challenges in academic entrepreneurship for academic entrepreneur are role overload for academicians and lack of entrepreneur-owned resources (Juno & Vijayakrishna, 2018). Role overload for academicians means with the new role of becoming academic entrepreneurs, the major issue arising is the changing nature of academic work specifically properly prioritizing and juggling the roles of generating new knowledge (research), transmitting knowledge (teaching) and income generation (entrepreneur). Lack of entrepreneur-owned resources means academics have to deal with enormous lack of resources. This affects the ability to be good entrepreneur as well as their role as an academic. These include limited financial resources, increasing capital costs, lack of infrastructure, delay in fund disbursement and difficulty in finding private sector collaboration. Academic entrepreneurs face mainly inter-role conflicts, as they are tasked with teaching and research in universities and need to be accountable to the state, school and students, while they are also tasked with the development and growth of entrepreneurial enterprises and need to be accountable to customers, employees and other stakeholders.

Some researchers analyze the impact factors of academic entrepreneurs' role conflict. For example, role conflict has been found to be fostered by scholarly identification and lowered by entrepreneurial identification with these two factors interacting to also lower experienced role conflict in academic entrepreneurs (Zou et al., 2019). These authors also report the role conflict hampers academic entrepreneurship performance. Based on social learning theory, Zhang et al. (2021) examine how academic entrepreneurs' prior academic experience and prior entrepreneurial experience influence their role conflict. The results show that prior academic experience positively impacts role conflict, while prior entrepreneurial experience negatively impacts role conflict. Moreover, the negative effect of academic experience is weaker for academic entrepreneurs who have a longer length of prior entrepreneurial experience. This research is an attempt to provide insight into the antecedents of academic entrepreneurs' role conflicts and to thereby deepen our understanding of why some academic entrepreneurs perceive more role conflict than others. They theorized that the difference in

role conflict can be attributed to differences in two kinds of prior experience, namely, academic experience and entrepreneurial experience.

Some researchers also analyze the impact effects of entrepreneurs' role conflict. For example, Nambisan and Baron (2021) find that entrepreneurs' role conflict will lead to stress, then decreases the venture performance, and the positive relationship between role conflict and stress is moderated by ecosystem openness and that the negative relationship between stress and venture performance is moderated by entrepreneurs' self-control. Based on the theory of planned behavior, Liao et al. (2022) point out that for Chinese academic entrepreneurs of teachers, role conflict has a negative effect on perceived behavioral control and the perceived behavioral control has a positive effect on academic entrepreneurial intent.

In conclusion, due to the special nature of the identity of academic entrepreneurs, the role conflict between academics and entrepreneurs is a phenomenon that academic entrepreneurs inevitably face in the process of entrepreneurship and brings great challenges to academic entrepreneurs. Academic entrepreneurs face problems such as role overload and lack of resources. Some scholars have analyzed the factors influencing academic entrepreneurs' role conflict, such as the effects of scholarly identification, entrepreneurial identification, and social identity continuity on academic entrepreneurs' role conflict. Some scholars have analyzed the effects of academic entrepreneurs' prior academic experience and prior entrepreneurial experience on academic entrepreneurs' role conflict. Some other scholars have analyzed the outcome effects of academic entrepreneurs' role conflict, such as causing stress, reducing firm performance, and decreasing perceived behavioral control. In the short term, under conditions of limited time and resources, role conflict among academic entrepreneurs can have a negative impact on the development of entrepreneurial ventures. However, in the long run, a series of reconfiguration strategies can be adopted to coordinate and combine the roles of academics and entrepreneurs so as to bring into play the linkage effect of innovation and entrepreneurship.

In relating role-conflict with academic-entrepreneurial competences we hypothesize that:

H2: Academic-entrepreneurship competences have a direct negative effect on Role conflict

H2a: AEC *GeJu* has a direct negative effect on Role conflict.

H2b: AEC Leadership has a negative effect on Role conflict.

H2c: AEC Research ability has a direct negative effect on Role conflict.

H2d: AEC Motivation has a direct negative effect on Role conflict.

H2e: AEC Business knowledge has a direct negative effect on Role conflict.

One consequence of P-E fit was explored by Kreiner (2006) within the larger context of work-home conflict where the researcher posited a match between resources needed allowed for a better boundary negotiation, and therefore less conflict experienced.

Previous research conducted by Mayes and Ganster (1988) took the need-for-achievement and need-for-power as proxies of P-E fit, and with a sample of 128 public servants from professional, administrators, clerk and maintenance, found a strong correlation between these and role conflict, which was stronger than that found for role ambiguity. However, in exploring the sources of stress in entrepreneurs, Harris et al. (1999) found that workload was more strongly associated with entrepreneurs' stress than role ambiguity was.

Within the context of developing a comprehensive scale on P-E fit, researchers (Chuang et al., 2016) tested the validity and reliability of many dimensions of P-E fit, and in one of the empirical studies they report many positive correlations between these (e.g. Person-Organization fit, Person-Job fit, Person-Group fit, Person-Supervisor fit) and in-role behavior, which can be taken as a proxy of role-conflict.

Liu and Li (2018) design a conceptual model that crossed the effects of job complexity, role conflict, task efficacy in explaining the perception of challenge or hindrance as mediators to motivation to work and task persistence. With a sample of 324 employees from an airline company and a time-lagged design, findings show role conflict is strongly correlated with job complexity as well as with hindrance appraisal stemming from role conflict while reporting a negative interaction effect between role conflict and task efficacy in explaining hindrance appraisal, which authors interpret as supportive of a P-E fit approach that highlights the positive effects of match between personal and environment features.

In taking work-family conflict and family-work conflict as expressions of role conflict as sustained by Greenhaus and Beutell (1985), Yan et al. (2022) test the direct effect of person-job fit on these two indicators to find results that corroborated their hypotheses, thus showing person-job fit is a relevant construct to explain role-conflict. We therefore hypothesize that:

H3: P-ENT fit has a direct negative effect on Role Conflict.

Because P-ENT fit is conceptualized as an outcome of individual academic-entrepreneurial competences in hypothesis 1 and it is also closely related to role conflict in hypothesis 2, we infer its mediation role. We thus hypothesize that:

H4: There is a negative indirect effect of AEC on Role conflict through P-ENT fit.

H4a: There is a negative indirect effect of AEC *GeJu* on Role conflict through P-ENT fit.

H4b: There is a negative indirect effect of AEC Leadership on Role conflict through

P-ENT

Fit.

H4c: There is a negative indirect effect of AEC Research Ability on Role conflict through P-ENT fit.

H4d: There is a negative indirect effect of AEC Motivation on Role conflict through P-ENT fit.

H4e: There is a negative indirect effect of AEC Business Knowledge on Role conflict through P-ENT fit.

So far, the literature review has shown how academic entrepreneurial competences produce tensions and role conflict, but its outcomes are still unexplored. We reason the most relevant that motivates this study is to know how to relate it with academic-entrepreneurial performance.

5.2.3 What is a successful academic entrepreneur?

5.2.3.1 Profiling entrepreneurial success

Many entrepreneurship studies have addressed the evaluation of entrepreneurial performance. Some scholars proposes that when evaluating entrepreneurial performance, one should focus on both survival and growth dimensions (Chrisman et al., 1998). Scholars have a high degree of agreement with this idea, and many related studies have evaluated entrepreneurial performance in terms of these two dimensions. Survival performance is generally associated with the number of years of existence of the venture, while growth performance is mainly related to the growth of financial indicators, such as sales, net profit, and market share.

Entrepreneurial success is often used as an operational indicator for entrepreneurial performance evaluation. Entrepreneurial success was defined as the criteria used by entrepreneurs to judge business success (Wach et al., 2016). So far, there is no uniform measure of entrepreneurial success. Most scholars use multiple dimensions to measure entrepreneurial success. For example, Fisher et al. (2014) point out that entrepreneurial success is a multidimensional construct that is best captured by more than financial and economic indicators. Wach et al. (2016) think entrepreneurial success has various indicators: firm performance, workplace relationships, personal fulfillment, community impact, and personal financial rewards. According to Hundera et al. (2021), the multidimensional success factors can further categorize as subjective financial success and subjective personal success. The subjective financial success is related to income and finance, whereas the subjective

personal success is centered around personal development and other nonfinancial goals of the entrepreneur. Specifically, they think subjective financial success includes firm performance (for example, turnover) and personal financial rewards (family income), and the subjective nonfinancial success indicators are workplace relationships (for example, strong customer relationship), community impact (for example, social recognition) and personal fulfillment (for example, personal development). H. Zhao et al. (2021) put forward that there are five commonly used success measures: financial success (e.g., income, profit, and sales), firm survival, firm size, growth, and subjective success (e.g., satisfaction). Wach et al. (2016) think "entrepreneurs' achieved success" was conceptualized as a multi-faceted construct that includes entrepreneurs' self-reported achievement of firm performance, workplace relationships, personal fulfillment, community impact, and personal financial rewards, and it was measured via the Subjective Entrepreneurial Success–Achievement Scale (SES-AS).

In general, entrepreneurial performance evaluation has the following characteristics. First, entrepreneurial performance evaluation focuses on the performance output at the organizational level. And secondly, entrepreneurial performance evaluation usually focuses on operational indicators. Such an evaluation approach is compatible with the nature of entrepreneurial activity as a business practice.

In addition to this, some scholars have analyzed the impact of demographic characteristics, such as gender and age, on entrepreneurial success. Compared with male entrepreneurs, female entrepreneurs often face significant conflicts in allocating time and resources to the various roles demanded of them by their communities (Hundera et al., 2019). By studying 204 women business owners, Hundera et al. (2019) analyze the structural relationships between role conflict, coping strategies, and entrepreneurial success. It was found that women entrepreneurs' coping strategies change when the level of role conflict intensity changes, and moreover that changes in coping strategies have different impacts on entrepreneurial success. Specifically, when the intensity of role conflict is relatively low, they cope by prioritizing their entrepreneurial roles, which affects financial success positively but nonfinancial success negatively. When the intensity of role conflict is relatively moderate, they cope by involving others or reacting to all roles, which positively affects both financial and nonfinancial success. However, when the intensity is relatively higher, they cope by prioritizing family and social roles, which affects nonfinancial success positively but financial success negatively. H. Zhao et al. (2021) focus on the relationship between age and entrepreneurial career success, the results show that age has a weak, positive linear relationship with overall entrepreneurial success, but it does exhibit signs of a U-shaped relationship, with the relationship being

negative among younger samples but positive among older samples. The researchers explained that older entrepreneurs tend to have larger businesses, so older entrepreneurs are "punished" for having a larger denominator in the calculation of growth, putting them in an unfair position if growth is the sole measure of success.

5.2.3.2 Profiling academic entrepreneurial success

As a special form of entrepreneurship, academic entrepreneurship is not suitable to simply apply the general entrepreneurial performance evaluation indices, but must consider the own characteristics of academic entrepreneurial activities. The success of academic entrepreneurship reflects the results and achievements of such entrepreneurship, which is important to the development of academic entrepreneurship and regional economies (Balven et al., 2018). In empirical studies, researchers often use academic entrepreneurship performance as the measure of academic entrepreneurial success (Guo et al., 2019a; Li et al., 2021; Zou et al., 2019). Academic entrepreneurship performance refers to academic entrepreneurial achievement on the economic and social benefits of research commercialization, as well as on scientific research accomplishment during this process (Chang et al., 2016; Chrisman et al., 1998). Some studies measure academic entrepreneurial performance using some of the following five items (Guo et al., 2019a; Li et al., 2021; Zou et al., 2019), including "In the process of academic entrepreneurship, I achieve the economic benefits of research Commercialization", "In the process of academic entrepreneurship, I produce the social benefits of research commercialization", "Academic entrepreneurship facilitates my scientific research", "Academic entrepreneurship is my long-term activity", and "Academic entrepreneurship continuously facilitates my scientific research and research commercialization".

From a comprehensive point of view, because academic entrepreneurship is characterized by multiple entrepreneurial goals, diverse entrepreneurial forms, and multi-level entrepreneurial subjects, the evaluation of academic entrepreneurship performance should also reflect the characteristics of multi-dimensionality and multi-levelness. Multidimensionality mainly refers to the comprehensive evaluation of academic entrepreneurship performance in terms of economic, academic and social benefits. Multi-level refers to the fact that the evaluation of academic entrepreneurship performance can be carried out from the level of different subjects. From the government level, it focuses more on the improvement of regional innovation capacity and the boost to local economic development; from the university level, it focuses more on the expansion of funding channels, the

enhancement of social reputation, and the improvement of community relations; while from the individual level, it focuses more on the acquisition of material resources and the improvement of academic ability. In empirical studies, existing scholars tend to evaluate the performance of academic entrepreneurship at the individual level in terms of the economic benefits, social benefits, and academic achievements achieved by academic entrepreneurs in the process of academic entrepreneurship.

Some researchers have also explored the main factors affecting the academic entrepreneurship performance, such as role conflict and entrepreneurial identification. For example, Zou et al. (2019) empirically analyze the relationship between role conflict and academic entrepreneurship performance, and the results show that role conflict is negatively related to academic entrepreneurship performance. Guo et al. (2019a) explore the effect of entrepreneurial identification on academic entrepreneurship from the social identity theory viewpoint, and the empirical results indicate that the relationship between entrepreneurial identification and academic entrepreneurship performance is positive, and role integration mediates the relationship between entrepreneur identification of academics and academic entrepreneurship performance. Li et al. (2021) find that the interactions between effectuation logic and role innovation are related to academic entrepreneurship performance and that the four interactive effects play different roles.

In general, not much research has been conducted on the factors influencing academic entrepreneurial performance, and most of the existing studies have been conducted at the individual level. Scholars have only analyzed the effects of role conflict and entrepreneurial identity on academic entrepreneurial performance. The question of what competences academic entrepreneurs possess that are more likely to achieve academic entrepreneurial success has not been well answered.

By putting together all the literature reviewed up to this moment, we hypothesize that:

H5: Role conflict has a negative direct effect on AE performance.

And if indeed role-conflict has a direct negative effect upon academic-entrepreneurial performance, then the whole process departing to academic-entrepreneurial competences to academic-entrepreneurial performance can be assembled by means of a sequential mediation. We thus hypothesize that:

H6: There is a sequential positive indirect effect of AEC on AE performance through P-ENT fit and Role conflict.

H6a: There is a sequential positive indirect effect of AEC *GeJu* on AE performance through P-ENT fit and Role conflict.

