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NORMATIVE DIFFERENCES OF OPEN SCIENCE PRACTICES IN UNIVERSITY-INDUSTRY RESEARCH COLLABORATION IN FINLAND AND CHINA

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Abstract

Open science (OS) policies have become increasingly prominent, not only in the EU with initiatives like Plan S, but also in the US following the introduction of a new OS policy in 2022. In the People's Republic of China (PRC), OS is highlighted in science policy, particularly in the revised Science and Technology Progress Law of the People's Republic of China (2021). As industrial research and development gains value due to the increasing competition and knowledge intensity of the global economy, and with many governments cutting public research funding during the 2010s austerity trend, university-industry research collaboration (UIRC) has become increasingly common. This paper examines whether and how the OS movement has transformed norms in the UIRC context. By comparing multiple case studies, two from Finland and two from the PRC, this paper explores the normative differences between liberal meritocratic capitalist systems and political capitalist systems in terms of their OS practices, such as open access publishing, open data sharing, and science communication. The paper addresses two research questions: 1) What are the similarities and differences in the norms guiding the application of OS practices in UIRC in Finland and the PRC? 2) What do these differences reveal about the science systems of Finland and the PRC? This study applies institutional logics theory (Thornton et al., 2012) to illustrate the normative environment and its dynamics. The findings reveal that both countries share similar institutional logics that foster or hinder OS, including state, market, corporation, profession, and community logics, but with varying weight and manifestations. Finland's institutionalized OS policies and diverse community logics support OS adoption, while the PRC's OS norms in the UIRC context reflect stronger academic capitalism and global competitiveness, often applying OS selectively in areas that align with broader state-driven objectives. This paper contributes to the under-researched topic of OS in UIRC by comparing two distinct contexts: Finland, a small, forerunner country in open science, and the PRC, a rising global science superpower. It highlights how political and economic systems shape OS adoption, offering insights into the dynamics of OS practices in contrasting governance models.

Keywords: open science practices, university-industry research collaboration, institutional logics

1. Introduction

Open science (OS), an umbrella term for various initiatives aimed at strengthening openness, one of the core norms of scientific research, with the aid of digital technologies (Fecher & Friesike, 2014), has become a prominent topic on the global science policy agenda. The institutionalization of OS is often traced back to the 2003 Berlin Declaration on Open Access (Max Planck Society, 2003) and has risen to global prominence almost 20 years later, e.g., through the UNESCO Recommendation on Open Science (UNESCO, 2021). Although OS is seen as a means to promote a more equitable academia and equalize access to knowledge (Fecher & Friesike, 2014), it has also faced criticism. Critics argue that, despite its proclaimed ethos, OS may ultimately benefit large technology companies (Mirowski, 2018) and reinforce the Matthew effect which favors institutions in the Global North and places those in resource-limited, colonized countries at an even greater disadvantage on the global academic market (Ross-Hellauer et al., 2022).

Currently, the most significant steps toward fostering the OS movement have been initiated by the public sector, both at national and multinational levels. Also, the People's Republic of China (PRC) was among the UNESCO member states that adopted the UNESCO Recommendation on Open Science (ibid.) and has implemented various governmental initiatives to promote OS (Li et al., 2022). As the world's most prolific publisher of scientific articles in terms of both quantity (Tollefson, 2018) and quality, as measured by citations (Brainard & Normile, 2022), the PRC's OS development is of considerable global interest. Meanwhile, the European Union (EU) is widely regarded as a global leader in OS, with progressive policies such as Plan S, launched in 2018, which mandates that all publicly funded research articles from 2021 onward must be published as open access (OA) (cOAlition S, 2018). Within the EU, Finland stands out as one of the most active member states in promoting OS (Lilja, 2020).

Fostering OS in academia is relatively straightforward as openness has been a core principle of academic ethos since the Enlightenment (Vermeir & Margócsy, 2012) and seen as part of the ethos of science (Merton, 1973). However, when academic institutions collaborate with companies to increase societal impact, such as in university-industry research collaboration (UIRC), fostering OS becomes more complex due to the traditionally closed "patenting culture" (Rhoten & Powell, 2007). Chataway et al. (2017) call attention to this issue, one which they deem an important area for further research. They also highlight the relevance of understanding OS in the context of university–industry collaboration more broadly. However, only a few early studies have taken up this task. Lattu and Cai (2023) applied the institutional logics approach (Thornton et al., 2012) to examine the norms of OS practices in UIRC in Finland, and Lattu and Lin (2025) explored the same question in the PRC context. These studies not only shed light on different countries' UIRC contexts and their motivations to implement OS but also provide deeper insights into the normative similarities and differences between diverse science systems.

In response to the call of the MPIWG's Lise Meitner Research Group workshop, "The System of Science and Democratic and Authoritarian Social Structures in the Twenty-First Century," this study builds on previous research on norms related to OS in UIRC. The research questions guiding this study are: 1) What are the similarities and differences in the norms guiding the application of OS practices in UIRC in Finland and the PRC? And 2) What do these differences reveal about the science systems of Finland and the PRC?

This study aims to answer these questions by employing a multiple case study methodology (Yin, 2018) and applying institutional logics theory to capture the norms related to OS practices in UIRC. The data consists of previous studies on institutional logics of OS in UIRC in the

PRC (Lattu & Lin, 2025) and Finland (Lattu & Cai, 2023), totaling 42 interviews, along with bibliometric and other project-related data. This chapter also builds upon my doctoral dissertation completed at Peking University (Lattu, 2025).

This chapter proceeds as follows: first, it addresses the research gap by presenting literature on OS in UIRC, with a focus on the PRC and Finland. Then, it moves onto a review of the development of OS in Finland and the PRC, followed by an explanation of the methodology and case studies. After that, it provides a breakdown of the different institutional logics that foster and hinder OS in both countries. It then outlines the similarities and differences of the guiding and constraining norms of OS and describes the characteristics of the two science systems. The chapter concludes with the main findings, limitations, and suggestions for future research.

2. Literature Review

Since the influence of the OS movement on UIRC is a recent phenomenon, it has not yet been extensively explored. Before the OS movement became prominent, scholars examined the norm of openness in academic research in UIRC contexts (e.g., Dasgupta & David, 1994; Tijssen, 2004; Larsen, 2011). Openness was conceptualized within the framework of Mertonian norms, such as communism and disinterestedness. These studies suggest that as industrial partners became more involved in universities' research activities, the Mertonian norms were challenged by industry-driven norms, particularly regarding intellectual property rights (IPR) protection.

Previous research has highlighted that firms engaged in research and development (R&D) do participate in scientific publishing—an activity that can be considered a form of scientific openness—when it aligns with their strategic interests (Hicks, 1995; Simeth & Raffo, 2013). These interests include enhancing in-house knowledge absorption capabilities, increasing credibility and corporate image among stakeholders (such as potential recruits, scientists, shareholders, customers, and investors), and signaling tacit, unpublished knowledge. This signaling enhances a company's networking and collaboration opportunities within the scientific community (Hicks, 1995).

Additionally, studies found that openness, when operationalized through publishing, can increase UIRC efficiency by enabling an enhanced division of labor, allowing researchers to focus on academic publishing (Bikard et al., 2019). Normative dynamics in UIRC are also more nuanced than a simple dominance of industry interests. For example, Biscotti et al. (2012) noted an "asymmetrical convergence," where industry norms influenced academia, but academic norms also shaped industrial practices, particularly regarding publication and data sharing. Furthermore, Simeth and Raffo (2013) elaborated that academic partners often influence decisions on publishing scientific articles or conference proceedings, demonstrating that these decisions are not solely dictated by firms' interests.

With the rise of the OS movement, Chataway et al. (2017) called for further research into how OS affects UIRC. In Finland, Lilja (2020) found that OS practices had intensified and complicated normative tensions in UIRC, particularly around data sharing. Answering this call for further research, Lattu and Cai (2023) applied the institutional logics framework to study OS practices in UIRC in Finland, identifying five institutional logics: state, market, corporation, profession, and two variations of community logic. These findings will be further elaborated in the following sections.

While empirical studies on UIRC are limited, discursive works provide valuable insights into how OS is conceptualized in the Chinese context, which will be addressed in the following section.

This body of literature provides foundational insights into how normative tensions regarding openness persist in UIRC and how OS has, if not increased, at least not resolved these tensions. However, gaps remain in understanding the nuanced normative tensions globally and within specific national contexts.

3. Open Science Development in Finland and China

This section reviews the overall state of OS development in Finland and the PRC, focusing on the attitudes and initiatives fostering its progression. The section concludes with an overview of the current state of OS in UIRC.

