The Offshore Innovation Platform and its impact on Regional Innovation Ecosystem Development

By

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Abstract

This thesis focuses on a new form of intermediary to help international technology transfer and innovation commercialisation. This thesis investigates how Offshore Innovation Platforms (OIP) and other stakeholders in regional innovation ecosystems join forces to build bridges across borders and across disciplinary boundaries. The researcher explores new collaboration solutions for reducing transactional costs, in order to nurture innovation and shape their own changing roles in the process. Three main research questions have been proposed to cover the research gap: (1) How does OIP play a role in the regional innovation ecosystem? (2) How does OIP help high-tech start-ups to grow? (3) What is the IP protection effect on imported technology transfer?

The researcher has used a qualitative research method to explore the first two research questions. Cases have been analysed in-depth and using a perspective based on micro-foundation theory. Along with network capacity, financial capacity and incubation capacity, the unique advantage of stakeholders from their original country can bring key success factors to enable the growth and sustainability of regional innovation ecosystems. Entrepreneurs have broadened their horizons by moving their focus from the regional innovation ecosystem to the broad international stage. Quantitative research method has been used to explore the impact of intellectual property protection on the imported technology transfer (to OIP's home country). Provincial data from 2001 to 2013 has been tested with a GMM model as an illustration for new cross-border collaboration. The international property protection in its original country could enhance international technology transfer and thus have a positive effect on the role of OIP.

OIP can provide comprehensive collaboration opportunities towards cross-border innovation collaboration and add value to a variety of participants and co-produce a series of products or services for different user groups. OIPs can substantially strengthen international technology collaboration by deepening connections among relevant parties, injecting solid innovation resources into the regional innovation ecosystem, sharing more valuable and insightful knowledge and creating a continuous stream of interactive innovation. Alongside these advantages, it will empower entrepreneurs, SMEs and large companies, and help them to transfer their science and technology from the lab to the broader market. It will also help make comparisons with isolated innovation collaborations, contribute to the open innovation and conquer the growth limit of capitalism.

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List of Abbreviations

CWS	Co-working Spaces
FTT	Forced Technology Transfer
GMM	Generalized Method of Moments
IAC	Incubators, Accelerators and Coworking space
ITT	International Technology Transfer
IP	Innovation Platform
IPP	Intellectual Property Protection
IPR	Intellectual Property Rights
MOU	Memorandum of Understanding
NHS	National Health Service
OEM	Original Equipment Manufacturer
OECD	Organisation for Economic Co-operation and Development
OIP	Offshore Innovation Platform
RBV	Resource Based View
RIE	Regional Innovation Ecosystem
SME	Small and Medium-sized Enterprise
TBI	Technology Business Incubator

TCE	Transaction Cost Economic
TRL	Technology Readiness Level
VC	Venture Capital
WTO	World Trade Organisation

Declaration

I declare that the work contained in this thesis has not been submitted for any other award and that it is all my own work. I also confirm that this work fully acknowledges opinions, ideas and contributions from the work of others.

Any ethical clearance for the research presented in this thesis has been approved. Approval has been sought and granted by the University Ethics Committee.

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Date: 5 January 2022

1. Introduction

Blueseed is a typical offshore innovation platform (OIP). A start-up company based near the coast of Silicon Valley and co-founded by Max Marty and Dario Mutabdzija in 2011, it is a vessel stationed incubator, accelerator and coworking space (Crunchbase, n.d.). In other words, it is a sea innovation platform 30 minutes off the shore of Half Moon Bay (Banister, 2013). 'Blueseed is located in international waters outside the jurisdiction of the United States' (Romanian startups, n.d.). By providing incubator services to start-ups offshorely, Blueseed has created a competitive advantage of providing entrepreneurs with an opportunity to start their business without holding a working visa in the U.S (H1B). Instead, entrepreneurs can use a business or tourism visa (B1/B2) to travel in the U.S. mainland for up to 180 days per year. When start-ups grow large enough, they have the opportunity to relocate to Silicon Valley by legal channels. This idea, when first thought up, attracted people's attention. According to investors, Blueseed has been seen as 'floating cities' for entrepreneurs as by mid-2013, over 1,000 entrepreneurs from more than 70 countries expressed an interest in living on Blueseed (Shedlock, 2019); and it has attracted bitcoin investment as an offshore decentralised innovation platform friendly to the entrepreneurs busy about visa.

Blueseed has provided the world with a feasible business model. It is a platform which can provide benefits outside a home country and then induce growing start-ups into the country to help them achieve technology commercialisation. This model can be further developed and explored. Since

the appearance of Blueseed, the idea of an offshore innovation platform has been widely used and is growing.

OIP is a unique, one-of-a-kind innovation platform. It is essential to understand the objective of an innovation platform to understand its meaning thoroughly. The Organisation for Economic Co-operation and Development (OECD) has claimed that an innovation platform's objective is to develop, introduce and utilise knowledge (technological, organisational or institutional) in an economic or social process (OECD, 1999). Van Fossen, Morfin and Evans (2018: 609) have defined the term 'innovation platform' as:

> 'An innovation platform is a physical or virtual space, or series of events, whose purpose is to support the development of new ventures.'

There are typical innovation platforms like incubators and accelerators and alternative innovation platforms that include science parks, coworking spaces, innovation and entrepreneurship events. The term 'offshore innovation platform' refers to platforms established overseas with a physical site. With more motivation than the general innovation platforms – nurturing start-ups and finding approaches for cross-border collaboration, technology transfer and commercialisation – with specific characteristics and different culture layers, OIP has more roles at play in a regional innovation ecosystem.

This dissertation uses empirical examples of an offshore innovation platform to explain the role of the OIP in the regional innovation ecosystem. It also aims to explain the interactions between platform owner, investors, technology holders, and other stakeholders existing inside and outside regional innovation platforms. This dissertation also studies how those activities can benefit high-

tech entrepreneurs in the regional innovation ecosystem. The dissertation contributes to the theory by providing a framework of the OIP with its unique characteristics – different cultural layers with the primary motivation of achieving international technology transfer (ITT). It develops and presents a theory to describe and explain the dynamics of ITT and offshore innovation platforms' collaboration.

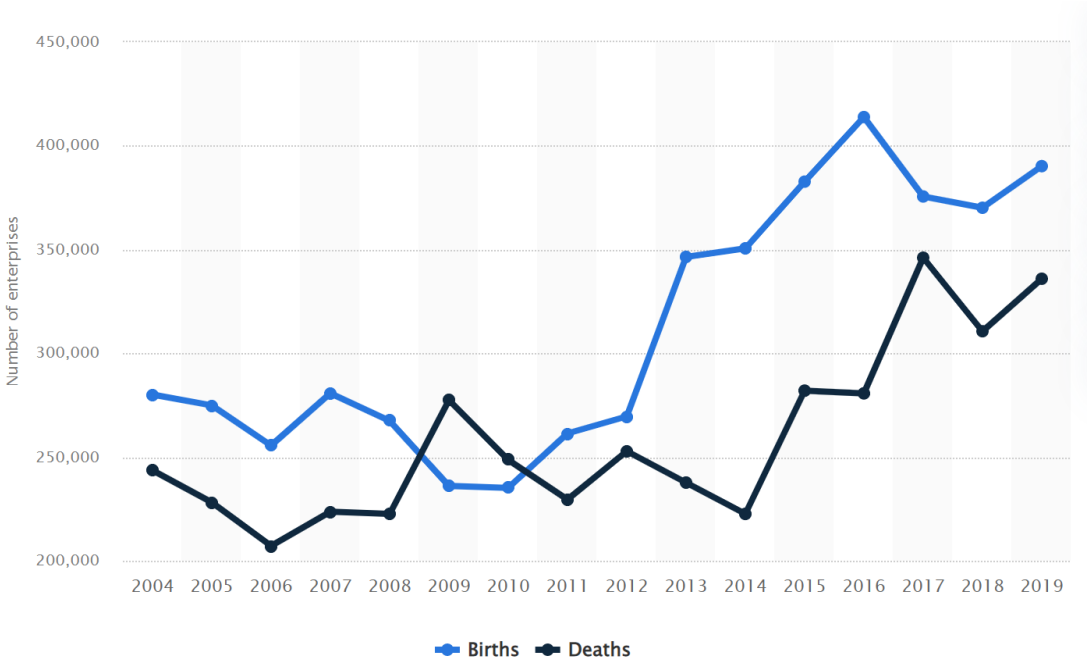
1.1 Background and Motivation

Offshore Innovation Platforms play a role in the regional innovation ecosystem from the perspective of the standard innovation platforms (IPs) nurturing new businesses in local economies' (Sherman 1999). OIPs facilitate global resources and match regional innovation ecosystems and high-tech start-ups with backgrounds in different home countries.

Entrepreneurs and high-tech start-ups are considered the most dynamic part of the economy and the driving force behind economic development. With simple structures, start-ups are found to be more flexible and experimental to create innovation and answer the disruptive technology changes (Christensen & Bower 1996; Eisenhardt & Tabrizi 1995). Further studies show them to be a strong engine in the innovation process (Colombo & Piva 2008; Mustar et al. 2008). Even though the relationships are comprehensive and may be reciprocal in some studies (Amorós, Fernández & Tapia 2012), it is widely accepted in research that entrepreneurs contribute to the economy by providing new job opportunities, creating a vibrant economic environment for the innovation ecosystem, and introducing innovations to the markets (Acs et al., 2012; Huggins & Thompson 2015; Koellinger & Thurik 2012; Romer 1990; Schumpeter 1934).

The number of entrepreneurs and opportunities has been increasing rapidly due to technology development and the growing digital economy (Clarysse et al. 2015). People's interest in becoming an entrepreneur continues. Figure 1.1 shows the data collected by the Office for National Statistics of the U.K. government. From 2014 to 2019, the number of start-ups has increased yearly.

Figure 1.1: Number of business enterprise births and deaths in the United Kingdom from 2004 to 2019



Note. From Number of business births and deaths in the UK 2004-2019, by D. Clark, 2021 (https://www.statista.com/statistics/285285/number-of-new-enterprises-in-the-united-kingdom-uk/). Copyright 2021 by Statista.

There are positive examples of high-tech start-ups that have been successfully merged or matched with favourable resources. DeepMind, an artificial intelligence start-up based in London, is an excellent example of an emerging innovative start-up and the search for matching investors. This example has broadened the future for both the investor and the start-up company. By investing in DeepMind, Alphabet Inc. (Google's parent company) gets new opportunities to create business models and with predictable potential financial profits. The Economist (2015) claims that DeepMind has a competitive advantage in the strategic battle competing with Facebook, Microsoft, Amazon and other rivals.

A start-up can have more opportunities to develop and accumulate experience in a new area, such as the business collaboration between DeepMind and Royal Free London, in July 2015. The data clinicians from British public hospitals within the National Health Service (NHS) Foundation Trust approached DeepMind to develop software providing healthcare services and will trigger the complete digital upgrading of NHS (Powles 2017). 'Using such high-tech cooperation, the NHS could improve patient care with various aspects, including actionable analytics and advanced research; improvements that could be further applied at the hospital-wide level and the population-wide level, which is a strong example of an open innovation ecosystem' (Suleyman 2016).

However, such good opportunities are rare for start-ups. The competition to survive for entrepreneurs is high. There were 672,890 start-ups registered in the U.K. for just one year – 2018 to 2019 (Companies House, 2019). Simultaneously, by 2018, 57.6% of start-ups started since 2013 have gone under (Office for National Statistics 2018).

Many entrepreneurs and high-tech start-ups fell into the 'Death Valley'. The term 'Death Valley' was first coined by Merrifield in 1995 to describe the technology flow towards low-income countries and explains the distance between advanced technology invention and its commercialisation (Markham 2002; Simeone et al. 2017). Entrepreneurs and high-tech start-ups can suffer from a lack of access to the market and ways to connect with actual customers. The customers bring profits, which means the 'food and fuel' for the innovation carriers – the high-tech start-ups. Even though some public funding offers help to high-tech entrepreneurs, it suffers from the imperfections of the capital market.