H6b: There is a sequential positive indirect effect of AEC Leadership on AE performance through P-ENT fit and Role conflict.

H6c: There is a sequential positive indirect effect of AEC Research Ability on AE performance through P-ENT fit and Role conflict.

H6d: There is a sequential positive indirect effect of AEC Motivation on AE performance through P-ENT fit and Role conflict.

H6e: There is a sequential positive indirect effect of AEC Business Knowledge on AE performance through P-ENT fit and Role conflict.

One of the key constructs in this study pertains to the strategies individuals develop to cope with the hardship of academic-entrepreneurial endeavors.

5.2.3.3 Coping strategies of academic entrepreneurs

Faced with P-E misfit and role conflicts, academic entrepreneurs often adopt a series of strategies or measures to help them face these challenges or difficulties. Scholars have also conducted relevant studies on this issue. For example, Follmer et al. (2018) identified three broad responses to the experience of person-environment misfit: Resolution, Relief and Resignation. The Resolution approach contained strategies aimed at reducing the sources of misfit; whereas, the Relief-seeking approach contained strategies seeking to reduce the pain associated with misfit, without changing its underlying sources. Those who achieved neither resolution nor relief turned to Resignation, which involved acceptance of misfit as painful but unavoidable. Firstly Resolution approach includes Leaving strategies and Adjustment strategies. Leaving strategies include two specific measures, Exit (Leaving the organization to restore fit) and Internal transfer (Seeking internal movement or assignment within the current organization to restore fit). Adjustment strategies include two specific measures, Changing the environment (Working to adapt jobs or others' behaviors or expectations to restore fit) and Changing the self (Working to fundamentally change the self to restore fit). Secondly, Relief-seeking approach includes Surface-level behavior change (Making minor changes in outward behavior to convey the impression of fit to others), Buffering (Focusing on fit in one area to compensate for misfit in another) and Temporal framing (Viewing misfit as a temporary condition with an endpoint). Thirdly, Resignation approach includes Distancing (Separating self from work and work identity) and Taking pride in misfit (Reframing misfit as resulting from something negative about the organization, and unique and positive about themselves). This study provides a good reference for how academic entrepreneurs respond to P-E misfit.

Based on qualitative study, Jain et al. (2009) put forward that academic entrepreneurs typically adopt a hybrid role identity that comprises a focal academic self and a secondary commercial person, and they delineated two mechanisms – delegating and buffering – that academic entrepreneurs deploy to facilitate such salience in their hybrid role identity. Delegating means scientists craft arrangements with other actors as part of participating in technology transfer. They are comfortable allowing others to provide the entrepreneurial energy required in the commercialization process. This delegation allows them to focus on maintaining and nurturing their academic role identity, which is viewed by them with fondness and appreciation for the unique benefits it provides. At the same time, by engaging in such delegation, they share in any benefits that accrue while distancing themselves from aspects of commercialization that they find unpalatable or difficult. Buffering processes signify an individual's affinity to their extant role identity as well as represent a proactive means of preserving key elements of it. Many scientists took steps to protect their role identity from the influence of norms typically associated with commercialization. These individuals were mindful of preserving certain cherished values associated with being an academic and made sure that these were not compromised as a result of their involvement with technology transfer. Such internally focused initiatives at establishing role identity salience are regarded as buffering. In all, the result suggests that university scientists take active steps to preserve their academic role identity even as they participate in technology transfer.

Drawing on neo-institutional theory and the notion of "boundary work", Lam (2010) examined how scientists seek to protect and negotiate their positions, and also make sense of their professional role identities based on 36 interviews and a survey sample of 734 academic scientists from five UK research universities. He identified four different orientations and different coping strategies for each type of scientist. Type I Traditional Scientist adopts the strategy of Boundary Separation and Expulsion. They believe that commercialization of research is harmful to academic science and they see the growing pressures for applicability in research as a threat to scientific autonomy. They responded to the rising tide of commercialization by avoidance or contestation. Type II Traditional Hybrids adopt the strategy of Boundary Testing and Maintenance. They adopt a more accommodating atti¬tude and are prepared to test the boundary relationships to explore the emerging opportunities in anticipation of possible benefits. They seek to "test" as well as "maintain" the science and business boundary. Type III Entrepreneurial Hybrids adopt the strategy of Boundary Negotiation and Expansion. They emphasized an interactive relationship between basic and applied research, and appeared to be comfortable and confident in crossing the

science–business boundary. They resolve the tension by maintaining one dominant academic identity and creating mediating beliefs to reconcile the internal inconsistencies. Type IV Entrepreneurial Scientists adopt the strategy of Boundary Inclusion and Fusion. To the entrepreneurial scientists, science is inherently commercial and the pursuit of commercial science is entirely logical and compatible with their academic role. They seek to fuse the academic role with the entrepreneurial one to make a two-faced hybrid identity.

Furthermore, in holding the practitioner pole in tension with the academic one, some researchers elevate it to a more equal status than is often the case (Bartunek & Rynes, 2014). Academics have been known to "talk down to" (or more accurately, "at") practitioners rather than engaging in an equal exchange. Talking down is far more likely when practitioners are just visions of our social constructions rather than real people sitting at the same table. But academics who more fully engage the tensions of research and practice will increase the chances of finding something truly new and interesting, and at the same time increase academic citations and the likelihood of producing highly influential research.

According to the empirical research conclusion of Zou et al. (2019), on the one hand, academic entrepreneurs should move from the notion that one can either be a good scientist or a good entrepreneur, but not both. Academic entrepreneurs should try to accept their hybrid identity first and foster a higher-level scholar-entrepreneur meta-identity, later through the adjustment of self-concept and the sense-making process. On the other hand, academic entrepreneurs should maintain a high level of social identity continuity. Because people with high levels of social identity continuity can maintain multiple relationships with different groups, when during difficult times, these groups can provide more resources that can help academic entrepreneurs reduce role conflict and improve their performance.

Some researchers put forward some coping strategies which would help the academics, universities and stakeholders involved in academic entrepreneurship perform better (Juno & Vijayakrishna, 2018). Firstly, as for policies and strategies, universities must put in place structures to support academics and stake holders in academic entrepreneurship. Secondly, knowledge and tacit skills of academics are the main sources of business opportunities for a university. Therefore, it's necessary to develop a data bank about analysis of captured data for the development of university policies, strategies and initiatives related to academic entrepreneurship, and short, medium, and long-term planning. Thirdly, human capital is important, conducting training courses will equip the academics with relevant and up to date skills and competences to contribute to the transformation of traditional universities into entrepreneurial universities.

According to the result of the empirical research (Nambisan & Baron, 2021), the significance of individual-level skills and capabilities to potentially mitigate the costs of digital entrepreneurship has been emphasized. Specifically, while entrepreneurs might experience role-conflict induced stress in digital ecosystems, their skills associated with self-control could allow them to manage or mitigate such costs to certain extent. The research indicates that several aspects of self-regulation (including self-control) can, in fact, be enhanced by appropriate training and experience. This suggests that to the extent entrepreneurs acquire or strengthen their self-regulation skills, they may well enhance not only their own performance, but that of their companies as well in digital ecosystems. Therefore, appropriate training and experience is essential for academic entrepreneurs to meet the challenges of role conflict.

Based on an empirical study, Zhang et al. (2021) pointed out reducing role conflict is an urgent challenge for academic entrepreneurs. An important way to deal with this challenge is to learn entrepreneurial norms and skills to modify their extent of scholarly values and behavior patterns. Scholars who intend to create a startup should be exposed to entrepreneurial information and knowledge for a substantial period so that they can overcome their existing scholarly behavioral inertia. For example, scholars can participate in business-related activities or entrepreneurial education before engaging in a formal entrepreneurship.

Based on the properties of the theory of planned behavior (where human control over will and behavior is considered as a continuum), the research explains how enhancing the academic entrepreneurial intent teachers in higher education can be achieved by increasing their perceived behavioral control (behavior under non-volitional control), thereby reducing the negative impact of role conflict (Liao et al., 2022). As this study confirms, perceptual behavioral control effectively reduces the negative effect of role conflict on the academic entrepreneurial intention of teachers in higher education. Therefore, academic entrepreneurs can address the challenges of role conflict in the early stages of academic entrepreneurship by improving their perceived behavioral control.

In summary, scholars have proposed many strategies to help academic entrepreneurs cope with P-E misfit and role conflict based on their research findings. These strategies mainly include resolution, relief, and resignation, delegating and buffering, try to accept their hybrid identity first and foster a higher-level scholar-entrepreneur meta-identity, having appropriate training and experience, participate in business-related activities or entrepreneurial education before engaging in a formal entrepreneurship, improving their perceived behavioral control.

These coping strategies are of great importance in guiding academic entrepreneurs in entrepreneurial practice. If academic entrepreneurs adopt appropriate coping strategies, it should improve the impact of role conflict on academic entrepreneurship performance.

We thus hypothesize that:

H7: Coping strategies moderated the relationship between role conflict and AE performance.

H7a: Relief coping strategy moderated the relationship between role conflict and AE performance.

H7b: Resignation coping strategy moderated the relationship between role conflict and AE performance.

H7c: Persistence coping strategy moderated the relationship between role conflict and AE performance.

5.3 Conceptual model

The overall set of hypotheses designs a conceptual model that integrates all the key constructs with theory as shown below in Figure 5.1.

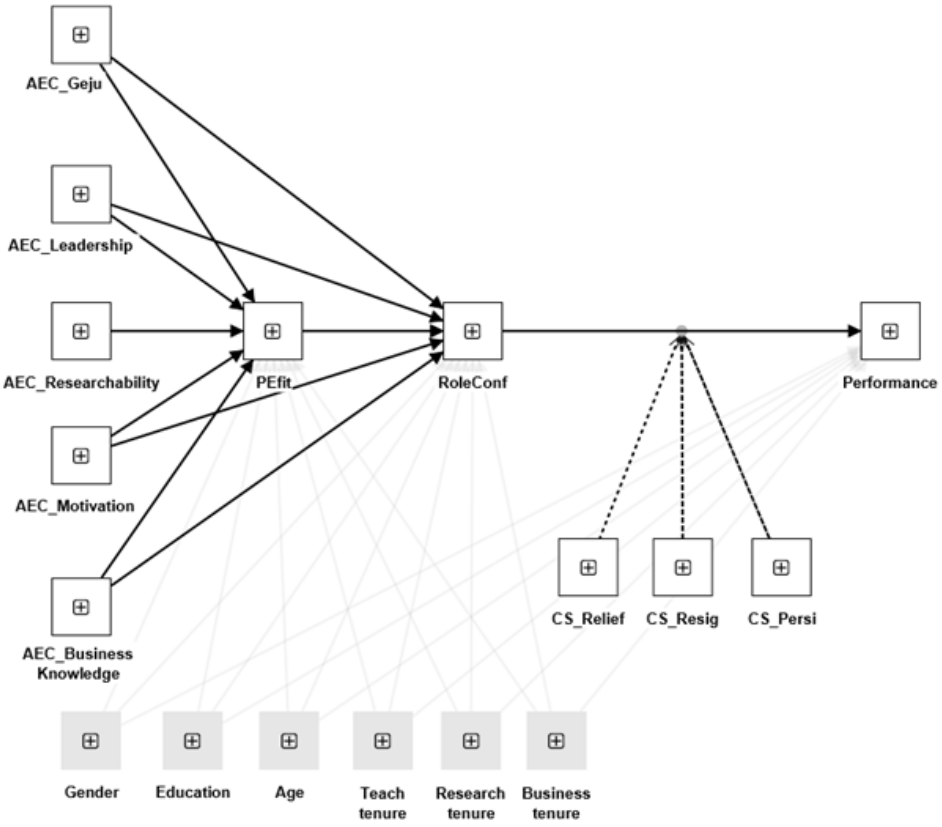

Figure 5.1 Conceptual model of the impact of academic entrepreneurial competences on academic entrepreneurial performance

5.4 Method

5.4.1 Procedure

Considering the design of the conceptual model, as a moderated mediation, it is advisable to conduct a time-lagged data collection strategy. To achieve this, we have deployed WeChat invitations on a purposeful sample asking to snowball to similar profile contacts. Snowballing is a suitable strategy to accede uncommon populations as the professional or social networks that connect them tends to offer more guarantees and efficiency to the data collection process (Kalton & Anderson, 1986).

The researcher sent out personal invitations both directly to individuals as well as to WeChat groups that comprise entrepreneurs, among which academic entrepreneurs. Invitations were sent out from December 2022 to April 2023. The invitation included the informed consent and a note that a second invitation (2nd wave) would follow within two weeks to which the response would be very important. The informed consent contained the nature of the survey, the voluntary participation, its anonymity (via a code that allowed matching data without knowing exactly who responded), and the expected time the survey would take. The code was generated by the respondent following specific instructions so to be able to repeat it in the second wave without the need to use memory.

Both questionnaires were available online in Wen Juan Xin platform and with a link to access it. The first questionnaire comprises the sociodemographic variables together with the scale for academic-entrepreneurial competences (See Annex C for the first-round questionnaire). The second questionnaire comprises measures about coping strategies, role conflict, P-ENT fit, and entrepreneurial performance (See Annex D for the second-round questionnaire).

After receiving the responses in both waves, the database was screened for unmatched cases, which were removed. All the cases that contained fully answered questionnaire were retained and among these we screened for cases of speedy answers that contained contradictory data (e.g. monotonous answers and those lacking attention) so to keep high data quality.

5.4.2 Sample

After applying the data quality screening, the sample comprises 217 respondents, but some were not eligible because they were not having simultaneously occupation in a teaching or

research position in a university while developing entrepreneurial activity. Therefore, the final sample comprises 167 academic entrepreneurs.

The sample is mostly masculine (79.6%), highly educated (24.6% with a Bachelor degree, 45.5% with a Master degree, and 29.9% with a PhD), with a varied range of ages most frequently found in the 40-49 years old (4.2% < 29 years old; 25.1% from 30 to 39 years old; 36.5% from 40 to 49 years old; 27.5% from 50 to 59 years old, and 6.6% 60 or more years old). Teaching and research tenure is also varied in the sample ranging from zero up to 10 or more years. Zero implies the specific respondent has either an exclusive activity in teaching or in researching as they can work in universities or only in research institutes. Both activities tend to be dependent (Spearman $r=0.266$, $p<0.001$) but 29.3% of the sample reported no teaching experience and 10.8% of teaching staff report no research experience.