3.1 Open Science Development in Finland

Finland is one of the most active EU member states promoting OS (Lilja, 2020), with its public sector being among the first to invest in OS development in a coordinated manner (Forsström et al., 2019). As shown in Figure 1, the OS movement in Finland emerged in the 1990s, driven by library initiatives and academic Internet communities, supported by the Finnish Ministry of Education and Culture (MEC) (Ilva, 2020b). In the 2000s, OS gained momentum through Nordic cooperation, with milestones such as the establishment of the Directory of Open Access Journals (DOAJ) following the 2002 Nordic Conference on Scholarly Publishing.

In the 2010s, OS became a mainstream agenda in Finnish science policy, culminating in the Open Science and Research Initiative 2014–2017 funded by the MEC. This initiative positioned the Federation of Finnish Learned Societies as the coordinator of Finland's OS efforts, formally named the National Open Science and Research Coordination of Finland (NOSRC) (NOSRC, 2017). It defines OS across four categories: 1) open access (OA) publishing, 2) open data, 3) open scholarship culture, and 4) open education (ibid, 2021). The term OA publishing refers to OA journals, repositories, and preprints, while open scholarship emphasizes transparency, citizen science, and societal engagement.

The Declaration for Open Science and Research 2020–2025 (DOSR 2020–2025), published in 2019, was a significant milestone in aligning academic institutions toward common OS goals NOSRC, 2020). Several academic institutions signed the declaration and are implementing its vision through institutional policies and practical recommendations which have been co-created by voluntary expert groups of Finnish scholars. In March 2025, an updated Declaration for Open Science and Research 2025–2030 was adopted to reflect changes in the global research environment, including heightened geopolitical and security considerations, while reaffirming Finland's commitment to OS (NOSRC, 2025).

Figure 1: Milestones of Open Science Policy Development in Finland Adapted from Lattu (2025)

The NOSRC committed to continue its mission to create four policies and 24 recommendations throughout the 2020s to adhere to the DOSR 2020–2025. To incentivize OA publishing, the MEC included a funding coefficient of 1.2 in Finland's university funding model, which allocates resources based on performance indicators such as publication output (Himanen & Nykyri, 2024). By 2019, 64.9% of Finnish research outputs were OA (Ilva, 2020a), with further increases following the new 1.2 coefficient. However, Finnish researchers reported ambivalence toward OS policies, viewing them as detached from the realities of academic work, particularly in qualitative research. Concerns include participant anonymity and the lack of recognition for OS-related work (Lilja, 2020).

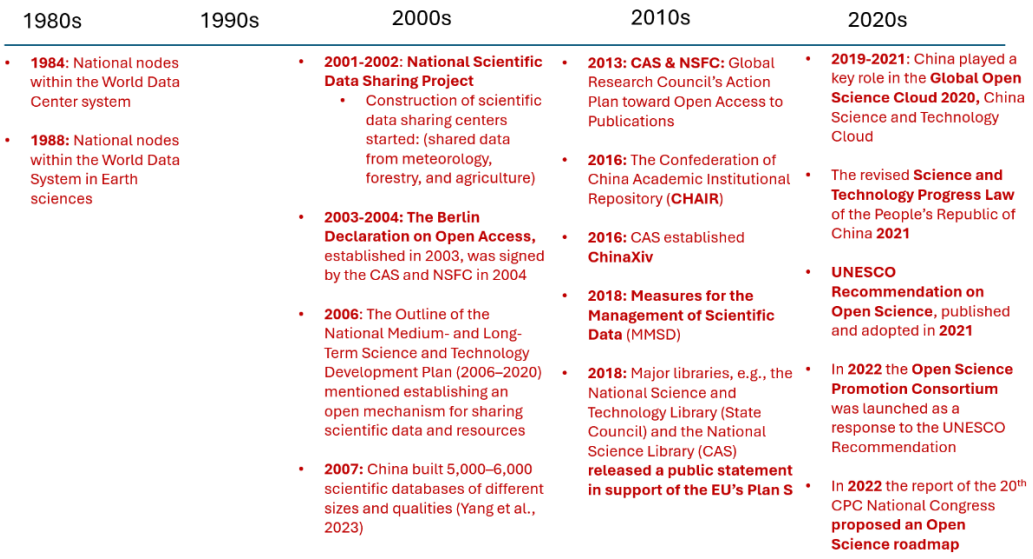
Finnish policies acknowledged the relevance of OS in UIRC, including the DOSR 2020–2025, which emphasizes openness in collaborative research with private companies (NOSRC, 2020). In 2022, the NOSRC published guidelines for collaborative research, development and innovation activities between research organizations and companies, emphasizing the safe, efficient, and open utilization of research outputs generated in UIRC contexts (Mikkonen et al., 2022). In DOSR 2025–2030, responsible openness in innovation activities—including UIRC—was emphasized, and collaboration with companies was recognized as a merit in research assessment and career advancement (NOSRC, 2025). To conclude, OS development in Finland has been strong and steady over the years, evolving to include policies that address emerging areas such as UIRC.

3.2 Open Science Development in the PRC

In the PRC, OS development has been promoted through national and institutional policies, particularly focusing on open data since the 1980s, as can be seen from Figure 2 (e.g., Jin et al., 2022). Large-scale OS initiatives began in the 2000s, including the Scientific Data Sharing

Project in 2001 and the Outline of the National Medium- and Long-Term Science and Technology Development Plan 2006–2020 (Li et al., 2022; Zhang et al., 2022). The PRC also took significant steps toward OA publishing when the Academy of Sciences (CAS) and Natural Science Foundation of China (NSFC), forerunner organizations in fostering OS in the PRC, signed the Declaration on Open Access to Knowledge in the Sciences and Humanities in 2004 (Chinese Academy of Sciences, 2004).

Figure 2: Milestones of Open Science Policy Development in the PRC Adapted from Lattu (2025)



The 2010s saw further momentum as PRC institutions publicly supported major global OS initiatives, such as the Global Research Council's Action Plan toward Open Access in 2013 (Zhang et al., 2012) and the principles of Plan S (National Science Library, 2019). Open data infrastructure expanded during this time, supported by policies like the Measures for the Management of Scientific Data, which mandated government-funded data sharing (Li et al., 2022).

The 2020s have so far been a time for further OS institutionalization following a global standard clarified by the UNESCO Recommendation on OS (UNESCO, 2021). Its importance was emphasized when it was included in the revised Science and Technology Progress Law of the People's Republic of China (2021), (中华人民共和国科学技术进步法(2021年修订)·中华人民共和国科学技术部, 2021, Article 95). In 2022, the Open Science Promotion Consortium (OSPC) was established as a response to the UNESCO Recommendation on OS, initiated by the China Association for Science and Technology (CAST). The OSPC, which includes both Chinese and foreign organizations involved in OA publishing, open data, and OS infrastructure construction, was established in the same year. Additionally, the report of the 20th Party Congress in 2022 summarizes global OS development and proposes an OS roadmap and action plan for the PRC's OS development (Yang et al., 2023). However, beyond these macro policies and guiding measures, there are no specific or strong regulatory provisions for the implementation of OS practices.

Even though many scholars were optimistic about the PRC's fast OS development in the 2010s (e.g., Zhang, 2014; Ren & Montgomery, 2015; Montgomery & Ren, 2018), the 2020s outcomes have not yet met these high expectations. Despite being the largest contributor to OA articles in 2022, with 337,611 publications, only 38% of the PRC's articles are OA, compared to 54% in the US and 88% in Sweden (STM, 2023). Similarly, in terms of open data, the PRC ranks behind leading nations: it ranked 12th in Re3data scientific research data repositories with 48 repositories, while the US ranked first with 1,136 repositories (Li et al., 2022). By 2024, the PRC was ranked 61st in OpenDOAR repositories, with 65 listed repositories compared to the US's 818 (OpenDOAR, 2023).

Scholars have identified five key categories contributing to the sluggish development of OS in the PRC. First, insufficient technological infrastructure limits the consistency and interoperability of databases. Second, regulatory challenges around IP and copyright create barriers (e.g., Li & Chen, 2020; Yang et al., 2023). Third, the idea of openness has weak resonance in Chinese research culture, and skepticism toward OA persists (Huang et al., 2021; Zhang et al., 2022). Yang et al. (2023) also note a lack of consensus on the definition of OS in the PRC. Fourth, non-mandatory OS policies and the lack of incentives in research evaluation hinder adoption (Li and Chen, 2020; Yang et al., 2023). Finally, challenges within the publishing industry include high subscription fees and article processing charges (APCs) for non-PRC journals, as well as non-OA-compliant business models of national publishers (Yang et al., 2023).

While empirical studies on OS in UIRC are limited, scholarly discussions provide valuable insights. Zhang (2013) argued that industry and academia should focus on their core functions—commercialization and knowledge dissemination, respectively—while avoiding overlapping roles. Similarly, Li and Chen (2020) highlight the importance of balancing public and commercial interests in OS practices, advocating for clear contractual agreements to define boundaries for openness. Yang et al. (2023) emphasize OS practices in UIRC as crucial for the PRC's economic development. This illustrates that although OS development has been unpredictable and has not met expectations, it is being promoted gradually and, in the UIRC context, is viewed positively as a contributor to economic growth.