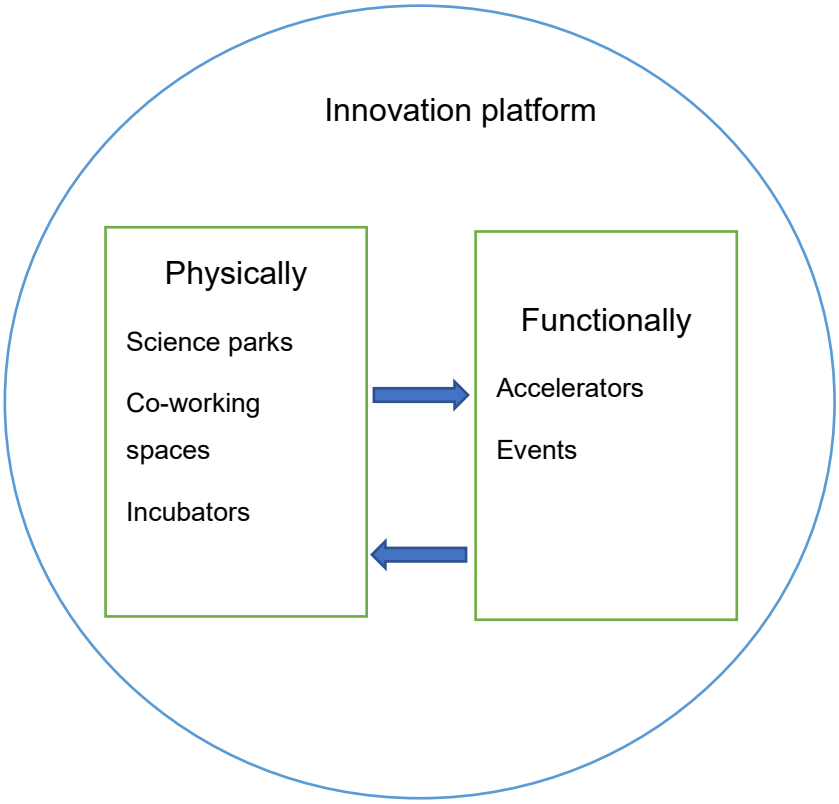
Regional innovation ecosystems take responsibility for nurturing a new generation of innovation and enabling technology development (Jackson 2011). Unlike organisational networks, a regional innovation ecosystem has characteristics such as 'clusters.' This refers to the co-location of business that can stimulate collective functionality and facilitate innovations (Potter 1998). It also has 'value networks,' which refers to the interactive and dynamic relationship between the participants in the innovation ecosystem (Christensen and Rosenbloom 1995).

There are examples of successful innovation ecosystems. Silicon Valley is a prime example of a positive regional innovation ecosystem. Silicon Valley has successfully and continuously boosted innovation in a highly focused high-tech region, nurturing numerous start-ups (Lee 2000). Silicon Valley has unmatched characteristics such as its spectacular welcoming culture, the incentive of high financial returns, and the business infrastructure (mentors, law firms and accounting firms, etc.) As a highly distributed thriving entrepreneurship cluster, Silicon Valley has become a place with the most competitive venture capital market worldwide, world-class research universities, top talent and high labour mobility' (Bresnahan, Gambardella & Saxenian 2001; Miller et al. 2000; Moore & Davis 2004). Silicon Valley has turned out to be an excellent example to explore how the multiple roles in the ecosystem interact with each other, as reported in the Stanford Silicon Valley New Japan Project (2015). However, just like the survival rate of entrepreneurs, it is hard to find another regional innovation ecosystem like Silicon Valley. With its unique advantages, Silicon Valley is hard to copy (Moore & Davis 2004). One of the Isenberg (2010) rules even states 'not to emulate the Silicon Valley' when creating an innovation ecosystem. It is

believed that an ecosystem should be adjusted to the local conditions, and it is not realistic to imitate Silicon Valley.

Young age seems to be the trend of entrepreneurs. Governments contribute to the trend by encouraging entrepreneurship as it brings technology innovation, pushes society development and solves the unemployment problem. However, entrepreneurs and high-tech start-ups need more than just investments to scale-up as the start-ups must face various challenges before growing. Classified by the resource-based view (RBV), these challenges include a lack of financial resources (Paradkar et al. 2015), technical and marketing capabilities (Huang et al. 2012) and the attitudes and abilities of the core team (Chorev and Anderson 2006). The growing number of start-ups every year has led to more heated competition for scarce resources; it is also a challenge for the traditional incubation system. Unlike the other types of ecosystems in the business range, the innovation ecosystem seems to have a weaker demand side (Wright 2014). Due to the 'limited resources and lack of knowledge-intensive business services' (Mian, Lamine & Fayolle 2016). It is therefore essential to explore new organisational mechanisms to nurture high-tech entrepreneurs to acquire external resources to gain the skills and abilities to survive. People give this kind of mechanism many names: Technology Business Incubators (TBIs), innovation/technology centres, science/research/technology parks, business/seed accelerators, etc. (Mian, Lamine & Fayolle 2016). They can also be referred to as innovation platforms (See figure 2 overleaf).

Figure1.1: Innovation platforms and the other intermediaries (Author's own)



The carriers of innovation and entrepreneurship activities can be classified both physically and functionally. 'Science parks, incubators and coworking spaces provide physical spaces with facilities for the available services and activities, the accelerator programmes and other events, such as the pitching ideas, meetings and pairings that can deepen the connections between entrepreneurs and their potential investors' (van Rijnsoever 2020). Incubators, accelerators and coworking spaces (IAC) are seen as providing workspace and support for start-ups and Small and Medium-sized Enterprises (SMEs).

There were 205 incubators and 163 accelerators in the U.K. in 2017 (Bone et al. 2017) and this number is still growing today. There are 5,903 companies that use the coworking spaces.

Innovation platforms could contribute to the agglomeration effects. The research by Klerkx et al. (2012) on innovation platforms for the agricultural sector supports the viewpoint that these platforms could attract and gather related companies, communities, and organisations with no cooperation experience before exploring these approaches to achieve their goal.

National research claims that a start-up has more possibilities to survive when it has built connections with innovation platforms such as incubators and accelerators (Department for Business, Energy & Industrial Strategy 2017). Further studies have shown the reasons behind this: the innovation platforms can help overcome the weak network problems in the regional innovation ecosystem (Howells 2006; Lukeš et al. 2019). A study by van Rijnsoever (2020) shows financial support networks generated from the incubators build a bridge between the start-ups and potential investors. It also serves as a bridge between the knowledge and business subsystems in regional innovation ecosystems. A study by Kiran and Bose (2020) used data from 60 managers in TBI to test their model. Results found connections between TBIs, universities and facilities. The network has played a significant role in intermediary facilities and has positively impacted TBI outcomes. This research provides supportive evidence with the findings of van Rijnsoever (2020) which show that an entrepreneur can have more opportunities to 'meet' and 'match' the resources by networking services provided by an innovation platform.

InoCrowd is an innovation platform that aims to improve the health of the global population. Started with 1,000 participants, InoCrowd now connects

organisations seeking solutions for business challenges with a network of more than 1.6 million of the sharpest minds in technology and science. InoCrowd fosters collaboration between public and private corporations and the growing community of specialists, researchers and developers worldwide structurally through new technologies.

An offshore innovation platform has two more specific characteristics compared with the general innovation platforms, which are detailed below:

1. Different Cultural Layers.

Using cultural identity, people with different backgrounds can easily be sorted into groups, which could cause inactive communications between different communities under different culture. Cultural differences can create high transaction costs and bring increased value to internalising intangible assets. Being aware of cultural differences and cultural identity is effective for successful intercultural business communications (Bargiela-Chiappini & Nickerson 2003).

OIP can reduce the transaction cost caused by cultural difference effectively. An OIP is built and run by people from different cultural backgrounds. The diverse cultural layers between home and local countries have contributed to its unique feature, making it attractive to specific clusters. Many international business reports have noted diverse cultural perspectives such as an essential role in immigrant entrepreneurship and networking. When dealing with overseas clients, investors and stakeholders, entrepreneurs will face misunderstandings from different cultural backgrounds, such as negotiations with contracts in another language, an ethnically diverse workforce, or the

impact of other individuals' values, behaviour and attitudes (Jameson, 2007). Cross-cultural trust and cooperation are important concerns for international business collaborations (Kuwabara et al., 2007).

Organisational culture can be considered as a resource in the business relationship. Thanks to its many different nationalities, an OIP can be seen as 'an immigrant innovation platform', which is likely to gain certain national-related advantages to reduce transaction costs, acquire resources, and enhance business performance. This thesis will look at cultural differences as part of the transaction cost and explore how an OIP can help entrepreneurs collaborate.

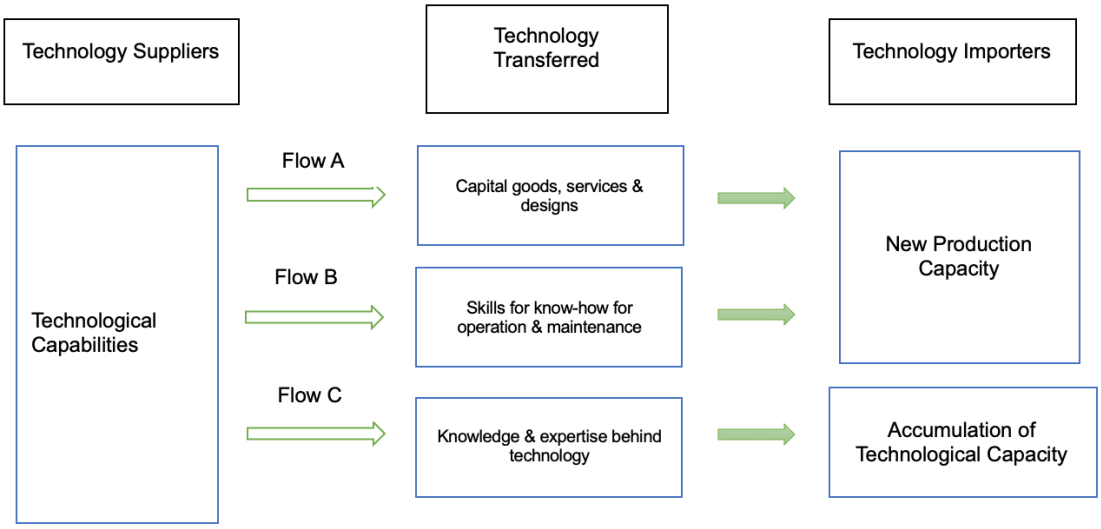
2. Motivation of International Technology Transfer (ITT)

Access to technology, regardless of where it has been developed, has constituted an important instrument in the economic growth of countries and organisations (Audretsch et al. 2014; Huuck 2015) because it promotes changes in society, creating new needs and satisfiers (Mauricio & Lopez 2018). A country's competitive advantage is usually dependent on knowledge and technology transfer (Hall 2014). Woerter (2012) notes that companies 'get involved in transfer activities to update and modify their knowledge base and improve their competitiveness.'

ITT means the 'flow of technical information between different stakeholders with its production output' (Maskus & Saggi 2014). It is an approach to achieve rapid industrial development and cause long-term economic growth (Madu 1989). Ockwell, Haum, Mallett and Watson (2010) have summarised

the findings of Bell (1990), showing the primary ITT route classified in equipment, knowledge and processes (Figure 3 below).

Figure1.3: The technological content of international technology transfer (Ockwell, Haum, Mallett, Watson 2010)



ITT has played a significant role in developing countries as an efficient approach to enhance productivity and stimulate innovation. At the national level, ITT is the flow of information and resources between two countries. From a micro perspective, enterprises want to upgrade their technologies to achieve innovation on new products and services, or to find solutions to lower the cost. ITT's primary manifestation could be achieved in various ways. For example, the direct purchase of instruments and equipment, the transnational flow of talent, or the cross-national commercialisation of high-tech.

One of the primary motivations for OIP is to help international technology transfer (ITT). Incubators are just one example of the innovation platforms; many incubators are funded by governments and universities. They also make money from the equity they put into the start-ups or charge users' service fees. Some incubators also make money from rent. For example, they offer hot-desking (first come first use working spaces) and offices to entrepreneurs, or

charge rent to cover the financial balance. With the markets and investors from their home countries, OIPs can make a profit when they successfully help tech entrepreneurs find matching markets.

However, successful ITT does not only rely on simple business transactions. Instead, it requires an ongoing relationship between the enterprises that send and receive the technology for the independent reproduction within standards for the receiving enterprise (Teece, 1976). It means that the ITT relies on the transfer of know-how (Reddy & Zhao, 1990).

Building an OIP in a developed country could be a cost-effective way for developing countries to attract advanced technologies. It is attractive to local government in the developed country thanks to the job opportunities and economic benefits an OIP can create. This specific characteristic has broadened the resources an OIP can provide to entrepreneurs. OIPs are also able to create more networking opportunities for local high-tech entrepreneurs.

Such cross-national high-tech commercialisation projects always proceed with professional institutions as accelerators and technology transfer centres. Insufficient international cooperation has led to the incomplete and inefficient ITT (Liu & Zhao 2007). ITT requires building a partner network that dovetails with global industrial innovation resources in order to enhance efficiency integrate into the global innovation system and facilitate the transformation and industrialisation of more advanced international technologies. The form of OIP has been participating as the third-party agency in the ITT process and works for the investors from home country, commercialisation and collaboration with the OIPs are two sides to one coin. An OIP, as a mixture of

incubators, accelerators and event organisers, is one part of the enabling environment for innovation (Malbon, Lawson & Davison 2014).

