Doctoral Dissertation

Career Service Mechanism for Promoting Career Diversification of International Doctoral Students in the Humanities and Social Sciences in Japan

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Abstract

In recent years, the career development issues of PhD graduates have gradually gained attention. However, in the fields of humanities and social sciences, especially in non-English-speaking countries like Japan, the career transition paths for international PhD students remain severely neglected. This paper focusses on the structural challenges faced by international PhD students in the humanities and social sciences in Japan, aiming to explore how to integrate emotional mechanisms, skill transfer mechanisms, and technology empowerment mechanisms through the lens of service science to construct a service framework that supports their diverse non-academic career transitions.

Three related sub-studies are included in this thesis. Through interviews with international PhD graduates in Japan, Study 1 investigates the emotional mechanisms of cruel optimism. It explains how a variety of elements, including social culture, family, and academic institutions, restrict PhD students' capacity to develop professional identities and make career choices. To better understand how international PhD students recognize, cultivate, and use their transferable skills in a cross-cultural setting—and make the shift from researcher to non-researcher professional identities—Study 2 proposes the AACA framework (awareness–assessment–cross–action). Study 3 builds the concept framework of human-AI value co-creation, highlighting how doctoral students can enhance their action and career decision-making skills through resource integration, capability recognition, and intelligent feedback in dynamic collaboration with AI systems.

Based on the above research findings, Chapter Six comprehensively proposes a multi-party collaborative career service system framework centered on international doctoral students. This framework consists of three parts: the emotional support module, the skill transformation module, and the AI empowerment module. It integrates universities, external career institutions, and technology platforms to build a service ecosystem that encompasses psychological adjustment, cultural capital development, and intelligent intervention.

This thesis makes multiple theoretical contributions in the fields of career development theory, doctoral education research, and service design, proposing that doctoral students should be viewed as co-creators of their career paths rather than passive service recipients. On a practical level, this study provides universities, enterprises, and policymakers with a set of career support service design principles that are inclusive, cross-culturally adaptable, and technically feasible, with the potential to drive a paradigm shift in doctoral education from an academic specialization model to a diverse competency and self-development model.

Key words：higher education，humanities and social sciences，cruel optimism, career development，career service，professional identity，transferable skill，cross-cultural，international PhD

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In the end, I am very glad that I chose to focus my research on the career development of doctoral students during my PhD program. At first, I was determined to pursue an academic career, but during the research process, by interviewing many PhDs' experiences and extensively reading relevant literature, I gradually realized that the experiences and skills required during my PhD could also play the value outside of academia. This experience not only broadened my professional horizons but also boosted my confidence in pursuing a diverse range of career paths. I hope this research can provide inspiration and assistance to future PhD students facing similar choices.

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Chapter 1
Introduction

1.1 Research background

About 277,000 people graduate with a PhD each year globally (World Population Review, 2025), and the proportion of PhD holders in developed economies has significantly increased. Between 2014 and 2019, the proportion of the population aged 25 to 64 with a doctoral degree in OECD countries increased by an average of 25% (OECD, 2021). However, in some developed countries, the development of doctoral education has shown signs of stagnation. For example, since 2000, the number of doctoral students in Japan has been continuously declining, with the admission rate to doctoral programs dropping from 16.7% to 9.7% in 2021 (Watanabe et al., 2023), making it the only OECD country to experience a long-term downward trend (Raczyńska, 2024).

Research shows that PhD students generally feel unprepared to enter the non-academic job market (Garcia-Morante et al., 2024). According to the OECD (2024) report, the current academic positions generally implement a high competition system. For example, scholars on temporary contracts need to frequently apply for new positions, career paths lack stability and transparency, and promotion standards often rely on vague assessments of research output. These uncertainties significantly weaken PhD students' confidence and expectations regarding academic careers. Only about 25% of PhD graduates worldwide can enter academic positions each year (Ganning, 2024), while the rest need to turn to non-academic markets.

However, many PhD students believe they are ill-prepared to enter the non-academic job market

(Schubert et al., 2022). In the absence of more career choices, many PhD students insist on pursuing academic positions, a psychological state known as cruel optimism (Berlant, 2011), where they are aware of the difficulties ahead but still unwilling to give up. This obsession not only affects their career choices but also has a negative impact on their mental health and well-being (Shirazi, 2020).

In the field of humanities and social sciences, this challenge is even more obvious. On one hand, compared to STEM disciplines, the recognition and market demand for humanities in non-academic fields are limited (Karaca-Atik et al., 2023; Barnacle et al., 2020), a high level of education has not translated into employment advantages; instead, it may lead to employment barriers due to degree misalignment with employers' requirements (Chuang & Hsueh, 2024). Moreover, international doctoral students often face multiple obstacles such as language barriers, cultural gaps, and visa restrictions when entering the local labor market (Liu-Farrer & Shire, 2023). Currently, one in four doctoral students in OECD countries is an international student (OECD, 2016), indicating that the trend of internationalization in doctoral education requires us to rethink how to build a more inclusive career development support system.

Career counseling, as an important bridge between higher education and society, not only helps students clarify their career directions and adapt to societal needs but also provides psychological support and development path planning (Muhrman & Andersson, 2024; Nilsson & Bengtsson, 2024). However, the existing career support services primarily focus on undergraduate students, students with disabilities, and low-income groups (Quinlan & Renninger, 2022; Taneja-Johansson, 2024; Angela, 2024). For doctoral students, especially international doctoral students, systematic support mechanisms are still lacking.

For example, METI (2023a) pointed out that Japan currently lacks a comprehensive career support system for doctoral students, with institutional gaps existing at multiple levels, including university employment services, government policy coordination, and corporate recruitment mechanisms. In the context of increasing transformation pressures, establishing an innovative, interdisciplinary, and sustainable career support system for PhD students has become particularly urgent (Hobin et al.,2014). Some studies have also begun to explore the potential of artificial intelligence technology in higher education career guidance, pointing out that it can provide support in areas such as skill identification, matching skills with job demands, and connecting network resources (Westman et al., 2021).

Therefore, the purpose of this study is to support the diverse career development of international doctoral students in the humanities and social sciences and to construct an innovative career support service framework. The research results not only address the shortcomings in the study of career

support services for doctoral students in the field of higher education but also aim to raise awareness among society, the government, private enterprises, and universities about the need to support the diverse career development of doctoral international students, thereby improving their awkward situation in the labor market. Allow doctoral international students to fully utilize the value of doctoral education, avoid the waste of educational resources and talent, establish a fairer labor market, and promote the goal of sustainable economic growth.

1.2 Research objectives and research questions

This study aims to construct a conceptual framework for career services that supports international PhD students in the field of humanities and social sciences (HSS) in achieving diverse career development. To this end, the research explores the key influencing factors and coping strategies of PhD students during the job search process from three dimensions: emotional mechanisms, skill transfer mechanisms, and AI empowerment mechanisms, thereby proposing possible pathways for service system design.

First, this study analyses the phenomenon of cruel optimism emotional attachment formed in the academic career expectations of international doctoral students through interviews with PhD graduates who chose to enter academia, revealing how it affects the construction of professional identity and career choices.

Secondly, through interviews with PhD graduates who have successfully transitioned to cross-disciplinary employment, this study focusses on their career transition process in a cross-cultural context, exploring how they identify, transform, and apply the transferable skills cultivated during their doctoral program.

Finally, using the method of systematic literature review, this study explores the potential functions and value of artificial intelligence in career guidance services. It proposes a service framework from the perspective of human-machine value co-creation to assist doctoral students in personalized career planning and job matching and provides theoretical support for the design of related service systems.

Based on the above research objectives, this paper proposes the following research questions:

Main Research Question (MRQ):

In the field of humanities and social sciences, how can we construct an effective career service framework

and operational mechanism that promotes the exploration of diverse career paths for international doctoral students and provides possible pathways to achieve a more equitable and inclusive labor market?

Sub-research questions (SRQs):

SRQ1: How does cruel optimism emotional attachment affect the professional identity construction and career development of international PhD students?

SRQ2: In cross-cultural career transitions, what factors influence PhD students' recognition and practical application of transferable skills?

SRQ3: How does the value co-creation mechanism of artificial intelligence in career guidance services affect the individual's employability?

1.3 Significance of this study

This study employs an interpretative phenomenological approach to deeply explore the learning and job-seeking experiences of doctoral students in the humanities and social sciences in non-English-speaking countries, aiming to understand the fundamental reasons behind their constrained career paths and employment difficulties. Through three sub-studies (study 1–3), a career service framework aimed at promoting the diversified career development of doctoral international students was gradually constructed.

In study 1, the research revealed how cruel optimism affects doctoral students' relentless pursuit of academic careers and further shapes their professional identity and career choices.

Study 2 explored how international PhD students identify and apply transferable skills to adapt to non-academic job environments during career transitions.

On this basis, study 3 analyzed the potential of artificial intelligence in career guidance services through a systematic literature review and proposed a theoretical framework for human-machine value co-creation in doctoral career development services.

Based on the results of the three studies, this paper proposes a conceptual framework for career development services for doctoral international students aimed at higher education institutions and enterprises, with the goal of addressing the issues of limited career paths, insufficient support faced by doctoral students.

At the theoretical level, this study has the following innovative contributions. First, shift the research perspective from the macro education system to the individual experiences of doctoral students, addressing the previous overlooked of emotional and psychological factors in career choices. Secondly, it fills the gap in research on the career development of international doctoral students, particularly in non-English-speaking countries like Japan. Once again, it clarifies the skill transfer pathways for PhDs in cross-industry employment, enriching the discussion on the practicality of transferable skills. Finally, a career guidance service framework from the perspective of human-machine value co-creation was proposed, providing a theoretical foundation for the integration of AI technology and career services.

At the practical level, this study has significant implications for the career service systems of universities and enterprises. For universities, the proposed career service framework helps promote the reform of the career guidance system, relieve the issue of information separation faced by doctoral students during job hunting, and addresses the cognitive bias between doctoral students and enterprises. By enhancing career awareness and identity construction abilities, it helps broaden doctoral students' understanding and choice of non-academic career paths. For enterprises, this study provides theoretical support for identifying the professional abilities and potential value of PhDs in the humanities and social sciences, optimizing recruitment processes and job matching systems, and helps promote diversity in recruitment and fair selection of talent.

In summary, this study not only provides a theoretical foundation and service framework for the career path expansion of doctoral graduates but also offers specific recommendations on how to effectively integrate AI technology into career guidance and talent recruitment platforms through the analysis of service systems in universities and enterprises. This further establishes the application foundation of AI technology in higher education career guidance, with the hope of making a positive contribution to building a more equitable, inclusive, and sustainable talent development ecosystem.

1.4 Structure of dissertation

This thesis is divided into seven chapters, show as in Figure 1.1, which are: introduction, literature review, sub-studies 1 to 3, service framework construction and conclusion. The content of each chapter is as follows:

Chapter 1: Introduction
This chapter introduces the background, research objectives and questions, significance of the study, and the overall structure of the thesis. By outlining the current state of research on doctoral graduates'

employment issues, it clarifies the social value and theoretical contributions of this study.

Chapter 2: Literature review

This chapter conducts a literature review around three themes to construct the theoretical background of the thesis and identify research gaps:

2.1 Transformation of Japan's doctoral education and employment landscape

Discuss the phenomenon of cruel optimism in the Japanese doctoral education system and the structural employment barriers faced by international doctoral students in the Japanese labor market.

2.2 Career development of international PhD Students in the humanities and social sciences

Focusing on research subjects, this study analyzes the career development issues faced by international doctoral students in a cross-cultural context, including the adaptation process, the construction of professional identity, and the application and challenges of transferable skills in the humanities.

2.3 Innovation in career guidance services

Review the literature related to the theory of service science and the application of artificial intelligence in career services to provide methodological and theoretical support for the subsequent construction of the service framework.

Chapter 3: Sub-study 1 — Cruel optimism and career challenges of International PhDs in humanities and social science

This chapter introduces the research background, methods, and results of study 1. Through qualitative interviews, it explores how cruel optimism affects the career expectations, actions, and development paths of doctoral students in the humanities and social sciences (SRQ1).

Chapter 4: Sub-study 2 — Transferable skills application for international PhDs in humanities and social science

This chapter elaborates on the research design and findings of study 2, aiming to construct a visual model that describes how international doctoral students identify and apply transferable skills during their career transition (SRQ2).

Chapter 5: Sub study 3 — Human-AI value co-creation in career guidance and its impact on employability

This chapter introduces the research design and results analysis of study 3, exploring how the co-creation process between humans and artificial intelligence in career guidance affects the job-hunting strategies and skill enhancement of individual (SRQ3).

Chapter 6: Framework development — an innovative model for promoting diverse career development

of International PhDs in humanities and social science

Integrating the research findings from studies 1 to 3, we propose an innovative career service framework based on human-AI value co-creation, aimed at providing diverse and sustainable career development support for international doctoral students.

Chapter 7: Conclusion and Implications

This chapter addresses the research questions, demonstrates the theoretical contributions and practical significance of the doctoral dissertation, reflects on the limitations of the research, and proposes future research directions and development recommendations.

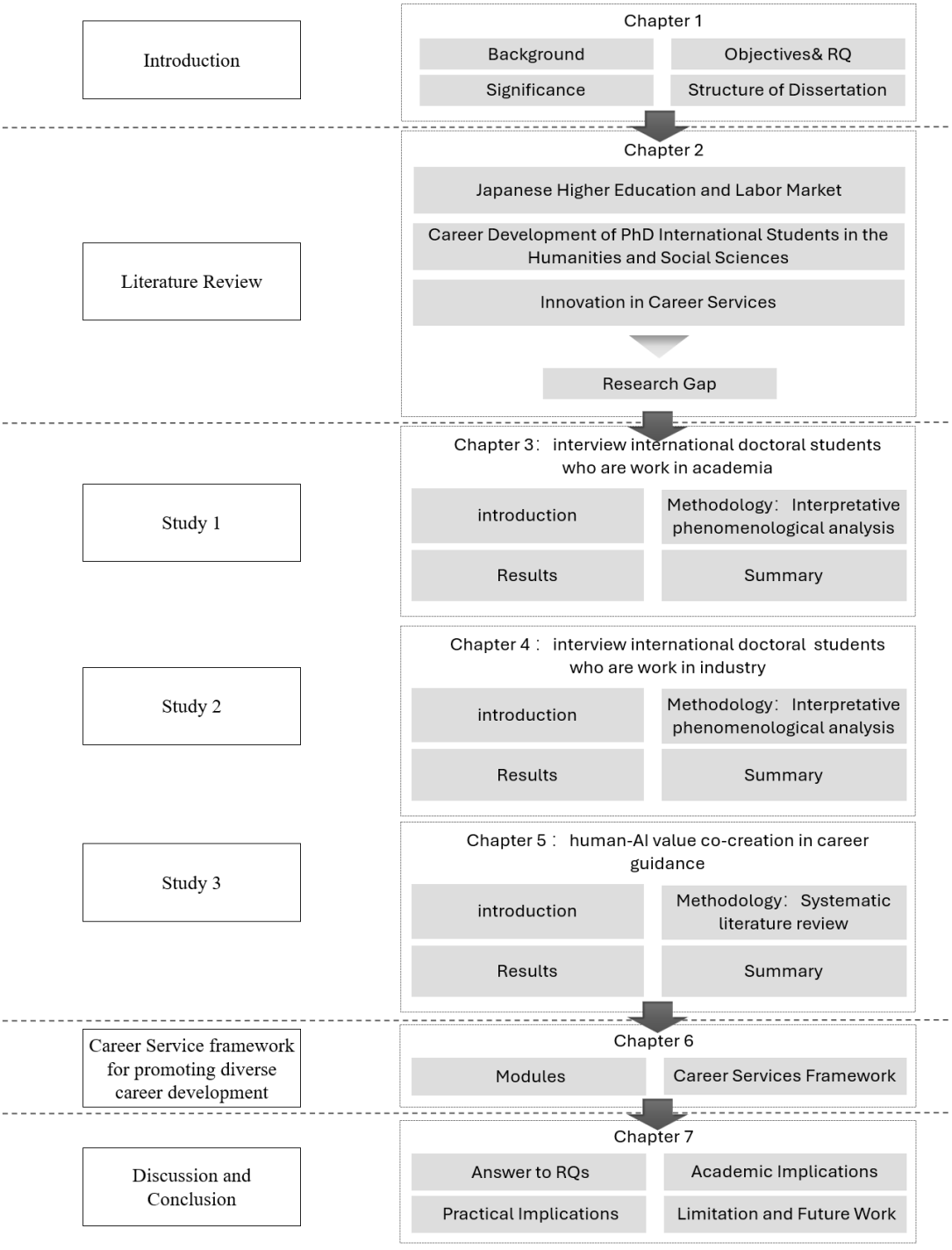


Figure 1. 1 The structure of dissertation

Chapter 2
Literature Review

2.1 Transformation of Japan's doctoral education and employment landscape

2.1.1 Neoliberal reforms and cruel optimism in academia

Lauren Berlant's (2011) theory of cruel optimism illustrates how individuals remain emotionally attached to idealized career goals, even when systemic conditions render those goals increasingly unattainable. Rooted in the neoliberal reforms championed by Reagan and Thatcher in the 1980s, this framework prioritizes innovation and efficiency as solutions to global challenges (Berlant, 2011; Gormley, 2020). Japan followed a similar trajectory through three major waves of educational reform.

Show as in figure 2.1, the first wave began in 1984, when Prime Minister Nakasone promoted the liberalization of education by emphasizing market competitiveness and reducing government intervention (Moriyama, 2008). The second wave, in the 1990s, occurred amid economic recession, driving universities to strengthen ties with industry and restructure doctoral education (Mori, 2012; Takatsu, 2023). For example, Osaka University (2024) incorporated practical research training and internships into its doctoral programs to encourage collaboration with industry. The third wave was marked by the 2004 National University Corporation Act, which transformed national universities into semi-independent entities reliant on external funding. This shift led to a reduction in tenured positions and a rise in short-term contracts (Liu, 2022). The Tokyo University (2009; 2021), for instance, adopted performance-based pay systems to enhance financial sustainability and competitiveness, increasingly depending on private-sector sponsorships and external research funding.

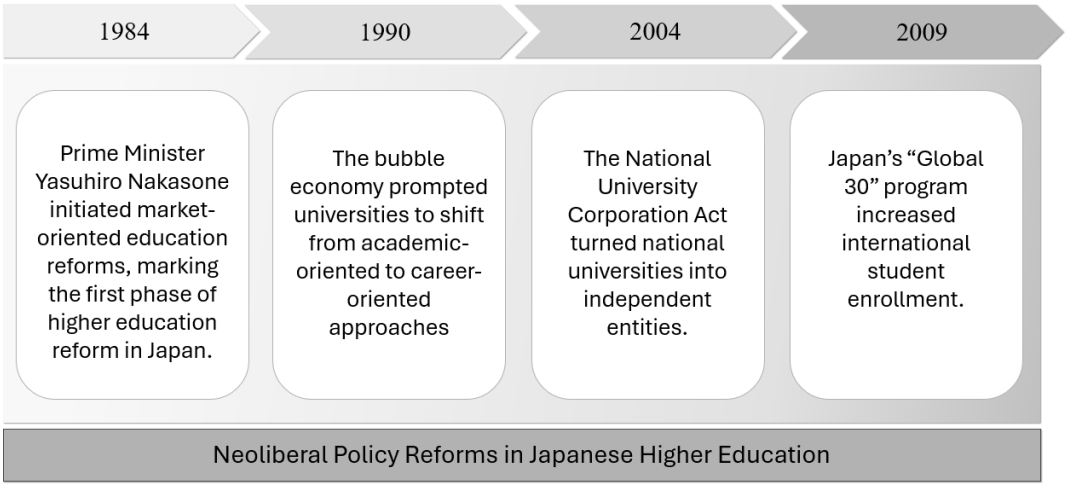


Figure 2.1 The timeline of neoliberal policy reforms in Japanese higher education

Although these neoliberal reforms were intended to enhance institutional performance, they also contributed to job instability within academia (Thouaille, 2018; Caretta et al., 2018). The Global 30 Project, which aimed to attract more international students, maintained the classification of doctoral candidates as students rather than researchers, in contrast to the employment models seen in many European countries (Julien & Nohara, 2024). This classification places the burden of employability enhancement—and its costs—on the individual (Chang & Chang, 2024; Smith & Samuell, 2024).

In this competitive environment, PhD students are under constant pressure to improve their market value, often experiencing high levels of psychological stress and job insecurity (Danvers, 2023). Many continue to believe that academic merit will eventually lead to stable employment. However, the shrinking number of tenured positions—combined with systemic inequities based on race, gender, and class—significantly limits such opportunities (Bone, 2021; Adler & Lalonde, 2020). The neoliberal ideology of individual responsibility leads many to internalize their struggles, interpreting unemployment or underemployment as personal failure rather than structural exclusion (Meade et al., 2023; Lipton, 2017). Even when faced with prolonged unemployment or financial hardship, many remain emotionally tethered to the academic ideal, thereby intensifying psychological distress (Bone, 2021).

The theory of cruel optimism provides insight into how this emotional attachment can become a constraint, hindering the ability of PhD students to adapt and thrive within an increasingly neoliberal academic environment (Berlant, 2011). To overcome this impasse, higher education policy must support the reconstruction of professional identity and facilitate exploration of diverse, non-academic career trajectories (Archer, 2008). However, even outside of academia, the employment prospects for

international doctoral students remain bleak. The following section analyzes the structural characteristics and evolving trends of Japan's labor market to shed light on the challenges awaiting PhD graduates beyond the academic realm.

2.1.2 Employment structures and doctoral job market trends

Japan's traditional lifetime employment system—known as Nihon-gata koyō (Japanese-style employment)—has long shaped its corporate and labor structures. According to the report of Recruit Works Institute (Hagiwara, 2024), Japanese-style employment is characterized by seven key features: bulk hiring of new graduates, company-led personnel transfers, seniority-based wages, on-the-job training (OJT), internal promotions, lifetime employment, and company-specific labor unions (show as in Table 2.1). Originally rooted in the Tasho period, this membership-based employment system was institutionalized and widely adopted during Japan's postwar economic boom (Tsumura, 2018; Nakagawa, 2018).