4. Theoretical Framework

This study applies the seven ideal-type institutional logics by Thornton et al. (2012) to understand the different norms fostering OS practices, including OA publishing, open data and science communication. Thornton and Ocasio (1999, p. 804) define institutional logics as "the socially constructed, historical patterns of material practices, assumptions, values, beliefs, and rules by which individuals produce and reproduce their material subsistence, organize time and space, and provide meaning to their social reality." These logics constitute distinct organizing principles that provide actors with "vocabularies of motive and a sense of self (i.e., identity)" (Thornton & Ocasio, 2008, p. 4). Each logic constitutes individuals, organizations, and society (ibid.) and simultaneously constrains and fosters specific types of behavior. Logics also provide actors with "cultural resources for transforming individual identities, organizations, and society" (Thornton & Ocasio, 2008, pp. 4–5).

Thornton et al. (2012) distilled Western societies' ideal logics into seven ideal types: family, community, religion, state, market, profession, and corporation logics, summarized in Table 1. Although these seven ideal types represent societal-level logics, this study applies them in

a field-level context of UIRC, responding to the call by Mountford and Cai (2023) for a "flatter ontology of institutional logics (IL)." According to the authors, a flatter ontology—utilizing the seven ideal types of IL instead of developing new field-level logics—makes it possible to identify connections and interactions between field- and societal-level logics. This approach is appropriate because most field-level logics are instantiations of societal logics, hybrid logics, or ideologies rather than entirely new field-level logics.

Table 1: Seven Ideal Types of Institutional Logics by Thornton et al. 2012 Summarized Based on Lattu and Cai (2023)

Name of the institutional logic	Summary of the institutional logic
Family logic	Actors' objective is to maintain and increase the status and honor of the family. Family entity is seen as a "firm" in the economic system.
Community logic	Actors share a value base and ideology as well as an emotional connection that works like a glue between the actors in the same group. Personal investment in the group is crucial for belonging in the group. A common objective for the community is to increase status and honor of its members.
Religion logic	Faith, the supernatural, and sacredness are in the core of the logic, where the religious leader uses charismatic power and association with deities is considered important. The mode of actors applying this logic is to increase symbolism of natural events. However, despite the focus on supernatural, from the economic perspective is present and temple or church is seen as a "bank."
State logic	Actors are most of all citizens of the state and the common objective is to increase common good of the citizens. State intervention of redistributing public goods is considered important and authority for actors with certain bureaucratic roles exercising power are legitimized with democratic participation.
Market logic	Actors are faceless and driven by maximizing profit with efficiency and subject all their agency to transactions. The (stock) market dynamics caused by shareholder agency depict the rules of actors and their agency can be quantified by share prices. The bottom line of the market logic is that all actors are driven by self-interest.
Profession logic	Actors perceive themselves and others as professionals to be in a relational network, where one's professional status is based on personal expertise. One aims at increasing personal reputation by doing quality work.
Corporation logic	Actors identify with their bureaucratic roles and are bound to follow top-down command orders from a board of directors to subordinates according to the corporate hierarchy. Giving in fully to the organizational role and following orders increases actors' status in the corporate hierarchy. The overall goal of the actors is to strengthen the market position of a firm by increasing its size and diversification.

The IL framework is employed in this study to identify supra-organizational patterns that provide meaning to actions and conflicts (Cai and Mountford, 2022), as the UIRC field exemplifies a complex institutional environment. While IL was created to articulate societal-level logics of Western society, the approach has been applied in studies of Chinese science and innovation systems (e.g., Yan, 2016; Zheng et al., 2018; Cai & Liu, 2020). However, the framework has faced criticism for its inability to fully capture the nuances of non-Western contexts (Jacks, 2017) and for verificationism, which leaves limited room for inductive analysis (Cruz, 2016). To address this critique, this study pays close attention to the framework's potential rigidity and considers the emergence of logics outside the established framework during data analysis. All in all, the IL approach provides a lens to examine the interplay of societal and field-level norms, offering insights into the institutional dynamics shaping OS practices in UIRC contexts, as visualized in Table 2.

Table 2: Theoretical Framework for Identifying Institutional Logics Driving OS Practices in UIRC

Open Science practices	Ideal types of institutional logics							
		Family	Community	Religion	State	Market	Profession	Corporation
	OA publishing							
	Open data practices							
	Science communication practices							

5. Methodology

This study employs the comparative multiple case study research approach, a method well-suited for exploratory studies (Yin, 2018). This method was chosen as it best suits the objective of this paper: to understand the similarities and differences in norms that facilitate or impede the adoption of OS practices in UIRC in Finland and the PRC, a topic that has not been extensively explored.

The data used in this analysis are derived from two previous studies concerning the institutional logics of OS practices in UIRC: one conducted about Finland (Lattu & Cai, 2023) and the other about the PRC (Lattu & Lin, 2025), as illustrated in Table 3. Both studies employed distinct purposive sampling strategies (Patton, 2014) to obtain focused insights into the studied phenomenon. In addition to the two focal cases in each country, the analysis also draws on pilot and expert interviews, particularly in the PRC, where interviews conducted beyond the case organizations were important for contextualizing OS practices (see Appendices).

In the Finnish context, where OS is more deeply institutionalized, the sampling strategy involved identifying typical UIRC cases funded by key public research instruments, including Business Finland's Co-Innovation and Horizon 2020's Research and Innovation Action. The selected cases included universities that were among the top recipients of private funding for UIRC, medium-sized budgets compared to other projects funded by the same instruments, and representation of fields where UIRC is most common, such as natural, medical, and technical sciences. Interviewees were selected to ensure a balanced representation from business representatives, university researchers, and intermediaries. However, since UIRC research fields are predominantly male-dominated, female interviewees were underrepresented in the data (see Appendix Table 1). The collected data comprised 24 interviews, bibliometric data, information about open data practices, and communication materials related to the selected cases.

In the PRC, the sampling strategy aimed to identify extreme cases in terms of OS practices. The institutionalization of OS is not as advanced in the PRC as it is in Finland (e.g., Li & Chen, 2020), and there was a realistic possibility that UIRC cases would not apply OS practices. During the data collection I categorized a case as “extreme” if the institution in question

applied OS practices. The selected projects involved research collaborations between university researchers and companies, where OS practices were applied in some form and focused on fields where UIRC is most common, such as the natural, medical, and technical sciences. European companies partnered with the Chinese UIRC cases (A and B). This is not surprising, as OS is recognized as a movement originating outside the PRC (e.g., Yang et al., 2023). Interviewees were selected to ensure as balanced a representation as possible from business representatives, university researchers, and intermediaries. However, business representatives were harder to reach due to availability constraints, resulting in their underrepresentation in the data (see Appendix Table 2). The collected data comprised 18 interviews, bibliometric data, and related materials.

Regarding coding, both studies followed the same analytical framework of IL presented in the previous chapter to analyze how the seven ideal types of IL were driving or hindering UIRC actors in applying OS practices. However, the data from the Finnish context were re-coded since the Lattu and Cai (2023) study did not include the category of science communication, unlike the Chinese data. This adjustment ensures that the coding framework applied across both contexts aligns with the broader comparative objectives of this study. Hence, the IL analysis of Finnish cases presented in the next chapter differs slightly from the original work. These adjustments are elaborated upon in the next chapter.

Due to the different sampling strategies and the overall starting point of analyzing two very different countries, the comparative objective of this paper is to strive for a better understanding of both contexts, as separate systems of science. The following section elaborates on the cases from Finland and the PRC.