However, within the process of establishing relationships with overseas companies, there are difficulties in two areas. Entrepreneurs overseas may face many difficulties due to cultural differences, language barriers and information asymmetry. During international collaborations in the commercialisation of new technologies, practical solutions need to be explored to conquer intellectual property (IP) management barriers. The investigation of some ITT organisations has also shown that the mutual trust relationship between two parties has not been fully established. This makes it difficult to carry out the substantive development of technology transfer work. Subsequently, China's ITT institutions have experienced difficulties in their operations. In a survey of its partners by the China International Technology Transfer Centre, transfer institutions' main challenges include a lack of mature transferrable technologies, effective information channels, and platforms to access technology and market information. Thus, it is very important to explore the protective environment from the technology-receiver country to evaluate the current situation of fledgling technologies to grow and develop.

1.2 Problem Statement and Research Question

The introduction established that growing OIPs are under-represented in research. Therefore, their perspectives need to be further explored or represented. Intermediaries like innovation platforms can help the network problems in various ways (Van Weele et al. 2018). The theoretical mechanisms of how different forms of support help overcome weak network

problems have not been well established. An OIP, as a new model of innovation platforms, has unique resources to bring established entrepreneurship back to its home country. This means that there are more areas that need to be explored academically.

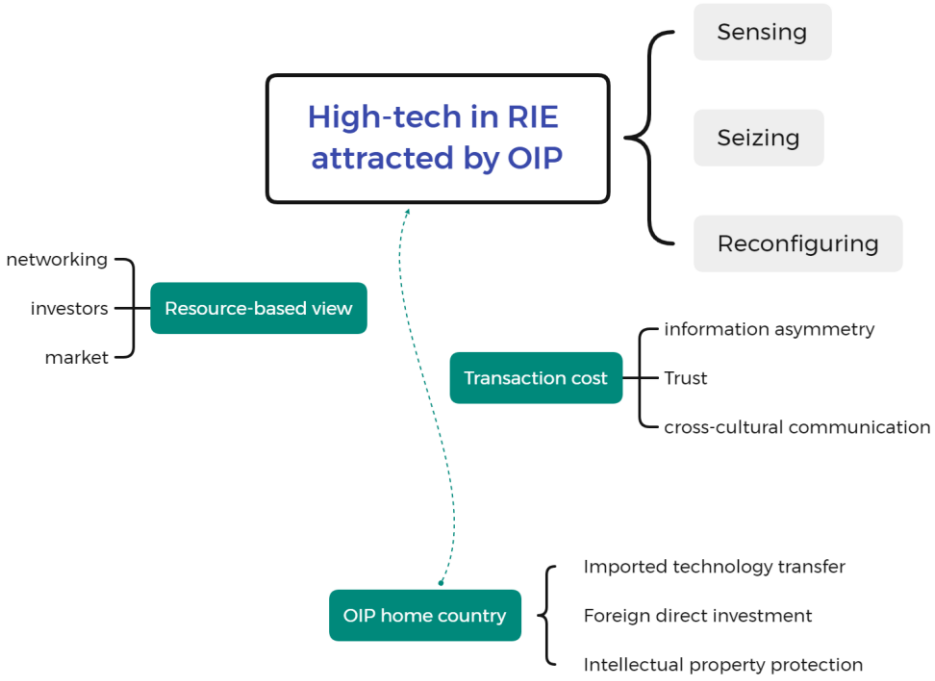
The home country's IP protection also affects the OIP's work. An OIP can help the home country absorb and import advanced technologies and avoid the IP conflicts from the beginning stages. It is therefore essential to discuss the relationship between intellectual property protection and the imported technology transfer. Further recommendations and suggestions can be brought up for home countries to assist OIPs on the other side.

Motivated by the research topic, this research has given rise to the following questions:

1. How does the OIP play a role in the regional innovation ecosystem?
2. How does the OIP help high-tech start-ups to grow?
3. What is the IP protection effect on imported technology transfer?

By exploring these questions, this thesis aims to construct a theoretical model of the OIP that specifies its functions in the regional innovation ecosystem and the process of international technology transfer. A theoretical framework (Figure 4) has been created to combine with different literature streams: transaction cost economics (TCE) literature, resource-based view (RBV) literature, international technology transfer (ITT) literature, innovation ecosystem literature, and dynamic capability literature.

Figure 1.4: Theoretical Framework (Author's own)



This framework has guided the researcher's data collection and analysis. Entrepreneurship, OIP and regional innovation ecosystem literature provide the fundamental theoretical and empirical background for the research questions. They supply the theoretical background for the relationship between OIPs, high-tech start-ups and the regional context. They also provide the literature around stakeholders and actors in the regional innovation ecosystem, their interactions with entrepreneurs. Likewise, they guide the research into networks and how it affects high-tech start-ups. By exploring the process of international technology transfer, the literature provides the steps

of matching adequate high-tech entrepreneurs with investors. This contributes to defining the transaction cost of entrepreneurs.

Furthermore, transaction cost theory has been used to identify and categorise transaction costs of entrepreneurial growth. A resource-based view has been used to identify and classify both the resources that start-ups need to survive and the resources that an OIP may provide. The integration of the literature above provides an initial over-arching theoretical framework. All categorisation and classification will be used in the chapter 4 and 5 to discuss the following: The roles the OIP plays in its local, regional innovation ecosystem (where the OIP is found), the activities an OIP creates, and how it can help local entrepreneurial growth. This thesis will explore the relationship between the home country's intellectual property protection rules and imported technology transfer with a quantitative study. This research has used the panel data of the home country of the cases selected, ranging from 2001 to 2013, to analyse the effect of intellectual property protection (IPP) on the scale of international technology transfer.

1.3 Research Objectives and Approach

The research objectives are as follows: (1) to explore and represent the features and functions/operations of OIPs, (2) to define the role of offshore innovation platforms within the regional innovation ecosystem, (3) to build the framework of a regional innovation ecosystem that will be a base for further research, (4) to explore the impact of OIPs in the ITT process, (5) to list the barriers in international cooperation of OIPs by exploring the dynamic capabilities of OIPs, and (6) to examine the effect of IPP on the scale of

technology transfer.

A mixed methodology will be used to answer each research question. This research examines the impact of activities. For example, the high-tech start-ups' internationalisation processes in the selected two OIPs are analysed in terms of regional innovation ecosystem development by applying the concept of the innovation ecosystem framework. To explore the research objectives of (1), (2), (3) and (4), this research uses semi-structured interviews guided by Yin (2015) on (a) OIPs, (b) universities, (c) benefited companies, (d) other relevant existing local platforms and (e) involved investors.

This study sets up the hypothesis to answer the third research question: ITT in China. Using panel data in China from 2001 to 2013, the regression is set to analyse the effect of IPP on the scale of international technology transfer. This thesis discusses the future trend of OIP and its role in the international collaboration process using panel data analysis.

1.4 Structure of the Dissertation

This chapter introduces the research topic and how the author finds the vision and motivation for the broader work. There are a few points that can be summarised regarding the content of this chapter:

- The author's researcher's development outline and research interests in OIPs, the summary of the research gap and the terminology used in the thesis.

- Explanation of the motivation behind an OIP; the difference between the OIP and the traditional innovation platforms. With each difference, this chapter introduces theories used in that research area.
- Summary of the research questions and research objectives.

The remaining chapters are organised as follows. Chapter 2 contextualises this research by referring to relevant literature and explaining the terms used in this study. Introducing and comparing the pertinent theories of three main aspects, Chapter 2 further explores the theoretical and conceptual frameworks. Chapter 3 explains the research methodology and methods selected to answer the research questions. Chapter 4 analyses the role OIPs play in the regional innovation ecosystems by summarising their main activities, their impact on the regional innovation ecosystem from a resource-based view, and also the resources they can provide and how they impact networks. As there are two main OIPs involved in this research, there is a comparative analysis between the key activities and their impact on the regional innovation ecosystems with their frameworks built under ecology theory. Chapter 5 explores the impact of an OIP in ITT and how it helps entrepreneurs' match adequate resources based on transaction cost theory and a micro-foundations ITT by panel data results. Chapter 7 considers the social meanings constructed through the analysis of an OIP. Chapter 7 also looks at the future development of OIPs for policymakers, entrepreneurs, investors and relevant stakeholders. Chapter 8 summarises this research's limitations and provides some future directions for the research on the route of ITT and the cross-border technology collaborations and investments.

2. Literature Review

In Chapter 1, the context, aims, research questions, literature framework and structure of the thesis were explained. This chapter will review the literature surrounding innovation platforms, regional innovation ecosystems, transaction costs, international technology transfers, resource-based views, and dynamic capability in greater depth, to provide an initial theoretical framework and permit further investigation into the research questions.

The functions and services provided by OIP within the regional ecosystem can be seen as resources to nurture high-tech start-ups and help reduce transaction costs. Chapter 2.1 summarises the existing literature for the ecosystem discussion and identifies main stakeholders and networks present in the regional innovation ecosystem, and therefore provides a basic background for this thesis. Chapter 2.2 provides the theoretical background of innovation platforms. The definitions of different innovation platforms are in ambiguity and there is limited research on OIP. Nevertheless, this thesis draws on existing literature to form the theoretical framework of the basic services and functions OIP provides, which will be tested in later empirical research (chapter 4 and 5). Chapter 2.3 adds the resource-based view to the framework and analyses how does an OIP uses resources to help high-tech start-ups grow. Using transaction cost theory, chapter 2.4 extends the theoretical framework by analysing the OIP functions and services, using transaction cost theory to explore how OIPs can be of benefit to start-ups and related stakeholders. In addition to having their own special features of cross-cultural, cross-border collaboration, OIPs possess particular features in terms of cross-technology transfer, which intends to help high-tech start-ups develop. Chapter 2.4

consequently combines transaction cost theory with the relevant literature to extend the framework and cover the research gaps. Chapter 2.5 discusses intellectual property protection in the home country and puts forward hypotheses to explore if the strict protection will have a negative impact on international technology transfer.

2.1 Understanding Regional Innovation Ecosystems

Research started to focus on ecosystems in the business field in the 1990s, and viewpoints on innovation ecosystems are controversial. In the business field, innovation ecosystems are both interconnected and interactively used alongside three other ecosystems (business ecosystem, entrepreneurship ecosystem and knowledge ecosystem). This chapter provides a theoretical background on the ecosystem and clarifies the innovation ecosystem used in this thesis. Main theories, models and their limitations on innovation ecosystems will be discussed. With regional-level characteristics, factors and stakeholders will be summarised within the theoretical framework during empirical analysis.

2.1.1 Innovation ecosystem: A historical view

The term, ‘ecosystem’, was first used in research by Tansley (1935) in the field of ecology, to explore plant communities. He found all organic and inorganic elements to interact, which contributed to the formation of the ecosystem. He therefore believed that ecosystems should thus be taken into consideration independently and thoroughly. In his research, ‘ecosystem’ referred to a self-contained entity within an entity (Tansley, 1935).

There are similarities and differences between the biological ecosystem and the ecosystems in the business world. Like the biological ecosystem, business ecosystems follow the rule of competition: the winner, with competitive advantages, survives in a cruel world. At this level of understanding, it seems that enterprises with more innovative ideas or advanced technologies stand a good chance in the competition compared to the others by taking innovation as their competitive advantage. That said, why are there still so many start-ups that go into 'Death Valley' and never figure their way out? One big reason is money.

The term, 'ecosystem', has been used in a business capacity since the early 1990s by Moore (1996). He uses ecological metaphors to explain the lack of boundaries in business networking, following the idea of 'community'. He further defines a business ecosystem as an 'economic community that produces products and services for consumers' (Moore 1996). According to him, this economic community is supported by a series of individuals, institutions and relevant stakeholders that interact with each other and with consumers to form part of the ecosystem (Moore 1996). He claims that the roles of different organisations and individuals may change as time passes. However, the importance of the ecosystem's leaders does not decline. Instead, 'they focus on contributing to the community to share their vision, align investments and implement supportive roles' (Moore, 1996).

Since Moore's (1996) research exploring business ecosystems, the term has become increasingly used in the business world. However, until 2015, there was still limited research related to business, management and economics that used the term, 'ecosystem'. According to research by Scaringella and

Radziwon (2018), only 39 relevant articles used the term. This number has since increased noticeably and since 2015, 704 new articles on the 'Web of Science' have used the search string: 'ecosystem AND business AND innovate'.

From a systematic literature review on ecosystems, there are four main types of ecosystems in business: business, innovation, entrepreneurship, and knowledge. These four main terms are 'highly related, used repeatedly, and have controversially similar definitions' (Scaringella & Radziwon, 2018). This thesis has summarised the mainstream definitions for those ecosystems, below, ahead of further discussion.