However, the collapse of the economic bubble and increasing global competition have exposed the weakness of this model. Lifetime employment and seniority-based wages have become increasingly unsustainable, while the rigid system has proven inadequate in supporting professional development (Asia-Pacific Research Institute, 2020). In response, the government and corporations have promoted human capital management strategies, focusing on attracting high-skilled talent, including PhD graduates and foreign professionals (METI, 2022).

At the policy level, doctoral graduates are now recognized as valuable resources for advancing innovation across sectors. In line with this recognition, the government has launched initiatives such as career development programs, corporate matching guides, and doctoral employment schemes. It has also introduced multilingual resources and support systems aimed at improving the living and working conditions for foreign talent (MEXT, 2024a; Immigration Services Agency of Japan, 2022).

Despite these efforts, structural mismatches persist between doctoral talent and corporate hiring practices. For example, only 3.2% of PhD graduates are employed in R&D roles, and the hiring rate for humanities PhDs is effectively zero (MEXT, 2022; 2023). A recent survey indicates that 80% of universities view the employment environment for international students as very severe compared to their Japanese peers, citing issues such as unclear hiring criteria, high language barriers, and difficulty integrating into workplace culture (METI, 2024b).

Table 2. 1 Characteristics of Japanese-style employment from the report of Recruit Works Institute

No.	Characteristic	Description
1	Simultaneous Hiring of New Graduates	New grads are hired in bulk right after graduation.
2	Company-led Job Rotation and Transfers	Employees are rotated across roles and locations by the company.
3	Seniority-based Wage System	Salary increases with age and years of service.
4	On-the-Job Training (OJT)	Skills are developed through in-house training after hiring.
5	Internal Promotion to Executive Roles	Executives are mostly promoted from within.
6	Lifetime Employment (Long-term Employment)	Employees are expected to stay until retirement.
7	Enterprise-based Labor Unions	Unions are organized at the company level.

These mismatches reveal a significant disconnect between doctoral education and corporate expectations—both in terms of information and perception. Currently, many PhD job seekers continue to rely on personal connections or supervisor recommendations rather than systematic support (MEXT, 2017; METI, 2025).

Recently, the promotion of job-based employment, shifts the focus from assigning people to roles to hiring based on specialized roles—has opened new institutional opportunities for doctoral graduates, particularly international ones (MEXT, 2019). However, humanities and social science PhDs often struggle to align their academic expertise with corporate expectations due to the absence of mechanisms for articulating their skills in practical terms (Fujii, 2015).

Thus, developing bridging mechanisms that can translate research capacity into practical value remains a pressing issue. Enhancing the visibility and perceived utility of PhD competencies in non-academic sectors is vital to resolving the mismatch between doctoral training and employment outcomes.

2.2 Career development of international PhD students in the humanities and social sciences

2.2.1 Career development and challenges in cross-cultural contexts

Career development refers to the ongoing process through which individuals enhance their self-awareness, understanding of external conditions, and decision-making capacities (Tuckman, 1974). In the context of higher education, career development plays a vital role not only in personal growth but also in the sustainable utilization of highly educated human capital (Akkermans et al., 2021). However, doctoral training remains largely research-centric—particularly in the HSS where students are primarily socialized as future academics and often receive limited preparation for non-academic career paths (Rivas, 2024).

Despite the diminishing availability of academic positions, many PhD students continue to aspire to faculty or research roles, believing these careers best reflect their values and scholarly identity (Gibbs & Gryphon, 2013). In HSS fields, students often idealize academic life and significantly overestimate their chances of securing academic employment (Diogo et al., 2022). For international doctoral students, the situation is further complicated by language barriers, cultural differences, and unfamiliar institutional norms. Although career development has been widely studied among international master's students, fewer studies have examined how doctoral students' aspirations translate into actual career outcomes (Zuo, 2022; Kong et al., 2023).

In this study, the concept of cross-cultural context refers to the socio-cultural environment in which individuals engage across two or more cultural systems. It emphasizes how people navigate differences in values, behaviors, and institutional norms through comparative, interactive, or adaptive processes. In contrast to intra-cultural analyses, the cross-cultural perspective provides a framework for understanding how cultural differences shape identity, decision-making, and career development outcomes (Stambulova & Alfermann, 2009). Cross-cultural adaptation is critical in this process. Cross-cultural adaptation is critical in this process. Defined as cognitive, emotional, and behavioral adjustment to a new cultural context (Haslberger, 2005), it facilitates the development of transferable skills such as communication, teamwork, and problem-solving (Chen, 2019). Through cross-cultural experiences, students often enhance their language proficiency, critical thinking, and flexibility—competencies vital for global employability (Dailey-Strand et al., 2021). Nevertheless, international PhD students frequently struggle with limited knowledge of local labor markets, weak social networks, and discrimination, which hinder the effective translation of their learning into employment outcomes (Lu & Everson Härkälä, 2024; Jia & Yunus, 2024).

Japan's job-hunting process is highly institutionalized and culturally specific, requiring advanced proficiency in Keigo (honorific language), strict adherence to etiquette, and alignment with group-oriented values (Mansikka, 2014). For international HSS doctoral graduates, success requires not only

academic expertise but also cultural sensitivity, social capital, and language competence. Yet, few studies have explored how these various forms of capital interact to influence employability in non-English-speaking contexts like Japan (Jayasinghe & Rathnayake, 2022).

The growing demand for global talent and multicultural workplaces underscores the need for graduates to navigate across cultural boundaries. While international mobility offers opportunities for skill development, little is known about how PhD students integrate these experiences into their professional growth (Jones, 2013). This study thus examines how international PhD students in HSS fields in Japan combine language skills, cultural adaptability, and professional networks to achieve cross-cultural integration and enhance their employability. By analyzing the process of career transition and identity formation, it aims to offer theoretical and practical insights for better supporting diverse career outcomes. In the following section, we will continue to explore the topic of the professional identity construction of international doctoral students.

2.2.2 Professional identity formation

Professional identity (PI) refers to the process by which individuals develop self-awareness, acknowledge their own skills and expertise, and integrate into a particular professional community (Canrinus et al., 2011). PI gives people a sense of purpose in their work lives in addition to influencing their attitudes, behaviors, and general well-being (Wang et al., 2022; Toubassi et al., 2023).

In higher education, the construction of PI is influenced by the interplay of individual experiences, social structures, and career ideals, involving the imagination of the future and the continuous adjustment of current identity (Clarke et al., 2013). Research shows that doctoral education often constructs identity with an academic career orientation (Castelló et al., 2021; Shin et al., 2018). Increasingly on text of an increasingly informalized higher education system, doctoral students need to explore non-academic paths and develop relevant skills (Whitchurch & Gordon, 2010).

Most existing research focuses on English-speaking country contexts, where doctoral students are recognized as researchers and benefit from institutional support and professional status. This formal recognition facilitates their integration into academic and research-oriented careers. In contrast, doctoral students in Japan lack both recognition and social security. They are still officially classified as students, which complicates the development of their professional identity during training (Julien & Nohara, 2024). Paradoxically, despite the lack of institutional r PhD students in Japan internalize a researcher identity during their training. When transitioning to non-academic sectors, this strong academic identity can become a psychological burden, hindering their adaptation to new professional environments (Li & Horta, 2024).International doctoral students from cross-cultural and

interdisciplinary backgrounds are more likely to experience "identity misalignment," often experiencing dual anxieties: aligning their personal values with professional norms, and matching their capabilities to labor market demands (Dai & Mu, 2024; Skakni et al., 2022).

Although attention to PI transitions is increasing, research on international PhD students in the HSS field, especially those facing structural disadvantages, remains limited. For these students, overlapping language barriers and institutional exclusion mean that identity construction becomes not only a cognitive process, but also a coping strategy in response to marginalization.

Although there is growing research on identity adaptation, few studies examine PI construction among international HSS students—a group often marginalized in elite academic systems. This study focuses on how these students build, negotiate, and adapt their professional identities while navigating a career system shaped by cruel optimism. By applying PI theory, the study aims to illuminate the complex meaning-making processes that underpin PhD students' diverse career decisions.

2.2.3 Transferable skills and labor market fit

Transferable skills refer to abilities that can be flexibly applied across different fields and contexts (Nägele & Stalder, 2017), including non-technical skills such as teamwork and critical thinking. These skills are not only an important component of higher education learning outcomes but also a key factor influencing the employability and career adaptability of doctoral graduates (Li & Zhu, 2023).In 2010, the researcher development framework (RDF) developed by Vitae in the UK specified the knowledge, skills, and attributes that doctoral graduates should possess (Vitae, 2010), providing theoretical guidance for the career development of PhDs.

Research indicates that the development of transferable skills is crucial for the non-academic career adaptability of doctoral graduates, especially in an increasingly complex labor market (Spronken-Smith et al., 2024).For example, critical thinking and problem-solving skills help improve the adaptability of doctoral graduates in working across multiple fields (Rivas, 2024).Moreover, these skills are particularly important for graduates in the HSS, as they often lack technical skills directly corresponding to industry demands, leading to a mismatch with employer needs (Dayaratna-Banda & Dharmadasa, 2022; Gaeta et al., 2021).To address this issue, it is crucial for doctoral graduates to identify and articulate their transferable skills. However, for doctoral graduates in the HSS, this process still faces significant challenges. Research indicates that even if doctoral students possess transferable skills, their potential application may be underestimated if these skills cannot be translated into a format easily understood by employers (Wellcome Trust, 2009; Schaffarczyk & Connell, 2012; Bran

et al., 2024).Simply labeling skills as transferable does not mean these skills can be seamlessly applied to different work environments (Golovushkina & Milligan, 2012). Especially in the HSS field, the issue of doctoral graduates' skills being underestimated in non-academic industries is particularly evident. Doctoral graduates in this field generally have a low awareness of their own skills, particularly in transferable skills such as project management and interpersonal communication. Although they possess the relevant skills, due to their low awareness of these skills, they are more likely to perceive work demands as overwhelming threats, thereby increasing stress and avoidance behaviors, which may ultimately lead to impaired job performance (Bran et al., 2024; Durette et al., 2016).

Current research on transferable skills of doctoral graduates mostly focuses on designing doctoral programs and proposing career guidance schemes to promote skill development (O'Leary et al., 2024; Bracewell et al., 2024; Barge-Gil et al., 2021; Mello & Wattret, 2021; Rippa et al., 2022).Research on how to effectively convey skills to employers through practical activities such as job applications is still lacking (Chen et al., 2024). Less is known about how students translate these skills into marketable forms during job search processes. Additionally, how to build a comprehensive service support platform for PhD international students to identify, develop, and apply transferable skills to meet the demands of the non-academic labor market is also worth discussing. In the following chapters, we will discuss innovative career services.

2.3 Innovation in career services

2.3.1 Theories of service science and service design

Service science is an interdisciplinary theory proposed by Maglio and Spohrer (2008), aimed at understanding the interactions between people, technology, and organizations, thereby optimizing the collaborative efficiency and value creation capabilities of all participants in the service system. This theory emphasizes that service is not a one-way provision behavior, but a process of resource integration in interaction, with its core concept being value co-creation. In this logic, the service system is defined as a collaborative system composed of multiple actors (such as individuals, organizations, and platforms) through rules, resources, and relational networks, possessing the ability for self-regulation, adaptation, and evolution (Carroll et al., 2012).

In recent years, an increasing number of scholars have redefined the higher education system as a service system (Petrescu et al., 2024), emphasizing that from the perspective of education as a service (EaaS), students are not only recipients of knowledge but also co-creators of educational value (Cai & Kosaka, 2024). Unlike the traditional teacher-centered teaching model, service science emphasizes the importance of collaboration among students, teachers, administrators, businesses. And encouraging

the realization of multi-party participation, multi-dimensional interaction, and co-creation of value in higher education, through institutional arrangements, platform tools, feedback mechanisms, and other diverse means (Omland et al., 2025; Bingang & Guangzhong, 2024; Zamora-Ramos et al., 2023).

In service system, mechanisms play a crucial intermediary role. Mechanisms in service system not only reconcile the role differences and resource asymmetries between actors but also provide pathways for the integration of institutional logics (Elo et al., 2024). The service system's mechanisms mainly refer to the specific paths or meaning through which service providers and customers release and integrate resources in the value creation process. These mechanisms have transformed the traditional transactional relationship between service providers and customers, turning customers from passive purchasers into co-producers or value contributors (Saarijärvi, 2012). According to previous research, the core functions of mechanisms in service systems include: (1) coordination function: promoting cooperation and consensus formation (Lawrence et al., 2009); (2) embedding function: integrating service logic into existing institutional frameworks (Wieland et al., 2017); (3) transformation function: linking structural constraints with participant agency to achieve institutional evolution (Lawrence & Suddaby, 2006). For example, Dong, Yan, and Yang (2024) pointed out through system dynamics modelling that a positive feedback mechanism is formed between AI technology empowerment, organizational support, and participant engagement. Under the synergistic effect of the three, the value creation capability of the service system is significantly enhanced.

Although the concept of value co-creation has been widely discussed, the mechanism as the core driving force in the value co-creation process still lacks systematic identification and service framework construction research for various types of mechanisms in specific contexts (Saarijärvi, 2012). Especially in higher education and career support systems, how to construct a student-centered service framework that can achieve personalized growth and system synergy remains a key challenge in research and practice.

In this context, in recent years, service design as a user-centered systematic approach has gradually become an important tool for constructing complex service systems. Service design emphasizes transforming abstract service concepts into actionable service touchpoints and interaction pathways through processes such as stakeholder involvement, prototyping, and iterative optimization (Stickdorn et al., 2018). In the context of higher education, service design not only focusses on the front-end learning and interaction experiences but also emphasizes the collaborative design of back-end resource management, technical tools, and organizational mechanisms (Awahnde, 2021). This approach helps to construct a career service framework that simultaneously considers structural stability and individual differences, providing implementation pathways for the mechanisms in service science and

offering practical basis for the systematic construction of career development services (Hay & Vink, 2023).

Therefore, this study aims to construct a career service framework centered on international doctoral students, driven by mechanisms and supported by multi-party collaboration, based on service science theory and service design methods. By deeply understanding the career experiences and development needs of international doctoral students, we aim to develop a career service framework with a clear value co-creation mechanism and multiple participation pathways.

The next section will further explore the current state and challenges of AI applications in higher education and the career development of international doctoral students against the environment of rapid advancements in artificial intelligence.

2.3.2 Artificial intelligence-enhanced career service

According to the definition by the Working Group on Career Guidance (WGCG, 2021), career guidance refers to the support services provided to individuals of different age groups to make informed decisions regarding education, training, and career paths. Career guidance services mainly include six core components (WGCG, 2021): career education, career information provision, individual and group counselling, skills and psychological assessment, employer interaction, and the development of job-seeking/self-employment skills.

Career guidance in higher education is gradually shifting from traditional promotion and face-to-face consultations to digital interaction models relying on advanced technologies (Ostroga,2024). For example, artificial intelligence technology can not only provide students with real-time career information and diverse career path displays but also enhance personalized support and the construction of career identity (Jawhar, 2024). Modern career guidance emphasizes the reasonable match between students' self-awareness and career information and highlights comprehensive support from exploration to implementation (Tkachuk et al., 2025). Although some programs have shown effectiveness in enhancing participants' employability, the current higher education system still lacks a unified and systematic framework for employability governance at the institutional level. Specific issues include the disconnect between curriculum content and labor market demands, the lack of data-driven graduate outcome assessments, insufficient resource allocation (such as career guidance, human support, and digital infrastructure), and the ineffective incorporation of employers into the design and management of career development programs, resulting in limited overall effectiveness of the employment support system (Adewolu Ogwo, 2024; Tran et al., 2024).

In recent years, artificial intelligence (AI) has been regarded as a key technology for enhancing the personalization level and service efficiency of career guidance. AI systems can generate customized career advice, training recommendations, and path matching by learning users' preferences and behavior patterns (Westman et al., 2021). Including large language models (LLMs) such as ChatGPT, and collaborative filtering-based recommended systems widely used in personalized learning environments (Wang ,2025). The intervention of AI has shifted traditional human-centered career services from inear delivery of standardized content" to data-driven personalized guidance and decision support (Bahalkar & Prasadu Peddi, 2024). But to achieve high-quality collaboration, users and career advisors need to possess basic technical literacy and maintain trust in the logic of AI system outputs (Donald & Straby, 2024). This also prompts researchers to focus on the practical significance of concepts such as human-AI collaboration and human-centered AI in the design of career services (Samadi et al., 2024; Balart & Shryock, 2024).

In this thesis, human-AI collaboration refers to the dynamic interaction and role complementarity formed between users and AI systems in specific goal-oriented tasks (Fragiadakis et al., 2024). Specifically, in the context of career guidance, AI is primarily responsible for data processing, trend prediction, and path suggestion, while human counsellors are responsible for emotional support, motivation enhancement, and value clarification, thereby forming a collaborative service (Kiselev et al., 2020). Human-centered AI, on the other hand, focusses more on system design principles, emphasizing that AI systems should be centered around user well-being, ensuring their interpretability, fairness, and transparency (Hartikainen et al., 2024).

Additionally, existing literature has also explored the impact of AI on the pprofessional identities of different groups, particularly in contexts where factors such as gender, nationality, and social resources intersect, where AI may either increase or relieve structural inequalities. Mehrotra & Sinha (2024) point out that AI platforms can provide equitable access to information for marginalized student groups, but this requires incorporating a social justice orientation into platform design, such as emphasizing equality and inclusive service design principles. For users such as international doctoral students who are at the crossroads of career transition, AI is not just a tool but an important support mechanism for improving their cognition and expression of their own abilities (Gedrimiene et al., 2024).

Therefore, in the field of higher education, to promote the diversified career development of international doctoral students, it is necessary to further focus on how AI can empower career guidance in the future, assist students in identifying transferable skills, reconstruct their professional identity, and complete self-positioning and path selection within the context of cultural heterogeneity. Therefore, this thesis is dedicated to developing an AI-empowered career service framework. Covering

human-centered design principles, functional complementarity between humans and machines, and interaction mechanisms among multiple stakeholders, including students, universities, corporations or employers. It aims to provide a theoretical foundation for building an inclusive and systematic career support system in higher education institutions.

2.4 Research gap

Although Japan has been continuously promoting policy reforms and increasing its focus on doctoral education in recent years, based on the existing literature, there are still some issues regarding the career development of international Humanities and Social Sciences (HSS) doctoral students that have not been addressed. Therefore, based on the three parts of the literature review, this paper's research gap is divided into three sections: structural, theoretical, and technological, as shown in Figure 2.2.

First, there are structural issues. This paper refers to issues related to the employment environment of PhD graduates, such as institutional factors, societal values, and employment systems. For example, although many studies have revealed the structural challenges of the Japanese academic labor market and the impact of neoliberal reforms, there is still limited attention on how "cruel optimism"—the emotional attachment to academic ideals—affects the professional identity and career decisions of international doctoral students. Especially in the context of increasingly scarce academic positions, the psychological pressure and identity conflicts arising from the pursuit of an academic career have not been thoroughly explored, and these issues are particularly pronounced for international doctoral students who are experiencing cultural differences and institutional barriers. Therefore, study1 will focus on exploring the relationship between institutional issues and the career development of international doctoral students.

The second is a theoretical issue. This paper refers to the theoretical study of the process of applying transferable skills by doctoral international students. Based on the literature review, we know that although transferable skills have been widely recognized as key to career mobility, empirical research on how doctoral students in the humanities and social sciences (especially international students) identify, articulate, and apply these skills in the non-academic labor market is still insufficient. This research gap is particularly significant in Japan, where recruitment practices differ culturally and institutionally from those in English-speaking countries. However, there is a lack of studies from the perspective of international doctoral students exploring their career transition process in this context. Therefore, study2 will focus on the theoretical issues of the process of applying transferable skills.

The third is a technical topic. This paper mainly refers to the application of AI technology in the field

of career guidance services and the potential for its expansion. Although the application of artificial intelligence technology in career guidance is becoming increasingly widespread, current research mainly focusses on the technical feasibility of AI tools, with less attention paid to their collaborative role in constructing career identity, enhancing career adaptability, or achieving equitable outcomes. Currently, there is a lack of conceptual frameworks that integrate the co-creation of human-machine value into the design of career services for doctoral students, especially in the systematic construction of services for students from diverse backgrounds. Therefore, study 3 focusses on the value co-creation process of AI technology in career guidance services and constructs a conceptual framework.

This doctoral dissertation attempts to fill the three research gaps. Focusing on the real experiences of international doctoral students in Japan, it explores the interactive effects of emotional, cognitive, and institutional factors in their career development process. At the same time, this study incorporates the role of artificial intelligence into the service innovation framework, proposing a more inclusive and responsive career service system.