Table 3: Case Descriptions of the Multiple Case Studies on OS Practices in UIRC in Finland and China

	Case A Finland	Case B Finland	Case A China	Case B China
Sampling strategy	Purposive sampling strategy of selecting a typical type of UIRC case in terms of a) funder b) budget, c) universities involved, d) field of science	Purposive sampling strategy of selecting a typical type of UIRC case in terms of a) funder b) budget, c) universities involved, d) field of science	Mix of purposive and convenience sampling strategy of selecting an extreme UIRC case in terms of applying OS practices	Mix of purposive and convenience sampling strategy of selecting an extreme UIRC case in terms of applying OS practices
Project type	BF Co-Innovation project	Horizon 2020 Research and Innovation Action (RIA)	Company university collaboration case	Company, university collaboration case, includes funding from MoSt and from a Northern European public innovation office
Funding source's OS policies and guidelines	Requires OA publishing and takes open data practices into account in project applications through a data management plan, although these are not funding criteria. OA publishing not evaluated by the	Requires projects to publish OA (Article 29.2). Open data practices recommended but with an opt-out possibility (Article 29.3). OA of all peer-reviewed articles and data need to be reported in scientific and finan-	-	-

	funder. Some guidelines provided for OA publishing and open data practices.	cial reporting. Extensive guidelines provided for OA publishing and open data pilots. Sanctions can follow in extreme cases if the OA policies are not respected.		
Objective of the case	To develop a technical solution to promote living standards, piloted in a country located in the Global South	To utilize different types of large data cohorts from different disciplines for groundbreaking medical research	Funding an ambitious basic research project of a postdoctoral researcher	To utilize large datasets and machine learning for groundbreaking medical research
Scientific field/s	Technical sciences	Medical sciences and natural sciences	Biomedical sciences	Technical sciences and biomedical sciences
Universities involved	LUT (leader) and Aalto	TAU (leader), University of Oulu, University of Helsinki, University of Turku, and 7 universities outside Finland (in total, n = 11)	Project 985 university from Beijing, PRC	Project 985 university from Shanghai, PRC, University hospital, Shanghai, PRC
Leading universities' OS policies and guidelines	LUT (leader) committed to fostering OA publishing and open data practices. Policies regarding open research data note that the industry's needs regarding openness need to be taken into account. Extensive guidelines for both OA and open data practices available.	TAU (leader) committed to fostering OA publishing and open data practices. The OS guidelines note that the commercial utilization of research data and the protection of rights need to be taken into account. Extensive guidelines for both OA and open data practices available.	^	Project 985 university from Shanghai
Companies involved	3 technology companies and 2 other companies (n = 5)	4 technology companies	European company from the medical industry	European company from the field of engineering. Independent consultant
Other organizations involved	2	7	-	-
Total number of partners involved	9	22	2	4
Amount of public funding*	600,000 EUR	11,000,000 EUR	(not available)	(not available)
Private funding	Amount not available as public information.	Amount not available as public information.	Amount not available as public information	Amount not available as public information
Percentage of OA publications (excluding theses)	40% (n = 25)	100% (n = 13)	50% (n=2)	No publications resulted yet, plan to publish OA
Open data practices	No open data practices applied	Plan to share data with a specific solution designed for the project	Data of the project deposited in a public repository	Plan not to share data since the data

				used is health data
Science communication practices	Media coverage (3 national and 3 global articles), 6 organizational news items, and a project website with 20 blog post	Extensive communications plan, (by the dissemination and outreach partner), a website with 9 blog posts, an active X account	Findings of the articles were shared with a wider audience through social media	Plan to communicate about future major findings
Number of interviewees	8	8	4	4

*The budget figures were rounded to maintain the anonymity of the cases

6. Case Description and Data

This section includes descriptions of all four case studies and the institutional logics driving and hindering OS practices in the UIRC that were detected in Finland and the PRC.

6.1 UIRC Case Description Finland

Case A Finland: Engineering for Global Impact

Case A Finland, funded by Business Finland's (BF) Co-Innovation program, focused on developing a technical solution to enhance living standards in a country in the Global South. The project lasted two years and concluded just before the interviews were conducted in 2020. This multidisciplinary project included Lappeenranta University of Technology (LUT), Aalto University, and five companies, supported by approximately 600,000 EUR in public funding provided by BF. With a team of approximately 20 core members, most of them engineers, the project successfully piloted the proposed solution, improving living conditions in its focus country, which made the project personally meaningful for the interviewees.

The adoption of OS practices—OA publishing, open data, and science communication—varied significantly across these areas. Only 19% (n=25) of publications resulting from the project were OA, and no open data practices were implemented, while science communication practices were extensively applied. In total, the project resulted in three national and three international news articles, six organizational news items, and a project website with 20 blog posts. Interviewees reported receiving substantial support for media communication from university communications departments. The limited adoption of OS practices can, to some extent, be attributed to the lack of mandatory OS requirements in BF funding guidelines.

The project's culture was built on shared sustainable values among team members and an engineering culture that fostered open dialogue, trust, and respect for agreements. This was demonstrated when a company left the consortium but chose not to charge BF for already completed work, as not all agreed-upon tasks had been finalized. Cultural differences in the focal country introduced some challenges but ultimately unified the project team members. Effective online communication via Slack software and monthly steering group meetings enabled a collaborative atmosphere and the progress of the project, despite the Covid-19 pandemic.

Overall, Case A Finland provides valuable insights into a typical UIRC case and highlights that, even in the "forerunner country of OS," average research projects may not fully adopt OS practices unless these are mandated by the funding body. The case also demonstrates that researchers' values, such as sustainability, when combined with a compelling project and robust support from UIRC organizations, can foster specific OS practices, particularly in areas like science communication.

Case B Finland: A Large Multidisciplinary Medical Research Project

In contrast, Case B Finland, supported by the EU's Horizon 2020 RIA, represented a large-scale initiative involving 11 universities, four companies, and multiple disciplines, including medical and natural sciences. Tampere University led this consortium, which had a budget of approximately €11 million. The project, which began in 2020, aimed to utilize extensive data cohorts for groundbreaking medical research. With over 80 participants involved—though the exact number was difficult to define—the project was a significant collaboration. Eight interviewees were selected from the largest research partners and companies most relevant to OS practices.

The adoption of OS practices was comprehensive and closely aligned with Horizon 2020's stringent requirements. All peer-reviewed publications resulting from the project (100%, n=13) were made OA, mostly through golden OA. Open data practices were implemented by including supplementary data in publications or making data available upon reasonable request when new data was generated. Additionally, the project aimed to build a platform for sharing anonymized data, tailored to meet the project's needs (e.g., sharing data across borders during research collaboration). Interviewees described the project as a forerunner in anonymizing medical data, enabling its secure sharing across borders with researchers and potentially even with EU citizens. Science communication practices included an extensive communications plan, with a designated partner responsible for dissemination and outreach. The project maintained a website, a blog featuring nine entries, and an active X account (formerly Twitter). The robust adoption of OS practices reflected Horizon 2020's clear mandates and enforcement mechanisms.

The project encountered challenges with data legislation, as Finland had recently revised the Act on the Secondary Use of Social and Health Data, complicating the application process for using medical data in research. Additionally, ensuring general data protection regulation (GDPR) compliance while sharing medical data within the multinational team presented difficulties. However, as all participating countries were EU members, and partners shared similar disciplinary backgrounds (technical and medical sciences), these challenges were mitigated by the project team's prior experience with Horizon projects. Communication and collaboration were primarily conducted via Microsoft Teams channels and regular consortium meetings. In summary, Case B demonstrates how robust funding requirements can drive OS adoption. At the same time, contradictory policies, such as those governing data protection, may hinder certain practices, including open data sharing.

6.2 Institutional Logics of OS Practices in UIRC in Finland

This study identified five ideal types of institutional logics to foster and hinder OS practices (i.e., OA, open data, and science communication) in UIRC: state, market, corporation, profession, and community. Within the community logic, three distinct forms emerged: academic community logic, sustainability-based community logic and traditional trust-based community logic. These logics were reflected in the interview data, as summarized in Table 4. This study included a category of science communication in the study, which led me to re-code the data. This process generated new insights that expanded upon the existing results, while leaving the previous findings valid. The additional insights related to science communication revealed the following logics: academic community logic, pro-OS market logic, contra-OS corporate logic, and stronger pro-OS corporation logic.

Table 4: Institutional Logics of OS practices of UIRC in Finland

Institutional logic of OS practices of UIRC		**Summary of institutional logic**	**Pro or contra the OS movement**	**Enforced, weakened, or not significantly influenced by the OS movement**
Market logic		Hindering or strengthening OS development for maximizing profits	Contra- and pro-OS movement	Pro-OS market logic is enforced by OS
State logic		Research outputs and research data are public property for the common good, and openly sharing both research data and publications is justified by public research funding	Pro-OS movement	Enforced
Corporation logic		Individuals' commitment to OS by following commands, fostered by beliefs in bureaucracy	Pro- and contra-OS movement	Pro-OS corporation logic is enforced by OS
Profession logic		Motivation to apply or not apply OS practices stemming from professional aspirations	Pro- and contra-OS movement	Pro-OS profession logic is enforced by OS
Community logics	**Traditional trust-based community logic**	Informal knowledge exchange and UIRC without written contracts enabled by the trust stemming from the culture of the Finnish engineering community	Contra-OS movement	Weakened
	Sustainability-based community logic	Motivation to apply OS practices stemming from sustainable values	Pro-OS movement	Enforced
	Academic community logic	Motivation to apply OS practices stemming from the values of the academic community	Pro-OS movement	Enforced

Source: Adapted Lattu (Dissertation Peking University)

In Finland, the state, market, corporation, profession, sustainability-based community, and academic community logics facilitated the OS movement and were stronger than the contra-OS sets of norms. The strongest pro-OS logic, state logic, reflected interviewees' norms that research outputs and research data are public property for the benefit of common well-being, and opening both research data and publications is justified by public research funding. As professor AU1 put it: "If it is funded with public money, the results should be made available to the public, and that is a good principle."