Table 2.1 Mainstream definitions of different ecosystems (Author's own)

Ecosystem	Definition	References
Business	The business ecosystem is an extended system that consists of mutually supportive organisations. Mutually supportive organisations include communities of customers, suppliers, lead producers and other stakeholders (such as financing, trade associations, standard bodies, labour unions, governmental and quasi-governmental institutions) and other interested parties. It is partially intentional and highly self-organised.	Iansiti and Levien (2004); Moore (1998)
Innovation	Consists of the input and output flow of products and the bundled elements and	Adner and Kapoor (2010)

	various actors in the environment.	
Entrepreneurship/Entrepreneurial	Consists of individual elements, such as leadership, culture, capital markets and open-minded customers, combined in complex ways.	Isenberg (2010)
Knowledge	Consists of knowledge users and organisers to facilitate joint research/competitive advantage.	Clarysse et al. (2014) Järvi et al. (2018)

The main differences between the four ecosystems are their value propositions and related actors. With different aims, ecosystems are typically organised around a focal firm, technology, platform, or value proposition (Autio & Thomas, 2014; Ritala et al., 2013).

Broad innovation consists of 'innovation' and 'entrepreneurship'. According to research by Massachusetts Institute of Technology (Roberts et al., 2019). Innovations can be defined by their nature in terms of: (1) product innovation (meaning new products or new product features); (2) technology innovation; (3) market innovation (which refers to the opening of a new market or entering into existing markets that the company has not been in before); (4) resource allocation innovation (namely the control rights of the product supply chain (raw materials or semi-finished)); (5) organisational innovation (a new position of companies in the industry, such as a monopoly) (Schumpeter, 1934). These innovations are accomplished by entrepreneurs, who Swedberg (2013) defines as being one individual or a team of people, who develop new combinations of existing resources. While the knowledge ecosystem 'focuses on the very early stage of knowledge creation' (Clarysse et al., 2014), the

innovation ecosystem ‘is defined by a broader scope of exploration and exploitation’ (Dattée et al., 2018; Valkokari, 2015). However, using a business ecosystem as a distinct concept to analyse the innovation ecosystem can provide two different perspectives: (1) value creation, which relates to technology transfer and the commercialisation process; and (2) the competition, which refers to the value capture and relates to pursuing competitive advantage and profit-making (Gawer 2014; de Vasconcelos Gomes et al. 2018).

When the ecosystems stay latent, unchangeable and with no further alignment, their impact and contribution tend to flatten and reach a fixed form (Adner, 2017). When there are new variants, conditions and actors, the existing equilibrium is broken, and it is essential to explore a new framework and approaches to achieve a Pareto equilibrium for its local innovation ecosystem to utilise and maximise its function and benefit all stakeholders.

2.1.2 Main Theories in Innovation Ecosystems

An innovation ecosystem has yet to have one consistent common theoretical concept. There are two main theories to define innovation ecosystems: ‘ecosystem-as-affiliation’ and ‘ecosystem-as-structure’ (Adner, 2017). From an organisational perspective, ecosystem-as-structure consists of participants relevant to similar products or services, while from the affiliation point of view, an ecosystem represents a cross-industry network of producers of different goods and services that nevertheless combine to support coherent value offering (Lansiti & Levien 2004; Moore, 1996). However, this classification has its drawbacks as structure and affiliation are not defined on the same dimension and they are not contradictory (Hou & Shi, 2020; Jacobidies et al. 2018). The following section gives an in-depth analysis of the

main theories and describes the viewpoint that ecosystem-as-affiliation and ecosystem-as-structure have consistency and can be combined and integrated into the theoretical framework of the thesis.

2.1.2.1 Ecosystem as affiliation

Following the ecology concept, Moore (1993)'s theory refers to an ecosystem in the business field as being a solution to nurture the business in a networking world with similarities to a biological ecosystem. Under such a concept, an innovation ecosystem should be the approach to nurture innovative and high-tech businesses in a networking cluster, using the innovation ecosystem's characteristics of vulnerability, resistibility and adaptability when facing a crisis. The term 'actor' is used here to refer to the entities that undertake the activities. With this in mind, the main properties of an innovation ecosystem include a diversity of actors; of networks and co-evolutions, where the focus mainly on its actors (Adner, 2017; Jucevičius & Grumadaitė, 2014). The theory of ecosystem-as-affiliation refers to a loosely interconnected network of a series of actors to develop new products and services using a shared set of technologies, knowledge, and skills (Moore, 1993). All elements interact in flexible ways to nurture technologies and innovation. The boundary is blurry and open to all possibilities. Furthermore, ecosystem-as-affiliation aims to facilitate the potential of new interactions and combinations coming from the increasing number of actors, centrality and expected power. By adding numbers of actors and expanding networks, the ecosystem boundaries expand, and the complexity of an ecosystem increases. This theory focuses on the big picture of the ecosystem, sees it as a whole and omits the detailed activities of actors; consequently, explicit results have been missed in the discussion (Adner, 2017).

2.1.2.2 Ecosystem as structure

Another way to understand the coordination and evolution of an innovation ecosystem comes from the idea of institutional approach (e.g., Thomas & Autio, 2012), which refers to an innovation ecosystem as organised with its own institutional actors (organisations that constitute a recognised area of institutional life include key suppliers, resource and product consumers, regulatory agencies, and other organisations that produce similar services or products), logics, and governance structures (DiMaggio & Powell, 1983; Thomas & Autio, 2014).

There are four main elements in the theory of ecosystem-as-structure: activities, actors, positions, and links (Adner, 2017). With this in mind, a real-life case has been used in this research to illustrate the structure of an innovation ecosystem. Ecosystem-as-structure works to achieve a consistent focal value proposition with a settled collection of interactive stakeholders and partners interacting with each other. All stakeholders and partners can thus be traced and defined by a series of collaborative agreements where an ecosystem is solid and stable rather than random and flexible. The ecosystem-as-structure theory has certain aims and achievements giving it direction, and under this consensus reached in the ecosystem, mutual agreement among actors have been set up, positions have been clarified, and flows have emerged; all activities serve to make the final goal happen. Ecosystem-as-structure works as an alignment structure and as a network of a variety of independent actors' (Walrave et al., 2018).

Unlike the theory of ecosystem-as-affiliation, two main targets have been created in the ecosystem-as-structure theory. Firstly, to co-create and deliver an overarching value proposition to end users, and secondly, to appropriate the

gains received in the process. Related activities thus turn out to be the ones for instantiation. However, since different actors have different views of their own value creation, these may cause controversial opinions in terms of gains for different participants, bias, and mistakes, which exist from information asymmetry. This will, in turn, impact the performance of an ecosystem. Furthermore, the ecosystem-as-structure works more as a specific project rather than a vivid network.

2.1.2.3 Comparison of the two main theories

There are three main differences between the two theories: activities, links and targets. Adner (2017) argues that ecosystem-as-structure uses the term 'activities' to refer to all direct and indirect actions that could contribute to the value proposition to materialise, but in the theory of ecosystem-as-affiliation, activities are more likely to refer to actors instead. However, with a more explicit aim, the links created to an ecosystem-as-structure refer to the transfers between different actors. In the ecosystem-as-affiliation, with a loosely connected network, links are considered the ties between the focal factor and other factors. In terms of targets, ecosystem-as-affiliation works as a community-oriented cluster, while ecosystem-as-structure works with a configuration of activities defined by value proposition.

There have been numerous ecosystem reviews attempting to offer a synthesised ecosystem framework (e.g., Bogers et al., 2019; Granstrand & Holgersson, 2020; Phillips & Ritala, 2019; Thomas & Autio, 2020; Tsujimoto et al., 2018). These reviews have contributed to the theoretical framework of this thesis. The innovation ecosystem is a huge organisation where multiple nodes interact with each other under specific situations to create innovation or promote innovation commercialisation. In the ecosystem-as-affiliation theory,

an innovation ecosystem is a loosely interconnected network, and thus the aims and goals do not need to be related to consistency. An innovation ecosystem works as an affiliation, as all high-tech start-ups here are looking for unspecific collaborations; vivid and expanding networks can help the entrepreneurs find more opportunities to work with. An innovation ecosystem also works as a structure with focal innovations and components of upstream and downstream works. The results are coherent, end-use facing solutions (Adner, 2006; Jacobides et al., 2018). Coordination between different actors is quite important, and innovations will fail if the coordination is inadequate (Adner, 2012; Adner & Kapoor, 2010; Kapoor & Lee, 2013). Jacobides et al. (2018) highlight the importance of affiliation in the structure view.

This thesis has used the following theories by Xu & Maas (2019) to develop the research framework: 'Start-ups that create innovation may lack opportunities for funding and marketing of the innovation commercialisation' and one of the main functions of the innovation ecosystem is to create more opportunities for enabling innovation commercialisations. The thesis uses the actors in the ecosystem-as-affiliation theory to identify all relevant stakeholders existing in the regional innovation ecosystem. This is achieved through empirical analysis where the role of OIP is discussed with its functional activities using transaction cost theory and resource-based view. Section 2.1.3 discusses the existing literature surrounding regional innovation ecosystem and the main participants to fulfil the theoretical framework.

2.1.3 Regional Innovation Ecosystem

Innovation ecosystems are based upon agglomerations in geographic, economic, industrial, or entrepreneurial terms. Many research scholars have attempted to draw the innovation ecosystem framework into different types,

levels, and models. Existing research mainly discusses innovation ecosystem models at five different levels, as shown in Table 2.2 below.

Table 2.2 Levels of Innovation Ecosystems (Author's own)

Study Level	Study Focus	Author & Year
National Level	Focus on three main types of information and knowledge flows: (1) interactions that could contribute to technology collaborations; (2) interactions between stakeholders that relate to knowledge spill over and technology transfer activities; (3) personnel mobility.	Freeman (1989, 1995); OECD (1997); Morrison (2013).
Regional Level		
Industrial / Network Level	Focus on the whole industrial system flows regarding resources, materials, and energy; interaction with the environment; and the sustainable ecosystem model.	Frosch and Gallopoulos (1989); Zahra and Nambisan (2012); Teece (2007); Erkman (1997).
Firm Level	Focus on how firm-level business entities could use existing external resources to create and capture new value.	Zott and Amit (2013).
Individual Level	Focus on the self-regulatory processes of entrepreneurs to face two main challenges: (1) manage multiple goals; (2) recognise the opportunities existing and beyond.	Nambisan and Baron (2013).

The two main types of innovation ecosystems (national and regional) are based on geographical factors. Models of the two types are discussed below, and the research limitations summarised.

2.1.3.1 National Innovation Ecosystem

The national innovation ecosystem was built on the original idea first put forward by Freeman (1989, 1995) called the 'national innovation system'. Freeman (1995) describes the network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies. This concept has been widely used in regions and sectors and has further evolved into the concept of the national innovation ecosystem. OECD (1997) claimed the difference between national innovation systems and

national innovation ecosystems is a national innovation system intends to describe a planned innovation environment, which is more widely used in the national development plan. In contrast, a national innovation ecosystem is used to describe the ecological innovation environment geographically divided by the nation. However, both definitions focus on the same elements and relationships between all the actors, such as enterprises, universities, government research institutes and other stakeholders. The definition of 'regional innovation ecosystem' is quite similar to that of 'national innovation ecosystem'; they are only different in terms of location. They both aim to explore all factors in society that could impact innovation; this is close to the aim of the original ecology concept. They both also analyse the ecosystem from the landscape perspective, involving the main characteristics of physical space and culture in the discussion (Shaw & Allen, 2018).

2.1.3.2 Regional Innovation Ecosystem

The innovation activities of firms and industries need to be implemented within a certain spatial context, i.e., with a certain space as a vehicle. From the perspective of Andersen (2011), an innovation ecosystem is first a successful innovation region (e.g., Silicon Valley and Bangalore), then new industries (e.g. the cloud computing industry) and then successful innovation platforms (e.g. iPhone, Android), as well as entrepreneurs and investors from around the world who commit themselves to the above. A regional innovation ecosystem is therefore defined as an organic whole in which various relevant innovation groups interact and influence each other and the innovation environment within a certain regional context. It is no longer confined to a specific industrial sector but is a re-integration of all industries, research institutions and higher education institutions within a certain spatial scope; a regional innovation ecosystem consists of a heterogeneous set of knowledge-intensive

firms and other institutions that interact with each other to gain efficiency and effectiveness. For this reason, they are mostly located within close geographical proximity. The regional perspective on innovation ecosystems highlights the concept of clusters, which are mainly characterised by the agglomeration of industries or innovation agents.