Most of the sample reported owning a business (they started up) for more than 10 years (55.1%) although some of the respondents are still in a pre-formalization phase (3% have not yet formally created the business), 1.8% did it less than a year ago, 10.8% are in the first three years of the startup, 19.8% are in the 4th to 6th year, and 9.6% are in the 7th to 9th year. Most of the organizations (69.5%) owned by respondents employ less than 50 people, and only 15.6% employ 51 to 100 people. A minimal number of respondents reported having a business with over 300 people (4.2%, from which 3% with 500 or more). These organizations cover a wide range of industries with the most represented being IT (31.7%) followed by Technological Innovation & Consulting (13.8%), Manufacture (12%), Educational support (7.2%), Health and social work (5.4%), Finance (4.2%), Leasing and business services (4.2%), Construction (3.6%) and Wholesale and retail trade (3.6%). The remaining have all 3% or less and cover culture, sports, and entertainment; agriculture, forestry, animal husbandry and fishery; residential services, repair and other services; accommodation and catering; real estate industry; transportation, storage and postal services; electricity, heat, gas and water production and supply; water, environment and public facilities management industry; and international organizations.

Respondents were mostly either independent founders of the business (33.5%) or co-founders (54.5%), and at current time they perform General Manager functions (69.5%) but also Senior managers (23.4%). When asked how much the focus was placed on entrepreneurial activity versus the scientific research, the largest part of respondents stated they had mostly a focus on entrepreneurial activity (26.9%), or most of the focus in entrepreneurial activity but also some on research and teaching (34.1%) or a balance between both (19.8%). 61% of the sample puts the priority of the focus on the entrepreneurial activity.

5.4.3 Data analysis strategy

Beforehand, data quality was checked by means of identifying and removing speedy answers and streamlined answers (monotonous). Likewise, unmatched responses in the waves were also excluded.

The psychometric quality pertaining to construct validity, convergent validity, discriminant validity and reliability were checked. As per the existence of the new scale proposed in the previous study, and due to the sample differences, we ran a principal component analysis which was followed by a confirmatory factorial analysis. The technical indicators for the former concern KMO and Bartlet's X^2 test, together with commonalities above 0.500, and explained variance not below 60%. The latter (CFA) was judged based on fit indices and respective thresholds (Hair & Alamer, 2022). Therefore, we consider a model to have acceptable fit as long as the following criteria are met: X^2 p-value above 0.001; normed X^2 below 3, Comparative fit index and Tucker-Lewis index both above 0.90, Root Mean Square Error of Approximation (RMSEA) below 0.07, and Standardized Root Mean Square Residuals (SRMR) below 0.08.

Convergent validity was judged based on Fornell and Larcker (1981) criterion, with an Average Extracted Variance (AVE) not below 0.500, and discriminant validity is judged on HTMT (Henseler et al., 2015) which should not present cross-constructs values above 0.85 (for strict validity) and 0 .90 (for liberal validity).

Reliability is judged based on Cronbach's alpha and Composite Reliability (Jöreskog, 1971) that should not fall below 0.70 (except in the cases of a novel measure, such as occurs in academic-entrepreneurial competences, which can exceptionally be considered as long as Cronbach's alpha is not below 0.60) (Nunnally & Bernstein, 1994).

As regards the hypotheses testing, path analysis is conducted on the conceptual model, entailing both direct effects, indirect effects, and conditional effects. Considering the complexity of the model, we opted to run path analysis in Smart-PLS software (Memon et al., 2021) as it allows for a more integrative simultaneous analysis compared to the more traditionally used PROCESS Macro (Hayes, 2017) which has a set of baseline models that could not accommodate our two-dependent variable model. Therefore, we conducted a 5000-repetition bootstrapping procedure for a 95% confidence interval, which offers a lower bound and an upper bound, which are used to judge on the meaningfulness of the coefficient. If the zero value is not comprehended in the interval, then one can trust the coefficient is not due to random effects and, thus, it is considered significant.

5.4.4 Measures

Academic-Entrepreneurial competences were measured based on the categories extracted from the 1st qualitative study and tested in the 2nd study. From the first psychometric testing in the second study eight items should be kept for academic competences' subscale, and 14 items kept from the entrepreneurial competences' subscale totaling 22 items. However, as a caveat, and to check the construct stability across two different samples, we kept the original 32 items. For metric's checking sake (to test stability of factorial structure) we opted to keep options open while still striving to check if the solution found in the 2nd study would survive this analysis.

The CFA for the original 10-factor solution showed poor fit indices ($X^2(442)=756.66$, $p<0.001$; Normed $X^2=1.712$, CFI=0.872; TLI=0.847; RMSEA =0.065 CI90 [0.057, 0.073] PClose=0.001; SRMR=0.0664) and none of the proposed factors had acceptable convergent validity and there were also six cases where factors were not sufficiently discriminating among themselves as indicated by HTMT (e.g. Self-awareness vs. Social skills HTMT=0.928).

Thus we have conducted a principal components analysis which showed a starting solution with good validity indicators (KMO=0.893, $0.755<MSA<0.957$; Bartlet's $X^2(528)=2775.059$, $p<0.001$) accounting for 62.4% of variance after rotation (Varimax) with 7 factors but with some minor commonalities issues as well as many cross-loadings. From sequentially removing the items that showed insufficient loadings on own factor together with those that had cross-loadings we arrived to a valid factor solution (KMO=0.865, $0.665<MSA<0.941$; Bartlet's X^2 (153)=1301.212, $p<0.001$) comprehending 18 items organized in five factors that account for 66.9% variance after rotation. The factor solution is shown in Table 5.1.

Table 5.1 Rotated component matrix for academic-entrepreneurial competences

	Component				
	1	2	3	4	5
GJ3 I am willing to share the benefits of my success and create public value with others	**.797**	.208	.116	-.038	.066
GJ2 I find myself happy when I see someone around me having a success	**.724**	.380	.047	-.031	.057
GJ4 I take into account the needs of others and society when considering my own needs	**.721**	.257	.058	.072	.114
PE1 I find myself taking initiative most of the time	**.660**	.113	.048	.374	.151
PE2 I am resilient to stress	**.608**	.167	.010	.335	.238
CL1 I am keen to learn new knowledge whenever I can	**.575**	.190	.163	.227	.168
LS1 I bring people together and turn them into a highly performing and cohesive work team	.205	**.849**	.088	.095	.157
LS2 I inspire other people and motivate them to achieve more	.338	**.753**	.158	.129	.181

LS3 I delegate important professional tasks to people around me	.189	**.737**	.075	-.019	.114
RO1 I am effective into getting funds to support company development activity if I need to	.181	**.724**	.092	.306	.102
SS2 I am aware of other people emotions and able to manage them well	.363	**.650**	.021	.274	-.028
RA3 I lead research projects in my field of expertise	.180	.010	**.821**	-.029	-.087
RA2 I establish networks with researchers to join in common international projects	.005	.104	**.796**	.120	.041
RA1 I am effective into designing rigorous research methodology	.074	.168	**.686**	.153	.258
MO1 I feel motivated by pursuing my own financial freedom	.155	.126	.031	**.841**	.137
MO3 I feel motivated by being recognized as a highly competent professional	.157	.242	.222	**.783**	.010
K3 I always consider some relevant decisions of the business from a financial perspective	.160	.080	.056	.125	**.829**
K2 I use my market knowledge to provide answers to market needs in my area of expertise	.237	.254	.085	.035	**.775**

Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 5 iterations.

The components were: *GeJu*-is a general orientation that builds a positive relation with others due to being considerate while also being initiative and learning oriented. It comprehends 6 items ("e.g. I am willing to share the benefits of my success and create public value with others", "I find myself taking initiative most of the time"). The second component is leadership skills conceived also with an extension to being resource driven and being aware of other people emotions comprehending five items (e.g. "I inspire other people and motivate them to achieve more", "I am effective into getting funds to support company development activity if I need to"). The third component is research ability which comprehends three items (e.g. "I lead research projects in my field of expertise", "I am effective into designing rigorous research methodology"). The fourth component refers to autonomy-competence motivation and comprehends two items ("I feel motivated by pursuing my own financial freedom", and "I feel motivated by being recognized as a highly competent professional"). The last component comprehends also two items and refers to business knowledge ("I always consider some relevant decisions of the business from a financial perspective", and "I use my market knowledge to provide answers to market needs in my area of expertise"). We reason that academic skills are better represented by *GeJu* and research ability while entrepreneurial skills are better represented by leadership skills, motivation, and business knowledge.

We conducted a CFA on this solution and found good fit indices ($X^2(13)=17.292$, p=0.186; Normed $X^2=1.330$, CFI=0.989; TLI=0.982; RMSEA =0.034 CI90 [0.000, 0.072] PClose=0.714; SRMR=0.0311). Figure 5.2 shows the factor solution and loadings.

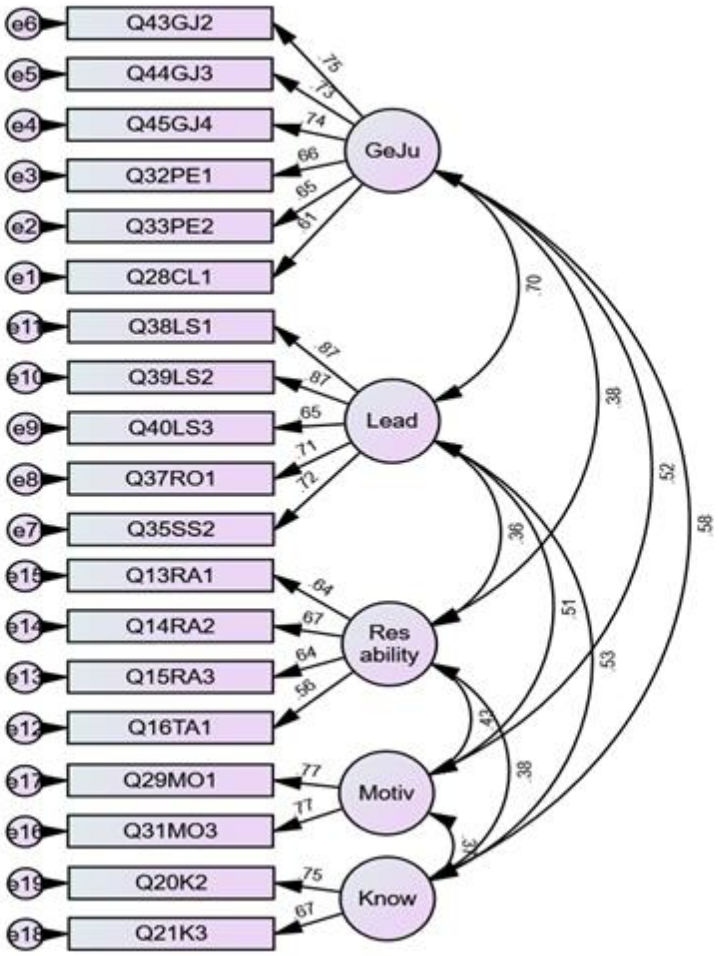

Figure 5.2 CFA for academic-entrepreneurial competences

Some latent constructs have some fragilities as regards convergent validity namely Research ability that does show an AVE below the threshold (AVE=0.395), and there is a case of a suboptimal reliability (CRknowledge=0.67). However, Nunnally and Bernstein (1994) stated internal consistency above .60 is acceptable for emerging measures (just as is the case) and, overall, the solution shows good discriminant validity with no case suggesting factor fusion (see Table 5.2).

Table 5.2 Reliability, convergent and discriminant validity

	CR	AVE	MSV	MaxR(H)	F1	F2	F3	F4
F1 *GeJu*	0.846	0.480	0.493	0.852		HTMT		
F2 Leadership Skills	0.877	0.592	0.493	0.900	0.724			
F3 Research ability	0.723	0.395	0.187	0.727	0.402	0.350		
F4 Motivation	0.742	0.590	0.267	0.742	0.540	0.532	0.444	
F5 Knowledge	0.670	0.504	0.339	0.677	0.595	0.519	0.391	0.384

Overall, this factor solution has a great overlap with the one independently found in the second study. It must be kept in mind that this factor solution was tested with a relatively smaller sample, but the construct validity is ensured by the indicators and the solution has not major issue, thus being eligible for future empirical research.

Coping strategies were measured with the same scale as reported in the previous study by Follmer et al. (2018) comprising the original 16 items. As a cautionary measure, because the psychometric indicators for this scale were not sufficiently good for its unconditional acceptance (namely some convergent validity problems as shown by AVEs), we opted to firstly test it as a reflective construct although we keep the formative construct option open.

The CFA for Follmer et al. (2018) original 8 factor structure showed poor fit indices both for the single order factor structure ($X^2(84)=188.858$, $p<0.001$; Normed $X^2=2.248$, CFI=0.839; TLI=0.770; RMSEA =0.087 CI90 [0.070,0.103] PClose=0.000; SRMR=0.0857) as well as for the 2nd order factor structure ($X^2(98)=244.150$, $p<0.001$; Normed $X^2=2.491$, CFI=0.775; TLI=0.725; RMSEA =0.095 CI90 [0.080,0.110] PClose=0.000; SRMR=0.0961). Taking the valid factor structure found in the previous study we ran a CFA which showed better fit indices ($X^2(33)=51.782$, $p=0.02$; Normed $X^2=1.569$, CFI=0.944; TLI=0.924; RMSEA =0.059 CI90 [0.024,0.088] PClose=0.301; SRMR=0.0634) although with two items with too low factor loadings which the Lagrange Multipliers converge as regards their lack of fit into the model. After removal of these two offending items there were still some issues related to poor convergent validity. Thus, the same problems were found in this scale which corroborates our view that it is better treated as a formative construct instead of a reflective one. Therefore, we have computed the composite indices for each of the three approaches as follows: Relief seeking (6 items, “S1a I make minor adjustments in my outward behavior so that others see myself as fitted to the current responsibilities I have in this venture”, “S1b I act so that other people do not realize when I am uncomfortable with playing the entrepreneur role”, “S2a I focus in some activities I like the most so to compensate for the things I do not really enjoy doing in this venture”, “S2b I always take time off to relieve from the pressure of having to do things I do not feel at ease or that I dislike in this venture”, “S3a I always remember the things I do not like doing as an entrepreneur are only temporary”, and “S3b I believe that with time I will learn to like to do the things I dislike now”), Resignation (4 items, “S4a In my understanding, the degree to which I adapt to my new role in the entrepreneurial process and my perception of myself can be two different things”, “S4b I remember I am not truly an academic-entrepreneur. I am more an academic that happens to be now an entrepreneur”, “S5a I always think only a good scholar and researcher will experience such misfit”, and “S5b I take pride for being a good scholar or researcher much more that being an entrepreneur”), and Resolution (6 items, “S6a I think about quitting or selling this venture to someone else (rev)”, “S6b I think about looking for someone that can replace me totally here (rev)”, “S7a I think about changing my current responsibilities within the venture and perform different duties

from the ones I have (rev)", "S7b I think about hiring people that can directly assist me or to whom I can delegate some of my responsibilities I am less found of (rev)", "S8a I worked hard to adapt to the way the other executive team members worked during the start-up process to achieve a better bonding effect and to make myself more competent in my role as a start-up entrepreneur.", and "S8b I put effort to adjust myself so to increase my own fit to the responsibilities I have today in this venture"). The items marked with "rev" were reversed for the data analysis so to express Persistence.