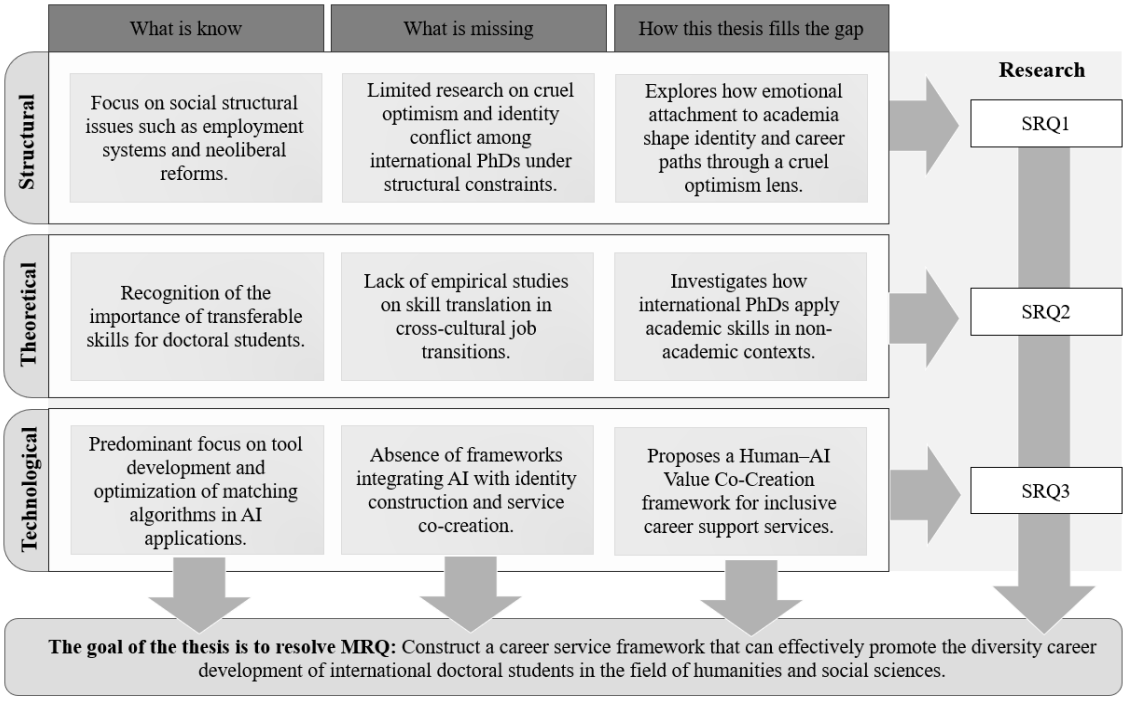


Figure 2. 1 Research gap

Chapter 3
Study 1: Cruel Optimism and Career Challenges of International HSS PhD Students

3.1 Introduction

In the context of the accelerated development of knowledge society and the internationalization of global higher education, the number of PhD graduates continues to increase. However, the scarcity of academic positions and the instability of university hiring systems are forcing more doctoral students, especially those in the humanities and social sciences (HSS) fields, to seek non-academic career paths (Edge & Munro, 2015; ORCE, 2019). Nevertheless, leaving the academic track is not an easy task. Taking Japan as an example, only about 14% of doctoral graduates enter corporate employment, compared to 40.2% in the United States, showing a significant gap (METI, 2023b; MEXT, 2020). In non-academic fields, the demand for PhDs in the HSS field is significantly lower than that for STEM PhDs (Karaca-Atik et al., 2023).

Among them, the challenges faced by international doctoral students are particularly prominent. Although international doctoral students in Japan make up about 40% of the doctoral population, with a majority being native Chinese speakers (METI, 2023b), systematic research on their career development paths remains very limited. They not only face the low practical value assigned to their disciplines in society, with doctoral degrees often being seen as over-qualified (Wallner et al., 2014);

on the other hand, international students also encounter numerous obstacles in integrating into the Japanese labor market due to language, cultural, and institutional barriers.

In higher education research, cruel optimism is used to describe PhD students' obsession with academic careers, even as the possibility of achieving them becomes increasingly remote (Berlant, 2011; Ma et al., 2020). This emotional state not only affects their career judgments but also has a profound impact on their mental health and social participation (Shirazi, 2020). Although previous studies have suggested that cruel optimism is prevalent among doctoral students, there is still a lack of empirical research on how this concept affects the career identity and path decisions of international doctoral students in a cross-cultural context.

Therefore, this study focuses on international doctoral students in the humanities and social sciences in Japan, constructing a theoretical framework through qualitative research to reveal the formation mechanism of cruel optimism in their career exploration process, and how it affects their career cognition, decision-making, and identity construction process. The research not only helps to reveal the structural dilemmas faced by international doctoral students but also provides empirical support for higher education institutions, enterprises, and career service systems to optimize doctoral education structures and non-academic employment support strategies.

This study, as the first phase of a three-stage doctoral dissertation research design, lays the theoretical foundation for understanding the career dilemmas faced by international doctoral students and provides a problem-oriented and realistic context for study 2 (focusing on how transferable skills are recognized and utilized in cross-cultural contexts) and study 3 (exploring the value co-creation mechanism of AI in doctoral career guidance).

3.2 Methodology

3.2.1 Heidegger's interpretive phenomenology theory

This study employs the interpretive phenomenology analysis method, with its theoretical foundation rooted in Heidegger's philosophy of being (Kafle, 2011). Unlike Husserl's descriptive phenomenology, which focusses on reducing the essence of experience, Heidegger emphasizes being-in-the-world, positing that human understanding is always embedded within specific historical, cultural, and social contexts (Laverty, 2003). Within this framework, experience is not seen as an objective fact but rather as a process that requires interpretation to construct its meaning. Therefore, the interaction between researchers and participants is a key pathway to understanding generation (Frechette et al., 2020).

The core methodological mechanism of interpretive phenomenology is the hermeneutic circle, which means that understanding is a dynamic process of continuous back-and-forth movement and deepening between the whole and the parts (Burns et al., 2022). Based on pre-understanding, researchers gradually reveal the meaning behind experiences by continuously examining the relationship between participants' narratives and the research context. This process requires researchers not only to conduct a detailed analysis of the text but also to maintain continuous reflection and self-awareness, reflecting the historicity and generativity of understanding (Tiwari, Tripathi, & Srivastava, 2025).

Although interpretative phenomenological analysis was initially widely used in nursing and clinical research, it has gradually expanded to research fields such as higher education and career development in recent years. For example, Moorman (2024) used this method to analyze the subjective motivations and emotional experiences of nurses leaving academic positions. Folabit & Jita (2024) revealed the impact of ethnic identity on scholars' career development in higher education institutions through this method. These studies indicate that interpretive phenomenology has unique advantages in exploring complex emotional experiences, structural tensions, and identity construction processes.

This study aims to reveal how international doctoral students construct their professional identities within the institutional context of cruel optimism. The interpretive phenomenological approach, with its emphasis on individuals' attribution of meaning to life experiences and embedded understanding of cultural and structural contexts, is highly compatible. This method can help understand how doctoral students navigate the tension between "hope and reality" within the neoliberal higher education system and construct professional meaning and self-identity amidst complex emotions and identity challenges (Matua et al., 2015).

3.2.2 Participants

According to the discipline classification standards of the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT, 2002), this study defines humanities and social sciences as encompassing 13 academic fields, including cultural anthropology, law, economics, business administration, and psychology, etc. The subjects of this study are 12 international doctoral graduates who completed their PhD studies in Japan and have either secured formal employment or are engaged in research work, show as in Table 3.1.

Participant recruitment did not impose restrictions based on nationality, gender, age, or type of job type, using snowball sampling through social networks for recruitment (Creswell & Creswell, 2017). The final sample includes 11 Chinese international students and 1 South Korean international student, of which 10 are female and 2 are male. The academic backgrounds cover various fields such as social

Table 3. 1 The characteristics of participants and question items

Participants	Gender	Nationality	Field of study	Occupation	Current contract status	Workplace
P1	Female	China	Management business	Lecturer	Tenure	China
P2	Male	China	Technology management	Lecturer	Tenure	China
P3	Female	China	Social psychology	University researcher	Contract faculty	Japan
P4	Female	China	Anthropology	Lecturer	Contract faculty	Japan
P5	Female	China	Mathematical economics	Associate professor	Tenure	Japan
P6	Male	China	Cognitive science	Lecturer	Tenure	Japan
P7	Female	China	Law	Associate professor	Tenure	Japan
P8	Female	China	Cultural psychology	Assistant professor	Contract faculty	Japan
P9	Female	China	Anthropology	Assistant professor	Contract faculty	China
P10	Female	China	Psychology	Lecturer	Contract faculty	Japan
P11	Female	China	Cultural anthropology	Assistant professor	Contract faculty	Japan
P12	Female	Korean	Social psychology	Specially appointed assistant professor	Contract faculty	Japan

The experience of job-hunting	
The opportunity for a job hunting	1. Please tell us about important experiences that sparked your interest and desire to find a job in academia/current field of work. 2. What to expect before the job hunt begins?
Individual actions	3. When did the job hunt start and end? 4. Is there anything about the job-hunting process that made it particularly difficult or hard for you? 5.What kind of resource did you use for job hunting? 6. Was there anything in your job hunting that made you feel powerless even though you tried?
The result of the actions	7. Do you think the results met your expectations? 8. What kind of resources or experiences do you think you would prefer to work for a company if you had them?

psychology, cultural anthropology, cognitive science, law, and management, all graduates from research-oriented universities in Japan, including national and private universities.

The recruitment process is divided into two phases: the first phase involves completing interviews with 8 participants and conducting preliminary analysis in January 2024; the second phase involves adding 4 participants in May 2024, reaching theoretical saturation at the 12th interview. All participants signed informed consent forms. Approved by the Japan Advanced Institute of Science and

Technology's Life Sciences Committee under Code: Human 05-060. All participants in this study consenting to research interviews were conducted via Tencent Meeting or Zoom, spanning from January 19, 2024, to June 9, 2024, resulting in a total of 61 pages of transcribed text.

It should be noted that the sample for this study mainly consists of PhD graduates who have successfully entered academia, including tenure-track faculty, lecturers, associate professors, and specially appointed instructors. This sample selection is based on the purpose of this study, which is to deeply understand the emotional mechanisms and professional identity construction of doctoral students in the process of achieving their academic career paths. Therefore, the focus is on individuals who have gone through the actual process of constructing their career paths. For doctoral graduates who have not yet found employment or entered academia, their career paths are still unstable or in the exploratory stage, and they cannot fully present a complete career construction experience. This differs from the aim of this study, which is to analyze the psychological mechanisms of academic path completers. Moreover, although the initial plan was to include individuals who had not successfully entered academia in the study, it was ultimately decided not to include them in the sample due to concerns that the interview process might cause psychological stress related to career setbacks. This also constitutes a limitation of this study. Future research could consider including such groups under more protective and supportive research designs to further enhance the understanding of the diversity in doctoral career development paths.

3.2.3 Data collection

This study employs the critical incident technique (CIT) to design semi-structured interview questions, aiming to identify and analyze the key events that shape the career development of international doctoral students. CIT focusses on the context of events, individual behaviors, outcomes, and their effectiveness (Dunn & Hamilton, 1986), making it suitable for points uncovering career turning and the meaning-making processes behind them. By guiding participants to review specific situations and experiences, researchers can gain a deeper understanding of how individuals respond to and interpret specific events.

There are three key question items of this study: (1) the triggers or contexts that cause job-seeking behavior, (2) the actions taken by individuals in those contexts, and (3) the outcomes of those actions. This structure not only aligns with the logic of CIT but also reflects the process of meaning formation emphasized by interpretive phenomenology, which highlights embodiment, situationally, and temporality (Watson, 2024).

Moreover, these question items help to reveal the emotional tension and identity formation

experienced by doctoral students during their career decision-making process. Although many doctoral students initially aspire to become scholars upon entering their programs, the structural limitations in reality—such as the scarcity of tenure-track positions—often prompt them to reassess their career goals. By reconstructing the pathways of opportunities, actions, and outcomes, the research can illustrate how doctoral students act amidst uncertainty and reveal how the emotional mechanisms represented by cruel optimism (Berlant, 2011) influence the construction of their professional identity.

3.2.4 Data analysis

The data analysis in this study is conducted in two phases, using Microsoft Word and MAXQDA software to assist in the implementation. The first stage involves cleaning and refining the text records using Word to ensure content accuracy and language clarity. The second stage employs the interpretive phenomenological analysis framework, following four steps for analysis: first, extracting representative significant statements; second, deepening understanding through the hermeneutic circle by combining the researcher's pre-understanding with participant data; third, summarizing common themes across all interviews; and finally, integrating various themes to generate a comprehensive interpretation of doctoral students' career experiences (Rädiker & Gizzi, 2024; Rädiker & Kuckartz, 2020).

During the coding process, we utilized MAXQDA's hierarchical code-subcode model to clarify the relationships between themes and sub-themes, thereby more intuitively revealing the manifestations of cruel optimism in the career development of doctoral students, as well as the dynamic changes and tensions in the construction of their professional identity.

To enhance the credibility and consistency of the analysis, this study implemented a collaborative coding strategy during the analysis process. The first author and co-authors repeatedly compared and discussed the preliminary coding results, corrected inconsistencies, and continuously consulted during the theme construction process to ensure the validity and logical rigor of the coding framework.

In addition, to enhance the transparency and reflexivity of the research, this study introduced reflexive journaling. Since the first author of this study is also an international doctoral student studying in Japan, the researcher positioning inevitably affects the understanding of the interviews. Therefore, incorporating reflective journals to write reflective notes throughout the data analysis process, continuously recording changes in one's understanding, emotional responses, theoretical associations, and other content, helps clarify potential biases and promotes the in-depth development of interpretations. And while maintaining resonance with the participants, avoid excessive emotional or experiential projection (Ho et al., 2025).

3.3 Results

3.3.1 The impact of external systems and environments on career choices

3.3.1.1 The influence of culture and networks on career choice

Two subcodes “The impact of social networks" and "Ideal careers under social norms"—reveal the key outside influencing elements on the PI of overseas doctorate students. Figure 3.1 shows how individual interactions in social networks affect professional selections; social norms drive career preferences on a macro level.

The PI of doctoral students is influenced by parents, mentors, friends, and seniors, with each role playing a part at different stages. Parents shape their children's perception of the ideal profession early on; for example, P2, influenced by a family of teachers, aspired to become a university teacher from a young age. Apart from their dissertation instructions, mentors influence career identity and offer recommendations or chances for job hunting (P3 hired their first job because of a mentor). Of the 12 interviewees, all claimed that either directly or indirectly their choices on job hunting affected mentors (Yin, 2024; Wilkins et al., 2021). Friends and seniors, on the other hand, mostly offer temporary assistance throughout the job hunt period, that is, industry information and experience (P1, P4).

Social norms define PhD candidates' PI by means of regional economic conditions and occupational values. For example, in economically underdeveloped regions such as northern China (P1, P2), safe jobs like teaching and government service are considered as ideal choices. PhD students are driven by social consensus toward traditional professional paths instead of looking at numerous possibilities (P1). P7 also pointed out, "if I wanted to go into business, I wouldn't have pursued a PhD at all." This indicates that joining academia is seen to require a PhD degree. Moreover, Japanese companies pick graduates with undergraduate or master's degrees since they think that PhD graduates have high salary expectations and their skills do not match employment standards, therefore lowering their competitiveness in non-academic sectors (P4, P10, P11). Limited by social conventions and vocational expectations, it is not only a personal decision but also a socialized behavior (Mocrei-Rebrean, 2023). Often unappreciated, the value of PhD candidates in non-academic fields leads to a mismatch between their qualifications and job requirements. Reflecting a global trend, this occurrence exists in Japan (San-Jose & Retolaza, 2021) as well as Belgium and Spanish (Wille et al., 2023; De Vlieger, 2024).

3.3.1.2 Uncertainty in academia work environment

This theme is composed of subcodes: "Lack of position" and "Invisible barriers." For international PhD students, the biggest challenge in seeking academic positions lies in the scarcity of available

positions.

Almost all participants indicated that obtaining a tenure-track position is very difficult, with the biggest issue being the supply-demand imbalance. Of the 12 participants, 5 got tenures and 2 of them did so directly following assistance from their advisers. To guarantee tenure prospects, most of the remaining candidates followed a lengthy application and waiting process. P10 said, for instance, "I had previously earned my PhD for three to four years but still couldn't get a job. Anxious, I thought about what I might have done wrong."P4 said that the Japanese government has declared its aim to limit financing for HSS, which has resulted in notable cuts in university spending particularly at national universities. Over the past decade, universities have been forced to reduce faculty recruitment, operating by hiring only one person for every two or three retirements.

Some hidden barriers in academic job recruitment increase the difficulty for international students to apply for faculty positions. P9 mentions, "We have learned to identify these job postings, especially those with very short application deadlines. They likely already know who they want, and posting the job is just a formality." The academic job market is not just about individual abilities but also involves interpersonal networks. You are unsure and don't know if this position has already been filled, but you still need to take the time to prepare for the limited opportunity. P7 points out that positions in the field of law are extremely rare, and recruitment often happens through internal recommendations, making it difficult for external applicants to enter. Some aspects of legal studies involve sensitive national content, so even if the recruitment information does not explicitly state it, these subjects do not accept foreigners as an implicit condition.

3.3.1.3 Challenges of applying for non-academic positions

Two sub-codes “Mismatches and non-transparent recruitment" and "Lack of career support resources"—combine to form this theme.

The lack of clarity in job postings by companies has been repeatedly mentioned as an issue. In Japan, companies usually provide clear recruitment requirements for undergraduate and master's students, while doctoral students are broadly categorized as "graduate students," lacking specific job information. P6 mentioned, "I don't know what the company wants... the job description looks like you can do anything." Many recruiters lack a clear understanding of job requirements and suitable fields of expertise, making it difficult for PhD students to assess their fit (Fu, 2024; Ellawala, 2024).In the field of humanities and social sciences, this issue is particularly prominent, as the specialized training of PhD students is difficult to directly translate into corporate needs (P3, P4, P6, P7, P9), making their job search in non-academic fields more challenging.

Even though only one out of the twelve participants do not speak Japanese, the other eleven have a high level of proficiency in the language. But they still feel confused due to fragmented information and the lack of career guidance. P3 underlined, "The biggest problem is the lack of job search guidance; we don't know where to find information." Only to discover when they start the job market that the recruitment rationale in non-academic is quite different from that in academia, PhD students spend a lengthy period concentrating on academics and have limited touch with the corporate world (P3, P6, P10).Universities' career guidance support mostly target undergraduate and master's students; they lack particular support for PhD candidates on how to show their value to businesses (P3, P7, P9).Therefore, the professional development of PhD students need to create a career advice system especially for them, offering accurate job data and bridging the gap between academia and business (Gough & Neary, 2021).

3.3.2 Individual Challenges and Responses

3.3.2.1 Existential values of self-pursuit

This theme comprises "Personal preference" and "Reflections on identity and value. “Both highlight how existential values; personal motivations profoundly affect PI formation. People's search for their employment to coincide with their own values reflects this existential value (Girard, 2024).

Participants' affection for research enables them to keep on when they feel the competitive pressure of academic employment. Some respondents said clearly, they are not interested in commercial roles since they believe a PhD career is naturally linked with an academic one. They have a deep passion for the field of research and derive intrinsic satisfaction from the process of exploration and knowledge acquisition. P3 said “I think it is because I am more interested in research, and at the same time, I feel that I am more comfortable with the atmosphere of working in a university. For example, the university is freer. Although the pressure of work is quite high, I feel that going to a company is always a task given to you, and then you follow the task to run that kind of feeling, I will be more rejected by that kind of feeling. The university may have a little more autonomy” Due to the highly creative nature of thesis writing, participants tend to prefer jobs with high autonomy in terms of time and other aspects. However, non-academic positions often lack this flexibility (Ruubel, 2021).

Some interviewees also explained continuing in academics as a process of self-discovery. Their PI (P8) was confirmed by their enjoyment of reading and writing. This emphasizes the existential relevance of career choices since meaningful participation in one's work might deepen self-awareness (Fleuren et al., 2024). At the same time, existential values emphasize that personal values, identity, and the

meaning of existence are aligned with career choices (Girard, 2024). Research has explained scholars' PI and academic motivation as driven by career interests, values, and commitment to significant work responsibilities (Folabit & Jita, 2024; Litalien et al., 2024).

3.3.2.2 The impact of PhD program experiences

This theme includes “Professional understanding”, “Mismatch between graduation plans and recruitment timeline”. This theme expresses the impact of doctoral programs on the career development of international students including their deep understanding of the field of profession. Additionally, there are conflicts in the timeline between the program itself and the development of other career paths.

There is a significant gap between their academic skills and business recognition. Students often feel that their expertise, especially in the HSS field, does not contribute to real-world society and lacks directly applicable skills. This gap leads to confusion about their professional identity when transitioning from academia to the corporate world. This confusion aligns with the understanding of PI, which includes a person's role at work and their social status (Johnson et al., 2012). Indeed, P4 said, "I am looking for a job in a private company, but I feel that I cannot make a significant contribution to society." So, I feel that my PhD degree is just for self-fulfillment.

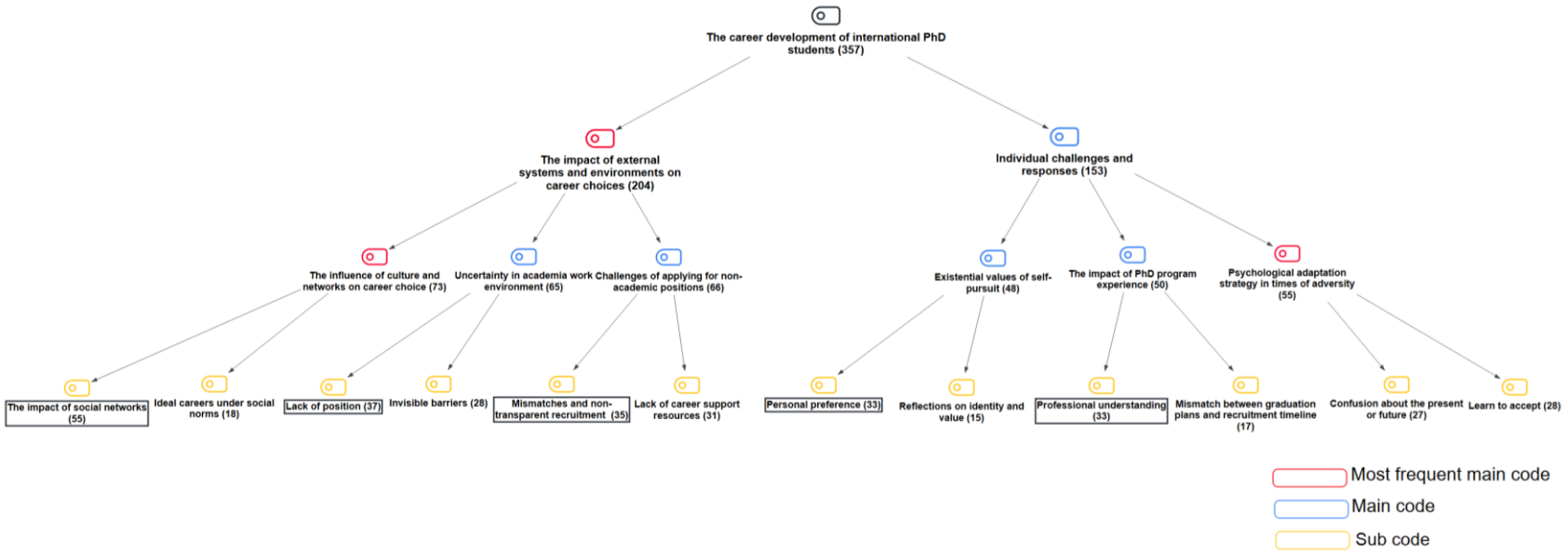
Due to the long and challenging process of writing a doctoral dissertation, PhD students often prioritize their dissertation over career planning. Additionally, the recruitment process in Japanese companies requires preparation one to two years in advance, which is both lengthy and complex. As a result, almost all students do not consider employment in Japanese companies after submitting their dissertations. P12 said, "At that time, I was more focused on completing my PhD and submitting my dissertation rather than worrying about what to do after graduation. The priority was to finish the dissertation and obtain the degree."