One of the major research gaps in this area is that innovation ecosystems have listed a long series of relevant factors but lack clear reasoning regarding cause and effect. However, all the main factors, much like in a jigsaw ecosystem, will interact each other. This means their effects are not linear and should be taken into further consideration. However, the coherence and interdependent effects need clearer explanations. In addition, it is not clear in some models which level of analysis is targeted by this framework. For example, it could be urban, regional, national or cross-system. Furthermore, the frameworks lack practical usefulness. All investigation is based on clusters, which have already built up plenty of successful entrepreneurships. Consequently, this makes the optimisation process not very valuable, as its causal depth and evidence base are rather limited. For example, in the UK, the London, Cambridge and Oxford areas that always lead the UK innovation ecosystem are discussed a great deal in previous studies. At the same time, there is doubt regarding how well the situation is going in other areas outside of central England. The geographical factor contributes to the uniqueness of each ecosystem, and the scale of the region has vast impacts on the specific running of an ecosystem.

Another problem is that the literature jointly considers factors ‘inside’ the geographical area but omits that, under the current situation, cross-country interactions have already deeply impacted the whole ecosystem. This cannot be ignored in terms of the transfer of information and technology, overseas

funding, and cultural and political impacts. All these aspects should be considered as essential factors of an innovation ecosystem, yet none of these papers consider them. Thus, in collaboration with participants overseas, the innovation ecosystem needs to be taken out to fill the gap and to make contributions to the current entrepreneurship ecosystems. However, it should be studied in a specific region and should not be selected by the entrepreneurial clusters that have already proved successful. The transfer flows from new entrants overseas have not been considered as a series of formal factors that should be involved in the discussion.

2.1.4 Research gap and theoretical framework

The aforementioned research gap exists due to various players joining the regional innovation ecosystem who aim to combine science, technology, and business. OIP is one player, based on region, but it could also be a channel to access international resources that have not been analysed before. With unique characteristics different from the earlier concepts of closed systems, such as innovation systems, science cities and innovation clusters, innovation ecosystems are more flexible, more digitalised, and more organised because of availability of international resources. Such a trend of open systems involves a range of players distributed up and down the supply chain, and the new player OIP will cause a series of impacts on the regional innovation ecosystem. The study of OIPs is of vital importance and would add considerable value to the existing research.

In this study, the author aims to apply both the mainstream ‘the ecosystem as structure’ conceptualisation of innovation ecosystems, as suggested by Adner (2006) and Gulati et al. (2012), and the idea of ‘the ecosystem as affiliation’,

as suggested by Moore (1993) and Iansiti and Levien (2004) to explore research question 1: How does the OIP play a role in the regional innovation ecosystems?

Innovation ecosystems aim to create active information and resource flows for innovative ideas to be translated into reality. All members inside this ecosystem co-evolve with it and always perform more than one function. They share the system as a whole (e.g., Li, 2009). Connections and communities are key success factors for the growth and sustainability of regional innovation ecosystems. Although the idea of the ecosystem as a community is close to reality, it has the limitation that it represents the whole picture too broadly. The inside structure, however, needs to be explored further to gain a more detailed analysis. Thus, the author has created a theoretical framework to identify and pictorially depict the roles of OIPs in regional innovation ecosystems by defining the existing actors and the communities and by exploring how they could contribute to the six function layers in the regional innovation ecosystem. The functions aim to:

(1) Help high-tech companies (which include the start-ups, SMEs, and big companies) to expand or find new markets

(2) Help high-tech companies to connect with prospective employees or partners

(3) Help high-techs get funding

(4) Contribute to the support system

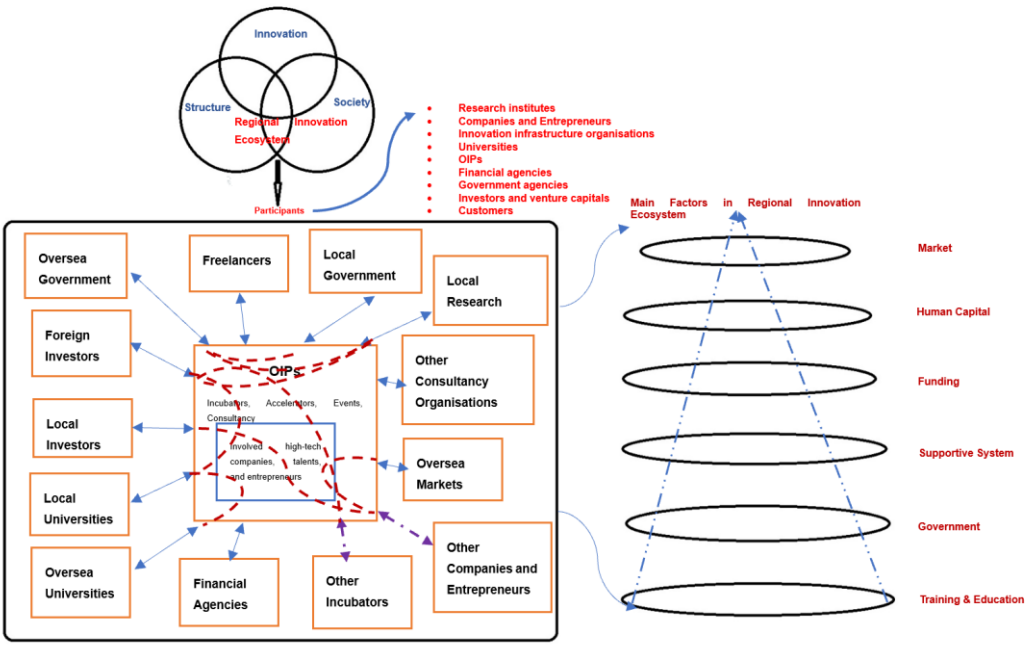
(5) Help obtain the assistance of related government departments

(6) Help talents in high-tech companies to receive advanced training.

A defining characteristic of regional innovation ecosystems is their ability to adapt and evolve (Basole, 2009). In other words, a healthy ecosystem should have the features of being productive and robust (Iansiti & Levien, 2004a; Moore, 1996). It means that an innovation ecosystem should be capable of consistently achieving technology transfer, exploring lower costs, and finding an entrance to new markets while simultaneously striving to survive risks and looking for niche markets to expand its diversity (Dodgson et al., 2013).

Based on the literature review above and the practice of innovation ecosystem discussed in this research, combined with theories, the roles that OIPs play in the regional innovation ecosystem are shown in Figure 2.1 below:

Figure 2.1 Research Framework of Regional Innovation Ecosystem (Author's own)



2.2 Offshore innovation platform literature

This section explains OIP definition by analysis on the existing literature of mainstream traditional innovation platforms. OIP is a comprehensive innovation platform that contains multiple functions of traditional innovation platforms such as incubators, accelerators and co-working spaces. By summarizing the existing literature, the research gap has been defined.

2.2.1 Platforms: A historical perspective

The term ‘platform’ in economics literature refers to the role of an intermediary mediating transactions between groups of actors (Gawer, 2014). It has been widely used in many industries, such as agriculture (e.g., Dror et al., 2016; Neef & Neubert, 2011), healthcare (McHugh et al., 2016) and infrastructure (Klijn & Teisman, 2003). There are three main streams of theories that have explained the nature of platform in the relevant study area, which the author has summarised in Table 2.3 below:

Table 2.3 Nature of Platform (Author's own)

Nature of Platform in Different Theories	Role	Main Activities	Author
Platforms are formal contexts of structure and convention. Different sub-organisations can be created on platforms under specific circumstances, such as hierarchical, matrix or network.	Meta-organisation	Networking	Ciborra (1996) Pierce (2009)
Platforms are functional groups. They can be used together in a product family whose functionality can be extended by the application.	Feature group	Functional extension	Shankar and Bayus (2003)
Platforms are components that can be used in different product families. Different platforms can combine and expand product family functions through network effects.	Component	Networking	Armstrong (2006) Boudreau (2010)

Platform types and their definitions are controversial, but they can be classified into two main categories:

(1) Via internal platforms, which can be used as a component, are for single usage, and are established by single company or purpose.

(2) Via external platforms, which operate as a coordinator for all the stakeholders, including the outside innovators, to join and develop innovations, technologies, and products without a specific range (Cusumano

& Gawer, 2012; 2014). The core motivation of platforms is to provide corresponding services and facilities to contribute to the collaboration and nurturing innovative solutions and start-ups in specific situations. The next section will introduce studies on the main IP types, summarise their features and functions and relate them to the conceptual framework for this thesis.

2.2.2 A taxonomy of Innovation platforms (IPs)

2.2.2.1 Features of IPs

Innovation platforms can be seen as intermediaries whose functions are performed by objects of innovation infrastructure (Chesbrough, 2006; Gamidullaeva, 2018). To successfully innovate, IPs need to provide services to cover the gap between developers, patent holders and innovative entrepreneurs and their potential users, firms, organisations, and other stakeholders that have complementary expertise, knowledge, and resources.

In general terms, IPs are useful when (1) the people or organisations that represent different socioeconomic backgrounds, interests and perspectives have a stake in a particular problem or solution; (2) many people or organisations want or need to experiment jointly on aspects that they cannot solve individually or that benefit from synergies; (3) new solutions require a combination of new technologies (technological innovation), effective collaboration (organisational innovation) and/or new rules, funding and incentive structures (institutional or policy innovation) and/or (4) actors and organisations are willing to share knowledge, resources, benefits and risks, as well as sufficient common interests and trust to engage in collective innovation to address a common challenge (Buerkler, 2013).

Howells (2006) summarised ten functions that are provided by IPs during the innovation process (see Table 2.4 below):

Table 2.4: Functions provided by innovation platforms, Adapted from Howells (2006)

Function	Description
1. Foresight and diagnostics	(a) Technology foresight and forecasting, technology road mapping (b) Articulation of needs and requirements
2. Scanning and information processing	(a) Scanning: Information gathering and identification of potential collaborative partners (b) Scoping: Selection of collaborative partners
3. Knowledge processing, generation, and combination	(a) Combine the partners (knowledge) (b) Generate in-house research, recombination of existing knowledge bundle
4. Gatekeeping and brokering	(a) Negotiation, facilitate contracts, deal-making (b) Advice to finish the contract
5. Testing, validation, and training	(a) Testing, diagnostics, analysis, and inspection

	(b) Prototyping and pilot facilities (c) Scale-up (d) Validation of analytic methods (e) Joint training in usage of new technologies
6. Accreditation and standards	(a) Specification setter or providing standards advice (b) Formal standard-setting and verification (c) Voluntary and de facto standards setter
7. Regulation and arbitration	(a) Formal regulation (b) Self-regulation (c) Informal regulation and arbitration
8. Intellectual property protection services (IPP)	(a) Intellectual property rights advice (b) Intellectual property management
9. Commercialisation	(a) Marketing support: Market research, business plan (b) Service on sales networks and build up channels (c) Matching with capitals at the early stage (d) Match with venture capital

	(e) Initial public funding
10. Assessment and evaluation	(a) Technology assessment (on technology and performance) (b) Technology evaluation (when put into the market)

Innovation intermediation can be seen as a function, process, and relationship in the system of innovation. During the innovation process, such as ideation, invention, standard-making, managing of intellectual property rights, commercialisation and creating a new market, the intermediaries play a key role in facilitating the users by bringing different actors together (Katzy et al. 2013). By reducing the transaction complexities among the different stakeholders, the innovation intermediaries make interactions and match them to help the innovations, particularly for the entrepreneurs who have stronger needs for collaboration as they lack internal resources (Das & Teng 2000; Eisenhardt & Schoonhoven 1996).

IPs can be set up with different motivations, such as (1) IPs from a specific geographical perspective, (2) IPs through specific supply chains or set-ups for different industrial sectors, (3) IPs to tackle specific problems and (4) IPs for specific organisations (Homann-Kee Tui et al., 2013). Since the role of IPs is to provide a flexible environment for participants to work across different levels to achieve effective collaboration, and thus IP functions and services vary when it comes to achieving different goals. IPs do not need to meet with Howells' (2016) ten functions as they sometimes act purely as part of the chain in the process of nurturing innovation process. This thesis will discuss three main types of IPs which supplement the theoretical framework used in the

study.

2.2.2.2 Incubators

For two main reasons, detailed below, there is no consensus on incubator definitions. The first is that the incubators need to fit the local needs and conditions. Diffusion and repeated adaption will lead to changes to the original incubator concept. In a weak business ecosystem, incubators tend to rely on the low rent to attract their users, with a public official or faculty member providing supportive services, and in a good business environment, incubators tend to offer a variety of innovative, value-adding services but with near-market rents (Lalkaka, 2002). The second reason is that there is a trend of not specifically defining the incubation process (Hackett & Dilts, 2004; Lalkaka, 2002; von Zedtwitz & Grimaldi, 2006).