Role conflict was measured with Zou et al. (2019) 5-item scale that was designed specifically to target role conflict experience in academic entrepreneurs. It comprehends five items (1."Taking teaching, research, and entrepreneurship into account, I often encounter conflicts in time distribution", 2."Taking teaching, research, and entrepreneurship into account, I often encounter conflicts in problem-solving", 3."Taking teaching, research, and entrepreneurship into account, I often doubt my pursuits", 4."Taking teaching, research, and entrepreneurship into account, I feel that conflict exists in my knowledge structure" and 5."Taking teaching, research, and entrepreneurship into account, I often encounter conflict in my measurement system").

Participants use a 5-point Likert scale (1=strongly disagree, 5=strongly agree) to signal their opinion. The CFA from the single factor showed poor fit ($X^2(5)=43.65$, $p<0.001$; Normed $X^2=8.730$, CFI=0.829; TLI=0.658; RMSEA=0.216 CI90 [0.160,0.277] PClose=0.000; SRMR=0.0905). A Principal component analysis showed a valid two-factor structure (KMO=0.700, 0.614<MSA<0.755, Bartlet's $X^2(10)=232.252$, $p<0.001$) that accounts for 72% variance after rotation (Varimax) where the first component concerns "cognitive conflict" and the second "problem solving" (see Table 5.3).

Table 5.3 Rotated component matrix for role conflict

Taking teaching or research (including R&D) and entrepreneurship into account…	Component	
	Cognitive conflict	Problem Solving
RC4 I feel that conflict exists in my knowledge structure	**.805**	.195
RC5 I often encounter conflict in my measurement system	**.789**	.313
RC3 I often doubt my pursuits	**.788**	.037
RC1 I often encounter conflicts in time distribution	.055	**.918**
RC2 I often encounter conflicts in problem-solving	.330	**.785**

Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 3 iterations.

The CFA for this two-factor solution under a 2nd order factor has good fit ($X^2(5)=10.279$, $p=0.068$; Normed $X^2=2.056$, CFI=0.977; TLI=0.953; RMSEA=0.08 CI90 [0.000,0.150] PClose=0.199; SRMR=0.0415) and the factors have both good reliability (1st order CRProblemSolving=0.715, 1st order CRCognitive=0.763, 2nd order CRRoleConflict=0.747)

and convergent validity (AVEProblemSolving=0.556, AVECognitive=0.525 AVERoleConflict=0.598). Figure 5.3 depicts the solution found.

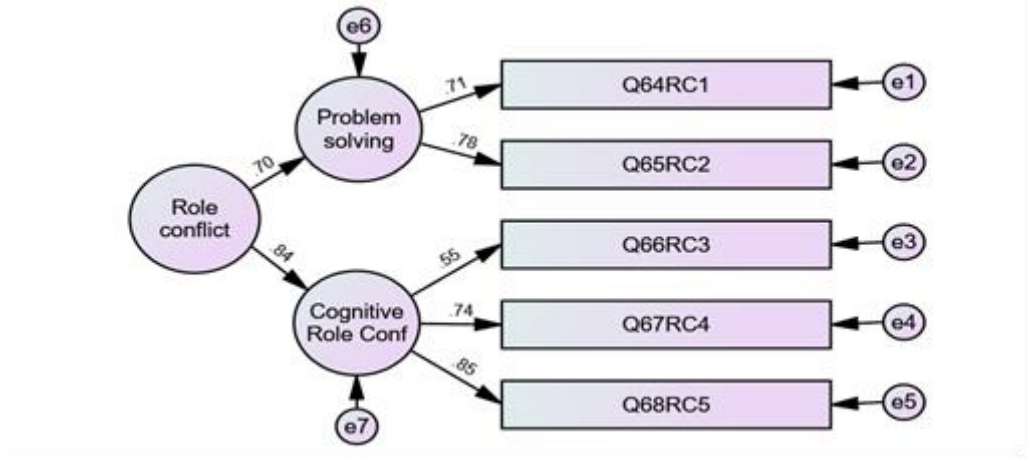

Figure 5.3 CFA for role conflict

Academic entrepreneurial performance was measured with Zou et al. (2019) 5-item scale that was designed by these authors based on previous studies (Chang et al., 2016; Chrisman et al., 1998), and comprises the following items: 1. "In the process of academic entrepreneurship, I achieve the economic benefits of research commercialization", 2. "In the process of academic entrepreneurship, I produce the social benefits of research commercialization", 3. "Academic entrepreneurship facilitates my scientific research", 4. "Academic entrepreneurship is my long-term activity", and 5. "Academic entrepreneurship continuously facilitates my scientific research and research commercialization". Participants use a 5-point Likert scale (1=strongly disagree, 5=strongly agree) to signal their opinion.

The CFA for the single factor solution has unacceptable fit ($X^2(5)=74.542$, $p<.001$; Normed $X^2=14.908$, CFI=.774; TLI=.549; RMSEA=.289 CI90 [.233,.349] PClose=.000; SRMR=.1006). A Principal component analysis showed a valid two-factor structure (KMO=.732, .684<MSA<.856, Bartlet's $X^2(10)=313.363$, $p<.001$) that accounts for 76% variance after rotation (Varimax) where the first component concerns "Academic-Commercial Synergy benefits" and the second "Socio-Economic benefits" (see Table 5.4).

Table 5.4 Rotated component matrix for academic-entrepreneurial performance

Taking teaching or research (including R&D) and entrepreneurship into account…	Component	
	Synergy performance	Socio-Econ
AEP5 Academic entrepreneurship continuously facilitates my scientific research and research commercialization	**.861**	.231
AEP4 Academic entrepreneurship is my long-term activity	**.847**	.153
AEP3 Academic entrepreneurship facilitates my scientific research	**.708**	.259
AEP1 In the process of academic entrepreneurship, I achieve the economic benefits of research commercialization	.193	**.907**

AEP2 In the process of academic entrepreneurship, I produce the social benefits of research commercialization	.276	**.877**

Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 3 iterations.

The CFA for this two-factor solution under a 2nd order factor has good fit ($X^2(5)=4.625$, p=0.463; Normed $X^2=0.925$, CFI=1.000; TLI=1.000; RMSEA=0.000 CI90 [0.000,0.104] PClose=0.672; SRMR=0.0321) and the factors have both good reliability (1st order CRSynergy=0.827, 1st order CRSocio-Econ=0.796, 2nd order CRAEP=0.761) and convergent validity (AVESynergy=0.705, AVESocio-Econ=0.570, 2nd order factor AVEAEP=0.624). Figure 5.4 depicts the solution found.

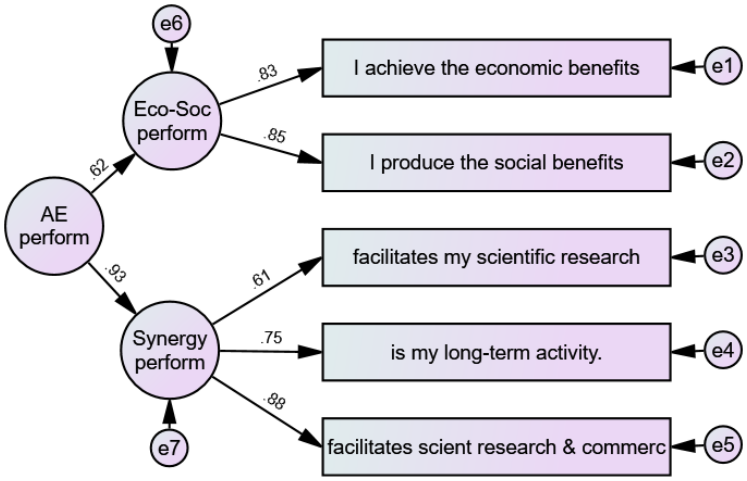

Figure 5.4 CFA for academic-entrepreneurial performance

Person-Entrepreneurship (mis)Fit was measured with Cable and DeRue's (2002) scale comprising 6 items organized in a single factor: "PEM1 There is a good fit between what current entrepreneurship offers me and what I am looking for in entrepreneurship", "PEM2 The attributes that I look for in entrepreneurship are fulfilled very well by current entrepreneurship", "PEM3 The entrepreneurship that I currently hold gives me just about everything that I want from entrepreneurship", "PEM4 The match is very good between the demands of the current entrepreneurship and my personal skills", "PEM5 My abilities and training are a good fit with the requirement of current entrepreneurship", and "PEM6 My personal abilities and education provide a good match with the demands that current entrepreneurship places me".

The CFA for this single-factor solution has poor fit ($X^2(9)=51.316$, p<0.001; Normed $X^2=5.702$, CFI=0.917; TLI=0.862; RMSEA=0.168 CI90 [0.125,0.214] PClose=0.000; SRMR=0.0594). A subsequent principal components analysis showed a valid solution (KMO=0.863; 0.824<MSAs<0.903, Bartlett's $X^2(15)=517.698$ p<0.001) but with the first item showing low commonality. After removal of this item all indicators from the principal

component analysis were good but a subsequent CFA also indicated an issue with the second item. After removing it we found a solution with good fit ($X^2(2)=4.06$, p=0.131; Normed $X^2=2.03$, CFI=0.994; TLI=0.981; RMSEA=0.079 CI90 [0.000,0.190] PClose=0.241; SRMR=0.0219), and also acceptable reliability (CR=0.866) and convergent validity (AVE=0.621). Figure 5.5 depicts the solution found.

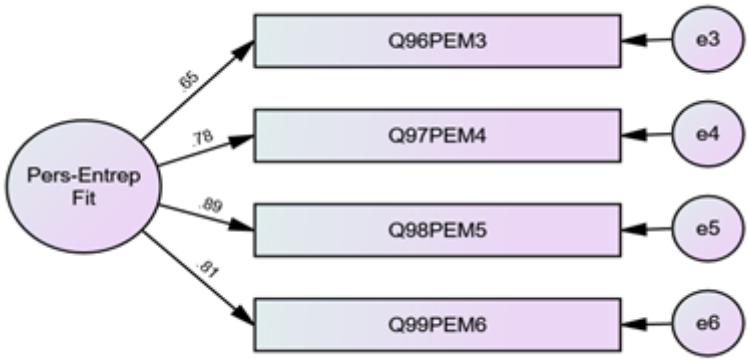

Figure 5.5 CFA for person-entrepreneurship fit

Sociodemographic and organizational variables were collected, namely: gender (1=Masculine, 2=Feminine), age (1=<30, 2=30-39, 3=40-49, 4=50-59, 5=60+), education (1=BSc, 2=MSc, 3=PhD), teaching work tenure (1="no experience", 2="<1 year", 3="1 to 3 years", 4="4 to 6", 5="7 to 9"; 6="10 or more"), researching work tenure (1="no experience", 2="<1 year", 3="1 to 3 years", 4="4 to 6", 5="7 to 9"; 6="10 or more"), business tenure / Time startup in business (1="0", 2="<1 year", 3="1 to 3 years", 4="4 to 6", 5="7 to 9"; 6="10 or more"), position in startup (1="General manager", 2="Senior manager", 3="Mid-level manager", 4="Basic manager", 5="Other"), founding year (as the real integer year number), and startup size expressed by the number of hired employees (1="<50", 2= "50-99", 3="100-199", 4="200-299", 5="300-399", 6="400-499", 7="500 or more"). Also for descriptive purposes we asked about the industry of the startup (1="Agriculture, forestry, animal husbandry and fishery", 2="Mining industry", 3="Manufacturing", 4="Electricity, heat, gas and water production and supply", 5="Construction", 6="Wholesale and retail trade", 7="Transportation, storage and postal services", 8="Accommodation and catering", 9="Information transmission, software and information technology services", 10="Finance industry", 11="Real estate industry", 12="Leasing and business services", 13="Scientific research and technology services", 14="Water, environment and public facilities management industry", 15="Residential services, repair and other services", 16="Education", 17="Health and social work", 18="Culture, sports and entertainment", 19="Public administration, social

security and social organizations", 20="International organizations").

5.4.5 Measurement model

The measurement model takes all the latent constructs in a joint confirmatory factorial analysis and the results indicate acceptable fit ($X^2(508)=684.471$, $X^2/df=1.347$, CFI=0.971, TLI=0.968, RMSEA=0.042 90% CI[0.033; 0.049] PClose=0.963; SRMR=0.0427).

5.5. Results

5.5.1 Descriptive and bivariate statistics

GeJu is the most reported academic-entrepreneurial competency (M=5.12, sd=0.65), followed by entrepreneurial motivation (M=4.76, sd=0.86), leadership (M=4.59, sd=0.80), research ability (M=4.57, sd=1.08), and lastly by knowledge (M=4.65, sd=0.99). All of these falls above the scale's midpoint (4). Coping strategies are not homogeneously reported as relief is most prevalent (M=3.23, sd=0.75) being the only one that is above the midpoint (midpoint=3, t(166)=3.952, p<0.001), while the remaining (persisting, M=2.97, sd=1.06; resignation, M=2.89, sd=0.90) fall within the vicinity of the scale's midpoint. Overall, coping strategies seem not to be frequently used by respondents. This goes in line with the modest report of experienced role conflict (global, M=3.11, sd=0.71) with a slight stronger incidence in problem solving role conflict (issues and time management, M=3.28, sd=0.82).

As regards academic entrepreneurial performance, respondents tend to report stronger perception of synergy performance (M=3.83, sd=0.70) compared to socio-economic performance (M=3.59, sd=0.79) which are around the general subjective academic-entrepreneurial performance reported (M=3.73, sd=0.63). Among the subjective performance components, the most reported is SP3 (M=3.90, sd=0.67) and the least reported is SP1 (M=3.05, sd=0.85). The report on person-entrepreneurship fit is moderated high (M=3.77, sd=0.70) clearly above the midpoint (t(166)=14.197, p<0.001).