3.3.2.3 Psychological adaptation strategy in times of adversity

Finally, this theme includes two subcodes: " Confusion about the present and future " and " Learning to accept." This theme covers the psychological and behavioral responses of doctoral students to various challenges during the job search process.

Participants' anxiety about the future is manifested as a lack of motivation. For example, P3 said, "I just lay at home anxiously for a while; I didn't send out my resume. “Like P2 discussed, people's reluctance to push for a position —including whether to send a resume —is many students gradually came to terms with their reality of an uncertain career path and learned to modify their expectations to

manage stress over time. P8 said that despite the current instability, it's okay because everyone is in the same boat, not just international students. She is confident about obtaining tenure. It reflects the process of acceptance and adjustment. Most PhD students feel varying degrees of anxiety about their current situation and future. P12 expressed long-term confusion and uncertainty about working in Japan as a foreigner, feeling doubtful about future career development and their sense of identity and belonging. P3 mentioned a very excellent professor she knows, who applied to 26 schools before finding a job. The professor's experience put immense pressure on her, but she had no choice but to accept the situation. PhD students oscillate between accepting the status quo and being confused about the future. This cycle of hope and disappointment may continue until they achieve or abandon their goals.



*Most frequent main code (Red): Represent the main code that appears most frequently among all codes. It is automatically generated by MAXQDA based on the frequency of each code.
*Main Codes (Blue): Represent the major branches of each theme.
*Subcodes (Yellow): Detailed aspects under the theme.
*The high frequency subcodes are marked with a box to highlight their importance within the overall theme.
* The numbers in brackets next to the codes represent their frequency of occurrence

Figure 3. 1 a hierarchical codes-subcodes model of dynamic influencing factors for career development

3.4 Summary

Although the neoliberal system is considered to exacerbate the instability of the academic labor market and induce scholars' cruel optimism emotional attachment to academic positions, there is still a lack of thorough exploration on how it affects the career development and professional identity construction of doctoral international students in the humanities and social sciences in a cross-cultural context.

To fill this gap, this study employs interpretive phenomenological analysis to interview 12 international students who have obtained doctoral degrees in humanities and social sciences in Japan, exploring how cruel optimism operates in career choices and professional identity construction.

Show as in figure 3.2, the career development of doctoral students is influenced by both external and internal factors. External factors include socio-cultural and professional environments, such as social networks and norms that lead doctoral students to view academic careers as the only reasonable choice. Mentors and community culture reinforce this identity, making them prioritize academic positions. Additionally, the demand for doctoral students in the non-academic market is unclear, corporate recruitment information is vague, and university career counseling is insufficient, further intensifying doctoral students' emotional attachment of academia positions.

Internal factors involve PhD students' personal interests, career perceptions, and psychological adaptation. Many enter academia out of a passion for research, which is further reinforced during their doctoral studies. Even though, international PhD students also face uncertainties in cross-border job searches, issues of belonging, and restrictions on foreign hires in certain disciplines in academia labor market. Moreover, their limited understanding of non-academic careers, coupled with the mismatch between PhD graduation timelines and corporate recruitment cycles, makes it difficult for them to explore alternative career paths. Ultimately, they are compelled to accept the cruel of the academic job market, further deepening their dependence on academia and believing that perseverance will eventually lead to success.

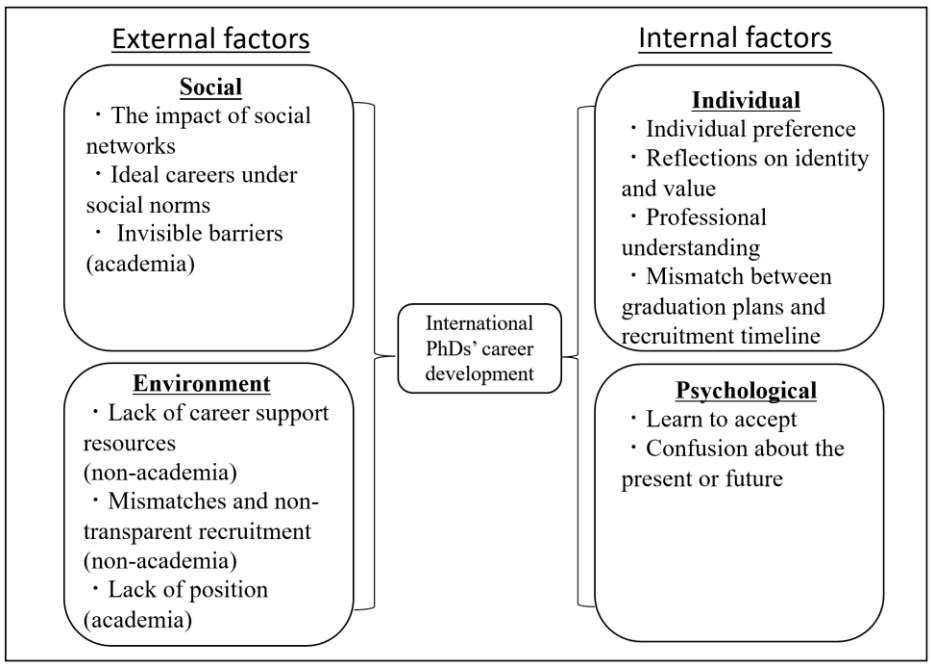


Figure 3. 2 Framework of external and internal factors influencing PhD students' career development

Moreover, this study summarizes three impacts of cruel optimism on the career development of doctoral students:

(1) The rigid academic identity limits their career choice flexibility

(2) Long-term investment in academic positions makes it difficult for them to accept non-academic fields

(3) In non-academic job searches, they often fall into psychological struggles due to lack of confidence and unclear perceptions.

However, understanding career dilemmas solely from institutional and psychological perspectives is still insufficient. How international doctoral students can identify and effectively transform their professional skills to adapt to interdisciplinary and cross-field workplace practices is key to achieving career diversification. Therefore, the next chapter, study 2, will further explore this topic.

Chapter 4
Study 2: Transferable Skills Application for International HSS PhDs

4.1 Introduction

Although in recent years, graduates in the field of Humanities and Social Sciences (HSS) have also begun to seek employment opportunities outside of academia. However, this shift is driven by multiple factors, including an oversupply of PhD graduates, the worsening instability of academic employment, and the continuous demand for highly educated, interdisciplinary talent in a knowledge-based society (Hnatkova et al., 2022; Spronken-Smith et al., 2024).

Moreover, for international doctoral students educated in the field of humanities and social sciences, the challenges of career transition are particularly severe. In addition to the limited recognition of their skills outside academia and the misalignment between training content and market demand (ESF, 2017; Broms & de Fine Licht, 2019), they often face additional barriers such as cultural differences, language barriers, and a lack of industry connections (Skakni et al., 2022). Taking Japan as an example, the traditional corporate recruitment culture and the lack of long-term postdoctoral career paths in the institutional environment further exacerbate the career uncertainty faced by these doctoral graduates (Calmand et al., 2018).

Although existing research has explored the career transition motivations of doctoral students and strategies for universities to enhance their employability (Phan, 2024; Crawford et al., 2024), there is still a lack of in-depth investigation into how international doctoral graduates actually apply the

transferable skills developed during their doctoral studies to achieve cross-disciplinary career transitions.

To fill this gap, study 2 focuses on the core research question, "How do international doctoral graduates' cross-cultural experiences influence the development and application of their transferable skills?" Using the interpretative phenomenological analysis (IPA) method, the study analyzed interview data from six international doctoral graduates who sought employment in Japan and successfully entered companies (including one dropout). By integrating the theory of transferable skills and the theory of cross-cultural adaptation, this study proposes a process-oriented model aimed at explaining how international doctoral graduates in the humanities and social sciences identify, reconstruct, and practically apply their skills in cross-cultural and professional contexts.

This study contributes to a deeper understanding of the career autonomy of international doctoral graduates in the global labor market, while also providing theoretical references and practical insights for optimizing doctoral education support systems and promoting diverse career development.

4.2 Methodology

4.2.1 Heidegger’s interpretive phenomenological theory

Interpretative phenomenological analysis (IPA) is a qualitative research method based on Heidegger's philosophy (Eatough & Smith, 2017), aimed at revealing the deeper meanings of phenomena that are concealed or overlooked in daily life through in-depth interpretation of lived experiences (Frechette et al., 2020). This method emphasizes balancing description and interpretation, uncovering the unique meanings of life experiences through participants' self-expression and researchers' in-depth analysis. The core principles of IPA emphasize the uniqueness and subjectivity of individual experiences while ensuring the authenticity of the narratives and the depth of the research (Alase, 2017; Pietkiewicz & Smith, 2014).

IPA is suitable for exploring the life experiences of people from diverse backgrounds, especially in complex situations such as cross-cultural contexts and career transitions, as it can capture the process of meaning-making by individuals in multicultural and contextual settings (Woodend & Arthur, 2024).This study aims to understand how the cross-cultural background of doctoral international students influences the formation of transferable skills and to explore the process through which they practice these transferable skills. Therefore, this study will use IPA for data analysis, and the data collection and analysis process will be detailed in the following sections.

4.2.2 Sampling and recruitment

We recruit participants based on the following three criteria: first, foreigners who are not Japanese nationals: second, those who are pursuing or have obtained a PhD in the humanities and social sciences in Japan. The classification of humanities and social sciences is based on the discipline classification published by the Japanese Ministry of Education, Culture, Sports, Science and Technology (2002); third, those who are currently working outside the academia. Due to the small number of PhD graduates in the HSS who find employment outside of academia, most students aim for research positions or universities (Sherman et al., 2021).To achieve the research objectives, we conducted purposive recruitment of eligible potential participants through personal networks and referrals from interviewees between January and October 2024.Ultimately, in the data analysis of the sixth participant, the study found no new themes or perspectives, thus concluding that data saturation had been reached. According to Table 4.1, the participants included 3 males and 3 females, aged between 20 and 40 years. Three international students from Thailand chose to return to their home country to work after graduation. Three Chinese international students chose to stay in Japan after graduation. Although the research was conducted within Japan, the participants' career choices and identity development unfolded across the intersection of their home and host cultures. Therefore, the

Table 4. 1 The characters of participants

Participants number	Gender	Age group	Nationality	Research areas of PhD	Time investment in doctoral degree	Occupation	Workplace
P1	Male	40	Thailand	Service design	4years	Business Partner and Engineer.	Thailand
P2	Male	30	Thailand	Supply Chain Management	4years	Logistic Company's Manager	Thailand
P3	Female	30	Thailand	Municipal Solid Waste Management	4years	Chemical Company Senior Officer	Thailand
P4	Female	40	China	Management Philosophy	4years	Consultant	Japan
P5	Female	20	China	Education	3years	IT Specialist	Japan
P6	Male	20	China	Geography	3rd-Year Dropout	Market Researcher	Japan

study adopts a cross-cultural lens to examine how international doctoral students negotiate cultural differences in their professional transitions.

The research fields during their doctoral studies included service science, management, education, and geography. Out of the 6, 5 obtained their doctoral degrees, and 1 dropped out. This study has been approved by the Japan Advanced Institute of Science and Technology's Life Sciences Committee under Code: Human 05-060. All participants signed informed consent forms and voluntarily participated.

4.2.3 Data collection and analysis

We conducted semi-structured interviews with six participants, using the critical incident technique (CIT) to design questions. CIT is a method that reveals underlying trends, motivations, and structures by analyzing seemingly ordinary events in daily practice (Husband, 2020). Based on the research objective of understanding the job-hunting experiences of international PhD students, revealing the factors that influence transferable skills, and exploring how they apply these skills, using CIT can help us reflect on the details of events, participants' reactions, and outcomes, delving into the deeper meanings of job-hunting events. Therefore, based on the CIT method, we divide the questions into three parts: job opportunities, actions taken, and the outcomes of those actions.

After transcribing the interview recordings into a 43-page text document, the data was imported into MAXQDA 2024 for analysis. The analysis process follows the guidelines of Interpretative Phenomenological Analysis (IPA) (Woodend & Arthur, 2024; Smith, Larkin & Flowers, 2021) and incorporates the MAXQDA user guide (Rädiker & Kuckartz, 2024), divided into the following five

Table 4. 2 The process of interpretive phenomenological analysis

Step	Task	Action
1	Repeatedly read individual cases	Deeply understand the participants' worlds and familiarize oneself with their narratives.
2	Semantic analysis	Record important information from the transcripts and paraphrase it.
3	Extract exploratory notes	Identify the most important features and use memos to create experiential statements for each case.
4	Codes and subcodes generation	Based on experiential statements, compare the similarities and differences between cases, generate codes and subcodes with code creating system, and construct a framework of connections.
5	Writing the analysis results	Present the research findings to the readers through detailed descriptions and charts.

steps: 1. Repeatedly read individual cases;2. Semantic analysis;3. Extract exploratory notes;4. Codes and subcodes generation;5. Writing the analysis results. The details are as follows in Table 4.2.
To ensure the credibility of the themes and researchers repeatedly check the data, compare the logic of the main themes and sub-themes, and incorporate expert opinions at every step of the analysis.

4.3 Results

The findings of this study revolve around two key themes and six sub-themes. First, it explores how doctoral students in HSS in Japan navigate the process of cross-cultural adaptation to explore and clarify their self-identity, facilitating career transitions. Second, it analyzes how international students develop transferable skills to adapt to different professional cultures and shape their personal brand by integrating and interacting with various forms of capital in a cross-cultural context.

4.3.1 Leveraging cross-cultural adaptation for career transition

4.3.1.1 Identifying opportunities through cultural sensitivity

This topic reveals how international doctoral students, in a multicultural context, can identify potential career opportunities and adjust their strategies accordingly to achieve career transitions by observing cultural signals in environmental changes. The cultural sensitivity demonstrated in this process is a key ability for international students to establish professional identity and smoothly integrate into organizations in a cross-cultural workplace. Having cultural sensitivity not only helps in understanding organizational norms and reducing cultural conflicts but also significantly enhances one's adaptability and competitiveness in the local labor market (Dai & Pham, 2024).

For example, after realizing the limited salary returns and career development bottlenecks in the Japanese academic community, P6 re-evaluated their research skills in the humanities and attempted to transform them into a competitive advantage in non-academic fields. He said “This is the reality, even for PhD graduates working in universities. For a foreigner in the humanities, especially someone like me who studied human geography—a niche field—the academic opportunities are scarce. The typical salary range would only be around 180,000–200,000 yen. It might take until my 40s or 50s to even have a chance of becoming an associate professor... For fields like sociology, there’s at least a chance to find roles at private schools. But for humanities fields, the opportunities are even fewer…. Add in the anxiety from the pandemic, family expectations, and the feeling of being almost 30 years old and still relying on parental support, it’s a lot. Scholarships are also unreliable….”

P2 further verified how the broader salary and career choices in the industry attract PhD international

students to enter market-oriented work environments. As P2 indicated, “In the business world, they have a wider range of rights than in academia. You may get paid much more than the university pays you.”

From the interview data, doctoral students with cross-cultural experience are more likely to flexibly reflect on and adjust their self-perception, break away from traditional academic paths, and enhance their ability to identify and seize new opportunities (Pidduck & Zhang, 2022). This finding is also consistent with existing research, which indicates that cultural sensitivity, as a key cultural capital, can significantly enhance the adaptability and employability of international doctoral students (Wang et al., 2024).

4.3.1.2 Reflecting on academic experiences to adapt goals

This section emphasizes the process by which participants adjust their career goals through reflecting on their academic experiences. Although most participants aimed for academic positions when entering the doctoral program, during their studies abroad, they continuously evaluated whether they were suited to continue the academic career path by reflecting on academic life and research topics.

P5's mental and physical health were severely compromised due to excessive pressure during her PhD program, leading her to gradually prioritize whether a career could bring well-being. Although she initially had doubts about whether leaving academia for the corporate world would devalue her PhD, and hesitated due to societal pressure and family expectations, these views gradually changed over time. Ultimately, she became more focused on finding a career path that could meet her mental health needs and enhance her personal happiness. “I hesitated for about one to two months before starting my job search during my second year. In the end, I decided that I didn’t want to stay in academia. The main reason was that pursuing a PhD had severely affected my physical and mental health. I felt like I was developing symptoms of anxiety and depression. Because of the stress from my PhD, I often had insomnia, and for several days in a row, I would feel deeply down and just want to lie at home. It was significantly affecting my well-being, so I didn’t want to continue in academia（P5）.”

Reflective ability is an important transferable skill cultivated in doctoral programs. It helps students identify their growth needs, explore the significance of academic research, and achieve a synchronization of personal and professional development (Kinsella, 2017). In the participants' learning process, reflective ability played a crucial role in their career positioning. For example, P6's research was interrupted due to the pandemic, and the uncertainty of the pandemic disrupted his research plans, causing him to question the feasibility of continuing an academic career. Ultimately, he chose to drop out at the right time and adjust his career path. P4, as a doctoral student in business

management, realized through reflection that he lacked corporate work experience, which made his research lack practical significance and soul. On the other hand, P1, P2, and P3 pointed out that academia focuses more on theoretical innovation, while the private sector emphasizes translating innovation into implementable business outcomes. PhD students who choose to enter the corporate sector, through reflection, discover that they can utilize the research skills, critical thinking, and project management experience developed during their doctoral studies to create tangible results for the company, thereby feeling the value of their work more directly.

This indicates that through the cultivation of reflective abilities, doctoral students can not only reposition their roles in the labor market but also efficiently transform academic skills into practical abilities, making more meaningful contributions to the development of academic or practical fields.

4.3.1.3 Culture factors shaping career choices

Through analysis, we found that cultural background mainly influences participants' career choices through language, social responsibility, and intrinsic needs.

Previous studies have indicated that language, as an important component of culture, has a significant impact on career choices (Zhu & Zhang, 2014; Adedeji & Alabi, 2024). This study found that language proficiency affects international students' willingness to stay and work in Japan. Job hunting in Japan requires a high level of Japanese language proficiency (P2, P5, P6), but some international students find it difficult to master quickly due to limited study time or cultural differences (P1, P2, P3). For example, Chinese students learn Japanese faster due to the similarity of kanji, while students from other countries face greater learning obstacles.

In Asian culture, family expectations and social responsibilities play an important role in career choices (Tao et al., 2018; Aisyawati & Akbar, 2024).For example, some international students choose jobs with higher returns in order to better take care of their families (P1, P3).Some students initially pursue a PhD because a doctoral degree symbolizes higher social status and is a family honor. But as they experience and understand the actual academic work content and environment during their studies abroad, such as the increasing number of contract-based teaching positions mentioned in P6, many choose to seek alternative paths. For international students, when making career choices, they may seek a balance between family and society, while also being more inclined to utilize new environmental resources to achieve their career goals. This aligns with previous research that suggests individuals with multicultural backgrounds are more likely to respect intrinsic motivations in their career choices (Akosah-Twumasi et al., 2018).

4.3.2 Developing transferable skills in cross-cultural contexts

4.3.2.1 Seeking guidance and building support networks

4 participants mentioned seeking job-related guidance and support through personal networks, university career support centers, and external vocational training institutions. International students hoping to find jobs in Japan, through seeking external help, understand the recruitment processes of Japanese companies, the requirements for job applications, and details such as material preparation. They learn and practice how to translate their academic skills into skills useful for companies (P2, P4, P5, P6).

For instance, P4"I specifically invited a professor who researches career support activities to talk with me two or three times. When I was preparing my interview materials and practicing answering potential questions, I asked that professor to check over my responses…. He gave me advice on interviews for consulting firms. He explained the skills that consulting companies expect from students and provided me with some materials…. and he helped me organize my ideas. After receiving his feedback, I restructured and refined my plans…Before I started job hunting, I consulted many people, trying to seek advice from professionals or experienced individuals. I didn't handle everything on my own—I was constantly asking for advice…."

P5 participated in an off-campus job counseling course. She mentioned that the teachers at the career counseling agency are all from the management of various well-known Japanese companies, and many of them have worked as HR. They guide her in writing resumes and conducting mock interviews from the perspective of an interviewer. "Before, I didn't know how to write a resume or answer interview questions at all. After the instructor revised my resume a few times, I started understanding how to make it more appealing to HR. Through multiple mock interviews, I became more fluent and knew how to respond during real interviews…. Relying on professionals made the process much more efficient. The biggest issue for PhDs is the lack of information, both online and from universities. Without professional help, it's difficult to navigate the process. Personally, I had no prior experience with job hunting and didn't know where to start…. When I asked university staff for advice, they admitted they had no experience helping PhDs with job hunting. Hearing that made me even less confident, as I had no guidance and no resources to refer to…So I thought getting help from a professional institution would be the best option."

From the participants' experiences, we found that due to the complexity and diversity of the Japanese recruitment process, professional career guidance can help international students better understand Japanese corporate culture and alleviate job-seeking obstacles caused by cultural differences.

Moreover, compared to university career guidance, having more authoritative personnel as career guidance instructors can not only better assist PhD students in the HSS better by transforming obscure and abstract theoretical research content into skills applicable in the corporate and social sectors, but also provide substantial psychological support for international students.