However, the primary goal of all incubators is to support start-ups (Amezcua et al., 2013; Rice et al., 1995). By providing (1) a shared infrastructure, such as office space, facilities and, possibly, specialised equipment; (2) professional consulting services, coaching or mentoring; (3) network services and (4) funding opportunities (Bruneel et al., 2012; Eveleens et al., 2017; Hansen et al., 2000; Lalkaka, 2002), successful start-ups can grow and leave the incubation programme with the potential to create jobs and gain profit.

Table 2.5 Service type in incubators (Von Zedtwitz and Grimaldi, 2006).

Service Type	Category	Main supports	Competitive advantage
Tangible Services	Physical infrastructure	Office space, desk, meeting rooms	Competitive rent / lease terms, volume discount, shared use
	Office support	Wifi, printers, PC & equipment, mail service, security	IT support & lease, reception services, safety & protection
	Tangible capital	Direct investment	Own incubation fund
Intangible services	Access to capital	Access to VCs	Milestone instalments
	Process support	Coaching, mentoring, consulting, legal service	Preferred client agreements, start-up training, business planning
	Networking	Employees, customers, suppliers, collaborators	HR firms, networking organisations, VCs, business angels

2.2.2.3 Tangible service

A physical space primarily facilitates incubators, and it is central to the incubator model (Centre for Strategy & Evaluation Services, 2002). Tangible services are provided based on the space, such as shared facilities (Wi-Fi, printer, etc.). Incubators need support related to tangible supportive mechanisms, such as office and laboratory space, administrative staff, and meeting rooms.

A stable, cost-effective basic service provided by incubators will provide entrepreneurs with an enabling environment in the start-up stage. This helps to reduce the costs associated with launching an enterprise. The establishment of incubators provides not only physical innovation spaces for regional innovators but also opportunities for the development of inspirational new ideas. Previous research has gathered evidence that adequate services provided by incubators can potentially enhance the synergy of psychological factors and the psychological capital of entrepreneurs, which can affect the performance of the entrepreneurs in business incubators and subsequently the regional innovation performance (Mavi et al. 2019; Lai & Lin 2015).

2.2.2.4 Intangible service

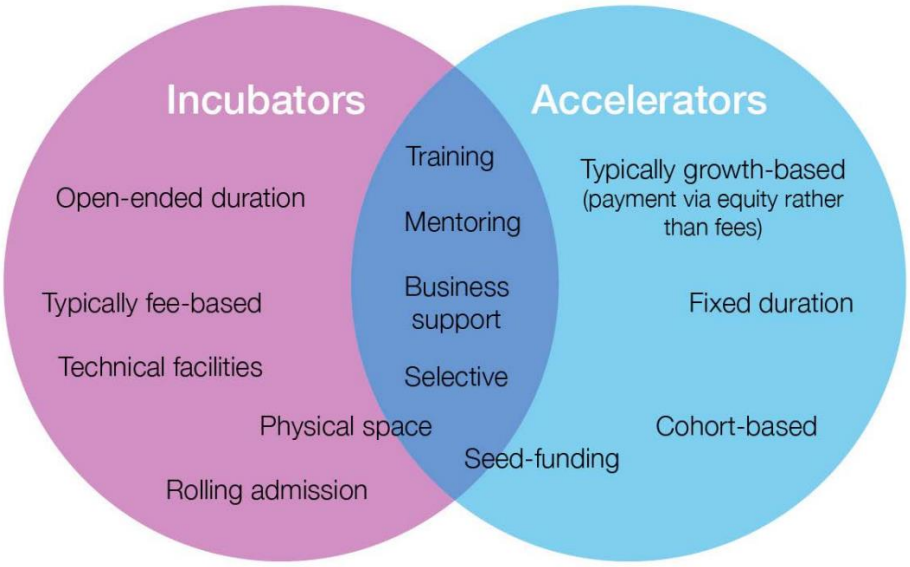
Counselling, training, information, and networking services software should be provided by incubators. For instance, Vanderstraeten and Matthyssens (2012) identified that business incubators could further enhance people's self-confidence and optimism of innovation by building a stable innovation platform and a solid basic service system. Therefore, effective business incubators can actively promote the creation of strong entrepreneurial atmospheres and enhance the innovators and entrepreneurs' psychological capital. Mavi et al. (2019) revealed that 'people who worked in business incubators would continue to improve their entrepreneurial self-efficacy, which had a direct positive impact on the innovation performance for start-up technology companies.'

2.2.2.5 Accelerators

The accelerators help prospective start-ups to develop initial business solutions and define and identify their customer segments. The accelerator also provides resources, including capital and employees (Cohen et al., 2014). Many researchers such as Bone et al. (2019) and Dee et al. (2015) studied the mode of accelerators and found that through a highly selective, cohort-based programme, accelerators help start-ups with prototypes or mature products by providing opportunities for them to match with investors and the markets. Incubators and accelerators share a common goal of supporting start-ups and helping them avoid 'Death Valley'. They provide a range of supportive activities and stakeholders. However, the big distinguishing feature between the two is expressed in their 'respective strategic focus' (Hochberg 2015), where incubators are established to help start-ups survive and grow, and gas pedals, like investment institutions, expect start-ups to grow rapidly and gain

investment returns from them.

Figure 2.2: Compare incubators and accelerators (Bone et al. 2017)



Bone et al. (2017) compared incubators and accelerators in the innovation ecosystem. In their studies, the common functions provided by both incubators and accelerators are mentoring and training courses (or workshops) and business support. Both entities are selective regarding their participants (start-ups). An accelerator differs from an incubator in five main ways: it usually (1) provides seed-funding investments, (2) has a mentorship system, (3) uses a cluster model, (4) has a fixed duration and (5) ends on a roadshow date (Cohen 2013; Hathaway 2016; Hochberg,2016).

2.2.2.6 Co-working spaces (CWS)

Co-working spaces (CWS) not only offer a workplace to freelancers, entrepreneurs, and employees; they also provide office workspaces combined with social spaces (Bilandzic & Foth, 2013). Through this alignment, ‘CWS can facilitate joint work, creativity, knowledge exchanges and work

satisfaction, which ultimately lead to increased innovation and entrepreneurship' (Bouncken et al., 2016; Capdevila, 2015; Moriset, 2013). The services of CWS are: (1) a physical space, (2) business support, (3) membership and (4) networking events. CWS enable the creation of a culture where start-ups can collaborate and become partners (Tripathi & Oivo, 2020). CWS need to fulfil the following criteria: Access to information, access to knowledge, access to key resources, access to social capital, potential collaboration opportunities (Leclercq-Vandelannoitte & Isaac, 2016). Additionally, CWS need to help provide places to perform events and programmes along with the provision of a work location for start-ups to develop business ideas into a prototype and fully-fledged product.

2.2.2.7 Innovation platforms in the agricultural sector

Occasionally, innovation platforms are set up to tackle a specific technological, organisational, or institutional challenge in a value chain or a more generic problem that needs to be addressed across different value chains. Innovation platforms have been set up and used in the food industry to collect different stakeholders and create new collaborations and innovations (Tui et al., 2013). Participants with different backgrounds are connected here with a space to learn, act, and make changes. Different actors and organisations, such as farmers, traders, researchers, processors, and government officials, can build up efficient interactions and solve the research and development (R&D) problems with adequate resources. Innovation platforms have been widely used in agricultural research for development (AR4D) as a programme of open innovation to overcome a range of agricultural challenges (Schut et al., 2019). Open innovation refers to collaborative innovations with external paths and resources to accelerate innovation and expand markets, and it has been widely used in large enterprises to break the closed innovation cycle inside companies

when it comes to technology transfer (Chesbrough 2003, 2006a). This constitutes a solution to create new collaborations and networks between creative technologies and wide markets and thereby offers opportunities for creative customers, companies, and investors (Yun et al., 2015).

Research conducted by Klerkx et al. (2012) on innovation platforms for the agricultural sector supports the viewpoints that innovation platforms could attract and gather all the related companies, communities and organisations that have no prior cooperation experience in exploring the approaches to achieve the goal. Organisation for Economic Co-operation and Development (1999) claimed that the objective of an innovation platform is the development, introduction, and utilisation of knowledge (technological, organisational or institutional) in an economic or social process. There is a variety of literature that describes the supportive physical or virtual facilities and services related to an innovation platform, such as the incubators, accelerators, science parks, co-working spaces, innovation, and entrepreneurship events (Van Fossen et al., 2018).

Relevant offshore innovation platform studies usually focus on specific types, such as overseas incubators. Blackburne and Buckley (2019) discussed the impact of an international business incubator and how it can facilitate British businesses overcoming the entry and expanding their market in China.

2.2.3 Gaps, research questions and OIP conceptual frameworks

This section summarises the different types of typical innovation platforms. Studies (Oakey, 2012; Ratinho & Henriques, 2010; Schwartz, 2009, 2013; Tamasy, 2007; Tavoletti, 2013) have discussed their services, mechanisms and

competitive advantages, and a vast amount of empirical work has shown that innovation platforms do not effectively facilitate the success of start-ups However, existing literature provides three main explanations for this outcome:

1. Start-ups may not use the incubator's resources if they are of insufficient quality. Entrepreneurs may not want to take advice from non-professionals and are unwilling to join networking services if the networking is undeveloped.

2. There is a disparity between the resources provided by incubators and the resources needed by start-ups. Ratinho and Henriques (2010) argue that the incubator's services are too rigid, as they are not tailored to the specific needs of individual start-ups. Likewise, since incubators support mature start-ups that already have a solid resource base, Bruneel et al. (2012) find the incubator's resources to be 'superfluous'. Mature start-ups have no need for incubator-support.

3. Entrepreneurs often have a technological background and little entrepreneurial experience (Rice, 2002; Scillitoe & Chakrabarti, 2010). Such entrepreneurs may not recognise the gaps in the resource base (Oakey, 2003; Vohora et al., 2004) and are unable to recognise the value of the incubator's resources (Patton, 2014).

There are several gaps in the research of such intermediaries as OIPs. Firstly, there is a lack of transaction cost analysis based on activities. However, other possible explanations show inefficiency to originate from high transaction costs. Consequently, start-ups may have recognised an opportunity, but cannot afford the high transaction cost. It is in this area that a research gap exists. When exploring activities in the regional innovation ecosystem, the transaction cost of the activity has not been examined. As a result, it is hard

for an entrepreneur to make a beneficial business decision.

Secondly, the role of IPs has not been well-examined. Collaboration and cooperation between partners have been found that they hold the same significance as the process integration inside the firm (Chen & Paulraj, 2004). However, there is limited research regarding how IPs act as process managers or coordinators' (Katzy et al. 2013) and Batterink et al. (2010) and Pittaway et al. (2004) also identify that 'the impact of IPs on the innovation process remains under-researched'. In response, Lopez-Vega and Vanhaverbeke (2009: 30) formulated the open research question, 'How do companies identify, select and interact with innovation intermediaries?'

In the pre-collaboration phase especially, with the search for and matching of potential partners, there is little research into innovation partnerships. The question of whether an innovation intermediary remains passive with regard to concrete processes or actively engages as a promoter or process manager still remains open and unexplored. Nevertheless, Katzy et al. (2013) questions whether IPs provide only the services to transfer knowledge and technology from one party to the other or if there are individual services for other relevant stakeholders. Although most innovation intermediary activities are explored in the context of open innovation - close to firm entities - OIPs have not been fully examined in terms of regional innovation ecosystems, services, and rationales.

Thirdly, lack of analysis on new actors and new resources.

Discussions concerning the functions of intermediaries are limited. Innovation inside multi-national enterprises will break geographical barriers and cause an

innovation breakthrough internationally. No discussion has explored the cause and effect that a multi-national company could have on a regional innovation ecosystem, as the innovations and benefits are made for the firm. However, a multi-national intermediary company can play a key role in its region, as the services and functions provided by the intermediary are unique due to their new resources and actors. The transaction cost is not the same when compared to local events, the markets or collaboration, as information asymmetry, communication barriers, culture, law, and regulation differences can combine in a way that minimises asymmetric information on the market (Spulber, 1999).

When matching resources, it is insufficient to match with only local investors or set up local networking events. To illustrate, Silicon Valley is rare and unimitated, and the agglomeration effects created by the local relevant stakeholders in Silicon Valley are hard to emulate. Most regional innovation ecosystems do not have such good conditions to nurture innovative entrepreneurs. Thus, it is important to expand the area. If not, introducing a new generation of ideas into the old region could increase the opportunities for innovation holders to match with funding, markets, and partners.