Another strong pro-OS logic in UIRC (see Table 5) was the pro-OS market logic, where applying OS practices was seen as a means to maximize profits. OA publishing, or general publishing and science communication in UIRC were viewed as beneficial for companies increasing visibility, credibility, and motivation among R&D staff. Interviewee PI3 reflects on the strategic use of publishing in UIRC: "Sometimes a decision can be made where it's actually beneficial not to patent something, even if it's inventive and could lead to a good patent, but instead to publish it for everyone to use. In that case, the matter itself can be a tactical or strategic decision. For example, if you publish something good, it might generate some change in a larger context—systemic, technological, or something similar."

Corporation logic, which motivated the fostering of OS due to beliefs in bureaucracy and a commitment to following commands, was also evident in the promotion of OA publishing and science communication, as these practices were encouraged by the regulations of employers (research institutions) or public research funders financing UIRC projects, such as Horizon 2020.

In addition to this the profession logic reflects interviewees' norms which drive the application of OA publishing, sharing data and science communication for increasing visibility and recognition of their work, stemming from their individual professional aspirations. As researcher BU6 explained his motivations for OA publishing: "Well, when it's freely available, it might get more citations."

Finally, two variations of the community logic were emerging sets of norms that reflected interviewees motivations of applying OS practices stemming from community values and benefit. Sustainability-based community logic reflected interviewees' motivations to publish OA and share research data due to their sustainable value base. For instance, university researcher AU1 emphasized the importance of accessibility in regions with limited resources: "In country X [a country in the Third World participating in the Case A project], there are no funds in the same way [as in Finland] to buy access to all kinds of publication databases. So, of course, we want the people there, or in nearby areas, to read them [the project's publications]." The academic community logic in turn reflects motivations to share research data with colleagues for progressing scientific research for the benefit of the scientific community. As BU1 articulated in his vision: "perhaps we should even create practices for how this data could actually be processed efficiently. For example, some kind of web platforms where a vast amount of data would be widely available, so that it could also be approached in an interdisciplinary way and in an understandable format. I think it would really advance science, and in a way, it would create an entirely new field of science—one that focuses on analysing already produced data instead of always producing new data. But there's still a long way to go for that."

In terms of hindering logics, four institutional logics were detected to hinder OS practices in the UIRC field, namely contra-OS market logic, contra-OS corporation logic, traditional trust-based community logic and contra-OS profession logic.

The contra-OS market logic, a logic hindering OS practices, stemmed from the same aspects as pro-OS market logic: a focus on efficiency and profit maximization. In terms of OA publishing, open data and science communication, this logic represents the traditional logic of "closed science" in UIRC where protecting companies' trade secrets and patenting opportunities must take precedence to secure competitive advantages. Practices like delaying publishing due to patenting, or company representatives vetting all materials before publishing was common. As researcher AU7 explained: "Of course, we must make a strong effort to ensure that it's a win–win situation, that those [UIRC] projects also generate publications, but then, of course, those [pieces of information] that are the competitive advantages of those [partner] companies, as in trade secrets, must be strictly excluded."

In a similar manner, the contra-OS corporation logic, stems from interviewees' beliefs in bureaucracy and commitment to following commands—beliefs that also underpinned pro-OS accounts. This set of norms also hindered OS practices, particularly OA and data sharing in Case B, due to conflicting legislation and requirements. In terms of OA, APCs were considered expensive and not always provided by the public research funder Horizon 2020. Regarding open data, obtaining permission to use health data for research purposes involved a lengthy process. Moreover, while the OS requirements of Horizon 2020 encouraged the sharing of medical data within the international UIRC team and potentially with the public, data protection regulations like GDPR imposed strict requirements for anonymization.

The traditional trust-based community logics hindered the OS movement. This logic stems from the small and tight Finnish engineering community, where informal knowledge is exchanged within the community without Non-Disclosure Agreements (NDAs). The absence of formal agreements in such cases contradicts OS principles, as it may lead to uncertainties regarding openness in the long run.

Finally, the contra-OS profession logic is weak but present in the interview data as two researchers from different institutions in Case A (AU1, AU6) perceived the choice between publishing in a high impact-factor (IF) journal or an OA journal as a conflicting decision. While research institutions encourage researchers to achieve both, high IF journals are often non-OA, and OA journals tend to have lower IFs, which can negatively impact career advancement.

This study identified tensions between the pro- and contra-OS logics in the data, forming what this paper refers to as tension pairs. As illustrated in Table 5, the dominating logics are the pro-OS state logic, contra-OS market logic, and the pro-OS market logic. The strongest tension pairs among the logics were pro-OS state logic versus contra-OS market logic and pro-OS profession logic versus contra-OS market logic. However, the sustainability-based community logic, as an emerging institutional logic, was seen as possessing the potential to reconcile these tensions.

Table 5: Institutional Logics Facilitating or Hindering OS in UIRC in Finland

Sector /case	n	Logics facilitating OS practices						Logics hindering OS practices			
		State logic	Pro-OS Market logic	Pro-OS Corporation logic	Pro-OS Profession logic	Sustainability-based community logic	Academic community logic	Contra-OS Market logic	Contra-OS Corporation logic	Traditional trust-based community logic	Contra-OS Profession logic

University researchers	10	6	2	3	5	2	3	8	4	4	2
Business representatives	8	5	4	2	·	1	1	5	1	3	·
Intermediaries	6	4	4	2	1	1	·	4	2	·	·
Total	**24**	**15**	**10**	**7**	**6**	**4**	**4**	**17**	**7**	**7**	**2**
Pilot interviews	8	4	3	·	·	·	·	5	·	3	·
Case A (technical sciences)	8	5	2	3	2	3	·	6	·	3	2
Case B (medical and natural sciences)	8	6	5	4	3	1	4	6	7	1	·
Total	**24**	**15**	**10**	**7**	**6**	**4**	**4**	**17**	**7**	**7**	**2**

Source: Lattu (Peking University dissertation)

6.3 UIRC as a Case Description in the PRC

Case A China: Ambitious Basic Research Project in the Field of Biomedical Sciences

Case A China is situated in the field of biomedical sciences, involving a double first-class university in Beijing and a large European medical company. In 2017, the company, which has a framework agreement with the Chinese university in question, proposed a challenging basic research project to the lab head. The project involved funding a postdoctoral fellow for several years, during which the company provided research funds, focus, and materials. According to a company representative, the project outcome ultimately offered a deeper understanding of the company's existing products, thereby helping the company to market them more effectively. However, the complexity and time demands of the research caused the postdoctoral fellow to redirect her efforts, leading to the termination of the collaboration contract after three years. Subsequently, the project was handed over to a PhD student who, with additional time and resources, successfully advanced the research. This resulted in two high-level publications, one of which was coauthored by the company representatives.

This UIRC project represents an extreme case in the Chinese context, where OS practices were actively applied. Of the two publications, one was published in a highly reputable OA journal that required research data to be made publicly accessible. Additionally, the research findings were summarized and published on a WeChat account dedicated to popularizing scientific discoveries. The lab head's proactive attitude toward OS practices likely influenced this outcome, as both the PhD student and postdoctoral fellow expressed optimism about science communication during interviews.

Even though English posed challenges for some of the university team members, with the lab head often translating meetings, shared disciplinary norms ensured smooth collaboration. Mutual commitment between the partners was strong, exemplified by the lab's decision to continue the project after the formal contract and postdoctoral salary ended. The company,

in turn, continued to provide research materials, enabling the project to progress. This mutually committed approach allowed the challenging research to reach completion, ultimately benefitting both parties.

Case A China illustrates active engagement with OS norms in Chinese UIRC. While not an extreme OS case by European standards, it stands out in the Chinese context as a leading example of OS adoption. As top-tier universities in the PRC are often regarded as forerunners, with their practices influencing other institutions, this case offers valuable insights into the future of UIRC and OS practices in the region.

Case B China: Applied Research Project in the Fields of Technical and Biomedical Sciences

Case B China is a multidisciplinary collaboration that brought together actors from the fields of technical and biomedical sciences. Key stakeholders included a biomedical sciences laboratory from a double first-class university in Shanghai, researchers from a university hospital in Shanghai, a Northern European software company, and an independent consultant who acted as an intermediary. The consultant, operating in both the PRC and the EU, played a pivotal role in initiating the project by introducing the lab head and the head of the software company, who led their respective teams.

The project was conceived during the process of applying for public funding from stakeholders' home countries. It was co-designed as an applied research project, utilizing large datasets and machine learning to advance medical research. The collaboration successfully secured funding from the Chinese Ministry of Science and Technology (MoST) and a European research organization supporting UIRC projects, with additional contributions from the company's own resources. For the lab, the project provided valuable data to advance research on large language models, while the company sought to demonstrate scientific expertise to customers, gain insights, and build connections useful for entering the Chinese market.