4.3.2.2 Systematic alignment of academic expertise with industry needs

Participants will enhance the practical value of their doctoral research topics, deliberately cultivating and summarizing skills beyond academic ones. This will mitigate the employment barriers caused by a lack of work experience and the disconnect between academic disciplines and societal needs.

According to the research by Aiello et al. (2021), incorporating the genuine participation of stakeholders and research beneficiaries into the research process, and co-creating knowledge with stakeholders, can effectively enhance the practicality and social impact of research in the humanities and social sciences. Some participants connected their research topics with social hot issues through participation in industry-academia collaboration projects, helping them find jobs more smoothly. For example, P3 " Actually, there was a project in my hometown about cleaning up plastic waste in the oceans. Because My PhD research focused on waste management, I just want to do things related to managing waste. The company I work for now actually started this project about 10 years ago, and I came across it during my PhD research. I think that project was very cool and very interesting. And I think if the project owner runs the project very effectively, that can create a very good outcome. So after I graduated，would like to work in a company that meet on my experience and knowledge that I have at that time. So, apply to this company." P2, on the other hand, began working at a research institution after completing his PhD. Through engaging with industry-academia collaboration projects, he started to establish connections in the business sector, accumulating commercial experience and networks. These experiences played a crucial role in his subsequent evaluation and appointment to consulting firms and other business positions.

Some participants who did not have the opportunity to engage in industry-academia collaborative projects intentionally organized and expanded other practical skills. For example, participants P6 expressed that their experience presenting at academic conferences honed their public speaking skills and business etiquette, which they could apply to interviews. Additionally, P4 mentioned that during the interview process, she discovered that besides the content of her research and the fact that she held a PhD, the company also wanted to understand whether her interests and personality could make her an attractive candidate.

4.3.2.3 Flexible and strategic career planning

This section mainly demonstrates the strategic and flexible approach of doctoral international students when job hunting.

Strategic planning is reflected in the detailed and efficient job search plan developed after a thorough analysis of one's situation (P4, P5, P6). For example, to better adapt to the Japanese job search process, starting job search activities early. Extracting a few keywords of interest, widely participating in company information sessions, gradually clarifying one's interests and direction, and establishing clear career goals. Utilizing the multicultural background of international students, focusing on large companies with international business or those that are more open to foreigners.

Flexibility is reflected in dynamically adjusting job search goals. For example, after initially applying to 30 small and small SMEs and being rejected, P5 reviewed and organized interview feedback, discovering that larger companies were more accepting of PhD graduates compared to SMEs. Thus, they flexibly adjusted their goals to avoid unnecessary waste of time and energy. Similarly, P6, despite an unsatisfactory first job, should aim to accumulate experience and resources to prepare for higher-level opportunities in the future.

4.4 Summary

This study proposes a four-stage skill application framework (AACA framework) through in-depth interviews with six international doctoral students in the field of humanities and social sciences who completed or dropped out of their doctoral programs in Japan. The model aims to explain how they identify, develop, and practically apply transferable skills in cross-cultural contexts to achieve career transitions from academic to non-academic fields. The framework consists of four dynamic stages: awareness, assessment, cross, and action. Show as in figure 4.1, the framework emphasizes that transferable skills are not resources that can be directly used, but rather a process in which doctoral students gradually construct and reshape their self-perception of abilities through continuous reflection, interaction, and practice within specific cultural contexts.

Unlike the traditional view that sees transferable skills as directly transferable resources (Barandika et al., 2020; Mraha & El Messaoudib, 2022), the AACA framework points out that these skills only truly possess transformative value when doctoral international students can decode cultural contexts, translate academic achievements into corporate language, and re-express them in conjunction with their own identities. In this process, based on research findings, we identified three mechanisms that play a crucial role: (1) The cultural mechanism enables doctoral students to understand workplace unwritten rules and reconstruct their professional identities; (2) The support network mechanism

provides external resources for skill building, emotional regulation, and strategic feedback; (3) The value co-creation mechanism reveals that doctoral students, in their interactions with career service institutions, are no longer passive recipients but rather participants and co-creators. The process of identifying and transforming their abilities also feeds back into the service system itself. This model not only fills the existing theoretical gap regarding cross-cultural career adaptation paths but also provides a new perspective for understanding the social mechanisms behind the skill transformation of doctoral international students.

However, the research also reveals a significant structural issue: Although some international doctoral students have successfully achieved career transitions through personal reflection and social networks, this process lacks systematic support, leading to widespread issues such as information barriers, skill invisibility, and identity anxiety. Especially in the field of humanities and social sciences, international doctoral students face more pronounced skill translation difficulties, as their research outcomes are difficult to directly recognize and absorb in non-academic fields, severely limiting their value expression in the job market.

Therefore, study 3 will further explore how to establish a doctoral career support framework through systematic career guidance service design, characterized by diverse participation, cross-disciplinary collaboration, and a human-AI value co-creation orientation. Ultimately, this doctoral dissertation will focus on revealing the "co-creation participation model" of international doctoral students in the job-seeking service process and propose a set of service design principles aimed at international and diverse career paths, providing a basis and practical direction for institutional reforms in doctoral education and career development.

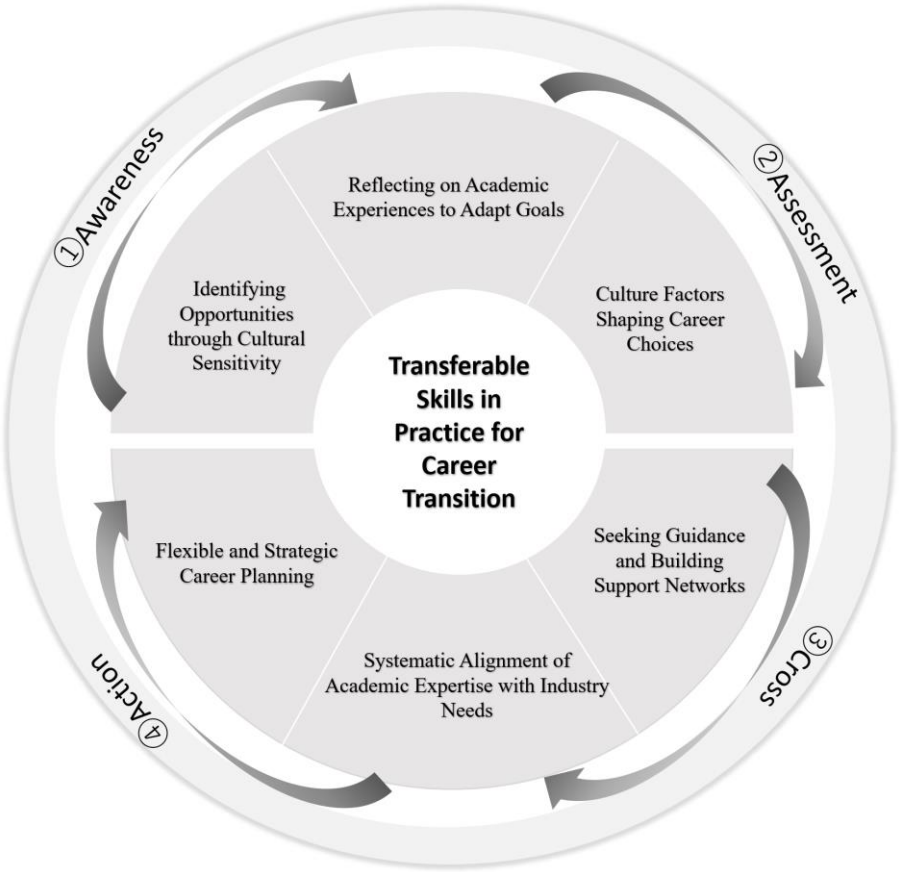


Figure 4. 1 The framework for the application of transferable skills

Chapter 5
Study 3: Human-AI Value Co-Creation in Career Guidance and Its Impact on Employability

5.1 Introduction

Against the backdrop of the rapid development of knowledge society and the continuous changes in the labor market, the career development of PhD graduates is facing unprecedented challenges. Study1 and study2 revealed the structural and emotional barriers faced by international PhD students in the HSS during their cross-cultural career development. Study2 constructed the transferable skills application framework (AACA), emphasizing that the career transition of doctoral students not only involves the identification and transformation of individual skills but is also a dynamic practice process embedded within cultural capital, support networks, and value co-creation processes.

On this basis, study 3 will shift its focus from interpersonal and institutional support to technological empowerment, exploring the potential applications of AI in career guidance services, with a particular emphasis on how human-machine collaboration can enhance doctoral students' career competencies and expand their career transition pathways. This study views AI as an extension of the support and value co-creation mechanism in the AACA framework, no longer merely as a technical tool, but as a dynamic participant within embedded service systems, possessing collaborative and co-creation

functions.

As technological advancements drive industrial restructuring, the labor market's demand for high-level talent has shifted from basic responsibilities to comprehensive talents with innovative capabilities, systematic thinking, and forward-looking vision (METI, 2022). This shift poses additional challenges for doctoral students, especially those in HSS, as they often face real-world issues such as low visibility of skills and insufficient guidance and support due to the difficulty in translating their research abilities into the common language of the industry. The first two research findings further confirm that the gaps in the conversion of these skills and support mechanisms are restricting the career adaptability of doctoral students, highlighting the urgent need to build more personalized and scalable support systems.

At the same time, artificial intelligence technology based on big data and natural language processing is gradually entering the field of career development services, with its human-like cognition, reasoning, and self-learning capabilities reshaping traditional career consulting models (Kok et al., 2009). For example, a survey released by Resume Builder in 2023 showed that 46% of job seekers used ChatGPT to assist in writing resumes or cover letters, with 59% successfully securing job offers (Resume Builder, 2023). These cases demonstrate the immense potential of AI in enhancing individual capabilities and improving career adaptability.

Therefore, this study adopts a systematic literature review approach to organize and analyze the value co-creation mechanisms and capability enhancement pathways of AI in the career guidance process, aiming to answer SRQ3: How does the value co-creation mechanism of artificial intelligence in career guidance services affect the individual's employability? This study not only expands the theoretical discussion on support mechanisms and co-creation mechanisms within the AACA framework but also attempts to provide a feasible framework for the intelligent innovation of future career service systems at both technical and institutional levels.

5.2 Methodology

5.2.1 Systematic literature review

To construct the human-AI value co-creation career guidance framework proposed in this study, a systematic literature review (SLR) is adopted as the primary research method. SLR is a structured and replicable research method that emphasizes the systematic collection and analysis of relevant literature under clearly defined search strategies and inclusion-exclusion criteria, to extract core concepts and construct theoretical frameworks (Ahn & Kang, 2018; Xiao & Watson, 2019).

Compared to traditional narrative reviews, SLR places greater emphasis on the transparency of the analytical process and the rigor of the methods, making it suitable for research that requires theoretical construction and mechanism extraction in interdisciplinary fields (León et al., 2024). Considering that the topics of this thesis span multiple research fields such as artificial intelligence, technology, service science, and career development, the SLR method can effectively integrate dispersed research findings, identify the relationships between concepts such as human-machine collaboration, skill enhancement, and career adaptability, and reveal key issues and knowledge gaps in the research (Arteaga et al., 2024).

Additionally, due to the following two considerations, it was ultimately decided to use SLR as the research method:

First, the goal of study 3 is to construct a conceptual framework that integrates the logical path of artificial intelligence—human-machine collaboration—capability enhancement, rather than verifying the causal relationships between variables. At the current stage of research, empirical data of human-AI in career guidance is still insufficiency, so it is more appropriate to extract themes and construct theories through a systematic review (García-Peñalvo, 2022).

Secondly, SLR can break the limitations of specific populations or contexts, integrating research findings from multiple countries, fields, and types of technology. This helps identify common mechanisms, usage patterns, and potential design elements, laying a theoretical foundation for subsequent service system design and empirical validation research (Afzal et al., 2024).

Based on the above considerations, this study adopts the four-stage SLR process proposed by Kaartemo & Helkkula (2018) and Xiao & Watson (2019): literature search, inclusion screening, quality assessment, and data extraction and thematic analysis. This method ensures systematic collection of data and the reliability of the results, providing theoretical support and an analytical foundation for the career guidance service framework proposed in study 3.

5.2.2 Keywords setting

In the SLR of this study, we used career guidance, artificial intelligence, individual capability and value co-creation as core keywords for literature selection. This choice is based on the following considerations: First, career guidance emphasizes providing specific advice, feedback, and support during the exploration of career paths, compared to career development or career design (Whelan et al., 2024). This aligns with the focus of this study on how doctoral students can leverage AI for support during career development. The term career guidance more accurately describes the operational scope

of the research framework. Career guidance can also conceptually connect study 1 and study 2 further, transforming insights from emotional mechanisms and skill conversion mechanisms into actionable intervention pathways.

Second, artificial intelligence is a technical concept involved in this study. Since this study aims to explore how AI technologies (such as recommendation systems and natural language models) can assist international doctoral students in career goal matching, path simulation, and personalized feedback acquisition. AI's recommendation algorithms and natural language processing models, such as ChatGPT, represent the main technological transformation directions of contemporary career service models (Ejjami, 2024).

Third, in this study, the term of individual capability focuses on the abilities, resources, and adaptability needed for individuals to achieve career transitions in the labor market (Belluzzi et al., 2025). This concept resonates with the "transferable skills" proposed in the second study of this paper, forming the main expected outcome of AI-enabled intervention mechanisms.

Fourth, value co-creation is the core concept of service systems, referring to resource integration in interaction rather than one-way provision (Maglio & Spohrer, 2008). This concept provides a theoretical foundation for understanding doctoral students' active participation and the human-AI collaboration mechanism in career guidance services.

Therefore, the combination of these four sets of keywords helps to focus on the research path of value co-creation and employability enhancement in AI-empowered career guidance.

5.2.3 Data analysis

In the first phase, we used the Scopus, Sage Journals, IEEE Xplore, and Science Direct databases to collect literature. In the preliminary screening, we selected data from 2015 to 2023 and used three different sets of keyword combinations for database searches. The articles included in this study must meet the following criteria: limited to Q1 journals, written in English, and published in open access journals (a total of 15,884 articles, as shown in Figure 5.1).

The second stage is the inclusion screening. According to Xiao & Watson (2019), we first conducted a preliminary screening by reading the abstracts. Any articles that did not contain keywords or synonyms such as career guidance or individual abilities were excluded, and a total of 69 articles were retained for the next step.

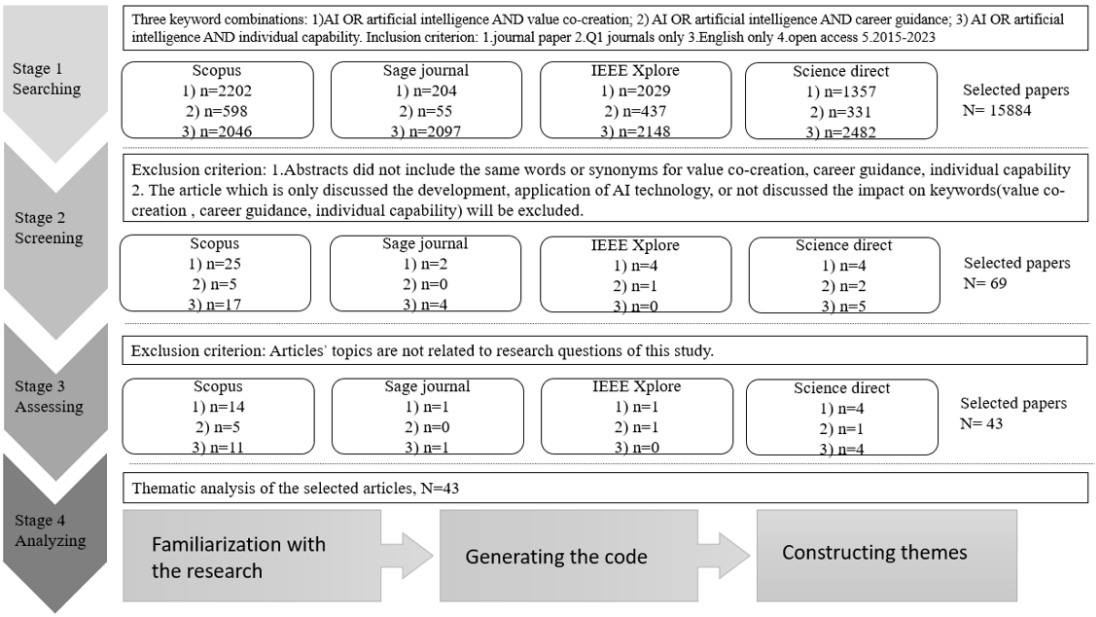


Figure 5. 1 Flowchart of the systematic literature review

In the third stage, to assess the quality of the literature, we read the entire text to determine its relevance to the research question. In the end, we identified 43 articles for final analysis.

In the fourth phase, we used thematic analysis to analyze the extracted qualitative data. Thematic analysis is a method for analyzing qualitative data by identifying and interpreting theme patterns. It provides researchers with structured coding and theme extraction steps, thereby organizing and presenting analytical insights (Terry et al., 2017). According to Xiao & Watson (2019) and Clarke et al. (2015), the analysis process includes three steps: familiarizing oneself with the data, generating codes, and constructing themes.

To familiarize ourselves with the data content, we recorded the basic information of each article, such as the year of publication, journal name, and title. In addition, we identified and coded the relevant content about the impact of artificial intelligence in each piece of literature. The study employed inductive content analysis to generate themes from the collected data (Kyngäs et al., 2020). In the subsequent steps, we identified the similarities and correlations between different codes, thereby inductively deriving thematic categories.

5.3 Results

The thematic analysis was conducted for three keyword combinations. The result of this analysis is presented in the following sections, show as in table 5.1.

5.3.1 Human-AI values co-creation process

5.3.1.1 Humans initiate collaboration

Human initiated collaboration is at the core of co-creating value with AI. It starts with humans providing initial data or making various requests (Paschen et al.,2021). When humans and AI work together, humans guide AI through predefined biases and parameters, enabling AI to perform operations efficiently according to human expectations and preferences, without the need for real-time human approval (Metcalfe et al.,2021). The key element in initiating this entire process is humans actively engaging in human-computer interactions to begin creating solutions.

5.3.1.2 AI guides collaboration

Once humans have initiated the human-machine cooperation model, AI begins the process of collecting and processing data. AI automation plays a significant role in efficiently gathering and analyzing user data (Paschen et al.,2021; Solakis et al.,2022). AI-driven data platforms can engage users in real-time, such as through ChatGPT which provides information via real-time text messaging to assist guests in planning and enhancing their experiences (Solakis et al.,2022). This conversation-based real-time interaction fosters user engagement, encouraging their participation in new product development and co-creation of value by increasing transparency and trust (Mengcheng & implementation of supervised progress significantly reduces the time needed to meet user needs and greatly enhances efficiency (Li et al.,2023).

5.3.1.3. Humans shape collaboration

In this step, users, whether organizations or individuals. Flowchart of the systematic literature reviews their understanding of the AI provided solution's content and determines its applicability. This often involves re-integrating their knowledge networks, which may include integrating expertise from different domains to facilitate comprehension (Weber et al.,2023). However, it's worth noting that while AI can serve as a supportive tool in the creative output process, co-creation with humans still necessitates significant human intervention to ensure the quality of the final output (Tigre Moura,2023).

5.3.1.4. AI optimizes collaboration

Following the user's provision of new requirements, AI systems, leveraging big data, work to connect additional resources to fulfill the user's needs. These resources may include data and stakeholders who can assist the users (Mengcheng & Tuure,2022; Li et al.,2023; Chatterjee et al., 2023). AI plays a vital role in resource matching, increasing resource density, and utilizing data effectively (Mengcheng & Tuure,2022). It facilitates knowledge exchange by connecting various stakeholders to address diverse needs (Li et al.,2023; Chatterjee et al., 2023). AI, by replacing manual interactions with real-time user monitoring, not only enhances productivity but also elevates the overall customer experience, serving

as a crucial function (Li et al.,2023; Solakis et al., 2022).

5.3.2 The impact of collaboration intelligence on individual capability

5.3.2.1. AI-driven augmentation of learning and creativity

AI has already achieved good results in enhancing human learning. Studies have demonstrated that the use of ChatGPT in computer education can enhance students' computational thinking and initiative in learning (Yilmaz & Karaoglan Yilmaz, 2023). And some scholars have pointed out that AI can not only help users to improve their problem-solving ability (Benvenuti et al.,2023), but also provide users with more personalized insights to broaden the boundaries of knowledge cognition (Gibson et al.,2023). AI is also a novel tool that can help users move from individual to collaborative learning (Shenkoya & Kim,2023). Moreover, the achievements of AI in helping human beings to improve their creativity are also outstanding. For instance, AI provides a higher-level inspiration to individuals, guiding them on what to say or how to act, thus enriching their responses (Sharma et al.,2022). AI's automation capabilities can perform repetitive tasks in place of humans, thus freeing humans to be freer to engage in more creative and productive work (Mikalef & Gupta,2021).

5.3.2.2. Enhancing emotional and cognitive capabilities

The process of human-AI collaboration has an impact on various human cognitive abilities. For example, AI's information processing and scientific matching procedures can reduce human cognitive load and optimize cognitive abilities (Samuel et al.,2022). AI also can expedite knowledge exchange among team members by streamlining the process. By connecting individuals with those who can offer guidance through a continuously optimized task allocation system, the overall process can enhance both collective and individual memory (Gupta et al.,2023).

5.3.2.3. Enhancing comprehensive ability at work

In recent years, many companies have ventured to integrate AI into their daily operations, ushering in an era where humans collaborate with non-human 'coworkers.' AI plays a significant role in influencing employees' work capabilities and aiding them in decision-making. Zirar et al. (2023) argued that human-AI collaboration and interaction can enhance teamwork skills beyond traditional human-to-human interactions. The utilization of AI in the workplace can also foster employees' problem-solving abilities. AI can assume the responsibility for repetitive and mechanical tasks, freeing workers to concentrate. on solving complex problems that are beyond the capabilities of AI systems. Furthermore, to adapt to a work environment that coexists with AI, employees may receive training or education in computer-related skills, indirectly enhancing their abilities. Mele et al. (2021) explore how AI can influence individual behaviors through digital nudging and impact human decision-making by learning individual characteristics. Additionally, AI can enhance user engagement and

facilitate decision-making by providing real-time data.