As stated, research on OIP is limited. A study by Li (2009) analyses two different types of international innovation platforms. The first is Inward International Business Development (IIBD), which refers to the motivation of attracting inward foreign direct investment and creating job opportunities where the IIBD platform is running. By contrast, the second is the Outward International Business Development (OIBD) innovation platform, which refers to the incubators or innovation platforms in another form, established by the home country and run abroad in order to encourage outward direct

investment into a foreign country. In this case, OIBD takes the start-ups from the home country abroad, facilitates them there and looks for interest from foreign investors. Unlike those mentioned above, an OIP is an innovation platform established by the home country and run abroad, but it aims to encourage and match the technology, innovation, and entrepreneurship with the resources in the home country, deepening cross-border business and innovation collaborations. The uniqueness of the start-up relies on the new actors and resources provided by an OIP – the actors directed by the home country's connections and the new resources brought by them. The entrepreneurs and other stakeholders in the regional innovation ecosystem may need to find new markets, new funds, and new resources. However, the transaction costs can be higher than a start-up can afford, and they are limited by geographical factors, time limitations and the information asymmetry brought by cross-border culture challenges. The existing literature remains a blank area in the cross-border collaboration between developing countries and developed countries. It also has its unique advantages in this global innovation network to break the growth limit of capitalism by focusing the investment on entrepreneurs and nurturing the cross-functionality and offering more open environment in the national R&D programmes.

Sections 2.3 and 2.4 below discuss the RBV and TCE theories to be adapted to the research and will answer questions 1 and 2:

1. How does the OIP play a role in the regional innovation ecosystem?
2. How does the OIP help high-tech start-ups to grow?

2.3 Transaction cost and how could the theory be adapted into the role of OIP

2.3.1 Transactional cost of entrepreneurship

Entrepreneurs need to sense, seek, and seize business opportunities to survive. Once they have found an opportunity, they must evaluate it and compete with other entrepreneurs to achieve it first. Studies have discussed this process and classified it into three stages: (1) ‘search and discover’ (Kirzner, 1997), (2) ‘evaluate’ (Shane & Eckhardt, 2003) and (3) ‘seize and reap for profits’ from Schumpeter (1911) (Stieglitz & Foss, 2009). Many scholars agree that entrepreneurs work hard in this process, and all stages heavily add up to the transaction cost for an entrepreneur (Denrell, Fang, & Winter, 2002; Nickerson & Zenger, 2004; Foss & Klein, 2005; Teece, 2007; Foss & Foss 2008).

The entrepreneurial environment is seen to be unstable, full of uncertainty and containing high information asymmetry between entrepreneurs, investors, and the resources available to them (Mahto et al., 2018a, 2018b). High-tech entrepreneurs tend to aim for venture capital (VC) with a higher reputation. Reputation in this area consists of two main aspects. Firstly, stakeholder understanding of a company's expertise in the production of the product or service. Secondly, the prominence of the company in the minds of the stakeholders. However, significant inefficiencies in the system have caused multiple redundancies.

In entrepreneurial finance, high environmental uncertainty combined with high information asymmetry between the entrepreneur(s) and investors significantly increase transaction costs involved in financing (Mahto et al., 2018a, 2018b). Transaction costs involved in start-up financing are so high that many entrepreneurial ecosystems have multiple redundant entities competing. This leads to significant inefficiencies in the system (Mahto et al., 2018a). As a result, many investors, especially venture capitalists (VCs), design their own systems and practices to deal with high information asymmetry and uncertainties inherent in the financial entrepreneurial ecosystem (Mahto & Khanin, 2013). To illustrate, most VCs and angel investors only specialise in certain industries. However, some prioritise either entrepreneurs or venture quality in their investment decision (Khanin et al. 2008). Furthermore, entrepreneurs reduce transaction costs by favouring investments from reputable VCs, even when they come with significant cost (Mahto et al., 2018a). Even with prevalent strategies for dealing with high transaction costs, some investors (namely VCs) further refine their strategies by focusing on specific characteristics such as reputation before choosing their entrepreneur or venture (Mahto & Khanin, 2013).

Transaction cost itself is considered before, during and after interaction. This ensures the transaction occurs without loss or fraud between different individuals, companies, and other organisations. However, Organisations could work if they provided lower transaction costs between operation processes, rather than to a series of separate individuals who might have a higher level of distrust. Trust is especially poignant since it plays a role in reducing transaction cost. However, trust is referred to as more of a state than a behaviour or a choice, according to Bhattacharya et al. (1998). Jones & George (1998) and Das & Teng (1998) agree trust can bring about

expectations and confidence However, in the case of 'blind trust,' it increases risks and interdependence (Rousseau et al, 1998). Due to the vulnerability of start-ups, building up reliable and stable trust is vital–and can reduce the transaction cost to a great extent (Steir & Greenwood 1995; Cable & Shane 1997). The work of trust has affected VC behaviour, as many angel funds or investors hold the idea that the decision of whether to invest or not in a certain project relies heavily on the people. Mutual understanding and trust between investors and entrepreneurs do exist, however, and bring benefits even before the deal is made (Sweeting, 1991).

Nevertheless, it is hard to quantify or give consistent recognition to trust in order to further explore its exact impact. This is because there is a limited understanding of the nature and mechanisms that start-ups use to build and maintain a relationship by trust.

When an OIP leads an incubator or accelerator programme, its function could be easier to see with Adner and Kapoor (2010)'s ideas which make it clear that further defining an innovation ecosystem, which consists purely of nodes in supply chain, takes it away from the focal firm and customer (Dodgson et al. 2013). In this thesis, empirical analysis uses transaction cost theory, which discusses real-world transactions (Coase, 1960) to help with the transaction process and to explore the roles played by OIPs using more explicit evidence.

Table 2.6 Transaction Costs in A Commodity Trading Setting (Jaffee 1995:30)

Types of transaction cost	**Source / origin of costs**	**Tangible forms of transaction costs**
Search costs	Lack of knowledge about opportunities (i.e.	Personal/personnel

Types of transaction cost	Source / origin of costs	Tangible forms of transaction costs
	products, prices, demand, supply, trading rights, market outlets)	time; Travel expenses; Communication costs.
Screening costs	Uncertainty about the reliability of potential suppliers/buyers; Uncertainty about the actual quality of goods/services offered	Consulting service fees; Advertising/promotion costs;
Bargaining costs	Conflicting objectives and interests of transacting parties; Uncertainty about willingness of others to trade on certain terms; Uncertainty over transactor rights and obligations	Costs of credit rating checks; Licensing fees; Insurance premiums
Transfer costs	Legal, extra-legal or physical constraints on the movement/transfer of goods	Handling/storage costs; Transport costs; Bribery and corruption expenses
Monitoring costs	Uncertainty about transactor compliance with specified terms; Uncertainty about possible changes in the quality of goods and services	Auditing fees; Product inspection charges; Investments in

Types of transaction cost	Source / origin of costs	Tangible forms of transaction costs
		measurement devices
Enforcement costs	Uncertainty about the level of damages/injury to a transacting party arising from contractual non-compliance problems in exacting penalties through bilateral arrangements or through use of third parties	Arbitration, legal, court fees; Costs to bring social pressures

Since an OIP's job is to nurture innovations and help start-ups, it initially aims to lower the internal transaction cost to benefit high-tech start-ups, save money and time, and help build solid and workable relationships. The section below analyses existing TCE literature, discusses transaction cost in the entrepreneurial process, and adapts it to the framework for empirical analysis.

2.3.2 TCE adapted to OIP functions

2.3.2.1 Transaction costs of entrepreneurship

Compared to large-scale enterprises, start-ups need to obtain production resources through market actions. OIPs change the traditional model of the start-up generation by using organisations to incubate and nurture start-ups in a unified manner. They achieve this using networks and communities to conduct transactions and reduce transaction costs.

For high-tech start-ups, lack of resources is often the first problem that determines the development of a business. OIPs can assist start-ups with

search and negotiation activities by finding and pooling resources, and thus reducing their transaction costs.

A purely market-based relationship is prone to higher transaction costs. This is due to a number of factors such as information asymmetry, limited rationality, and opportunity costs, higher communication costs, negotiation costs, and monitoring costs, if technology-based partnerships are sought. However, an OIP can provide entrepreneurs with internal networks and resources to lower intermediary costs for obtaining market factors, information cost and running cost. The credit system (trust and reputation), relationship (networking and community) can further help high-tech start-ups expand their business, lower the market entry and transaction costs during the period, nurture the innovation and increase the successful rate of business.

2.3.2.2 Transaction costs and cross-border cultures

Many studies have found that the range of culture, values, ideas, and other symbolic systems that shape behaviours can be passed on to future generations (e.g., Triandis, 1994; Hofstede 1994).

Transaction costs come into play before, during, and after interactions between start-ups and relevant stakeholders. This highlights the value of measures taken to ensure the transaction occurs without loss, or cheating between different individuals, companies, and organisations. Organisations often act as intermediaries, facilitating the process yet requiring lower transaction costs than there would be if they were handled by a series of individuals with some level of distrust in each other. Trust itself can play a role in reducing transaction costs. However, trust is more referred to as a state than a behaviour

or choice (e.g., Bhattacharya et al., 1998). It can bring about expectations and confidence (e.g., Jones & George, 1998; Das & Teng, 1998) but can also increase the risks and interdependence if that trust is blind (e.g., Rousseau et al., 1998). Due to the vulnerability of start-ups, building up reliable and stable trust is of vital importance if fledgling businesses are to reduce the costs of their transactions to a great extent.

The relationships between VCs and entrepreneurs are also greatly important for start-ups' success (Steir & Greenwood, 1995; Cable & Shane, 1997). Trust affects the behaviour of VCs, with many angel funds or investors holding the idea that the decision on whether or not to invest in a certain project relies heavily on the people involved. If mutual understanding and trust exist between investors and entrepreneurs, this reaps benefits even before a deal is made (Sweeting, 1991).

However, it is hard to quantify and consistently recognise trust to explore its exact impact on proceedings, and there is limited understanding of the nature and mechanisms that start-ups use to build and maintain relationships by means of trust.

2.4 Resource-based view and dynamic capabilities: adaptation to OIP

A possible explanation of the 'Death Valley' of start-ups in innovation platforms is that entrepreneurs do not take full advantage of the resources provided by platforms. Many empirical studies have shown that incubators do not perform at a satisfactory level in terms of facilitating these successful start-ups to grow acceptably (e.g., Oakey, 2012; Ratinho & Henriques, 2010; Schwartz, 2013; Tamasy, 2007; Tavoletti, 2013). As a result, three main theories can be used to explain this phenomenon: (1) Fewer resources are provided by innovation platforms than the entrepreneurs expect. (2) Those offered by them are inadequate or mismatched to the actual needs of the stage the start-up is at. (3) Entrepreneurs do not have adequate knowledge of the value of the resources provided by the innovation platforms. The resource-based view has been widely used in this research area to explore the reasons behind the Death Valley occurring. This thesis will utilise its terminologies to contribute to the existing explanatory frameworks.

Theories can expand the idea of innovation in relation to technology itself to all other criteria. For example, relationships and networks could contribute to potential future collaborations therefore uncovering more opportunities for commercial activities. By doing so, innovations could be extended to the approaches that lead to breakthroughs in technology itself and new allocation strategies that can be used to achieve competitive advantages.

This above concept was initially proposed by Selznick (1957) and Ansoff (1965) (Karimli, 2013). Competitive advantage refers to when companies have a wider product market or a better competitive position than their rivals (Ou et al., 2015). It also relates to the theories put forward by Porter (1991) and Barney (1991). Porter (1991)'s research has shown that both the outside operating environment and the internal capabilities of a company should be referenced in relation to its competitive advantage. Meanwhile, in terms of Barney's (1991) theories regarding the resource-based view, the uniqueness of competitive advantage is in its inability to be replicated. Thus, it requires the company to focus on three main aspects: resource allocation, core capabilities and unique technology (Hill & Jones, 1995).

The concept and running system of an innovation ecosystem has often been linked to different stakeholders in society, whose interactions could be a vitally important element in nurturing innovation, innovators, and innovation-based commercialisation. This means social capital plays one of the main roles in the aforementioned ecosystem. Consequently, more economics-based perspectives and social network theories could be jointly applied to this innovation framework to contribute to building its basic running mechanisms. More specifically, to build connections with stakeholders on the platform, various approaches to social networks could be employed. As all resources are limited, including potential partnerships that aid technology transfer, entrepreneurs also need to have the competitive advantage to win the chance to forge actual partnerships. Once an actual partnership has been built, a focal value proposition could materialise. With this, multiple stakeholders can interact directly and indirectly.

Table 2.7 Resource needs in an incubator (Van Weele et al. 2017:20)

Resource needs	Incubator support to fulfill resource needs
Physical capital	• Office space • University equipment and library
Financial capital	• Seed capital in exchange for equity • Access to investors
Knowledge	• Provide technological knowledge through proximity to university groups and laboratories • Provide business knowledge through coaching and training
Social capital	• Facilitate the creation of external networks by organizing events, creating partnerships and making introductions • Facilitate the creation of a community through co-location, social events and introductions
Legitimacy	• Association with an established incubator

The theory of dynamic capabilities describes a company's ability to create, allocate and manage its resources from both inside and outside of the business. This was first introduced in 1994 by Teece and Pisano, who further explained its definition as 'the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments' (Teece, Pisano & Shuen, 1997:516). In their study, the barriers to Schumpeter's theory mainly stem from increased awareness of intellectual property protection and difficulties associated with imitation. Schumpeter emphasises the importance of developing new competencies or improving existing technologies to create continued competitive advantages. Subsequently, dynamic capability improved Schumpeter's approach by using organisational theory to focus on the high performance of the operational process inside and outside the company to react quickly to the rapidly changing nature of the business world. It also absorbed elements from the resource-based view of firms.