At the time of data collection for this chapter, the UIRC project's OS outcomes were not yet visible. However, the UIRC team planned to adopt OA publishing, open data sharing, and science communication practices, with a particular emphasis on data. Despite Chinese legislation restricting the sharing of medical data and challenges posed by GDPR, the stakeholders were committed to finding ways to share data while abiding by the law. These efforts were particularly important given the geographic distances involved and cross-border nature of the collaboration. Although none of the funders explicitly required OS practices, the European funder encouraged their application where feasible. The lab head, intermediary, and company representative all expressed positive attitudes towards OS. The lab head actively incorporated OS practices into his research, while the company representative viewed OA-related costs, such as APCs, as justified investments for increasing visibility and enhancing business credibility.

The UIRC parties initially reported communication difficulties due to language barriers. However, face-to-face meetings and the facilitation of the independent consultant proved important in building trust and smoothing communication. The consultant's familiarity with both countries and stakeholders was critical to bridging gaps. Additionally, a shared disciplinary background and the presence of PhD holders across all teams, including the company, created a common ground for collaboration and understanding.

Regarding the broader significance of Case B China, while the project's outcomes remain unknown, the stakeholders' plans and attitudes reflect a strong commitment to OS. For this reason, the case can be categorized as an extreme OS case in the Chinese context. Similar to

Case A China, the involvement of top-tier universities with forerunner status positions them as likely models to influence other institutions across the PRC.

6.4 Institutional Logics of OS Practices in UIRC in the PRC

Table 6: Institutional Logics of OS practices of UIRC in the PRC

Institutional logics of OS practices of UIRC	Summary of the institutional logic	Pro or contra the OS movement	Dominating direction in terms of OS
Profession logic	Motivation or demotivation to apply OS practices stemming from professional aspirations	Pro-OS and contra movement	Pro-OS
Academic community logic	Motivation to foster OS practices stemming from the values of the academic community	Pro-OS movement	Pro-OS
State logic	Motivations to apply OS practices based on perceiving research outputs as a common good and justifying openness due to taxpayer funding	Pro-OS and contra-OS movement	Pro-OS
Market logic	Applying or not applying OS practices in UIRC for maximizing profits	Pro-OS and contra-OS movement	Pro-OS
Corporation logic	Individuals' commitment to OS stemming from beliefs in bureaucracy and following commands	Contra-OS and pro-OS movement	Contra-OS

The pro-OS profession logic captured interviewees' behavior in applying OA, open data, and science communication practices for their professional benefit (e.g., increasing visibility and the potential of getting cited, publishing preprints for claiming research findings). Researcher BU1 explained the publishing strategy of his group in line with this logic as follows: "The motivation to use preprints is to increase the visibility of our research group, because sometimes it takes maybe two or three years to have the full results down. But when we have some preliminary results and it's already convincing, and the idea is very cool, and we want the availability, then we do preprints."

The pro-OS academic community logic, on the other hand, reflected interviewees' motivation to apply OS practices stemming from the values of the academic community, emphasizing sharing knowledge with colleagues, as researcher GU4 described the role of communication in the scientific community: "In the scientific community you are not working by yourself, we work together. You cannot do the things just at home by yourself—you have to communicate with others."

The three strongest contra-OS logics were profession, corporation, and market logics. The contra-OS profession logic reflected interviewees' lack of motivation to apply OS practices for professional benefit (i.e., covering expensive APCs from the lab budget and not publishing preprints to prevent being scooped). As researcher GU10 explained: "If you publish open access publication, the problem is that it's very expensive. You need to pay a lot of publication fees ... And my lab, actually a very small lab. And as you may know, the funding in China is

very, very competitive. So, you cannot get funding easily. So, in this case you really cannot sometimes, cannot pay that much of publication fee (APC) for the Open Access publications."

Contra-OS corporation logic reflected interviewees' lack of motivation to apply OS practices because OS policy neither requires nor provides the necessary support (e.g., financial support for APCs). As GU6 remarked: "I think people have to really agree on this open science matter, and agencies and government have to put more resources into this to basically support this."

Contra-OS market logic reflects interviewees' attitudes of not applying OS practices due to delaying publication before patenting to maximize profits, delaying publishing to establish their own spin-off companies, avoiding data sharing for economic advantage, maintaining trade secrets, and protecting intellectual property in UIRCs.

Lattu and Lin (2025) highlight in their paper that the lack of an OS policy is one of the major barriers that trickles down to the UIRC level. According to them, this policy lag is linked to structural challenges in the PRC's OA publishing industry, including negotiations with non-PRC big publishers and the development of OA-aligned business models for the PRC publishing industry. According to the authors, the pro-OS academic community logics (i.e., pressure from the scientific community in the form of authoritative journals) and corporation logic (i.e., pressure from the global community in the form of multilateral organizations such as UNESCO) have the potential to mitigate these barriers. However, currently, the corporation logic is preventing OS development since there is no OS policy currently in place, and researchers need to pay their own APCs.

Lattu and Lin (2025) did not explicitly reflect on the strongest tensions between the logics; however, based on the data visible in Table 7, the strongest tensions appear to be between the pro-OS academic community and contra-OS corporation logic, and the pro-OS profession and contra-OS corporation logics. In these cases, the norms of the international scientific community foster OS practices, as well as the professional benefits of OS in terms of potential visibility. However, the lack of an OS policy hinders researchers from applying OS practices.

Table 7: Institutional Logics Facilitating or Hindering OS by Sector and Case Study in the PRC

Sector/ case	n	Profession logic		Academic community logic	State logic		Market logic		Corporation logic	
		Pro-OS	Contra-OS	Pro-OS	Pro-OS	Contra-OS	Pro-OS	Contra-OS	Pro-OS	Contra-OS
University researchers	11	11	8	10	8	3	4	1	1	4
Business representatives	2	1	·	2	2	·	2	·	·	1
Intermediaries	5	2	1	1	1	·	3	4	1	3
Total	18	**14**	**9**	**13**	**11**	**3**	**9**	**5**	**2**	**8**
Case study/data set	**n**	**Profession logic**		**Academic community logic**	**State logic**		**Market logic**		**Corporation logic**	
		Pro-OS	**Contra-OS**	**Pro-OS**	**Pro-OS**	**Contra-OS**	**Pro-OS**	**Contra-OS**	**Pro-OS**	**Contra-OS**
Case A	4	4	2	4	2	2	3	·	·	·
Case B	4	2	2	3	3	1	3	·	·	3
General interviews	7	6	4	6	6	·	1	2	1	4
Pilot interviews	3	2	1	·	·	·	2	3	1	1
Total	18	**14**	**9**	**13**	**11**	**3**	**9**	**5**	**2**	**8**

Source: Based on Lattu and Lin (2025)

7. Findings and Discussion

The following section is split into two, in the first, I compare the sets of institutional logics applied to OS practices in UIRC in Finland and the PRC, starting with the unique normative characteristics of the two case countries at the UIRC field level, drawing on existing literature. This section draws empirically on two prior studies: the Finnish data is based on Lattu and Cai (2023), and the Chinese data is based on Lattu and Lin (2025). In the second section, the comparison is expanded to shed light on what the differences at the UIRC field level reveal about the characteristics of the two systems of science, again informed by previous research.

7.1 Finland and PRC in the UIRC Field—An Idealistic Forerunner Dwarf Versus a Fast-Growing, Pro-Market Giant

When comparing the sets of institutional logics driving and hindering OS at the UIRC field level in Finland and the PRC, the contrasting characteristics of both systems become apparent. Finland emerges as a steadfast model country of openness, whereas the PRC's UIRC reflects a high-competition, high-ambition system that is still progressing towards OS. Even though both countries' UIRC fields include the same five ideal types of logics—state, market, corporation, profession, and community—their relative weight and influence differ.

In the Finnish context UIRC's strongest pro-OS logics are the state, pro-OS corporation and pro-OS market logics, whereas in the PRC's UIRC context, the strongest pro-OS logics are profession, academic community, and state logic. It is not surprising that the countries share a state logic enforcing OS, justifying it with public funding and the common good, even in the context of UIRC, since this logic is at the core of the OS ethos, as noted by Fecher and Friesike (2014). Additionally, as the OS movement has become mainstream in the EU and has sparked a global debate on the fairness of large publishers' profit margins financed by governments (Puehringer et al., 2021), it is not surprising that both countries' data share this norm.

However, there are notable differences in how state logic manifests in the two contexts. Unlike in Finland, in the PRC data the state logic also hinders OS adoption in UIRC due to the views that APCs are unfair when paid to non-PRC publishing houses. This finding highlights that Chinese researchers bear the financial burden of APCs because high-level laws referencing OS have not been implemented through concrete policies, and no institutional support is available for OS-related costs. As a result, some Chinese researchers view non-PRC publishers critically, focusing their attention on the recipients of APCs.