5.3.2.4. Empowering human autonomy

AI-assisted autonomy refers to both physical autonomy and autonomy at the cognitive or conscious level. AI can complement the lack of abilities of people with disabilities to enable them to achieve physical autonomy. Some studies have analyzed different types of intelligent assistive technologies and assistive devices that use different sensing technologies, algorithms, and functionalities to help visually impaired people with indoor and outdoor activities. AI assistive technology complements the abilities of visually impaired people and enables them to move around more freely (Madake et al.,2023). On the other hand, it has also been shown that the anthropomorphic features of AI can provide active and autonomous learning environments, and chatbots that support the need for autonomy and competence can encourage autonomous learning (Xia et al.,2023).

5.3.3. The impact of collaboration intelligence on career guidance

5.3.3.1. Providing strategies for personal growth

The biggest advantage of AI in career guidance is that it can provide more scientific and accurate predictions and thus more reasonable programs. In career guidance, AI can analyze the content of the questionnaire filled out by the user in advance to give career planning advice (Mikrat et al.,2022). AI's machine learning system can collect user information for logical reasoning to give the corresponding prediction results. According to the prediction results AI can recommend the users with more suitable career action programs (Guleria& Sood,2023). Intelligent career guidance systems based on machine learning and text mining technologies can more comprehensively analyze the user's information and match the user with more suitable job roles (José-García et al.,2022). The AI system is constantly updating the data, which allows users to learn more about their careers more conveniently and quickly, and to adjust their career direction at any time (Guleria& Sood,2023). AI’s personalized support also includes virtual reality technology to provide immersive learning environments, career courses advice on developing skills, etc. (Rodway & Schepman,2023). It has been shown that AI can facilitate the improvement of professional skills by providing rapid information that deepens the user's understanding of the field (Zafari et al.,2022). For example, importing ChatGPT into a training course that trains construction students to understand safety issues on construction sites improves the students' ability to recognize hazards. From here, we can see that AI-imported vocational training is effective in enhancing the professional competence of employees (Uddin et al.,2023).

5.3.3.2. Elevating user experience in career guidance

In response to labor market demands, importing AI into traditional career services departments has gained more attention. AI's large database can quickly provide users with the information they need,

Table 5. 1 The result of the systematic literature review

Theme	Sub-theme
Human-AI values co-creation process	Humans initiate collaboration
	AI guides collaboration
	Humans shape collaboration
	AI optimizes collaboration
The impact of collaboration intelligence on individual capability	AI-driven augmentation of learning and creativity
	Enhancing emotional and cognitive capabilities
	Enhancing comprehensive ability at work
	Empowering human autonomy
The impact of collaboration intelligence on career guidance	Providing strategies for personal growth
	Elevating user experience in career guidance

which greatly saves them time searching for information. Machine learning improves the accuracy of career planning (Guleria & Sood,2023). Virtual reality and real-time interactive technology also increase the user experience (Rodway & Schepman,2023; Uddin et al.,2023). In addition, the unique insights and personalized feedback provided by AI increase user satisfaction (Uddin et al.,2023).

5.4 Summary

This study proposes a human-AI collaborative career guidance framework oriented towards value co-creation, aiming to reveal how artificial intelligence can co-create value through interaction with human intelligence in supporting the career development of doctoral students.(show as in figure 5.2) The study summarizes a cyclical collaboration mechanism through a systematic literature review: humans, by providing goals and contextual inputs, leverage AI's data processing, problem identification, and solution generation capabilities to form a feedback loop, achieving value co-creation of "collaborative intelligence" in career guidance, skill development, and decision support.

This framework not only expands the service boundaries of doctoral career guidance but also emphasizes the potential of AI in enhancing individual capabilities (such as career adaptability, learning ability, and cognitive ability), promoting a shift from human-centered one-way guidance to a multi-directional collaborative service model characterized by human-AI co-creation. Through this transformation, career guidance is no longer a linear service output but a dynamic process of learning and resource reconstruction.

This study, as the third research in the doctoral dissertation, builds on the cruel optimism dilemma in career cognition revealed in study 1 and further echoes the AACA transferable skills application framework constructed in study 2, pointing out how doctoral students can achieve the construction and application of capabilities from awareness to action with the support of diverse resources. Study 3, through the perspective of AI intervention and value co-creation, provides a new path for career services for doctoral students under technological empowerment, emphasizing the participatory and social roles of AI in the individual transformation process.

Although the framework constructed in this study lacks empirical validation, it provides a conceptual foundation and directional guidance for future research on human-AI collaborative career guidance practices. The following chapters will construct a service framework to promote diverse career development for doctoral international students in the humanities and social sciences, based on the research findings of study1, study2, and study3.

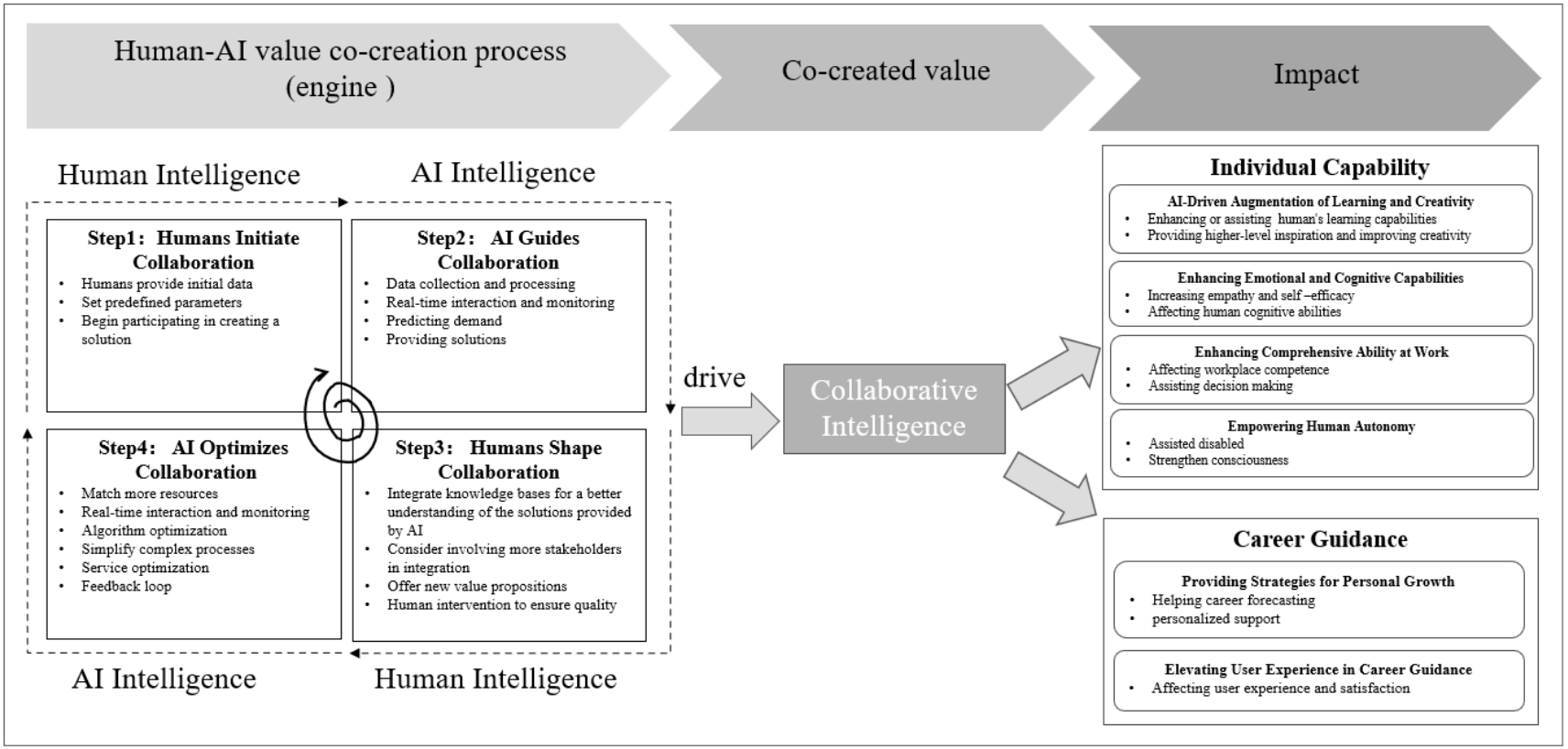


Figure 5. 2 The framework of human-AI collaboration in career guidance

Chapter 6
Career Service framework for promoting diverse career development among international doctoral students in the humanities and social sciences

6.1 Summary of three studies

This thesis consists of three interrelated studies, aiming to systematically explore the complex challenges faced by international doctoral students in the field of humanities and social sciences (HSS) as their career development. Each study focusses on different dimensions of this issue. From emotional struggles and identity dilemmas to skill transfer and technical support—gradually advancing the construction of a comprehensive career support service framework. Although the three studies differ in their research focus and methods, they are closely interconnected in terms of concepts and functions, with each study building on the previous one to propose a more integrated problem-solving approach.

Study 1, from an emotional perspective, introduces the concept of cruel optimism, revealing how PhD students psychologically cling to idealized academic career goals despite in the structural context of deceasing number of tenure positions. Through qualitative interviews, this study reveals how emotional attachment, internalized academic norms, and career identity crises weaken PhD students' confidence and adaptability in pursuing non-academic careers. This study emphasizes the necessity of establishing career services for PhD graduates that include emotional support mechanisms. Emotional

support mechanisms can cope with anxiety, support identity reconstruction, and promote reflection on career goals.

Based on this, study 2 shifts focus on the challenges faced by international doctoral students in identifying and applying transferable skills in non-academic. By constructing the transferable skills application model (AACA framework: Awareness–Assessment–Cross–Action), this study views skill transfer as a dynamic, culturally embedded process influenced by support systems, value co-creation opportunities, and student autonomy. The study points out that doctoral students often struggle to identify and express their own abilities during the process of cross-domain career transition, and there is an urgent need for structured interventions to help them translate their academic expertise into diverse career paths.

Study 3 addresses the practical needs identified in the first two studies by proposing the human-AI collaboration career guidance framework, with value co-creation as its core concept. Using a systematic literature review approach, it integrates research related to artificial intelligence, career guidance, and individual capability. In this framework, human users provide goals and contexts, while the AI system offers personalized suggestions and solutions, thereby creating a cyclical interaction mechanism. This study introduces a technology empowerment perspective, aiming to support doctoral students in identifying their own abilities, obtaining simulated feedback on matching positions, and achieving continuous optimization in the career decision-making process. Although the main contribution of this study is the conceptual design, its framework lays the foundation for subsequent empirical validation and system development.

In summary, these three studies form a coherent developmental path: first, recognizing the emotional and identity barriers in doctoral career development (Study 1), then addressing the skills and cognitive issues in interdisciplinary transitions (Study 2), and finally proposing a scalable, adaptable, and participatory support system through AI technology (Study 3). These integrated insights collectively support the construction of a modular, multi-party collaborative career support service framework, which not only has a solid theoretical foundation but also effectively addresses the real and complex issues faced by international doctoral students in HSS.

6.2 Three modules derived from three studies

In response to the diverse, phased, and cross-cultural needs of international doctoral students in the field of humanities and social sciences during their career development, this thesis uses the concept of modular service design when constructing the career service framework. This approach is derived

from systems theory, advocating the division of complex service systems into several interrelated but independently operable functional modules to reduce system complexity, enhance adaptability, and improve service reusability (Hunke et al., 2024). In the context of higher education and career support, the issues faced by students often exhibit high variability and individual differences, making it difficult for traditional linear service processes to respond flexibly (Kuncel et al., 2010). Modular design can flexibly call functional components based on the different stages of the service recipients, achieving a clear structure, student-centered, and sustainably evolving service system (Løkkegaard et al., 2016).

Moreover, modular design emphasizes the standardization and reusability of elements such as service resources, activities, and participants (Broekhuis et al., 2017). Tsvetkova & Gustafsson (2012) point out that key functions in the service design process can be stored in various modules, supporting their combination, optimization, and expansion in different scenarios, thereby improving the efficiency and effectiveness of service design. This structured design approach not only enhances the adaptability and deployment efficiency of the service system but also lays the foundation for mechanism coordination and value co-creation among multiple participants. The detailed contents of each module are as follows and table 6.1.

Therefore, chapter 6 constructs a modular career service structure composed of emotional support module, skill transformation module, and AI empowerment module, corresponding to the core issues and service functions revealed by the first three studies, and mapping them to different stages of the job search process for international doctoral students. Each module focusses on specific problem domains and service objectives, which not only helps systematically decompose complex needs but also provides a theoretical and practical foundation for the subsequent introduction of technology and the implementation of human-machine collaborative service systems.

Module1 is emotional support. This module originates from Study 1 and aims to address common issues faced by doctoral students in the early stages of job hunting, such as academic dependency, low confidence, and identity confusion, particularly when confronted with the uncertainty of non-academic career paths. This module is primarily suitable for the early stages of career exploration, where PhD students begin to gather information and contemplate future directions. Its core functions include enhancing emotional awareness, supporting identity reconstruction, and promoting cognitive transformation. Its typical implementation methods include emotional counselling and values clarification workshops provided by university career centers, or exchange activities involving

Table 6. 1 The details of three modules

Module	Targeted problem	Corresponding job-hunting phase	Main functions	Service Provider	Study
Emotional support	Cruel optimism (academic dependence, low self-confidence)	Early stage (information gathering, career path selection)	Emotional awareness, identity reconstruction, cognitive transformation	University Employer/ IT Corporation	Study1
Skill transformation	Difficulty identifying or articulating transferable skills	Middle stage (skill assessment, job matching)	Skill visualization, cross-sector applicability, matching with job roles	University Employer/ IT Corporation	Study2
AI empowerment	Lack of individualized and scalable career support	Whole process (feedback/collaborative intelligence loop)	Personalized assistance, job-fit recommendations, career simulation	University Employer/ IT Corporation	Study3

corporations and alumni. This module emphasizes the emotional mechanisms in career decision-making, aiming to help doctoral students establish psychological readiness for career transitions, and enhance their willingness to act and cognitive resilience.

Module2 is skill transformation. This module is based on the AACA framework proposed in Study 2, focusing on the identification and application of transferable skills by doctoral students during career transitions. It is applicable to the mid-career development stage, specifically the process of conducting competency assessments and job matching. Module functions include visualization of transferable skills, cross-domain skill translation, and strategic alignment with industry demands. This module needs to be implemented with the help of structured tools (such as skill mapping tables, domain transition models) and intermediary services (such as mock interviews, job analysis), usually jointly promoted by university career guidance institutions and partner companies. It helps doctoral students transform their academic abilities into transferable skills and effectively express them through professional language, enhancing their career adaptability and competitiveness in non-academic fields.

Module 3 is AI empowerment. This module is based on the human-AI collaborative career guidance framework proposed in Study 3, aiming to address the common issues of insufficient personalized support and the difficulty of scaling manual services in current doctoral career support. Unlike the previous two phased modules, the AI-enabled module runs through the entire job search process, forming a continuous feedback mechanism consisting of goal setting, data processing, intelligent recommendation, and reflection adjustment. Its functions include using AI technologies such as recommendation systems, natural language processing tools, and career simulation systems to provide personalized path suggestions, assist in career decision-making, and enhance reflective abilities. Although this module is still in the conceptual stage and has not yet been systematically implemented in practice, it demonstrates how AI technology can act as a collaborative agent, providing scalable personalized support for doctoral

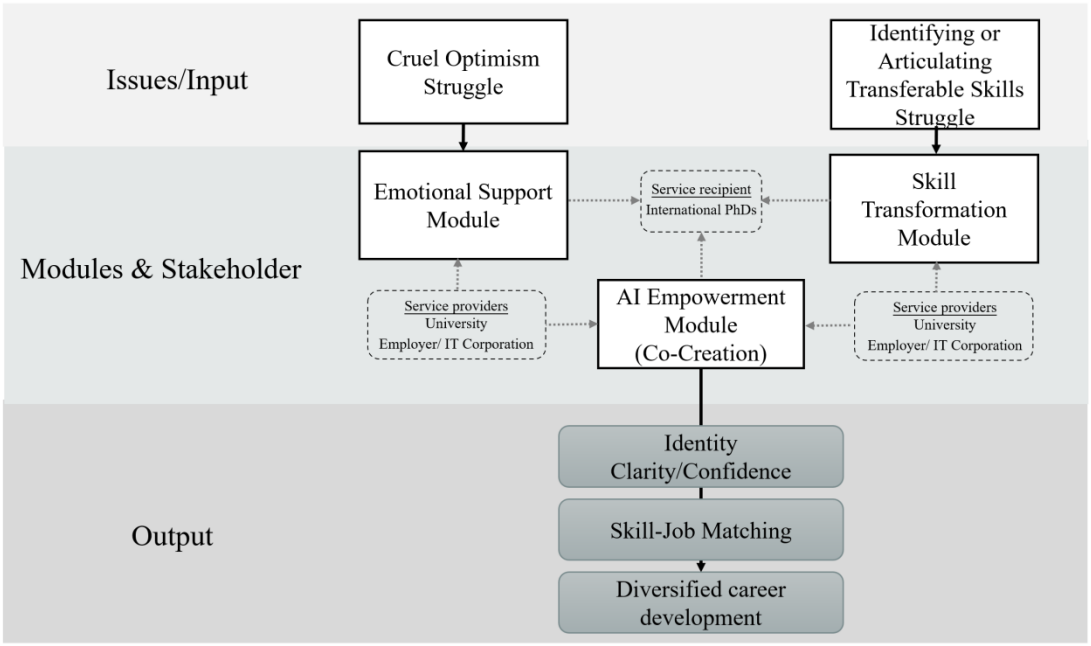
students. In the future, this module can also integrate corporate feedback systems to enhance the alignment between talent profiles and job requirements.

In summary, the three-module structure constructed in this section reflects a multidimensional, phased, and mechanism-driven design for international doctoral career service pathways. Each module focusses on a specific challenge while maintaining the overall coherence and synergy of the system through the concept of module integration in service design. The emotional mechanism, skills transformation mechanism, and AI technology mechanism together form a service system that is well-supported by theory, clearly structured, and has practical potential, laying a solid foundation for the comprehensive integration of the service framework in the next section.

6.3 Value co-creation career service framework for international PhD students in HSS

Based on the findings of the previous three studies, this section proposes a comprehensive career service framework based on the principles of value co-creation, aimed at supporting international PhD students in the humanities and social sciences in addressing the multidimensional challenges they face during their career development process. The framework not only addresses individual-level issues (such as emotional attachment to academia and skill recognition) but also responds to institutional and structural constraints (such as the lack of inclusive support systems and insufficient employer engagement). The framework includes three core service modules: emotional support, skill transformation, and AI empowerment, emphasizing the dynamic interactions between PhD students, universities, companies, and AI systems. The details show as in Figure 6.1.

The construction of this framework is based on empirical research findings and theoretical integration. Specifically, Study 1 revealed the emotional mechanism of cruel optimism and its inhibitory effect on doctoral students' career self-efficacy; Study 2 addressed this dilemma by proposing the AACA framework, emphasizing how doctoral students can identify and transform their skills in cross-cultural and professional contexts; Study 3 further broadened the perspective by integrating the human-AI collaboration framework, exploring how AI systems can provide scalable and personalized support in the career decision-making process. Although Study 3 employs a systematic literature review method, the conceptual design of the framework also incorporates elements of design thinking, particularly in



*Note: Solid arrows represent the main service processes and causal paths between modules. Dashed arrows represent the collaborative relationships and support links between service providers and service recipients in the operation of the module.

Figure 6. 1 Value co-creation career service framework for international PhD students in HSS

the setting of service functions and participant roles. Some content, while not directly derived from data, can be reasonably inferred from the needs and practice trends of stakeholders.

To ensure the logical connection between Study 2 and Study 3, the framework no longer views AI as a single technical tool but as a collaborative participant, helping doctoral students translate transferable skills into specific career decisions. With the help of intelligent feedback mechanisms, job matching simulations, and decision support functions, AI enables students to smoothly enter the action phase of the AACA framework, complementing the awareness and assessment phases emphasized in Studies 1 and 2. Therefore, Study 3, by introducing operational mechanisms, promotes the realization of the potential proposed in the first two studies and embeds it within an adaptable support system.

Moreover, this framework avoids the student-centered design bias through a multi-stakeholder participation structure. Based on the integration of the corporate perspective (especially the use of AI by companies in recruitment and talent assessment), the model emphasizes the bidirectional value co-creation mechanism in career services. Employers are no longer the passive recipients of candidates, but rather active co-creators in the design and feedback phases of the AI career service system, responding to calls for a more balanced employment support system and emphasizing the co-construction of hiring outcomes.

In response to the issue of clarity in the use of terminology, this study also defines key technical concepts: human-AI collaboration is understood as an iterative cooperative relationship where human users provide goals and contextual knowledge, and AI supports through data insights and adaptive responses, forming a continuous feedback loop that enhances decision quality; human-centered AI refers to systems aimed at augmenting rather than replacing humans, emphasizing personalization, transparency, and contextual alignment. On a technical level, the AI module within the framework is envisioned as a recommendation system, including functions such as career path modelling, natural language-based skill reasoning, and decision simulation. These technologies are already widely available in practice.

Through this framework, this study not only addresses the structural and emotional barriers raised in previous chapters but also provides a clear design path for achieving personalized, collaborative, and scalable career support services, proposing an implementable service model based on human-AI value co-creation.

Chapter 7
Conclusion

7.1 Answer to research questions

7.1.1 Answer to SRQ1

Study 1, through qualitative interviews with 12 international students who obtained their PhDs in Japan, clearly indicates that "cruel optimism" is an emotional attachment mechanism that profoundly influences doctoral students' career decisions. For international doctoral students in the humanities and social sciences, their emotional attachment to the academic path not only stems from personal ideals but is also deeply embedded in multiple structures such as family expectations, social norms, and academic institutions. This study attempts to reveal how this emotional mechanism restricts doctoral students' career exploration and identity construction process.