The bivariate statistics on socio-demographics crossed with variables in the conceptual model suggest no case of strong correlation as there is no significant correlation with gender and organizational size and only low magnitude correlations with the remaining sociodemographic variables. Such is the case for teaching experience with a negative correlation with entrepreneurial motivation (r=-0.155, p<0.05) and positive with Personal financial rewards (r=0.161, p<0.05). Research experience, however, does show a larger

number of cases with stronger magnitude also (research ability, r=0.319, p<0.01; synergy performance, r=0.254, p<0.01; and subjective overall academic-entrepreneurial performance, r=0.221, p<0.01). The most correlated is the startup age where one can find six cases of significant associations. Namely startup age is positively correlated with perceived financial performance (r=0.302, p<0.01), community impact (r=0.222, p<0.01), and socio-economic performance (r=0.172, p<0.05), academic-entrepreneur competences (*GeJu*, r=0.163, p<0.05; knowledge, r=0.232, p<0.01). Startup age is negatively correlated with coping strategy persistence (r=-0.315, p<0.01). In line with these, age positively correlates with community impact (r=0.272, p<0.01) and negatively with coping strategy persistence (r=-0.220, p<0.01) but also with entrepreneurial motivation (r=-0.236, p<0.01). Education is positively associated with research ability (r=0.232, p<0.01) which is in line with the relative strong association found between education level and both research (r=0.375, p<0.01) and teaching experience (r=0.252, p<0.01).

Almost all academic-entrepreneur competences are positively associated with person-entrepreneurship fit (ranging from r=0.221, p<0.01 to 0.414, p<0.01) with the sole exception found in research ability (r=0.103, p>0.05). Most of the subjective academic-entrepreneurial performance components are positively associated with academic-entrepreneurial competences, which encourage the conceptual model. The most associated academic-entrepreneurial competency is leadership which is associated with all the performance components (even with synergy performance and socio-economic performance). Personal-fulfilment (as an expression of personal work flexibility, own decision-making, and personal development) is positively associated with all the academic-entrepreneurial competences. Coping strategies have no association with any of these variables, but they have, as expected, a moderate to high positive association with role conflict. Role conflict has negative correlations with person-entrepreneurship fit being mostly due to cognitive role conflict (r=-0.249, p<0.01). The almost absent correlations between role conflict and academic-entrepreneurial performance (to the exception of subjective performance, r=-0.159, p<0.05; and perceived financial performance r=0.234, p<0.01) suggest experiencing role conflict is not a sufficient condition to hamper (or leverage) performance. The result is shown in Table 5.5 and Table 5.6.

Table 5.5 Descriptive and bivariate statistics (sociodemographics)

	Mean	SD	1	2	3	4	5	6	7
Gender	-	-	1						
Education	2.05	.74	-.178*	1					
Age	3.07	.98	-.083	.045	1				
TeachXp	3.54	2.04	.012	.252**	.230**	1			
ResearcXp	4.25	1.78	-.146	.375**	.253**	.237**	1		
StartupAge	4.96	1.35	-.130	-.191*	.402**	.055	-.079	1	
OrgSize	1.63	1.29	-.053	.033	.116	.036	.039	-.004	1
AEC_1_*GeJu*	5.12	.65	.054	.077	.058	.034	-.01	.163*	-.014
AEC_2_Leadership	4.59	.80	.116	-.024	.034	.130	-.075	.143	-.021
AEC_3_Research[a)]	4.57	1.08	-.111	.232**	-.015	-.039	.319**	-.123	-.031
AEC_4_ACMotivat	4.76	.86	-.029	-.037	-.236**	-.155*	-.057	.055	.000
AEC_5_Knowledge	4.65	.99	-.028	.021	.019	-.029	.003	.232**	.041
CS_Relief	3.23	.75	.120	-.178*	-.045	-.001	-.117	-.026	-.139
CS_Resig	2.89	.90	-.016	-.037	-.107	-.108	-.098	-.006	-.041
CS_Persi	2.97	1.06	-.060	.051	-.220**	-.091	.060	-.315**	.038
RoleConf_global	3.11	.71	-.043	.048	-.096	.043	.023	.074	-.079
AEPerf1	3.83	.70	-.049	.180*	.099	.142	.254**	.030	.118
AEPerf2	3.59	.79	.073	.084	-.028	.021	.108	.172*	.181*
PEfit	3.77	.70	.093	.041	.069	.103	.071	.077	.037

Note: a) Research ability does not reach sufficient validity threshold but for comprehensiveness's sake we show it in the descriptive and bivariate tables.

Table 5.6 Descriptive and bivariate statistics (conceptual model variables)

	8	9	10	11	12	13	14	15	16	17	18
Gender											
Education											
Age											
TeachXp											
ResearcXp											
StartupAge											
OrgSize											
AEC_1_*GeJu*	1										
AEC_2_Leadership	.619**	1									
AEC_3_Research	.306**	.279**	1								

AEC_4_ACMotivat	.543**	.491**	.288**	1							
AEC_5_Knowledge	.444**	.390**	.257**	.346**	1						
CS_Relief	-.013	.137	-.018	.052	.025	1					
CS_Resig	-.121	.028	.037	.034	-.052	.411**	1				
CS_Persi	.003	-.049	.039	.044	-.096	-.397**	-.395**	1			
RoleConf_global	-.079	.03	-.111	.071	-.106	.390**	.283**	-.319**	1		
AEPerf1	.336**	.203**	.349**	.146	.076	-.011	-.042	-.025	-.056	1	
AEPerf2	.230**	.248**	.233**	.163*	.166*	.054	.09	.034	-.069	.490**	1
PEfit	.382**	.414**	.103	.221**	.249**	-.009	-.062	.04	-.219**	.402**	.436**

5.5.2 Testing the conceptual model

The model has moderate to good predictive power depending on the target variables. The model accounts for 32.7% of variance of Socio-Economic Academic Performance, 25.1% of Synergy performance, 13.5% of role conflict and 21.5% of Person-Entrepreneurship fit. There are no multicollinearity issues found (largest VIF found between academic-entrepreneurship competences is 2.095 for role conflict and 2.049 for Person-Entrepreneurship fit) and for all predictors towards socio-economic performance is 1.675 and for synergy performance is 1.628. The interactions also have no issues of multicollinearity as the largest VIF is 2.378.

The effect sizes are mostly moderate (f2 for academic-entrepreneurship competences on PE-fit range from 0.020 to 0.078 with leadership being the strongest predictor; f2 for academic-entrepreneurship competences on role conflict range from 0.058 to 0.070 while PE-fit has a f2 of 0.107; role conflict on synergy performance has a substantial f2 of 0.212, and it has only a f2 of 0.055 on socioeconomic performance. The interaction terms exert moderate effect upon socio-economic performance (all between 0.070 and 0.072) but a substantial effect size upon synergy performance (ranging from 0.201 to 0.287).

Although not predicted in the hypotheses it is interesting to report one significant conditional sequential indirect effect involving the full path of mediators. When relief strategy is low and persistence is high, resignation interacts with the indirect effect in such a way that when resignation is low the coefficient is 0.015 ($p=0.086$) but when it is higher the coefficient is 0.046 ($p<0.05$). This indicates the indirect effect occurs when resignation is low and the other two coping strategies are more present.

Table 5.7 shows the direct, indirect, and conditional effects pertaining to all the hypotheses established in the conceptual model.

Table 5.7 Direct, indirect and conditional effects

	PE-fit				Role conflict				Synergy performance				SocioEco performance			
	Coeff.	t	p-val		Coeff.	t	p		Coeff.	t	p		Coeff.	t	p	
Control variable																
Gender	0.114	0.894	0.186		0.005	0.035	0.486		0.355*	2.198	0.014		-0.148	1.106	0.134	
Education	0.013	0.214	0.415		-0.116	1.673	0.047		-0.133*	2.005	0.023		0.049	0.805	0.211	
Age	-0.001	0.009	0.496		0.083	0.914	0.181		0.230**	2.507	0.006		0.038	0.562	0.287	
Teach_Tenure	0.011	0.428	0.334		0.018	0.575	0.283		0.001	0.045	0.482		0.021	0.852	0.197	
Res_Tenure	0.035	1.009	0.157		0.029	0.831	0.203		0.072*	2.165	0.015		0.048*	1.675	0.047	
Bus_Tenure	-0.001	0.022	0.491		0.105**	2.468	0.007		0.205***	4.727	0.001		-0.064	1.342	0.090	
Direct effects																
AEC *GeJu*	0.203*	1.838	0.033	H1a	-0.145	1.315	0.094	H2a								
AEC Leadership	0.243**	2.749	0.003	H1b	0.171*	1.753	0.040	H2b								
AEC Motivation	-0.020	0.237	0.406	H1d	0.100	1.122	0.131	H2d								
AEC BusKnow	0.048	0.863	0.194	H1e	-0.103*	1.709	0.044	H2e								
PE-fit					-0.259**	2.662	0.004	H3								
Role conflict									-0.210*	2.18	0.015	H5a	-0.027	0.34	0.367	H5b
Synergy Performance													0.443	6.278	0.001	
Indirect effects																
AEC*GeJu*->PEfit->RConf					-0.053	1.502	0.067	H4a								
AECLead->PEfit->RConf					-0.063*	1.733	0.042	H4b								
AEC_Mot->PEfit->RConf					0.005	0.222	0.412	H4d								
AECBKnow->PEfit->RConf					-0.012	0.721	0.235	H4e								
AEC_*GeJu* -> PEfit -> RConf -> AEPSyn									0.011	1.026	0.153	H6a				
AEC_Lead -> PEfit -> RConf -> AEPSyn									0.013	1.228	0.110	H6b				
AEC_Mot -> PEfit -> RConf -> AEPSyn									-0.001	0.187	0.426	H6d				
AEC_BKnow -> PEfit -> RConf -> AEPSyn									0.003	0.539	0.295	H6e				
AEC_*GeJu* -> PEfit -> RConf -> SocEcon													0.001	0.286	0.388	H6a’
AEC_Lead -> PEfit -> RConf -> SocEcon													0.002	0.290	0.386	H6b’
AEC_Mot -> PEfit -> RConf -> SocEcon													0.000	0.072	0.471	H6d’
AEC_BKnow -> PEfit -> RConf -> SocEcon													0.003	0.306	0.380	H6e’
Conditional effects																
Relief*RConf->AEPsyn									0.094	0.715	0.237	H7a				
Relief*RConf->AEPsocEcon													0.167	1.564	0.059	H7a’
Resign*RConf->AEPsynerg									-0.292**	2.605	0.005	H7b				
Resign*RConf->AEPsocEcon													-0.051	0.541	0.294	H7b’
Persist*RConf->AEPsynerg									-0.299***	3.732	0.001	H7c				
Persist*RConf->AEPsocEcon													0.042	0.458	0.323	H7c’
R^2 F^2																

The first hypothesis establishes a positive direct effect between academic-entrepreneurship competences and P-ENT fit and it comprehends five sub hypotheses. Because Research ability failed to reach the thresholds to be accepted as both valid and reliable, the sub hypothesis H1c cannot be tested. Findings show AEC *GeJu* has a significant direct effect ($\beta=0.203$, $p<0.05$) on PE-fit which is also observed for AEC Leadership ($\beta=0.243$, $p<0.01$) but not for AEC Motivation and AEC Business Knowledge. This supports H1a and H1b but rejects H1d and H1e thus giving partial support to H1.

The second hypothesis establishes a negative direct effect between academic-entrepreneurship competences and Role Conflict and it also comprehends five sub hypotheses and, as stated in the previous hypothesis, H2c could also not be tested. Findings show AEC *GeJu* does not have a significant direct effect on Role Conflict, that AEC Leadership does have a significant direct effect but with reverse valence than the one stated ($\beta=0.171$, $p<0.05$), that AEC Motivation does not have a significant direct effect, and that AEC Business Knowledge does have ($\beta=-0.103$, $p<0.05$). This supports H2e but rejects all the others, with the special case of having found a significant direct effect for H2b but reversed. Overall, the direct effect of Academic-Entrepreneurship Competences on Role Conflict is rejected.

The third hypothesis establishes a direct negative effect of P-ENT fit on Role Conflict and findings do show a significant effect ($\beta=-0.259$, $p<0.01$) which supports this hypothesis.

The fourth hypothesis brings together the previous three and establishes an indirect negative effect of Academic-Entrepreneurship Competences on Role Conflict through P-ENT fit. The same impediment occurs regarding H4c (on AEC Research ability) and findings show non-significant coefficients for AEC *GeJu*, AEC Motivation and AEC Business knowledge but a significant (Coef.=-0.063, $p<0.05$) for AEC Leadership. This supports H4b only. The overall coefficients found as depicted in Figure 5.6 below.