In Finland, however, the strong pro-OS corporation logic illustrates that OS is well institutionalized, making it something that researchers in UIRC adopt because of their funders' and institutions requirements. In the PRC, on the other hand, OS is not yet institutionalized, and the contra-OS corporation logic remains one of the strongest barriers hindering OS adoption. Due to the lack of comprehensive OS policy in the PRC, some researchers do not see a reason to make an extra effort for OS (contra-OS corporation logic).

Moving on to other differences between the two countries, in the PRC, the norms driving OS in UIRC are primarily linked to individual academics and encouraged by a global impetus

rather than the state and its policies (as seen in Finland's state and pro-OS corporation logics). In the PRC data, researchers are motivated to engage with OS as part of their career strategies, aiming for greater visibility, similar to researchers in Finland. However, Chinese researchers also strategically apply or avoid preprints to claim research findings or protect against scooping. These findings reflect the global competition in academia, where the "publish or perish" principle in performance reviews, quantified by publication statistics and dominated by the impact factor, is a norm in both the West and, as this study shows, especially in the East—the PRC (e.g., Shu et al., 2022).

In addition, the strong academic community logic motivates Chinese researchers in UIRC to share their work with the global scientific community, aiming for the fastest dissemination possible. This logic also emerged in Finland, but it was much weaker than in the PRC, where it was among one of the strongest logics. This finding underscores how the global academic community and disciplinary norms play a critical role in fostering OS in the PRC, where domestic institutionalization remains limited.

Continuing with the differences, Finland exhibits three versions of community logic, showing how the country includes different communities that hinder and foster OS. Besides the academic community logic also present in the PRC, Finland demonstrates the sustainability-based community logic, where the community encompasses the whole world, and OS practices are applied due to the sustainable values of promoting the well-being of the entire world. This illustrates how the institutionalization of OS is supported by various aligning narratives, not only by the state logic but also by positioning OS as a means to achieve ecological sustainability (through sharing scientific research) and social sustainability (providing the Global South with access to resources). These views are often presented by scholars (e.g., Vicente-Saez et al., 2021) as well as governmental bodies. However, as noted by Ross-Hellauer et al. (2022), OS can also have negative externalities, as it strengthens the Matthew effect in global academia.

As the PRC joined the group of upper-middle-income countries in 2010 (Chen et al., 2021), and has only recently begun addressing sustainability on its broader policy agenda (Baark, 2023), it is unsurprising that this aspect did not emerge in the data. Additionally, regarding the community logics, the traditional trust-based engineering logic hindered OS adoption in Finland, showing that, paradoxically, informal openness enforced by trust within a shared disciplinary culture can hinder OS in UIRC. This is because common boundaries of openness are not agreed upon, thereby slowing down the dissemination of knowledge beyond the engineering community. The emergence of this logic can be attributed to Finland's economic characteristics, where contract culture is less developed than in larger economies and reflects the traits of a small country.

Finally, an interesting finding present in both countries is related to the market logic. They both exhibited the contra-OS market logic stemming from the fear of disclosing trade secrets. This logic represents the traditional closed patenting culture in UIRC, as discussed in pre-OS literature (e.g., Dasgupta & David, 1994; Nader & Krimsky, 2004). This logic was especially strong in Finland. However, pro-OS market logic, where profit serves as a motivation for applying OS practices, was present in both countries. The pro-OS market logic corroborates earlier literature about firms' strategic intentions to publish scientific articles (Hicks, 1995). The findings suggest that OS practices, particularly the visibility, credibility, and signaling benefits of publishing and science communication, enhance firms' existing strategies to benefit from publishing. OS in UIRC can be seen as a strategic tool for companies to enhance their position in the age of a diversified digital economy.

The fact that contra-OS market logic is pronounced in Finland, where it represents the strongest barrier for OS in UIRC (while in the PRC data, contra-OS profession logic is the strongest), reflects the characteristics of Finland's national economy, which is not as large, diverse, or advanced as that of the PRC. In the PRC, researchers widely identify the commercial benefits of OS, with many professors running their own spin-off companies (Kroll & Liefner, 2008).

7.2 Implication of Detected Institutional Logics in the Science Systems in Finland and the PRC

This section highlights how the differences in institutional logics driving and hindering OS in UIRC reflect broader systemic characteristics in Finland and the PRC's science systems and provide deeper insights into the distinctions between democratic and authoritarian science systems.

Firstly, the same set of institutional logics drives and hinders OS in UIRC in both countries, despite their very different political systems. This reflects the globalization of science systems, which is unsurprising but important to note, in particular, the academic community logic illustrates this globalization—the disciplinary norms and the global academic community motivate researchers to share their work with colleagues, even in the traditionally unlikely context of UIRC. In the past, norms discouraged openness in UIRC or at least required clear strategic considerations before sharing research (Nader & Krimsky, 2004). Similarly, state logic highlights how the values of OS have been globalized and reinforced through initiatives like the UNESCO Recommendation on OS (UNESCO, 2021). Finally, the profession logic reflects the shared dynamics of global competition and academic capitalism (Rhoades & Slaughter, 1997), as researchers around the world strive for visibility and career advancement. Together, these logics demonstrate how the globalization of science systems fosters similar values that drive OS initiatives across national boundaries.

This shared foundation highlights the global nature of OS values, but the differences in how these logics manifest reveal critical systemic distinctions. In Finland, the presence of three distinct community logics (sustainability-based, trust-based, and academic) highlights localized perspectives on OS and a decentralized approach. In contrast, in the PRC data, single academic community logic is more centralized and reflects global values that have influenced Chinese science systems, compensating for weaker state and pro-OS corporation logics. At the science system level, this demonstrates how diverse communities and approaches coexist more readily in democracies. In authoritarian systems like the PRC, such diversity exists but is harder to identify, particularly as the cases examined in Finland represent average UIRC contexts.

Additionally, previous literature suggests that openness is not deeply rooted in Chinese academia (Huang et al., 2021), nor is it a core value in authoritarian systems more broadly (Jones et al., 2019). This may help explain the limited variety of perspectives on OS in the PRC. Conversely, openness is often articulated as a central value in democracies, aligning with broader systemic characteristics. This comparison underscores how democratic systems support a plurality of narratives and bottom-up approaches to OS, while authoritarian systems centralize and streamline efforts, aligning them with global academic norms when strategically beneficial.

Continuing with the institutionalization of OS, as discussed earlier, corporation logic reflects institutionalization levels in both systems. In Finland, a strong pro-OS corporation logic enforces OS through structured policies and institutional mandates, reflecting cohesive grassroots advocacy. This alignment is also evident in the distinct community logics present in Finland. In the PRC data, however, a stronger contra-OS corporation logic highlights gaps in policy implementation. While researchers are granted the freedom to engage in OS, they are also expected to fund and assess its benefits independently, often measured by citation statistics. These findings suggest that democratic systems tend to foster policy-first institutionalization of OS, creating alignment between institutional actors and systemic goals. Authoritarian systems, in contrast, often implement OS through centralized control (Green, 2023), nudging researchers to foster OS objectives that support state-set priorities.

When looking at the economic orientation of the two science systems, the interaction of state, profession, and market logics differ significantly. In Finland, state logic is the strongest set of norms fostering OS, even in the UIRC context, coexisting with market and corporation logics. In the PRC data, state logic is filtered through profession logic, where OS is applied primarily as a career strategy. This strategic use of OS is guided by the PRC government's ambition to become the leading science system globally and, ultimately, the largest economy in the world (e.g., Jakobson, 2007). Based on UIRC field-level data, Chinese science policy appears to foster OS primarily when it offers clear economic benefits. Given that the legitimacy of the Communist Party of China is contingent upon economic growth (Weber, 2021), the connection between pro-OS market logic and the authoritarian science system warrants further attention.

To conclude, it can be argued that although a globalized orientation, economic growth and academic capitalism have become increasingly important aspects in many authoritarian science systems. This phenomenon is not exclusive to the PRC; similar market-driven strategies are observed in other nations, such as Saudi Arabia and the United Arab Emirates (Kirk & Napier, 2009). Although non-authoritarian countries like the United States also exhibit strong market orientation, authoritarian systems may uniquely leverage market logic to navigate global academic norms while reinforcing domestic priorities like economic growth and regime legitimacy. The institutionalization of OS reflects broader tensions between global norms and local priorities, highlighting how diverse political and economic systems shape the adoption of shared values.

8. Conclusion

This study sought to answer two research questions: 1) What are the similarities and differences in the norms guiding the application of OS practices in UIRC in Finland and the PRC? 2) What do the differences reveal about the science systems of Finland and the PRC? The findings revealed that both countries share the same institutional logics that foster or hinder OS—state, market, profession, community, and corporation logics—but with varying weights and manifestations.