Based on interview data, the study summarizes the formation mechanism of "cruel optimism" and its three impact pathways on career development: first, social networks and cultural norms construct becoming a university teacher as the default career ideal; second, the opacity and lack of support within the academic system further reinforce PhD students' reliance on a single path; third, the long-term self-sacrifice and identity investment during the PhD training process make it difficult for PhD students to accept the possibility of non-academic identities. In addition, the study also reveals the inhibitory effect of this emotional dilemma on the mental health and motivation of doctoral students.

It is evident that cruel optimism is not only an individual emotional state but also a reproductive identity structure and career cognition mechanism. It leads to PhD students lacking a sense of identity and psychological preparation when facing non-academic options, thereby missing out on diverse career development opportunities.

Based on the research findings of Study 1, this paper introduces the emotional support module (Module 1) into the doctoral career service framework constructed in Chapter 6. This module aims to help doctoral students recognize and adjust their emotional biases, reshape career expectations and identity, thereby alleviating the dilemma of "emotional attachment—identity solidification—career stagnation" through interventions such as career dialogue, emotional recognition, and cognitive restructuring. The design of this module directly addresses the issues raised by SRQ1 and provides a theoretical foundation and practical pathways for supporting the diverse development of doctoral students.

7.1.2 Answer to SRQ2

Regarding the identification and practical application of transferable skills for international doctoral students during career transitions, Study 2, based on in-depth interviews with six international doctoral graduates, proposed the AACA framework, which systematically presents the four dynamic stages of skill transformation: awareness, assessment, cross, and action. The study found that international doctoral students often cannot directly transfer their academic skills but need to re-identify, name, and interpret their abilities in real-world contexts through mechanisms such as cultural sensitivity, practical reflection, and social networks. Especially under structural constraints such as language barriers, lack of transparency in recruitment information, and insufficient industry awareness, relying solely on individual reflection and experience accumulation is difficult to fully activate their potential. Therefore, the career services system needs to take proactive measures to establish a network of mechanisms that support skill conversion, including providing guidance on industry-specific language, creating platforms that bridge academic achievements with corporate needs, and encouraging international doctoral students to participate in cross-disciplinary projects to gain practical experience. The construction of the "skills transformation module" in chapter six is precisely based on the three key mechanisms extracted from the AACA framework—cultural mechanism, support network mechanism, and value co-creation mechanism. This further emphasizes that career services need to empower doctoral international students through institutional design, transforming them from job-seeking disadvantaged individuals into capability co-creators.

7.1.3 Answer to SRQ3

How artificial intelligence influences the career adaptability and employability of international doctoral students through value co-creation mechanisms is another core issue of this study. Study 3 constructs a human-machine collaborative value co-creation framework through a systematic literature review, indicating that AI in career guidance services not only provides static information and automated recommendations but also achieves deep empowerment of doctoral students' learning ability, reflective ability, and career judgement through collaborative intelligence, learning feedback, and capability activation in human-machine interactions. AI systems can not only analyze career paths in real-time and provide customized suggestions but also play the role of cognitive assistants in resume optimization, skill mapping, and emotion recognition, greatly enhancing the exploration efficiency and action capability of doctoral students. In chapter six, the AI empowerment module elevates AI from a tool to a value co-creation partner, clarifying its collaborative logic with doctoral students, universities, and enterprises from a service science perspective. It can be said that AI is not only a technical supporter but also a key participant in building a fair and open doctoral employment ecosystem.

7.1.4 Answer to MRQ

In response to the structural challenges and diverse needs faced by international doctoral students in the humanities and social sciences in their career development, this thesis, through the integration of three sub-studies and chapter six, proposes a collaborative career service framework centered on value co-creation, encompassing three major modules: "emotional support—skills transformation—AI empowerment." This framework not only emphasizes a doctoral student-centered service mechanism but also clarifies the roles and pathways of various collaborators such as universities, enterprises, and AI platforms, aiming to achieve a more equitable and inclusive labor participation mechanism.

Study 1 focusses on the emotional mechanism of "cruel optimism," revealing the tension between doctoral students' academic identity and real-world expectations and points out that emotional intervention and identity reconstruction are the starting points for diverse career exploration. Study 2, by constructing the AACA framework, systematically explains the process by which doctoral students identify, transform, and express transferable skills in a cross-cultural environment, emphasizing the important roles of external feedback mechanisms, cultural adaptation pathways, and support networks in career transitions. Study 3, from the perspective of "human-machine value co-creation," constructs a conceptual framework for human-machine collaborative career guidance based on a systematic literature review. It points out the role of AI technology in goal matching, path recommendation, and cognitive assistance, which can stimulate doctoral students' willingness to act and reconstruct their career cognition.

On this basis, chapter Six integrates the three research findings and introduces the concept of service modular design and service system theory, constructing a comprehensive career support system centered on doctoral students and based on a tripartite collaboration mechanism. The system, through the three dimensions of mechanism layer, function layer, and co-creation value layer, forms a multi-stage, combinable, and evolvable service architecture. This not only addresses the personalized needs of doctoral students at different stages but also considers the coordination between university support, corporate needs, and AI empowerment.

Therefore, this paper argues that effective pathways to promote the diverse career development of international doctoral students should not be limited to individual skill enhancement or information provision. Instead, a value co-creation service framework equipped with emotional cognitive support, skill transformation mechanisms, and intelligent feedback capabilities should be constructed. This framework helps enhance doctoral students' career adaptability and action capabilities, thereby achieving their fair participation and sustainable development in the diverse labor market.

7.2 Academic implications

7.2.1 Original contributions

This study systematically explores the key influencing factors in the career development of international doctoral students from three aspects: emotional mechanisms, skill transfer mechanisms, and human-machine co-creation mechanisms. It proposes a career service framework to promote diversified career development for doctoral students in the humanities and social sciences, with the following original contributions:

The greatest originality of this study lies in proposing a career service framework aimed at promoting the diverse mobility and equitable career development of international doctoral students. This framework breaks through the limitations of existing research on doctoral career development, which has long focused on the perspectives of higher education system reform and curriculum design (Passaretta et al., 2019; Oliveira et al., 2025; Dai & Mu, 2024), and instead shifts the focus to the doctoral international students themselves, particularly their first-person experiences, career perceptions, and identity construction challenges during the job search process.

On this basis, this study for the first time views international doctoral students as value co-creators and active participants in the career service system. Starting from the actual needs of the service recipients, it integrates the three identified mechanism gaps from Study 1 to Study 3—emotional mechanism, skill transformation mechanism, and human-machine value co-creation mechanism—to

construct a comprehensive career service framework centered on doctoral students. This framework not only addresses the issue of insufficient attention to the subjective experiences of international doctoral students in existing research but also fills the theoretical and practical gaps in the systematic service design for this group. It represents the most significant theoretical contribution and innovative achievement of this thesis.

Second, this study addresses the research gap in the career development of international doctoral students in non-English-speaking countries (McAlpine, 2016; Turk-Bicakci et al., 2014; Wenqin et al., 2018; Roach & Sauermann, 2010; Roy et al., 2025; Baldé, 2024). Unlike previous doctoral career research focused on Western contexts, this paper employs interpretative phenomenological analysis to deeply analyze the emotional struggles, cognitive conflicts, and adaptation pathways of international students who obtained their doctoral degrees in Japan during the cross-cultural job search process, addressing the gaps in research subjects and cultural contexts in this field.

Thirdly, the thesis theoretically advances the application of cruel optimism in the context of higher education in East Asia. Previous related research has mostly focused on the relationship between cruel optimism and neoliberal policies, as well as their impact on researchers' mental health (Bone, 2021; Meade et al., 2023; Azzarello, 2021), with few empirical studies exploring its role in individual career cognition and decision-making. This study establishes an analytical framework to explain why PhD students persist in academic paths for extended periods despite knowing the bleak prospects, emphasizing the need for interventions at the emotional support level to address their career choice dilemmas. Especially in the social context where the goals of doctoral training are severely disconnected from employment realities, it greatly affects the construction of doctoral students' professional identity and their psychological state. This study not only deepens the theoretical understanding of emotional mechanisms in the field of career development but also provides a comparable analytical framework for future discussions on other structural anxieties (such as immigration, gender, etc.).

Fourth, the research contributions surrounding transferable skills are reflected in path visualization and mechanism construction. Although there is a substantial amount of research highlighting the importance of cultivating transferable skills in doctoral students, and most studies focus on designing courses to develop these skills (Mello & Wattret, 2021; Skakni et al., 2022; O'Connor et al., 2023), there is relatively little discussion on the mechanisms of identifying, transforming, and applying these skills during the job search process. This study refines the career transition path for PhD students from academic to non-academic fields through the AACA framework, with a particular emphasis on the

critical roles of cultural capital, practical opportunities, and external support in the skill transfer process.

Fifth, in the context of the integration of artificial intelligence and career services, this study, based on a systematic literature review, proposes the human-AI collaborative value co-creation career guidance framework." It explores how AI can participate in the career service process from the perspectives of resource integration, path recommendation, and cognitive assistance, empowering doctoral students' decision-making and expression abilities. This framework transcends the traditional view of AI as a technical tool (Duan & Wu, 2024), emphasizing its role as a participant in collaborative mechanisms and providing a theoretical basis for constructing intelligent, personalized, and user-centered career service systems.

7.2.2 Contribution to the field of knowledge science

This thesis makes the following academic contributions to the field of knowledge science, particularly to the Knowledge Science Department to which the author belongs. This thesis focusses on the career development of doctoral international students under uncertainty and structural constraints, revealing how knowledge is constructed, transformed, and practically applied in real-world contexts, thereby expanding the understanding of knowledge transformation mechanisms. Especially in areas such as transferable skills, emotional attachment, and cross-cultural adaptability, this study deepens the epistemological discussion on tacit knowledge.

Furthermore, the thesis integrates the research findings of emotional theory, skill transformation models, and human-computer interaction into a unified service design framework, enriching the methodology of knowledge science. Through the three service modules constructed by this framework, it further elucidates how individuals can transform knowledge at the individual, social, and cultural levels into employability skills through interactions with people and artificial intelligence systems. This knowledge transformation process reflects the core concept of human-centered knowledge transformation advocated by knowledge science (Wierzbicki & Nakamori, 2007), providing theoretical basis and design pathways for constructing empowering support systems in complex and dynamic social environments.

7.3 Practical implications

7.3.1 International PhD students

This study reveals that international doctoral students generally face issues such as academic identity fixation, invisibility of skills, and "cross-cultural adaptation challenges" during the job search process,

particularly in the humanities field. To achieve a diversified career path transformation, doctoral students should actively engage in career cognitive restructuring and skill identification from an early stage. It is recommended that doctoral students use the AACA framework to conduct self-assessments, systematically examine their transferable skills, and gradually improve their language expression and situational adaptability by aligning with the culture and needs of their target industry. On a practical level, they should actively engage with the workplace environment, such as participating in internships, off-campus vocational training courses, or industry research projects, to accumulate communication and project experience in non-academic contexts. At the same time, doctoral students should reduce their dependence on mentors and the academic community, actively establishing cross-cultural professional networks, such as using platforms like LinkedIn and industry salons to expand their connections. In the face of emotional "brutal optimism," doctoral students need to develop psychological resilience. By engaging in conversations with peers or using AI tools like ChatGPT for career dialogues or professional psychological support channels, they can gradually adjust their career expectations and self-identity, enhance their willingness to act, and proactively shape the transition path from researcher" to workplace actor.

7.3.2 Higher education institutions

For higher education institutions, this study calls for a reconstruction of the career service logic in doctoral education, shifting from a research training path centered on academic output to a service mechanism that systematically supports the diverse career development of doctoral students. The findings from the interviews in Study 1 indicate that many universities still lack specialized support for international doctoral students, particularly those in the humanities and social sciences, within their career support systems. Due to the disparities in language, culture, and information resources, doctoral students often feel lost when facing non-academic paths, lacking effective emotional support and channels for identity reconstruction. Therefore, it is recommended that universities integrate "psychological support—career dialogue—identity construction" into a unified service module to help doctoral students establish positive cognitive and coping mechanisms in the early stages of career transition.

At the course level, universities should further strengthen the practice-oriented and interdisciplinary skill development. In addition to offering foundational courses such as cross-disciplinary skills development and career adaptability training, emphasis should be placed on modules like workplace communication and expression to help PhD students effectively translate their research experience into comprehensible skills within a corporate context. The results of study 1 and study 2 show that many humanities PhDs find it difficult to accurately express their strengths during job hunting, especially in cross-cultural recruitment scenarios where they are at a greater disadvantage. To this end,

it is recommended that universities and corporate HR departments jointly develop communication training courses for doctoral students, including explanations of industry terminology, mock interview practice, and the expression of research results, forming a language adaptation and industry connection mechanism based on the AACA framework. For example, establish multilingual career guidance windows to provide targeted counselling for PhD students from small language backgrounds, and use AI tools to offer resume optimization, skill matching, and interview simulation services, enhancing the personalization and accessibility of career services.

Moreover, the AI empowerment mechanism proposed in study 3 provides a new development direction for universities to build digital career support platforms. By integrating AI consultation systems, skill diagnosis models, and resource recommendation algorithms, universities can enhance doctoral students' self-awareness and proactive engagement in the career exploration process, creating a digital service platform equipped with intelligent recommendation features, multilingual support, and cross-cultural adaptation capabilities. This not only helps doctoral students more effectively engage in the career transition process but also aids universities in building new organizational capabilities in aligning digital transformation with talent development policies.

In summary, higher education institutions, as the core entities of doctoral education, serve as a bridge connecting doctoral students and enterprises. They not only need to actively respond to the international and diversified talent development needs at the levels of curriculum development, service design, and technology integration, but also should help doctoral students transition from supporting researchers to non-researchers, thereby building a more inclusive and forward-looking career development support system.

7.3.3 Industry

Based on the investigation of this doctoral thesis, we found that doctoral students, especially international PhD candidates in the humanities and social sciences, often face multiple structural barriers such as invisible capabilities, information asymmetry, and insufficient cultural adaptation when entering enterprises. To more effectively tap into and leverage the potential of PhD talent, it is necessary for companies to make proactive reforms in both the design of recruitment mechanisms and the acceptance of organizational culture.

First, in terms of the presentation and communication of recruitment information, companies should optimize the content design of their official websites and job pages. Currently, many international doctoral students find it difficult to establish a clear connection between their research background and the skills required by companies when browsing job postings. Interviews in Study 1 and Study 2

found that many PhD candidates miss out on suitable positions due to a lack of specific understanding of job expectations, responsibilities, and growth paths. Therefore, it is recommended that companies enhance their recruitment pages with more visual content, such as illustrated job descriptions, real work environment introductions, and clear indications of required skills and development paths, to lower the threshold for PhD candidates to understand the company's needs.

Furthermore, companies can collaborate with universities to build a "research-job matching" database system. This system can integrate specific research topics, transferable skills applied, and examples of the mapping relationship between actual positions and PhD employees already working in the company. PhD candidates can input their research content into this platform, using AI tools for skill identification and job recommendations, thereby achieving auxiliary matching for career exploration. This not only helps PhD students build a sense of career positioning but also aids companies in gaining a deeper understanding of the value potential that PhDs from different academic backgrounds possess, thereby broadening the dimensions of talent comprehension.

Secondly, in terms of cultural adaptation and organizational integration, study 2 points out that doctoral international students still experience a certain gap in language expression, project participation, and role recognition. Therefore, it is recommended that companies and universities collaboratively design a PhD candidate mentorship program, with company HR or departmental representatives serving as mentors to provide job descriptions, organizational culture introductions, and adaptation guidance for PhD talents. Although many Japanese companies have already established connections with doctoral students through campus recruitment fairs, these efforts are mainly focused on students in the science and engineering fields. In the future, efforts should be made to further expand the target groups to include students from the humanities and social sciences, as well as international PhD students, helping them gradually understand corporate operational logic and workplace norms, thereby enhancing their sense of belonging and professional confidence.

Finally, in the context of the continuous development of AI and talent management technologies, companies can introduce intelligent recommendation systems and big data analysis tools to achieve efficient and precise matching between PhD talents and corporate job requirements. At the same time, companies should actively participate in the co-creation process of doctoral career support systems in universities. By establishing industry-academia collaboration projects and industry lectures, they can enhance their understanding of the competency structure of PhD graduates in the humanities and social sciences, promote the coordinated development of doctoral education and corporate talent strategies, and truly achieve the diversified social acceptance of PhD graduates.

7.3.4 Policymakers: state and government

To effectively support the construction of an ecosystem for the diversified career development of international PhD students, policymakers should promote the deep integration of doctoral education and the labor market from the perspective of institutional design. This study suggests that the government strengthens policy guidance in the following three areas:

First, the policy positioning of doctoral student career development should be strengthened, systematically incorporating doctoral students, especially international doctoral students in the humanities and social sciences, into the national talent development strategy and high-skilled human resources system. In recent years, although the Japanese government has gradually introduced policies such as "Job-Type Research Internship," "SPRING Challenging Research Projects," and the internationalization of graduate schools (MEXT, 2024a) to support the career development of doctoral students and the cultivation of international talent, related policies and research still mainly focus on the STEM fields and domestic doctoral student groups in Japan (MEXT, 2024a; METI, 2024b; Onita & Kishi, 2023; Kuwahata, 2023). Therefore, it is recommended to further develop support policies for international doctoral students in the humanities and social sciences, such as establishing a diverse employment support fund for doctoral talent, encouraging universities to provide customized career guidance services, and promoting the inclusion of doctoral employment rates and career path transparency in university performance evaluation systems.

Second, a national-level doctoral career information and matching platform should be established to promote information symmetry and supply-demand matching between doctoral students and employers. This platform can integrate the research fields, transferable skills, and language backgrounds of doctoral talents, and combine AI technology to achieve job recommendations, skill diagnostics, and resume optimization functions, thereby alleviating the structural matching obstacles that exist in the employment process of doctoral students. Especially for small and medium-sized enterprises and organizations in non-capital regions with limited resources, this platform can significantly enhance their ability to identify and attract PhD talent.

Third, policies and visa systems related to doctoral employment should be improved. This study found that doctoral students often delay the start of their job search during their time at school because they focus on research and thesis writing, missing the early offer period of regular recruitment by Japanese companies. Additionally, since international students usually require more time to adapt to local job application rules, it is recommended that the government extend the grace period after graduation for student visas, establish a dedicated employment transition visa system for PhD graduates, and encourage companies to hire PhD talent while providing stability support.

In addition, policy guidance can encourage Japanese companies to set quotas for hiring PhD graduates and international students and provide subsidies to support collaboration between companies and universities in developing PhD-adapted positions. This would facilitate the transition of PhD talent from individual coping to systematic integration, thereby truly realizing the public value of PhD education in the knowledge economy and innovative society.

7.4 Limitation and future work

This study aims to construct a service framework that promotes the diverse career development of international doctoral students in the field of humanities and social sciences. Although it has systematically addressed the research questions through three sub-studies (emotional mechanism research, skill transformation model construction, and human-machine co-creation logic discussion), there are still several limitations that need to be further deepened and expanded in future research.

First, regarding the scope of the research subjects, this study primarily focusses on international doctoral students in the humanities and social sciences who are studying in Japan. Although this group does face significant structural barriers and cultural obstacles in their career development, their experiences may not necessarily represent the general situation of all non-Japanese doctoral students. The interview subjects in study 1 were primarily PhD graduates who successfully entered the academic field and did not include those who were unemployed or had failed job applications. This may lead to research results being biassed towards the experiences of "successful" individuals, neglecting the real needs of those in career difficulties. Moreover, the sample has a higher proportion of women, and gender may have a certain impact on career choices, emotional mechanisms, and social expectations. The overall sample size is also relatively limited, and the aforementioned factors may affect the external validity and generalizability of the research conclusions. Therefore, future research could further expand the sample size and diversity by including international doctoral students from different academic disciplines such as natural sciences and engineering, varying gender ratios, and different stages of career transition (including those who are not yet employed), to enhance the representativeness, generalizability, and explanatory power of the research findings.

Secondly, in terms of research methods, study 1 and study 2 employed qualitative interviews and grounded theory analysis, which help in understanding the subjective experiences and meaning construction of doctoral students. However, due to limitations in sample size and research context, the generalizability of their results still needs to be further validated through quantitative methods. In the future, techniques such as surveys and structural equation modelling can be combined to explore the

causal relationships between emotional mechanisms, skill transfer pathways, and career behaviors, thereby enhancing the generalizability and predictive power of the model.

Furthermore, in the discussion of AI's involvement in career support services, Study 3 proposed the "Human-AI value co-creation" framework and pointed out the empowering role AI might play in doctoral career development. However, the related analysis is mainly based on literature review and conceptual construction, lacking empirical application scenarios and user feedback support. Future research could conduct pilot practices in universities or vocational institutions, introducing AI tools and evaluating their actual effects on career awareness, skill matching, and path exploration, thereby refining the framework structure and technical interface design.

Moreover, although the career service framework proposed in this study has a certain general logical foundation and strives to integrate the three dimensions of cultural adaptation, support mechanisms, and value co-creation, its cross-national applicability has not yet been empirically tested due to its generation within the institutional context of Japan. Future research can employ international comparative studies to apply this framework to other non-English-speaking countries or developing nations, examining its adaptability and adjustment strategies within different educational structures and employment cultures. This will advance the knowledge accumulation of global doctoral education in terms of diversity, equity, and systemic support.

In summary, although this study has made positive explorations at both theoretical and practical levels, there is still room for further refinement and validation. In the future, by expanding the research subjects, integrating diverse methods, promoting empirical applications, and conducting cross-national comparisons, we can continuously optimize the theoretical model and service system for doctoral career development support, contributing to the construction of a more inclusive, open, and sustainable global doctoral education ecosystem.

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Zafari, M., Bazargani, J. S., Sadeghi-Niaraki, A., & Choi, S. M. (2022). Artificial intelligence applications in K-12 education: A systematic literature review. IEEE Access, 10, 61905–61921.