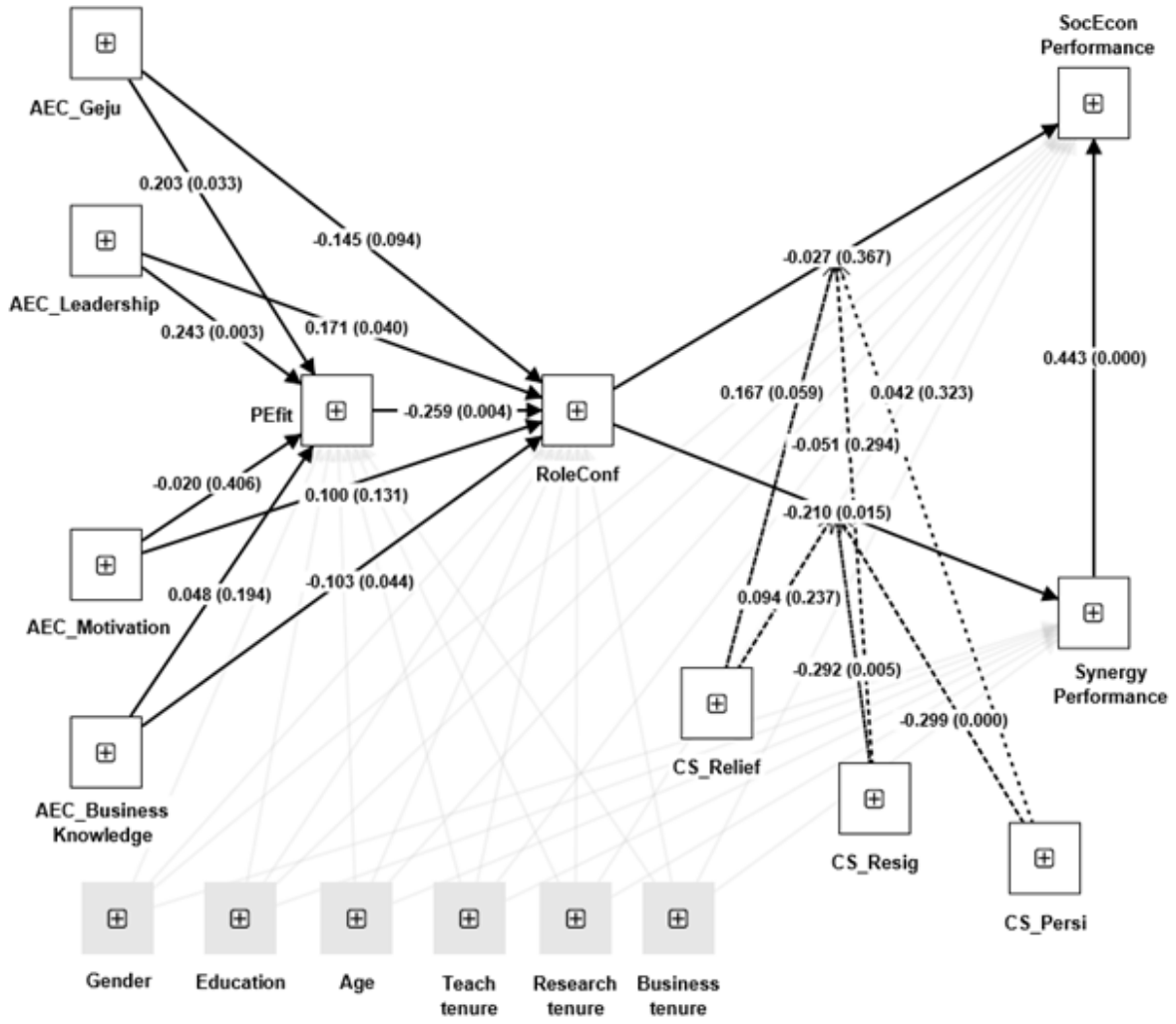

Figure 5.6 Path coefficients for the conceptual model

The fifth hypothesis establishes a direct negative effect of Role Conflict on Academic-Entrepreneurial Performance, that splits into Synergy Performance and SocioEconomic Performance. Findings show a significant negative direct effect on Synergy Performance (β=-0.210, $p<0.01$) but a non-significant effect on SocioEconomic Performance thus supporting H5a and rejecting H5b.

The sixth hypothesis goes into the whole model to establish a three-step sequential mediation that expects a positive indirect effect of Academic-Entrepreneurial Competences on Academic-Entrepreneurial Performance through P-ENT fit, and Role Conflict. Again, this hypothesis entails two sets of sub-hypotheses, one for synergy performance and the other for socioeconomic performance. Findings show no cases of a sequential indirect effect, which rejects H6.

The seventh hypothesis adds to the direct effect established in the fifth hypothesis a boundary condition consisting of the entrepreneur's Coping Strategies. The exact interaction effect was hypothesized according to the exact type of coping strategy, namely it was

expected to be reinforcing the direct effect when coping strategies are Relief and Persistence, and weakening the direct effect when individuals adopt a Resignation strategy. These interactions were extended to both academic-entrepreneurial performance dimensions. As regards socioeconomic performance, none of the hypothesized interaction effects were significant thus rejecting any boundary condition operating between Role Conflict and SocioEconomic Performance. Conversely, for synergy performance, Resignation strategy does weakens the direct effect (Coef.=-0.292, $p<0.01$) supporting H7b. However, relief strategy does not alter this effect (Coef.=0.094, $p=0.237$) rejecting H7a but Persistence strategy shows a significant interaction effect (Coef.=-0.299, $p<0.001$) which goes counter to the hypothesized one, thus rejecting H7c.

5.5.3 Discussion of results and conclusions

In this study, a theoretical model was developed to validate the effects of academic entrepreneurial competences on P-ENT fit, role conflict, and academic entrepreneurial performance. The results of the empirical study showed findings for all hypotheses tested (see Table 5.8).

Table 5.8 List of all hypotheses and respective support

Hypotheses	Yes or No
H1: Academic-entrepreneurship competences have a direct positive effect on PE-fit	
H1a: AEC *GeJu* has a direct positive effect on PE-fit	Y
H1b: AEC Leadership has a direct positive effect on PE-fit	Y
H1c: AEC Research ability has a direct positive effect on PE-fit	
H1d: AEC Motivation has a direct positive effect on PE-fit	N
H1e: AEC Business knowledge has a direct positive effect on PE-fit	N
H2: Academic-entrepreneurship competences have a direct negative effect on Role conflict	
H2a: AEC *GeJu* has a direct negative effect on Role conflict	N
H2b: AEC Leadership has a negative effect on Role conflict	N
H2c: AEC Research ability has a direct negative effect on Role conflict	
H2d: AEC Motivation has a direct negative effect on Role conflict	N
H2e: AEC Business knowledge has a direct negative effect on Role conflict.	Y
H3: PE-fit has a direct negative effect on Role Conflict	Y
H4: There is a negative indirect effect of AEC on Role conflict through PE-fit	
H4a: There is a negative indirect effect of AEC *GeJu* on Role conflict through PE-fit	N
H4b: There is a negative indirect effect of AEC Leadership on Role conflict through PE-fit	Y
H4c: There is a negative indirect effect of AEC Research Ability on Role conflict through PE-fit	
H4d: There is a negative indirect effect of AEC Motivation on Role conflict through PE-fit	N
H4e: There is a negative indirect effect of AEC Business Knowledge on Role conflict through PE-fit	N
H5: Role conflict has a negative direct effect on AE performance	
H5a: There is a negative direct effect of role conflict on synergy performance.	Y

H5b: There is a negative direct effect of role conflict on soc-economic performance	N
H6: There is a sequential positive indirect effect of AEC on AE performance through PE-fit and Role conflict	
H6a: There is a sequential positive indirect effect of AEC *GeJu* on AE performance through PE-fit and Role conflict	N
H6b: There is a sequential positive indirect effect of AEC Leadership on AE performance through PE-fit and Role conflict	N
H6c: There is a sequential positive indirect effect of AEC Research Ability on AE performance through PE-fit and Role conflict	
H6d: There is a sequential positive indirect effect of AEC Motivation on AE performance through PE-fit and Role conflict	N
H6e: There is a sequential positive indirect effect of AEC Business Knowledge on AE performance through PE-fit and Role conflict	N
H7: There is an interaction between coping strategies and role conflict in explaining AE performance	
H7a: There is an interaction between Relief coping strategy and the direct effect of role conflict on AE performance in such a way that when relief is higher the direct effect is stronger.	N
H7b: There is an interaction between Resignation coping strategy and the direct effect of role conflict on AE performance in such a way that when resignation is higher the direct effect is weaker.	Y
H7c: There is an interaction between Persistence coping strategy and the direct effect of role conflict on AE performance in such a way that when persistence is higher the direct effect is stronger.	N

As regards the first hypothesis that stated academic-entrepreneurial competences (i.e. *GeJu*, leadership, motivation, and business knowledge) have a positive direct effect on P-ENT fit, findings show only leadership and *GeJu* plays such a role. To interpret this, one must keep in mind that literature on P-E fit mostly places the focus upon its consequences (De Cooman et al., 2019; Vogel et al., 2016; Williamson & Perumal, 2021) and P-ENT fit is still very scarcely researched (Hsu et al., 2019) which means its antecedents are barely known. Our findings show that leadership is an important driver of P-ENT fit because entrepreneurship, by definition, entails a proactive positive attitude (Bolzani & Luppi, 2021), a sense of purpose and vision (Kempster et al., 2011), and many other attributes are commonly associated to leadership, which goes in line with Rivera-Kempis et al. (2021). So, one can hardly conceive of an entrepreneur without leadership competences. As against our expectation, motivation was not a predictor in the same way market knowledge was also not a predictor of P-ENT fit. This goes counter to some reports that highlight the importance of TTO bridging scientists to market (O'Gorman et al., 2008) and advocating market knowledge as a requirement for success in entrepreneurship (Kyndt & Baert, 2015). Still, these findings are generally found for entrepreneurial activity and not specifically to academic-entrepreneurial contexts. The fact that motivation was not a predictor of P-ENT fit might seem surprising, but one should consider that as scholars, many of these entrepreneurs may have already secured their financial autonomy and, likewise, in the execution of teaching and research duties, they may

also receive enough recognition as competent professionals. Therefore, participants may not truly be looking for those in their entrepreneurial venture or it might not be so strongly felt to determine their perception of P-ENT fit.

The novel role is found for *GeJu* that is the concept that names the individual behavior of caring about others, sharing resources and success with others, and accept their success without any feeling of envy (Sun & Zhou, 2021). This individual attribute operates at the same level of importance of leadership and it expresses benevolence, that is one of the components of trust (X. P. Chen et al., 2014). As in any society, endeavor is very dependent on the ability to build a team, to relate positively so to motivate the team, and to make the team members willing to follow the leader due to the benevolent character which can also be supported by the strong correlation found between leadership and *GeJu*.

Similar to the first hypothesis, the second one posits a negative direct effect of academic-entrepreneurship competences upon role conflict, i.e. the more competences one has the less conflict one would experience in being simultaneously an academic and an entrepreneur. Role conflict seems to be only prevented by business knowledge which goes in line with Urban et al. (2008) stressing the importance of knowing the map before going to the field. This shows that the scholar that venture into entrepreneurship spares themselves time and attention if one becomes more familiar with the market, its dynamics, and where the resources are available.

Surprisingly, leadership seems to foster role conflict instead of diminishing it. Following the lead of Fatfouta (2019) having strong leadership competences may translate into grasping much extra responsibilities both in academia as well as in the entrepreneurial activity. Lam (2010) stressed the active agency of scholars and the diversity of work orientations, which goes in line with our interpretation. So, work diversity and high work intensity will most likely produce a work overload that leverages conflicting time arrangements (Zhang et al., 2021) that foster the feeling of role conflict. Regarding the lack of association with motivation, the precise reasoning that was developed for the previous hypothesis applies here. Motivation may not be so strongly shared across the sample so to become a salient factor of role conflict. *GeJu* is also not associated with experienced role conflict eventually because role conflict stems more from time arrangements problems that it comes from relational domain, and therefore, it is not salient at all when task-conflict it the main problem.

The third hypothesis posits a negative direct effect of P-ENT fit upon Role Conflict. Empirical findings suggest that if academic entrepreneurs perceive more P-ENT fit, then they do perceive less Role Conflict. The result is in line with some researchers (Chuang et al., 2016;

Kreiner, 2006; Mayes & Ganster, 1988; Yan et al., 2022), which shows that P-ENT fit provides a needed resource thereby reducing Role Conflict for academic entrepreneurs. P-ENT fit indicates that academic entrepreneurs already have the knowledge, competences that entrepreneurs should have and that they are more prepared for entrepreneurship. As a result, academic entrepreneurs will be more comfortable with the process of entrepreneurship and thus will not perceive much Role Conflict.

The fourth hypothesis posits an indirect negative effect of Academic-Entrepreneurship Competences on Role Conflict through P-ENT fit. The results of the empirical study show that among the competences of Academic-Entrepreneurship Competences, which are *GeJu*, Leadership, Research Ability, Motivation, and Business Knowledge, only Leadership acts on Role Conflict through P-ENT fit. Our findings show that leadership is the most important driver of the effect of P-ENT fit on Role Conflict. It follows that academic entrepreneurs who have strong leadership skills can make them perceive more P-ENT fit and thus reduce their role conflicts. Therefore, Leadership is the most important resource for academic entrepreneurs to enhance P-ENT fit and reduce Role Conflict.

On the other hand, although it was verified in Hypothesis 1 that *GeJu* had a significant positive effect on P-ENT fit, the results of the empirical study in Hypothesis 2 indicated that *GeJu* would not act on role conflict through P-ENT fit. Combining the findings of the first four hypotheses, it can be seen that the *GeJu*, although it has a positive effect on P-ENT fit, its magnitude is not sufficient to enact an indirect on role conflict. Moreover, the *GeJu* has no effect on role conflict through P-ENT fit. As stated, *GeJu* ultimately has nothing to do with experiencing role conflict, as role conflict stems more from scheduling issues than from the relationship realm. So *GeJu* is not an important factor in driving the effect of P-ENT fit on role conflict. The three competences of research ability, motivation, and business knowledge have already been shown to be irrelevant to P-ENT fit in Hypothesis 1 and have already been discussed and will not be repeated.

The fifth hypothesis relates the role conflict with academic-entrepreneurial performance and it was only partially supported, when Synergy Performance was at stake. This partial support only regarding Synergy Performance can be explained by Synergy Performance being an expression of performance that is more closely related to the self (and role conflict is also more a within-person construct). Likewise, when considering the plausible temporal nexus of performance effects from an entrepreneur initiative, Synergy Performance (i.e. the effects exerted upon oneself) should precede the more distal effects towards society, at both the social and economic level. This entails important implication for theory as the Academic

Entrepreneurial Performance Measure might be expressing not just two parallel dimensions, but instead a sequence of performance effects. Firstly, the proximal performance as a set of effects pertaining to the entrepreneur and after these are established, then the distal performance on society. Overall, this finding does not go counter to Zou et al. (2019) but refines it.

The sixth hypothesis joins the direct effects and indirect effects previewed in all of the previous hypotheses and findings gave no support to the three-step sequential mediation from academic-entrepreneurial competencies to AE performance via P-ENT fit and Role Conflict. The rejection of this hypothesis indicates the segmented direct effects found in the model do not operate together with sufficient magnitudes to produce a meaningful process that can explain how academic-entrepreneurial competences can produce higher academic-entrepreneurial performance based on the joint role of P-ENT and Role conflict. This finding should not also be interpreted as a rejection of the overall idea presiding to the study that academic-entrepreneurial competencies will be required to achieve high AE performance. Instead, this finding should be interpreted as suggesting this is not a process that runs independently of the individual coping strategies, which invites observing the next hypothesis.