In Finland, the state logic dominates, supported by institutionalized OS policies and grassroots advocacy, fostering a collaborative culture underpinned by sustainability-based and trust-based community logics. In contrast, the PRC's OS norms are driven by academic capitalism and a pronounced market orientation, with a strong pro-OS profession logic motivating researchers to adopt OS practices for visibility and career advancement. The PRC's academic community logic plays a critical role, reflecting a globalized academic ethos that encourages

OS adoption. However, the lack of comprehensive OS policies weakens state and corporation logics, creating systemic barriers. Meanwhile, Finland's well-established institutional frameworks align diverse logics to support OS, while trust-based community norms paradoxically hinder formal openness. This interplay of shared global values and local contexts underscores the impact of systemic priorities and governance models on OS adoption.

Regarding the second research question, the findings shed light on the distinct characteristics of the science systems in Finland and the PRC. The PRC's authoritarian regime emphasizes economic growth which was reflected in the UIRC context examined in this study, shaping both institutional priorities and individual researcher behavior as evidenced in the data. According to the findings of this study, OS tended to be applied selectively, driven by economic priorities, with academic community norms operating in ways that aligned with broader state objectives. Researchers are often left to adopt OS independently when it aligns with the national, market-driven science policy. In contrast, Finland's small, democratic welfare state fosters a different set of norms, supported by institutionalized policies, grassroots advocacy, and alignment among institutional actors. While market logic plays a role in both systems, Finland's approach enables diverse, bottom-up OS adoption through pluralistic narratives and systemic alignment. By contrast, in the PRC's UIRC context, OS practices appear more closely aligned with state-driven objectives, often prioritizing global competitiveness and economic growth over broader institutionalization.

Regarding the UIRC field-level, this study demonstrates that the commercial benefits of OS practices in UIRC are becoming increasingly apparent and independent of national context. Companies have been savvy in terms of scientific publishing ever since conducting UIRC (Hicks, 1995; Simeth & Raffo, 2013). However, it now appears that the profitability of OS practices, particularly OA publishing and science communication, is more profoundly understood, offering visibility and credibility among various stakeholders. OS is no longer reserved for researchers wishing to share their work stemming from values aligned with Mertonian norms but can now also stem from purely profit-seeking values.

Limitations of the study include the use of different sampling strategies and the small number of cases examined in each country. Further research with larger datasets would be necessary to determine the extent to which these norms are widely adopted. To deepen our understanding of the nature and role of the market logic in authoritarian science systems, future comparative studies could explore similar dynamics in other contexts, such as between the PRC and the US. Additionally, investigating authoritarian science systems in countries like Saudi Arabia and the United Arab Emirates could provide valuable insights into the findings. Finally, as the findings of this study underline the commercial nature of OS in UIRC, an intriguing avenue for future research lies in exploring the overall essence of OS: Has the grassroots movement shifted into a marketing tool for R&D-intensive companies, academic entrepreneurs, and a profit-making strategy for publishing houses?

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Appendices

Appendix Table 1: Overview of Interviewees in the Finland Dataset

Interviewee code	Role	Gender	Education	Category and organization/sector	Date of the interview	Dataset
PB1	Development director	Male	MSc	Business: financial sector	3.6.2020	Pilot
PB2	Product manager	Male	PhD	Business: engineering industry	4.6.2020	Pilot
PI3	Personnel from innovation services	Male	MSc	Intermediary: TAU	5.6.2020	Pilot
PU4	Professor (technical sciences)	Male	PhD	Researcher: TAU	22.6.2020	Pilot
PU5	Professor (technical sciences)	Male	PhD	Researcher: Aalto	2.6.2020	Pilot
PI6	Lawyer	Male	MSc	Intermediary: business	24.8.2020	Pilot
PB7	Advisor	Male	MSc	Business: ICT sector	7.9.2020	Pilot
PU8	Research director (technical sciences)	Male	PhD	Researcher: LUT	15.9.2020	Pilot
AU1	Professor (technical sciences)	Male	PhD	Researcher: Aalto	10.11.2020	Case A
AI2	Advisor	Male	MSc	Intermediary: independent	13.11.2020	Case A
AB3	Business representative (industry)	Female	PhD	Business: engineering industry	27.11.2020	Case A
AB4	Business representative (industry)	Male	MSc	Business: engineering industry	1.12.2020	Case A
AI5	Programme director	Male	PhD	Intermediary: BF	2.12.2020	Case A
AU6	Postdoctoral researcher (technical sciences)	Male	PhD	Researcher: LUT	3.12.2020	Case A
AU7	Professor, director in university's middle management (technical sciences)	Male	PhD	Researcher: LUT	8.12.2020	Case A

AB8	Business representative	Male	BSc	Business: engineering industry	22.12.2020	Case A
BU1	Project coordinator, researcher (medicine)	Male	PhD	Researcher: TAU	1.8.2021	Case B
BB2	Business representative, founder	Male	PhD	Business: engineering industry	7.9.2021	Case B
BU3	Researcher, publication and IPR manager (biology)	Male	PhD	Researcher: TAU	17.9.2021	Case B
BI4	Technical developer (technical sciences)	Male	PhD	Intermediary: research institute	22.9.2021	Case B
BB5	Consultant (technical sciences)	Male	PhD	Business: engineering industry	27.9.2021	Case B
BU6	Head of a work package, PI (biology)	Male	PhD	Research institute researcher	1.10.2021	Case B
BU7	Researcher (medicine)	Male	PhD	Research institute researcher	19.10.2021	Case B
BI8	Consultant	Male	MSc	Intermediary: business	20.10.2021	Case B

**Each interviewee is assigned an interviewee code. The first letter indicates the dataset (i.e., P = pilot interview, G = general interview, A= Case A, B = Case B), the second letter indicates the interviewee's role (I = intermediary, U = university researcher, B = business representative), and the number indicates the order of the interview within that dataset.*

Appendix Table 2: Overview of Interviewees in the PRC Dataset

Interviewee code	Role	Gender	Education	Category and organization/ sector	Time of the interview	Interviewers	Dataset
PI1	Works in technology transfer	Male	PhD, Natural sciences	Intermediary, PRC metropolitan university	1.12.2021	I1, I3	Pilot interview
PI2	Researcher, innovation studies	Male	PhD, Social sciences	Intermediary, PRC metropolitan university	2.12.2021	I1, I3	Pilot interview
PI3	Leadership position, innovation office	Female	PhD, Social sciences	Intermediary, PRC metropolitan university	3.12.2021	I1	Pilot interview
GI1	Employee innovation office	Male	PhD, Natural sciences	Intermediary, PRC metropolitan university	7.3.2023	I1, I2	General interview
GU2	Professor, conducting UIRC	Male	PhD, natural sciences	University researcher, PRC metropolitan university	28.5.2023	I1, I2	General interview

GU3	Researcher, planning UIRC	Male	PhD, natural sciences	University researcher, PRC metropolitan university	29.5.2023	I1, I2	General interview
GU4	Assistant professor, planning UIRC	Female	PhD, natural sciences	University researcher, PRC metropolitan university	2.6.2023	I1	General interview
GU5	Associate professor, planning UIRC	Male	PhD, natural sciences	University researcher, PRC metropolitan university	3.6.2023	I1, I2	General interview
GU6	Professor, conducting UIRC	Male	PhD, natural sciences	University researcher, PRC metropolitan university	7.6.2023	I1	General interview
GU7	Professor, conducting UIRC	Male	PhD, natural sciences	University researcher, PRC metropolitan university	16.6.2023	I1	General interview
AU1	PI in the UIRC project	Male	PhD, Natural sciences	University researcher, PRC metropolitan university	9.6.2023	I1	Case A
AU2	Doctoral student in the UIRC project	Male	PhD, Natural sciences	University researcher, PRC metropolitan university	10.6.2023	I1, I2	Case A
AU3	Postdoc researcher in the UIRC project	Female	PhD, Natural sciences	University researcher, PRC metropolitan university	13.6.2023	I1, I2	Case A
AB4	Industry scientist, business representative in the UIRC project	Male	PhD, Natural sciences	Business representative: medical industry	27.9.2023	I1	Case A
BU1	PI in the UIRC project	Male	PhD, Natural sciences	University researcher, PRC metropolitan university	27.5.2023	I1	Case B
BU2	Researcher in the UIRC project	Male	PhD, Medical sciences	University researcher, PRC metropolitan university	4.7.2023	I1, I2	Case B
BI3	Independent consultant	Female	MSc, social sciences	Intermediary, independent consultant	22.9.2023	I1	Case B
BB4	Project lead, Norther European software company	Male	PhD, Technical sciences	Business representative: engineering industry	12.9.2023	I1	Case B

**Each interviewee is signified with an interviewee code, where the first letter signals for the dataset (i.e. P= pilot interview, G=general interview, A= Case A, B=Case B), second letter the position of the interviewee (I= intermediary, U=university researcher, B=business representative, E=OS expert) and the number the order of the interview in the dataset.*

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