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Appendix

Appendix 1: Interview guidance for participants-study1 and study2

Guidance for Participation in the Study on the Job-Hunting Experiences and Career Development of International PhD Students in the Humanities and Social Sciences

National University Corporation, Japan Advanced Institute of Science and Technology (JAIST)
Affiliation: Advanced Science and Technology Research School TKM
Researchers: Kunio Shirahada, YU ZHENRANYI

This survey is conducted to investigate the 'Relationship between Job-Hunting Experiences and Career Development of International PhD Students in the Humanities and Social Sciences'. This research is carried out with the approval of the Life Sciences Committee of the Japan Advanced Institute of Science and Technology."

1. → Research Overview

In Japan, there has been a problem with PhD students in the humanities and social sciences successfully matching with private companies. Previous research on the career matching of PhD students has proposed various solutions to improve this matching with private companies. However, the relationship between the job-hunting experiences of PhD students and their career development in private companies is still unclear. Furthermore, there is a lack of accumulated research on the career development of international students. Therefore, this study investigates the career development of international PhD students in the humanities and social sciences, aiming to improve their current situation of career matching with private companies.

2. → Research Purpose and Voluntariness of Participation

This study aims to clarify how the job-hunting experiences of doctoral students in the humanities and social sciences, particularly those who are international students, affect their career development. Specifically, the objective is to analyze the impact on their perception of career development in private companies.

Participation in this research by responding to the interview is voluntary. There are no disadvantages for not agreeing to participate in the experiment plan. Upon request, the relevant data can be disclosed to the participant. Withdrawing consent will not result in any disadvantage. The interview can be interrupted at any time.

3. → Research Methodology

This study will be conducted through interviews. The interviews are semi-structured, typically lasting 1.5 to 2 hours per session, and will be conducted once or multiple times, principally at the

interviews may also be conducted using online meeting tools. To ensure accurate records, the interviews will be recorded either in audio or video format.

The interviews in this study will be based on four data items. The basic information data items include 'gender, age, nationality, field of study, occupation'. Data items related to job-hunting experiences include 'triggers, motivations, and backgrounds for starting job-hunting', 'actions taken by individuals', and 'the results of these actions'. The purpose of collecting these data items is to clarify how people of different nationalities, genders, ages, and fields of study experience job hunting and how it influences their employment in private companies. Particularly, there is a lack of sufficient research accumulation on how doctoral students from different cultural contexts shape their careers through job-hunting activities. Your cooperation in this study is greatly appreciated.

4. → Information Storage and Personal Data Protection

The audio data will be transcribed for research purposes. During transcription, personal names and company names, as well as any information that could lead to individual identification, will be replaced with symbols, and a correspondence table will be created to protect this information. This table will be stored in a way that is disconnected from the network and safe from external leaks. The recorded audio or video data (in the case of online meetings) will be transferred to an offline storage medium and kept in a locked locker. The transcribed data, both in paper and electronic form, will be retained by the research director for 10 years before being disposed of.

The data, with personally identifiable information removed, will be presented as academic findings in various forms such as dissertations, conference presentations, or journal articles. The data will not be passed on to anyone other than those involved in the research implementation and will not be used for the profit-making purposes of specific companies. Collected data and personal information will only be used for this research.

5. → Honorarium

An honorarium will be paid in accordance with the remuneration regulations of Japan Advanced Institute of Science and Technology (JAIST).

6. → Consent and Withdrawal

If you agree to participate, please sign the consent form attached.

If you wish to withdraw your consent, please notify us by sending the 'Consent Withdrawal Form' to Professor Shirahada within two weeks after the conclusion of this interview. The relevant data will be deleted."

Contact Information

◎ For inquiries regarding the survey:

Japan Advanced Institute of Science and Technology (JAIST), Advanced Science and Technology Research School TKM

Professor Kunio Shirahada

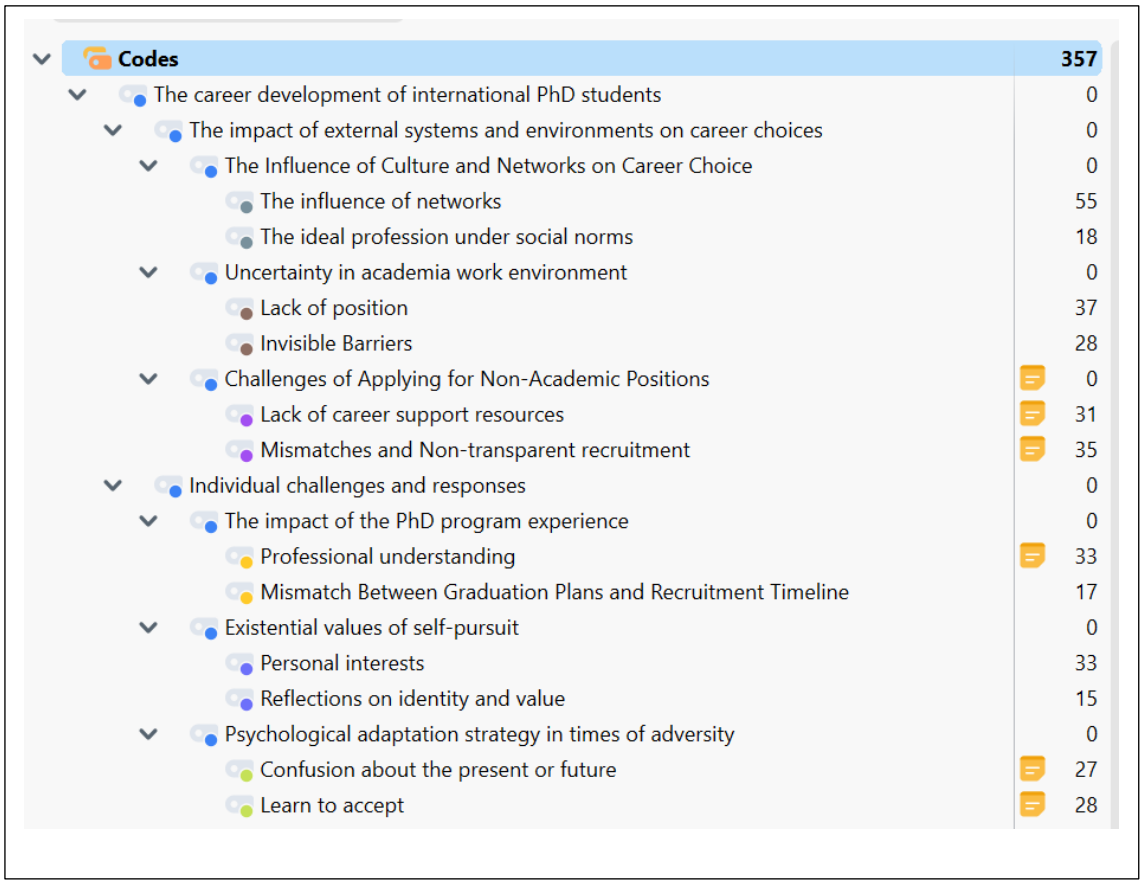
Email: kunios@jaist.ac.jp

Shirahada Research Lab, Advanced Science and Technology Research School, Japan Advanced Institute of Science and Technology (JAIST)

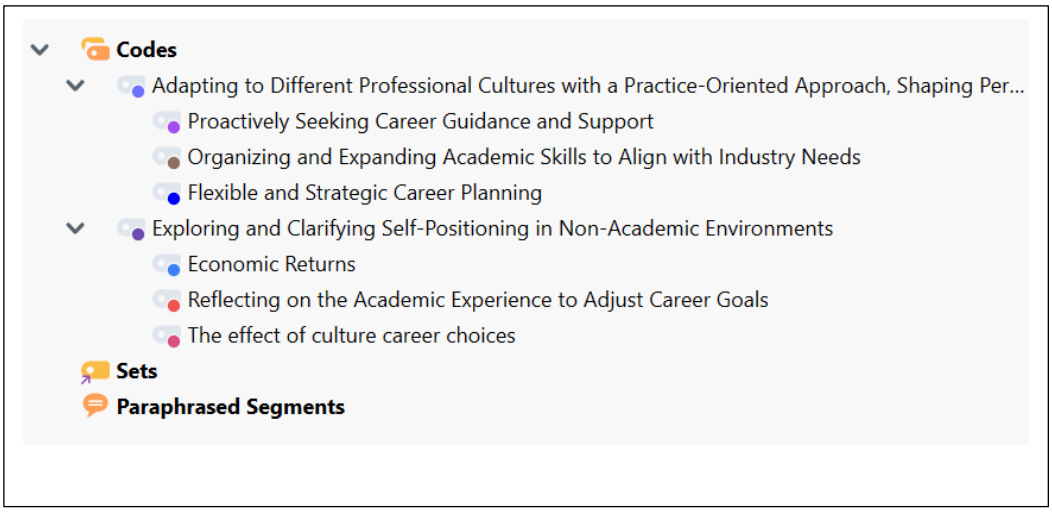
YU ZHENRANYI

Email: yuzhenranyi@jaist.ac.jp

Appendix 2: MAXQDA analysis of study1



Appendix 3: MAXQDA analysis of study2



Appendix 4: Selected and organized articles from four databases

Study 3 is a systematic literature review conducted using four databases and three keyword phrases.

Database	AI & value co-creation	AI & career guidance	AI & individual capability
Scopus	Chuang, C. M. (2023). The conceptualization of smart tourism service platforms on tourist value co-creation behaviours: an integrative perspective of smart tourism services. Humanities and Social Sciences Communications, 10(1). https://doi.org/10.1057/s41599-023-01867-9	Chan, C. K. Y., Hu, W. (2023). Students' Voices on Generative AI: Perceptions, Benefits, and Challenges in Higher Education. https://doi.org/10.1186/s41239-023-00411-8	Ozmen Garibay, O., Winslow, B., Andolina, S., Antona, M., Bodenschatz, A., Coursaris, C., Falco, G., Fiore, S. M., Garibay, I., Grieman, K., Havens, J. C., Jirotka, M., Kacorri, H., Karwowski, W., Kider, J., Konstan, J., Koon, S., Lopez-Gonzalez, M., Maifeld-Carucci, I., … Xu, W. (2023). Six Human-Centered Artificial Intelligence Grand Challenges. International Journal of Human-Computer Interaction, 39(3), 391–437. https://doi.org/10.1080/10447318.2022.2153320
	Paschen, J., Paschen, U., Pala, E., & Kietzmann, J. (2021). Artificial intelligence (AI) and value co-creation in B2B sales: Activities, actors and resources. Australasian Marketing Journal, 29(3), 243-251.	Uddin, S. M. J., Albert, A., Ovid, A., Alsharef, A. (2023). Leveraging ChatGPT to Aid Construction Hazard Recognition and Support Safety Education and Training. Sustainability (Switzerland), 15(9). https://doi.org/10.3390/su15097121	Gibson, D., Kovanovic, V., Ifenthaler, D., Dexter, S., Feng, S. (2023). Learning theories for artificial intelligence promoting learning processes. British Journal of Educational Technology. https://doi.org/10.1111/bjet.13341
	Weber, M., Engert, M., Schaffer, N., Weking, J., Krcmar, H. (2023). Organizational Capabilities for AI Implementation—Coping with Inscrutability and Data Dependency in AI. Information Systems Frontiers, 25(4), 1549–1569. https://doi.org/10.1007/s10796-022-10297-v	Gedrimiene, E., Celik, I., Mäkitalo, K., Muukkonen, H. (2023). Transparency and Trustworthiness in User Intentions to Follow Career Recommendations from a Learning Analytics Tool. Journal of Learning Analytics, 10(1), 54–70. https://doi.org/10.18608/jla.2023.7791	Huang, C., Zhang, Z., Mao, B.,Yao, X. (2022). An Overview of Artificial Intelligence Ethics. IEEE Transactions on Artificial Intelligence. https://doi.org/10.1109/TAI.2022.3194503
	Guida, M., Caniato, F., Moretto, A., Ronchi, S. (2023). Artificial intelligence for supplier scouting: an information processing theory approach. International Journal of Physical Distribution and Logistics Management, 53(4), 387–423. https://doi.org/10.1108/IJPDLM-12-2021-0536	Guleria, P., Sood, M. (2023). Explainable AI and machine learning: performance evaluation and explainability of classifiers on educational data mining inspired career counseling. Education and Information Technologies, 28(1), 1081–1116. https://doi.org/10.1007/s10639-022-11221-2	Sharma, A., Lin, I. W., Miner, A. S., Atkins, D. C., Althoff, T. (2022). Human-AI Collaboration Enables More Empathic Conversations in Text-based Peer-to-Peer Mental Health Support. http://arxiv.org/abs/2203.15144
	Megaro, A., Carrubbo, L., Polese, F., Sirianni, C. A. (2023). Triggering a patient-driven service innovation to foster the service ecosystem well-being: a case study. TQM Journal, 35(5), 1256–1274. https://doi.org/10.1108/TQM-02-2022-0072	José-Garcia, A., Sneyd, A., Melro, A., Ollagnier, A., Tarling, G., Zhang, H., Stevenson, M., Everson, R., Arthur, R. (2022). C3-IoC: A Career Guidance System for Assessing Student Skills using Machine Learning and Network Visualisation. International Journal of Artificial Intelligence in Education. https://doi.org/10.1007/s40593-022-00317-v	Xia, Q., Chiu, T. K., Chai, C. S., & Xie, K. (2023). The mediating effects of needs satisfaction on the relationships between prior knowledge and self - regulated learning through artificial intelligence chatbot. British Journal of Educational Technology.
	Neuhofer, B., Magnus, B., Celuch, K. (2020). The impact of artificial intelligence on event experiences: a scenario technique approach. https://doi.org/10.1007/s12525-020-00433-4/Published		Zirar, A., Ali, S. I., & Islam, N. (2023). Worker and workplace Artificial Intelligence (AI) coexistence: Emerging themes and research agenda. Technovation, 124, 102747.
	Chatterjee, S., Chaudhuri, R., Vrontis, D., Kadić-Maglajlić, S. (2023). Adoption of AI integrated partner relationship management (AI-PRM) in B2B sales channels: Exploratory study. Industrial Marketing Management, 109, 164–173. https://doi.org/10.1016/j.indmarman.2022.12.014		Shenkoya, T., Kim, E. (2023). Sustainability in Higher Education: Digital Transformation of the Fourth Industrial Revolution and Its Impact on Open Knowledge. Sustainability (Switzerland), 15(3). https://doi.org/10.3390/su15032473
	Li, Y., Fan, Y., Nie, L. (2023). Making governance agile: Exploring the role of artificial intelligence in China's local governance. Public Policy and Administration. https://doi.org/10.1177/09520767231188229		Yu, X., Xu, S., & Ashton, M. (2023). Antecedents and outcomes of artificial intelligence adoption and application in the workplace: the socio-technical system theory perspective. Information Technology & People, 36(1), 454-474.
	Tigre Moura, F., Castrucci, C., Hindley, C. (2023). Artificial Intelligence Creates Art? An Experimental Investigation of Value and Creativity Perceptions. Journal of Creative Behavior. https://doi.org/10.1002/jocb.600		Yilmaz, R., Karaoglan Yilmaz, F. G. (2023). The effect of generative artificial intelligence (AI)-based tool use on students' computational thinking skills, programming self-efficacy and motivation. Computers and Education: Artificial Intelligence, 4. https://doi.org/10.1016/j.caeai.2023.100147
	Terry, A. L., Kueper, J. K., Beleno, R., Brown, J. B., Cejic, S., Dang, J., Leger, D., McKay, S., Meredith, L., Pinto, A. D., Ryan, B. L., Stewart, M., Zwarenstein, M., & Lizotte, D. J. (2022). Is primary health care ready for artificial intelligence? What do primary health care stakeholders say? BMC Medical Informatics and Decision Making, 22(1). https://doi.org/10.1186/s12911-022-01984-6		Madake, J., Bhatlawande, S., Solanke, A., & Shilaskar, S. (2023). A Qualitative and Quantitative Analysis of Research in Mobility Technologies for Visually Impaired People. IEEE Access.
	Fu L, Pei T, Yang J and Han J (2022)How smart senior care can achievevalue co-creation: Evidence fromChina.Front. Public Health10:973439.doi: 10.3389/fpubh.2022.973439		
	Buhalis, D., Papathanassis, A. and Vafeidou, M. (2022), "Smart cruising: smart technology applications and their diffusion in cruise tourism", Journal of Hospitality and Tourism Technology, Vol. 13 No. 4, pp. 626-649. https://doi.org/10.1108/JHTT-05-2021-0155		
	Solakis, K., Katsoni, V., Mahmoud, A. B., Grigoriou, N. (2022). Factors affecting value co-creation through artificial intelligence in tourism: a general literature review. Journal of Tourism Futures. https://doi.org/10.1108/JTF-06-2021-0157		
	Flavián, C., Pérez-Rueda, A., Belanche, D., Casaló, L. v. (2022). Intention to use analytical artificial intelligence (AI) in services – the effect of technology readiness and awareness. <i>Journal of Service Management, 33(2), 293–320. https://doi.org/10.1108/JOSM-10-2020-0378		
Total 29	**14**	**5**	**10**

Database	AI & value co-creation	AI & career guidance	AI & individual capability
Sage journal	Schneider-Kamp A. The Potential of AI in Care Optimization: Insights from the User-Driven Co-Development of a Care Integration System. INQUIRY: The Journal of Health Care Organization, Provision, and Financing. 2021;58. doi:10.1177/00469580211017992		Kaur, A., Singh, S., Chandan, J. S., Robbins, T., Patel, V. (2021). Qualitative exploration of digital chatbot use in medical education: A pilot study. Digital Health, 7. https://doi.org/10.1177/20552076211038151
Total 2	**1**	**0**	**1**

	Databse	AI & value co-creation	AI & career guidance	AI & individual capability
23	Science direct	Galsgaard A, Doorschodt T, Holten AL, Müller FC, Ploug Boesen M, Maas M. Artificial intelligence and multidisciplinary team meetings; a communication challenge for radiologists' sense of agency and position as spider in a web? Eur J Radiol. 2022 Oct;155:110231. doi: 10.1016/j.ejrad.2022.110231. Epub 2022 Mar 11. PMID: 35361507.	Rodway, P., Schepman, A. (2023). The impact of adopting AI educational technologies on projected course satisfaction in university students. Computers and Education: Artificial Intelligence, 5. https://doi.org/10.1016/j.caeai.2023.100150	Mikalef, P., Gupta, M. (2021). Artificial intelligence capability: Conceptualization, measurement calibration, and empirical study on its impact on organizational creativity and firm performance. Information and Management, 58(3). https://doi.org/10.1016/j.im.2021.103434
24		Mengcheng, L., Tuure, T. (2022). Information Technology–Supported value Co-Creation and Co-Destruction via social interaction and resource integration in service systems. In Journal of Strategic Information Systems, Vol. 31, Issue 2. Elsevier B.V.	Mikrat, H., Amr, M. F., Bahnasse, A., Talea, M. (2022). Review of the Student's Orientation in the Age of New Technologies. Procedia Computer Science, 203, 683–687. https://doi.org/10.1016/j.procs.2022.07.101	Benvenuti, M., Cangelosi, A., Weinberger, A., Mazzoni, E., Benassi, M., Barbaresi, M., Orsoni, M. (2023). Artificial intelligence and human behavioral development: A perspective on new skills and competences acquisition for the educational context. Computers in Human Behavior, 148, 107903. https://doi.org/10.1016/j.chb.2023.107903
25		Sjödin, D., Parida, V., Palmié, M., Wincent, J. (2021). How AI capabilities enable business model innovation: Scaling AI through co-evolutionary processes and feedback loops. Journal of Business Research, 134, 574–587. https://doi.org/10.1016/j.jbusres.2021.05.009		Samuel, J., Kashyap, R., Samuel, Y., Pelaez, A. (2022). Adaptive cognitive fit: Artificial intelligence augmented management of information facets and representations. International Journal of Information Management, 65. https://doi.org/10.1016/j.ijinfomgt.2022.102505
26		Wang, X., Lin, X., Shao, B. (2022). How does artificial intelligence create business agility? Evidence from chatbots. International Journal of Information Management, 66.		Mele, C., Russo Spena, T., Kaartemo, V., Marzullo, M. L. (2021). Smart nudging: How cognitive technologies enable choice architectures for value co-creation. Journal of Business Research, 129, 949–960. https://doi.org/10.1016/j.jbusres.2020.09.004
27	**Total 10**	**4**	**2**	**4**
28				
29	**Databse**	**AI & value co-creation**	**AI & career guidance**	**AI & individual capability**
30	IEEE	J. S. Metcalfe, B. S. Perelman, D. L. Boothe and K. Mcdowell, "Systemic Oversimplification Limits the Potential for Human-AI Partnership," in IEEE Access, vol. 9, pp. 70242-70260, 2021, doi: 10.1109/ACCESS.2021.3078298.	Zafari, M., Bazargani, J. S., Sadeghi-Niaraki, A., Choi, S. M. (2022). Artificial Intelligence Applications in K-12 Education: A Systematic Literature Review. In IEEE Access (Vol. 10, pp. 61905–61921). Institute of Electrical and Electronics Engineers Inc. https://doi.org/10.1109/ACCESS.2022.3179356	
31	**Total 2**	**1**	**1**	**0**
32	**Total papers 43**	**20**	**8**	**15**
33				

Achievement list

1. Yu Zhenranyi, Kunio Shirahada(2024)“A Successful Matching in PhD Employment: An interpretive phenomenological inquiry focusing on cruel optimism and career development”，ICSSI Taiwan.
2. Yu Zhenranyi，Amna Javed，Kunio Shirahada（2024）“Impact of Human-AI Value Co-creation on Individual Capability and Career Guidance”， ICSSI Taiwan.
3. Yu Zhenranyi，Kunio Shirahada（2025）“Career Development of International Doctoral Students in Humanities and Social Sciences in Japan: Professional Identity Construction and Cruel Optimism”, Higher Education Quarterly, 79(3), e70048.
4. Yu Zhenranyi，Kunio Shirahada（2025）”Application Model on Transferable Skills: An Interpretive Phenomenological Study on Career Transition of International Doctoral Graduates in Japan”. （Currently revising the paper in preparation for submission.）