The seventh hypothesis posits that the relationship between role conflict and academic-entrepreneurial performance will be expected to reinforce the direct effect when coping strategies are Relief and Persistence, and weaken the direct effect when individuals adopt a resignation strategy. The results show that the relationship between role conflict and academic-entrepreneurial performance was not reinforced under Relief and Persistence. And the relationship between role conflict and academic-entrepreneurial performance was weakened under resignation strategy. Resignation refers to accepting misfit as painful but unavoidable (Follmer et al., 2018). The conclusion is in line with Jain et al. (2009), which put forward the delegating mechanism to cope with role conflict. Resignation is like delegating, which means scientists craft arrangements with other actors as part of participating in technology transfer. They are comfortable allowing others to provide the entrepreneurial energy required in the commercialization process. This allows them to focus on maintaining and nurturing their academic role identity, which is viewed by them with fondness and appreciation for the unique benefits it provides. At the same time, by engaging in such delegation, they share in any benefits that accrue while distancing themselves from aspects of commercialization that they find unpalatable or difficult.

In addition, the findings indicated that Relief and Persistence strategies did not reinforce

the negative impact of role conflict on academic-entrepreneurial performance. The relief strategy did not have either a positive reinforcing or a negative weakening effect. This result suggests that when academic entrepreneurs face role conflict, whether they adopt relief strategy is of little significance. Surprisingly, instead of positively strengthening the negative effect of role conflict on academic-entrepreneurial performance, the persistence strategy weakened the relationship. The results of this study suggest that, in the same way as resignation, persistence can reduce or mitigate the negative effects of role conflict on academic-entrepreneurial performance. Perhaps when faced with role conflict during the process of academic entrepreneurship, academic entrepreneurs should be able to achieve better performance by persisting and, in doing so, adjusting, adapting, and changing.

The divergence found between the factor structure of academic-entrepreneurial competences scale tested in the 2nd study compared to this one, can be attributed to sample differences. The sample from this study is more knowledgeable about entrepreneurship compared to the one in the second study (which was more exploratory in nature). Still, judging from the pattern of divergences, it is most likely that the scale has not yet reached the stability it is required for robust confidence.

Likewise, the difficulty in extracting latent variables from the coping-strategies scale derived from Follmer et al. (2018) categories suggest either that the scale requires a revision or that these variables are not easily accessible to the mind of the participants eventually because it requires some previous task to gain awareness and clarity. Still, the formative solution is reasonable due to theoretical support as well as the pattern of associations found between the subscales and role conflict, which suggests nomological validity.

Therefore, future research is needed to gauge the real stability of the academic-entrepreneurial competence scale, its internal factor structure, and refine items both from this and the one concerning coping strategies. Some low convergent validity indicators may suggest there are items missing that cover other aspects of each dimension and that may have passed unnoticed. Additionally, due to the complexity of the constructs and the varied path of each academic-entrepreneur, it is possible that there are distinct profiles of academic entrepreneurs and each has a specific awareness of some dimensions of the activity which may turn the scale less stable.

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Chapter 6: Research Conclusions

6.1 Conclusions

In order to explore the competences that academic entrepreneurs should possess and to reveal the mechanisms by which academic entrepreneurial competences influence entrepreneurial success through personal-entrepreneurial fit and role conflict, the study answered the research questions posed through three studies. Study 1 explored academic entrepreneurs' competences, role conflicts, and coping strategies primarily through in-depth interviews; Study 2 developed two scales, academic entrepreneurial competences and coping strategies; and Study 3 conducted an empirical study on the mechanisms and boundary conditions by which academic entrepreneurial competences influence entrepreneurial success through P-ENT fit and role conflict. The main findings of the three studies are summarized below.

The first motivating research question pertains to the identification of role differences and challenges experienced by academic entrepreneurs. Findings show that academic entrepreneurs have a clear idea about such roles and how they differ. The entrepreneur role is to focus on providing viable answers to market needs, to attract investment capital, and develop interpersonal relations both within the company as with outside stakeholders. This all requires a fast-paced rhythm, multitask and constant decision making. Conversely, the expert / scholar role is mostly focused on becoming scientifically proficient, having high expertise on technology and this does not really require neither to be focused on establishing high-quality interpersonal relationship, nor to be concerned with the anticipated utility of the researched technology considering market needs, nor to make constant decisions, nor to look for investment. It is all about using intellectual ability to discover, develop and test technologies.

The most mentioned challenges by the academic entrepreneurs' concern both the success in meeting customer demands as well as dealing with fast-paced and multitask management decisions. Another challenge concerns the need to keep up with the level of stamina and endurance such intense activity entails and building positive relations with the stakeholders by social networking which in the Chinese context is even more valued. Lastly, the emergence of a social dimension challenge comprehending both people skills and altruism are in line with the recognition of the non-cognitive assets for entrepreneurial success, namely emotional

intelligence.

The second research question concerns coping strategies academic entrepreneurs devise to deal with role conflict. The coping strategies highlight the entrepreneurs themselves as the main target. Namely, academic entrepreneurs should express a need for self-development to gain the right set of skills and mindset, e.g. by putting stress on continuous learning and gain self-awareness keeping an open mind. Without losing the focus on technology (which is more in line with the expert role), it is also required that the academic entrepreneurs strive to have the greater goal and strategy clarity as possible. Another focus targets the need to pay special attention to gaining knowledge on finance and the industry itself.

The third and fourth research questions concern the kind of academic entrepreneurs that are more likely to succeed and the influencing mechanisms of academic entrepreneur competences on entrepreneurial success. Academic entrepreneurs should have several competences, which are Research ability, *GeJu*, Leadership, Self-awareness, Motivation, and Neoteny. Research ability is an important competence that should be possessed by this particular group of academic entrepreneurs (Toole & Czarnitzki, 2010) albeit in our study it did not achieve sufficient validity as a measure to be tested. *GeJu* refers to a leader's moral character and bearing, including vision, perspective, ambition, mindfulness, and temperament, which is a comprehensive mental concept (Sun & Zhou, 2021). Leadership is one of the most important components of entrepreneurial competences as it exerts direct and indirect effects. Self-awareness reflects the personality component of entrepreneurial competences, but it did not emerge from the factorial analysis in the last study. Motivation is the cognitive component of entrepreneurial competences but again it seemed to play no distinctive role eventually due to the profile of the sample that is already highly motivated. Neoteny reflects the attitude of entrepreneurial competences, but it did not emerge in the third study, either. This deserves further thought as the structure of the AE competencies measure seems to be sensitive to the profile of the sample and this is not a desirable feature in any measure. Therefore, there is room to further develop and test the stability of this measure to either refine it (the wording or the items themselves) or to identify how larger the sample must be to guarantee some factorial stability.

Study 3 builds on the previous two studies by conducting an empirical study on the impact of academic entrepreneurial competences (*GeJu*, Leadership, Research Ability, Motivation and Business Knowledge) on entrepreneurial performance through P-ENT fit and role conflict. Results show that only *GeJu* and Leadership have positive direct effect on P-ENT fit. Research Ability, Motivation and Business Knowledge have no positive direct

effect on P-ENT fit for the reasons stated. Additionally, only Business Knowledge has a negative direct effect on role conflict along with the expected negative direct effect stemming from P-ENT on role conflict. Only Leadership has negative indirect effect on role conflict through P-ENT fit. Although role conflict has a negative direct effect on Synergy Performance, the indirect sequential effect was not found due to the magnitude of the direct effects entailed. Still, because relationship between role conflict and academic-entrepreneurial performance was weakened under resignation and persistence strategies it is possible (although not hypothesized) that the indirect effect is there but under the conditional effect of resignation and persistence coping strategies. Although not predicted in the hypotheses, the reported moderated sequential mediated effect offers support to the interpretation that AE competences to relate with AE performance via the path established but under some conditions related to the profile of coping strategies the individuals deploy. Therefore, the absence of a sequential indirect effect is not a sufficient condition to accept its absence. Only its absence when coping strategies is not simultaneously considered.

6.2 Theoretical contributions and practical implications

Based on the empirical study, reducing role conflict is an urgent challenge for academic entrepreneurs. An important way to deal with this challenge is to learn entrepreneurial norms and skills to modify their extent of scholarly values and behavior patterns. Scholars who intend to create a startup should be exposed to entrepreneurial information and knowledge for a substantial period so that they can overcome their existing scholarly behavioral inertia. For example, scholars can participate in business-related activities or entrepreneurial education before engaging in a formal entrepreneurship. Appropriate training and experience is essential for academic entrepreneurs to meet the challenges of role conflict.

From the empirical findings of this study, developing leadership skills and *GeJu* is also extraordinarily important for academic entrepreneurs. Improving leadership does not happen overnight; it takes a long time and experience. Academic entrepreneurs should, first of all, always maintain a learning attitude and a positive mindset. Secondly, they should build a professional and cooperative as well as cohesive management team. They should also set clear goals and directions for the organization and establish good communication and incentive mechanisms to enhance their leadership and team cohesion. To cultivate a big *GeJu*, academic entrepreneurs should first develop a long-term vision, because whether the vision is long-term directly determines the height of entrepreneurship that can be achieved. Secondly,

they should be able to take the overall situation into account, consider the overall situation, distinguish between primary and secondary issues, and when the primary and secondary issues appear to be contradictory, they should first solve the main problem. Also, in front of the trade-offs, academic entrepreneurs should be able to distinguish between right and wrong, and give up the immediate local interests for the long-term overall gains. Academic entrepreneurs should also cultivate a broad mind; only to cultivate the tolerance of people and things of tolerance, have enough ability to lead a strong cohesion and combat effectiveness of the team. They should also cultivate a strong sense of responsibility and a strong ability to resist pressure, and strive to set themselves up as good role models in the organization and lead by example. Although motivation was not found to predict neither role conflict nor P-ENT fit we cannot infer it is not important because our sample comprised academic-entrepreneurs and therefore all of them must have a certain level of entrepreneurial motivation which renders the analysis with less variance to work on.

To minimize the negative impact of role conflict on the entrepreneurial performance of academic entrepreneurs, academic entrepreneurs can adopt coping strategies of resignation or persistence. Resignation means that academic entrepreneurs should face up to the differences between the two roles of researcher and entrepreneur. They can think of themselves more as good scholars than entrepreneurs and be proud of it. Persistence implies that academic entrepreneurs are bound to go through a process of misfit or role conflict in their entrepreneurial endeavors, but in the process, entrepreneurs can better their entrepreneurial roles by constantly adjusting, changing, and adapting.

6.3 Limitations and future research

Limitations must be acknowledged to rightfully gauge the extension and reasonability of conclusions. Firstly, in Study 1, these conclusions are bounded by the small number of case interviews which provide an account that may not cover some representations academic-entrepreneurs hold on the whole experience. This is not only due to the small size but mostly because the four cases are successful academic-entrepreneurs (or have positive outlook) and therefore the unsuccessful ones would add value but were not considered because the intention was also to uncover effective coping-strategies. Still the sample was purposively made to represent typical domains of academic-entrepreneurial activity in China and the interview informational value is more based on its in-depth character rather than on the sheer number of interviews. Future studies may benefit from conducting larger number of

in-depth interviews also with less successful academic-entrepreneurs so to have a better understanding not only on which coping strategies are successful but also which ones are linked to failure, and the same is valid to contrast person-entrepreneurship fit factors.

Secondly, in Study 2, the development of the Academic Entrepreneurship Competences Scale and the Coping Strategies Scale was based on previous scholarly research. The aim of development of the Academic Entrepreneurship Competences Scale and the Coping Strategies Scale is to provide measurement tools for the subsequent empirical research. At the same time, the development of these two scales also suggests a research basis for future academic entrepreneurship research albeit we acknowledge that this is still a very exploratory study in nature. Overall, despite some divergences in the empirical findings to those suggested in the theory and previous scholars, this study can show a logical mental representation of academic-entrepreneurial competences as well as a set of empirically supported coping strategies that the individuals in the sample can recognize and structure together. Future research must depart from our acknowledgment that this is an exploratory study and that it may be sensitive to the nature of the sample. We thus think that before adopting only the items that were retained in the CFAs, future research should deploy the original item list and redo the analyses so to verify to which extent the items retained overlap with the ones reported in this study. After independent replications, if there is convergence – at least regarding the constructs – we believe to have taken a first step towards a more informative and robust measure of academic-entrepreneurial competences that can leverage quantitative empirical research in this domain.

Thirdly, in Study 3, due to the small sample of 167 academic entrepreneurs, we trust there might be an impact on the results of the empirical study and perhaps some bias. In addition, the study only considered the impact of personal factors such as academic entrepreneurs' competences on entrepreneurial performance at the individual level, without considering organizational, legal, institutional, and environmental factors that affect academic entrepreneurial behaviors, which also led to some limitations in the results of the study. Future research should increase the number of research samples and consider more organizational and environmental factors on academic entrepreneurship performance.

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Annex A: Interview Outline with Academic Entrepreneurs

1. Introduction

Thanks for taking your time to have the interview!

I am working on my dissertation for the Joint Program of Doctor of Management of UESTC and ISCTE, which focuses on academic entrepreneurs' behavior of and coping strategies for person-environment misfit.

In order to write the dissertation, I would like to record our conversation and take notes. Do you agree? You may ask me to turn off the recorder any time you like.

2. General Questions

(1) First, tell me about your company. When did you found this company? What was the main driving force for your entrepreneurship? What is the main business of your company? Could you briefly share with us the company's goals, current situation or dilemmas?

(2) Could you please briefly introduce your experiences before venturing? Like your educati on background, work experience and training (When the interviewee mentions academic experience, clarify his or her specific teaching role and academic role, like experience of a team leader, corporate entrepreneurship, technical transfer officer). Did you have any management experiences before creating this company?

(3) How many senior executives do you have in the company? Can you introduce their roles briefly?

(4) Now do you think your company needs investors or financial support? If you have already got financial support, have the investors given management support to your company (including assigning TMT member, or training or knowledge sharing practices)?

3. Challenges and Coping Strategies

(1) What do you think are the major differences between a tech expert and an entrepreneur? Such as roles, knowledge, skills, and abilities, working conditions, work demands and rewards. Do you prefer to define your role as a tech expert or an entrepreneur? Or both? Why? What role do you expect to play in the future? Why?

(2) What are challenges during the transition process from a tech expert to an entrepreneur? What do you think you are not used to or need to adjust to? When you face these challenges, or things you are not used to, what are your feelings? How did you cope

with these events?

(3) Generally, what challenges or difficulties do you think the academic entrepreneurs around you or in the same industry have encountered in the process of starting a business?

(4) Lastly, for those academic entrepreneurs during their transition from tech experts to entrepreneurs in your area, what advice would you like to give them, or is there anything you'd like to say to them?

Thank you very much for your support and cooperation.?

Annex B: Interview Outline with TMT Members

1. Introduction

Thanks for taking your time to have the interview!

I am working on my dissertation for the Joint Program of Doctor of Management of UESTC and ISCTE, which focuses on academic entrepreneurs' behavior of and coping strategies for person-environment misfit.

In order to write the dissertation, I would like to record our conversation and take notes. Do you agree? You may ask me to turn off the recorder any time you like.

2. General Questions

(1) Firstly, could you please briefly introduce your experiences? Like your education background, work experience and training.

(2) What was the main driving force that led you to join in the company? When did you join in this company? Could you please briefly share with us the company's goals, current situation and dilemmas?

(3) Please briefly introduce the background and the roles of all TMT members and your role and main responsibility in the company.

3. Recognition of Role Transition

(1) What do you think are the major differences between a tech expert and an entrepreneur? Such as roles, knowledge, skills, working conditions, job demands and rewards.

(2) What are the challenges that academic entrepreneurs around you have faced in starting a business? Based on your observations and knowledge, what strategies have they adopted to address these challenges? How effective do you think these strategies are?

(3) Lastly, for those during their transition from tech experts to entrepreneurs in your area, what advice would you like to give them, or is there anything you'd like to say to them?

Thank you very much for your support and cooperation

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Annex C: First-round Questionnaire

Dear Madam (Mr.):

Greetings! Thank you for taking your valuable time to participate in this survey. Under the background of “mass entrepreneurship and innovation”, many experts, scholars and researchers have actively responded to the government’s call to join the team of entrepreneurs and become academic entrepreneurs. The main purpose of this research is to understand the characteristics of academic entrepreneurs and their experiences in the process of entrepreneurship, and the research results will help more academic entrepreneurs to succeed in their business. There is no right or wrong answer, so you only need to answer truthfully and try to express your true thoughts. If a question describes a situation that does not match your situation, please pick the closest answer. Only truthful answers will make our research meaningful, so we kindly ask you to fill in the answers carefully. The data from the questionnaire will only be used for scientific research, so please feel free to answer the questions and thank you very much for your support!

Q Name: _____ (Only the first letter of your name is required)

Q Company: _____ (Only the first letter of the business name is required)

Q Contact (email): _____

Q1 Gender

1、 male

2 、female

Q2 Highest education degree

1、Bachelor’s degree and below

2、Master

3、PhD

Q3The age group you are in now

1、Under 30 years old

2、30-39 years old

3、40-49 years old

4、50-59 years old

5、60 years old or older

Q4 How long do you have teaching experience

1、None

2、Less than 1 year

3、1~3 years

4、4~6 years

5、7~9 years

6、10 years or more

Q5 How long have you worked in research?

1、None

2、Less than 1 year

3、1~3 years

4、4~6 years

5、7~9 years

6、10 years or more

Q6 Number of years you have been in business

1、None

2、Less than 1 year

3、1~3 years

4、4~6 years

5、7~9 years

6、10 years or more

Q7 The number of employees in your startup business is

1、Under 50 people

2、50-99 people

3、100-199 people

4、200-299 people

5、300-399 people

6、400-499 people

7、500 people or more

Q8 The industry of your business venture is

1、Agriculture, forestry, animal husbandry and fishery

2、Mining industry

3、Manufacturing

4、Electricity, heat, gas and water production and supply

5、Construction

6、Wholesale and retail trade

7、Transportation, storage and postal services

8、Accommodation and catering

9、Information transmission, software and information technology services

10、Finance industry

11、Real estate industry

12、Leasing and business services

13、Scientific research and technology services

14、Water, environment and public facilities management industry

15、Residential services, repair and other services

16、Education

17、Health and social work

18、Culture, sports and entertainment

19、Public administration, social security and social organizations

20、International organizations

Q9 What is your role in the startup

1、Independent founder

2、One of the co-founders

3、A partner who joined later

4、Other. Which one? _____

Q10 What is your position in the start-up company?

1、General Manager

2、Senior management

3、Mid-level manager

4、Basic manager

5、Other. Which one? _____

Q11 What is your professional development position?

1、Focus on scientific research / teaching

2、Focus mostly on scientific research / teaching, and secondarily on academic entrepreneurship

3、Focus equally on scientific research / teaching and academic entrepreneurship

4、Focus mostly on academic entrepreneurship and secondarily on scientific research / teaching

5、Focus on academic entrepreneurship

Q12 The following questions take a six-point scoring response. Please determine how often the behavior described in the following sentences occurs to you. Options from 1 to 6 indicate: 1 never; 2 occasionally; 3 sometimes; 4 often; 5 frequently; 6 always; 7 This item is not suitable for me。

1、The above description has been read

Q13	I am effective into designing rigorous research methodology	①②③④⑤⑥⑦
Q14	I establish networks with researchers to join in common international projects	①②③④⑤⑥⑦
Q15	I lead research projects in my field of expertise	①②③④⑤⑥⑦
Q16	I am effective helping others develop their expertise in my field	①②③④⑤⑥⑦
Q17	When explaining an idea, I provide many examples	①②③④⑤⑥⑦
Q18	Around me, people learn and grow	①②③④⑤⑥⑦
Q19	I use my technological knowledge to solve complex problems for business organizations	①②③④⑤⑥
Q20	I use my market knowledge to provide answers to market needs in my	①②③④⑤⑥

	area of expertise	
Q21	I always consider some relevant decisions of the business from a financial perspective.	
Q22	I have a fast pacing live that requires me to make any important decisions on a short time	①②③④⑤⑥
Q23	I keep an open mind to new ideas even when they challenge my current beliefs	①②③④⑤⑥
Q24	I only invest my time in studying or learning new knowledge when I see its applied value to the organizations	①②③④⑤⑥
Q25	I am aware of my own strengths and weakness	①②③④⑤⑥
Q26	I am aware of my own emotions and able to manage them well	①②③④⑤⑥
Q27	I am aware of my own health status and ablge to manage it well.	
Q28	I am keen to learn new knowledge whenever I can	①②③④⑤⑥
Q29	I feel motivated by pursuing my own financial freedom	①②③④⑤⑥
Q30	I feel motivated by building strong and meaningful relationships with others at work	①②③④⑤⑥
Q31	I feel motivated by being recognized as a highly competent professional	①②③④⑤⑥
Q32	I find myself taking initiative most of the time	①②③④⑤⑥
Q33	I am resilient to stress.	
Q34	I have positive and effective interpersonal relations in my professional activity	①②③④⑤⑥
Q35	I am aware of other people emotions and able to manage them well	①②③④⑤⑥
Q36	I give priority to market needs whenever I am deciding what to do next in my work	①②③④⑤⑥
Q37	I am effective into getting funds to support company development activity if I need to	①②③④⑤⑥
Q38	I bring people together and turn them into a highly performing and cohesive work team	①②③④⑤⑥
Q39	I inspire other people and motivate them to achieve more	①②③④⑤⑥
Q40	I delegate important professional tasks to people around me	①②③④⑤⑥
Q41	People look up to me to make important decisions and be their role model	①②③④⑤⑥
Q42	I get along well with people with very different personalities	①②③④⑤⑥
Q43	I find myself happy when I see someone around me having a success	①②③④⑤⑥
Q44	I am willing to share the benefits of my success and create public value with others to help others and contribute to social progress.	①②③④⑤⑥
Q45	I take into account the needs of others and society when considering my own needs and those of my business, and have a win-win mindset.	①②③④⑤⑥

Thank you very much for your support!

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Annex D: Second-round Questionnaire

Dear Madam (Mr.):

Greetings! Thank you for taking your valuable time to participate in this survey. Under the background of "mass entrepreneurship and innovation", many experts, scholars and researchers have actively responded to the government's call to join the team of entrepreneurs and become academic entrepreneurs. The main purpose of this research is to understand the characteristics of academic entrepreneurs and their experiences in the process of entrepreneurship, and the research results will help more academic entrepreneurs to succeed in their business. There is no right or wrong answer, so you only need to answer truthfully and try to express your true thoughts. If a question describes a situation that does not match your situation, please pick the closest answer. Only truthful answers will make our research meaningful, so we kindly ask you to fill in the answers carefully. The data from the questionnaire will only be used for scientific research, so please feel free to answer the questions and thank you very much for your support!

Q Name: _____ (Only the first letter of your name is required)

Q Company: _____ (Only the first letter of the business name is required)

Q Contact (email): _____

Q46 Everyone feels more or less comfortable or uncomfortable in the process of starting a business. Please think about your own reactions to the difficulties you encounter in performing your duties as an entrepreneur and determine the extent to which you agree or disagree with the following descriptions. Options from 1 to 5 indicate: 1 completely disagree; 2 somewhat disagree; 3 neutral; 4 somewhat agree; 5 completely agree.

The above description has been read

Q47	I make minor adjustments in my outward behavior so that others see myself as fitted to the current responsibilities I have in this venture	①②③④⑤
Q48	I act so that other people do not realize when I am uncomfortable with playing the entrepreneur role	①②③④⑤
Q49	I focus in some activities I like the most so to compensate for the things I do	①②③④⑤

Q50	not really enjoy doing in this venture I always take time off to relieve from the pressure of having to do things I do not feel at ease or that I dislike in this venture	①②③④⑤
Q51	I always remember the things I do not like doing as an entrepreneur are only temporary	①②③④⑤
Q52	I believe that with time I will learn to like to do the things I dislike now	①②③④⑤
Q53	In my understanding, the degree to which I adapt to my new role in the entrepreneurial process and my perception of myself can be two different things.	①②③④⑤
Q54	I remember I am not truly an academic-entrepreneur. I am more an academic that happens to be now an entrepreneur	①②③④⑤
Q55	I always think only a good scholar and researcher will experience such misfit	①②③④⑤
Q56	I take pride for being a good scholar or researcher much more that being an entrepreneur	①②③④⑤
Q57	I think about quitting or selling this venture to someone else	①②③④⑤
Q58	I think about looking for someone that can replace me totally here	①②③④⑤
Q59	I think about changing my current responsibilities within the venture and perform different duties from the ones I have	①②③④⑤
Q60	I think about hiring people that can directly assist me or to whom I can delegate some of my responsibilities I am less found of	①②③④⑤
Q61	I worked hard to adapt to the way the other executive team members worked during the start-up process to achieve a better bonding effect and to make myself more competent in my role as a start-up entrepreneur.	①②③④⑤
Q62	I put effort to adjust myself so to increase my own fit to the responsibilities I have today in this venture.	①②③④⑤

Q63 The following questions are answered by a 5-point scoring system. Everyone feels more or less role conflict in the process of starting a business. Please think about the extent to which you agree or disagree with the following descriptions. Options from 1 to 5 indicate: 1 completely disagree; 2 somewhat disagree; 3 neutral; 4 somewhat agree; 5 completely agree.

The above description has been read

Q64	Taking teaching or research (including R&D) and entrepreneurship into account, I often encounter conflicts in time distribution.	①②③④⑤
Q65	Taking teaching or research (including R&D) and entrepreneurship into account, I often encounter conflicts in problem-solving.	①②③④⑤
Q66	Taking teaching or research (including R&D) and entrepreneurship into account, I often doubt my pursuits.	①②③④⑤
Q67	Taking t teaching or research (including R&D) and entrepreneurship into account, I feel that conflict exists in my knowledge structure.	①②③④⑤
Q68	Taking teaching or research (including R&D) and entrepreneurship into account, I often encounter conflict in my measurement system.	①②③④⑤

Q69 The following questions are answered by a 5-point scoring system. Everyone gains more or less performance in the process of starting a business. Please think about the extent to which you agree or disagree with the following descriptions. Options from 1 to 5 indicate: 1 completely disagree; 2 somewhat disagree; 3 neutral; 4 somewhat agree; 5 completely agree.

The above description has been read

Q70	In the process of academic entrepreneurship, I achieve the economic benefits of research commercialization.	①②③④⑤

Q71	In the process of academic entrepreneurship, I produce the social benefits of research commercialization.	①②③④⑤
Q72	Academic entrepreneurship facilitates my scientific research.	①②③④⑤
Q73	Academic entrepreneurship is my long-term activity.	①②③④⑤
Q74	Academic entrepreneurship continuously facilitates my scientific research and research commercialization.	①②③④⑤

Q75 The following questions are answered by a 5-point scoring system. How successful have you been in the past year in achieving the following aspects? Please indicate your achievement on the scale ranging from 1 “not achieved at all” to 5 “absolutely achieved”.

The above description has been read

Q76	Turnover/sales	①②③④⑤
Q77	Profit growth	①②③④⑤
Q78	Increased market share (e.g., company expansion)	①②③④⑤
Q79	Employee satisfaction	①②③④⑤
Q80	Supportive firm culture	①②③④⑤
Q81	Social responsibility for employees	①②③④⑤
Q82	Strong employee relationships	①②③④⑤
Q83	Employee loyalty	①②③④⑤
Q84	Personal work flexibility	①②③④⑤
Q85	Own decision-making	①②③④⑤
Q86	Personal development	①②③④⑤
Q87	Firm social contribution	①②③④⑤
Q88	Environmentally friendly firm (e.g., emphasize recycling)	①②③④⑤
Q89	Social recognition (e.g., good firm reputation)	①②③④⑤
Q90	Personal income growth	①②③④⑤
Q91	Personal financial security	①②③④⑤
Q92	Ability to afford a lot	①②③④⑤

Q93 The following questions are answered by a 5-point scoring system. Everyone feels more or less fit *w*ith what entrepreneurship activity requires and offers. Please think about the extent to which you agree or disagree with the following descriptions. Options from 1 to 5 indicate: 1 completely disagree; 2 somewhat disagree; 3 neutral; 4 somewhat agree; 5 completely agree.

The above description has been read

Q94	There is a good fit between what current entrepreneurship offers me and what I am looking for in entrepreneurship.	①②③④⑤
Q95	The attributes that I look for in entrepreneurship are fulfilled very well by current entrepreneurship.	①②③④⑤
Q96	The entrepreneurship that I currently hold gives me just about everything that I want from entrepreneurship.	①②③④⑤
Q97	The match is very good between the demands of the current entrepreneurship and my personal skills.	①②③④⑤
Q98	My abilities and training are a good fit with the requirement of current entrepreneurship.	①②③④⑤
Q99	My personal abilities and education provide a good match with the demands that current entrepreneurship places me.	①②③④⑤

Thank you for participating.