However, because it focuses more on existing capabilities rather than the capacity of a company to create new competencies (Ambrosini & Bowman, 2009), this model could not fully explain the current dynamic market. Dynamic capability theory is more like a combination of the resource-based

view and resource dependency theory. The latter refers to the exploration since the 1970s of how external resources affect an organisation's behaviours (Pfeffer & Salancik, 2003). Furthermore, Barney (1991) proposed a resource model for sustained competitive advantage. In his theory, a company's ability to recognise its capabilities is one of the key resources. If a company can realise the core capabilities holding by them correctly, they can achieve sustainable competitive benefits by allocating their capabilities with other resources.

Ecosystem research consists of a wide body of network literature linked to management (Kastelle & Steen, 2010). Social network theory is also an approach that explores the relationships of individuals, organisations, and groups in societies. During business activities, actors could also be referred to as nodes. Additionally, weak and strong ties could be further drawn to describe the bigger picture. Since studies on social relations and social structure took place in the 1970s (Aldous et al., 1972; White et al., 1976), research regarding social networks has involved in a range of study areas; from sociology and political science to physics. There are three main basic types of social networks: (1) egocentric, (2) sociocentric and (3) open system (Kadushin, 2012). To explain, an egocentric network is a closed structure that is interconnected with a sign, node or individual, which explores how interaction patterns could affect outcomes at an individual level. In sociocentric networks, network boundaries are closed, and the structure of networks is the main target. Meanwhile, open-system networks are different from the other two. Their boundaries are not clearly defined; thus any value could be created in conjunction with the outside world. There are some typical examples of open-system networks like the elite class in America, connections between companies and organisations and the chain of influencers on a particular

decision. Another example that defines differences between an open-system social network with a closed one may be the variations between Google+ and Facebook (Amerland, 2013). Facebook is a closed social system, where marketing activities could only be engaged in with regard to existing users. However, Google+ could drag outside individuals inside to participate and create new solutions, applications or products. These two examples may be a good case for reflecting the advantages open-system social networks offer.

Nevertheless, a social network only represents one dimension of social capital as it solely explores relationships between separate individuals or norms within organisations and businesses. It could also reflect the trust and the norms of reciprocity that develop during interactional activities inside the network.

Investigations of social capital have been undertaken for a long time by many scholars, such as Bourdieu (1980, 1986), Burt (2017), Coleman (1988), Coleman and Coleman (1990) and Putnam et al. (1994). Lin (2017) gave a clear definition of social capital as being 'the investment in social relations with expected returns.' He further explains social capital in terms of its four main elements: (1) Information, influence, social credentials and reinforcement. 'Information' is the social capital that could facilitate how data flows, lower transactional costs between organisations and individuals and give them useful insights into making better choices. (2) 'Influence,' refers to the social ties that could impact the decision of an organisation's agent regarding an individual's hiring or promotion. (3) 'Social credentials' are related to acknowledged relationships that could be seen as qualifications and certifications for an individual and may even be interpreted as his/her social capital. Hence, an organisation or its agents could assume such an individual

might offer extra added resources that may benefit them due to the social ties the person has beyond his/her own personal value. (4) Reinforcement refers to social capital possibly reinforcing one's identity and strengthening recognition of public acknowledgement that opens up certain resources. These four main elements of social capital give it its unique importance over other kinds of capital, such as its economic or human counterparts. Moreover, the definition of social capital is very closely related to the utilised dynamic capabilities and incurred transactional costs during business collaborations and the technology transfer process. Nevertheless, network of relations represents only one dimension of social capital – the structural dimension. However, social capital could be utilised to reach competitive advantages via its dynamic capabilities (Ou et al. 2015).

2.4.1 Existing literature

Teece and Pisano (1994) defined the terms 'dynamic' and 'capability.' In the case of the former, they highlighted it as 'the shifting character of the environment which refers to the rapid changing market with regard to three main aspects: (1) the timing of entering the market, (2) the rapid improvement of technologies and innovations and (3) the unpredictable future of competition and potential markets.' They also defined capability as 'the key role of strategic management in appropriately adapting, integrating, and re-configuring internal and external organizational skills, resources, and functional competences toward changing environment' (Teece & Pisano, 1994: 537).

However, there are some dissenting voices regarding how a capability should be defined. Dosi et al. (2000) classified capabilities in connection with the

routine of daily work. This has been described as a fairly large-scale unit of analysis; one that has a recognisable purpose expressed in terms of the significant outcome it is supposed to enable. It is also significantly shaped by conscious decision both in its development and deployment. Ambrosini and Bowman (2009) further clarify it as the ability to interact with the existing resources inside the company and to allocate, reconfigure and refresh them in order to create new resources. Meanwhile, Eisenhardt and Martin (2000) define dynamic capabilities as 'the organisational and strategic routines by which the firm achieves new resource configurations as markets emerge, collide, split, evolve and die' (Eisenhardt & Martin, 2000:1107).

As a theoretical framework, dynamic capability is a synthesis of several concepts and disciplines from strategic management: business history, industrial economics, organisational science, and a further expansion of innovation studies. The theory of dynamic capabilities, proposed by Teece and Pisano (1994), tries to explain how a company reacts to capture the most opportunities and maximise its use of resources. In other words, it is a theory based upon competitive advantage and the resource-based view. Additionally, Teece et al. (1997) claim that its roots stem from work by Schumpeter (1934), Penrose (1995), Nelson and Winter (1982) and Prahalad and Hamil (1990). Their research is mainly about the evolutionary theory of economic change (Best, 1990; Best et al., 2000; Nelson and Winter, 1982), the knowledge-based view of the firm (Grant, 1996; Kogut and Zander 1992, 1995; Nonaka, 1994) and the Penrosian theory of the growth of the firm; 'where learning and innovation are central' (Penrose, 1995). Teece et al. (1997) also gave answers to questions relating to what kinds of strategies enterprises could select to capture their value. They summarised and compared four paradigms: (1) attenuating competitive forces, (2) strategic conflict, (3) the resource-based

view and (4) dynamic capabilities. They concluded that the dynamic capabilities perspective focuses on asset accumulation, replicability, and inimitability; processes, positions and paths were also seen to be the three basic elements when analysing this phenomenon (Teece et al. 1997).

In a series of research studies by Teece et al. (1994, 1997, 2007), dynamic capability is not only the approach the firm employs to react and respond to the outside world. It is also the method used to put itself in an appropriate position to shape the environment, communities, and operating conditions. This interaction between the company and the innovation ecosystem has further reinforced the theory of the national innovation system (Freeman 1989), which is where the core of the latter is the former. Nevertheless, the theory of dynamic capability emphasises the fact that firms can do a lot more than play their own role within this system. In relation to this, Teece (2007) states, 'they not only adapt to business ecosystems but also shape them through innovation and collaboration with enterprises, entities, and institutions' (Teece 2007: 319). In this case, the market structure is endogenous and results from learning and innovation. A successful company could occupy the marketplace and impact the whole market structure, which is quite the opposite to Porter's (1980) theory where he claims that the market structure is exogenous, and they should adapt to it. In 2018, Teece further claimed that a dynamic capability could create and capture new value by contributing to the building of ecosystems and correcting business models. However, his research does not explain how dynamic capabilities critically underpin value creation and capture by platform leaders.

Eisenhardt and Martin (2000) contributed to the concept of the aforementioned phenomenon by defining it as the tools that can manipulate resource

configurations to achieve competitive advantage in the long run, which leads to more flexibility in the application of the dynamic capability framework. When facing a rapidly changing market, a dynamic capability could guarantee that a company achieves a new competitive position by creating fresh resources (Eisenhardt and Martin, 2000). Different activities in a firm could also reflect the same aspect of dynamic capabilities. For example, commonalities exist because the given capability needs to deal with specific kinds of challenges (Eisenhardt and Martin, 2000). For instance, after summarising 18 cases, Dougherty (1992) concludes that, for an effective product development process to be enacted, the capability for common customer visits and feedback is vital.

Furthermore, Ancona and Caldwell (1992) found that successful product development requires extensive communication links to be used by the project's team leaders. These common features could be applied to different settings and configurations to create opportunities. Meanwhile, Bareto (2010) claims that dynamic capabilities could also be classified into four categories: abilities, capacities, processes, and routines. Nonetheless, in a rapidly changing environment or organisation, these categories would be quite difficult to define (O'Connor et al. 2008). Winter (2003) tries to distinguish the capabilities on two different levels: dynamic and operational. On an operational level, capabilities relate to the abilities that make the company survive namely, what is necessary to allow it to exist in a state of equilibrium. In this case, the company could make a living as time passes. This is also referred to as 'zero-level capabilities' (Winter, 2003). Based on the definition of the zero-level abilities, higher-level capabilities could be defined as those that are based upon learning that (Augier & Teece, 2006) may change the products, lead to innovations, and facilitate the discovery of new opportunities

(Teece, 2007).

Dynamic capabilities have been used to explore how to utilise employees' behaviour to affect breakthroughs in innovation. In an innovation platform, the related novel idea is irrelevant to the technology itself. Instead, it relates to new ways to efficiently serve the innovation commercialisation process for other companies. Thus, to discuss the micro-foundations of dynamic capabilities in the OIP in relation to the framework, we need to understand innovation as it exists in services. Teece (2007) has defined the dynamic capabilities and the corresponding micro-foundations below in Table 2.8:

Table 2.8: Micro-foundations of dynamic capabilities (Teece, 2007)

Dynamic Capabilities	**Micro-foundations**
Analytical systems (and individual capacities) to learn and to sense, filter, shape and calibrate opportunities.	Processes to direct internal R&D and select new technologies.
	Processes to tap supplier and complementor innovation.
	Processes to tap developments in exogenous science and technology.
	Processes to identify target market segments, changing customers' needs and customer innovation.
Enterprise structures, procedures, designs, and incentives for seizing	Delineating the customer solution and the business model.

opportunities.	Selecting enterprise boundaries to manage complements and 'control' platforms.
	Selecting decision-making protocols.
	Building loyalty and commitment.
Continuous alignment and realignment of specific tangible and intangible assets.	Decentralisation and near decomposability.
	Co-specialisation
	Governance
	Knowledge management

2.4.2 Research gap

There are two main research gaps in existing studies. The first relates to the development of dynamic capabilities being an unknown entity (Bareto. 2010). Such a gap mainly stems from the limited amount of research from a micro-foundational perspective (Abell et al., 2008; Felin & Foss, 2005; 2009). Felin and Foss (2005) claim the missing viewpoints that come from individual perspectives are 'an essential sacrifice when focusing on things on a collective level.' Compared to individual-based explorations, it is more important to study the link between micro and macro levels when investigating the motivations, behaviours and actions of individuals that lead to the development of collective routines and capabilities (Fallon-Byrne, 2013). However, this could only work with large-scale organisations. When an organisation is only made up of a small number of individuals, it is still essential to discuss and summarise systematic operational routines in relation to each person. Most of the existing studies focus on the macro level. This means there is a lack of research into how the development of capabilities with

individual and organisational strategies are linked, which could build dynamic capabilities at the micro level (Barreto, 2010; Kraatz & Zajac, 2001; Priem & Butler 2002). Most studies stay in a static perspective with structural holes to examine the performance of the location of network nodes, lacking attention to the process of incubation resource allocation. They ignore the responsibility of incubators to promote business incubation network and regional economic development at the network level. Prud'homme and Vonzedtwitz (2019) identified that the quality of IP services 'varies widely, and only more sophisticated resource matching services can transfer knowledge and competitiveness to incubation targets and help improve performance through the interaction of network nodes.'

The second gap relates to how the dynamic capabilities of an innovation platform could work in an innovation ecosystem. By addressing future resource creation and continually creating new resources and updating the existing ones, dynamic capability is one of the key elements involved in improving these abilities. Although numerous scholars have focused on dynamic capabilities (Schilke et al., 2018), there are a limited number of studies on the capabilities of firms that orchestrate ecosystems in general (Helfat & Raubitschek, 2018). This lack of knowledge could be covered by exploring how the dynamic capabilities of OIP could affect its level of innovation in terms of services for the innovation ecosystem as a broker. However, there is currently insufficient understanding of the topic to explore the dynamic capabilities in organisational strategies.

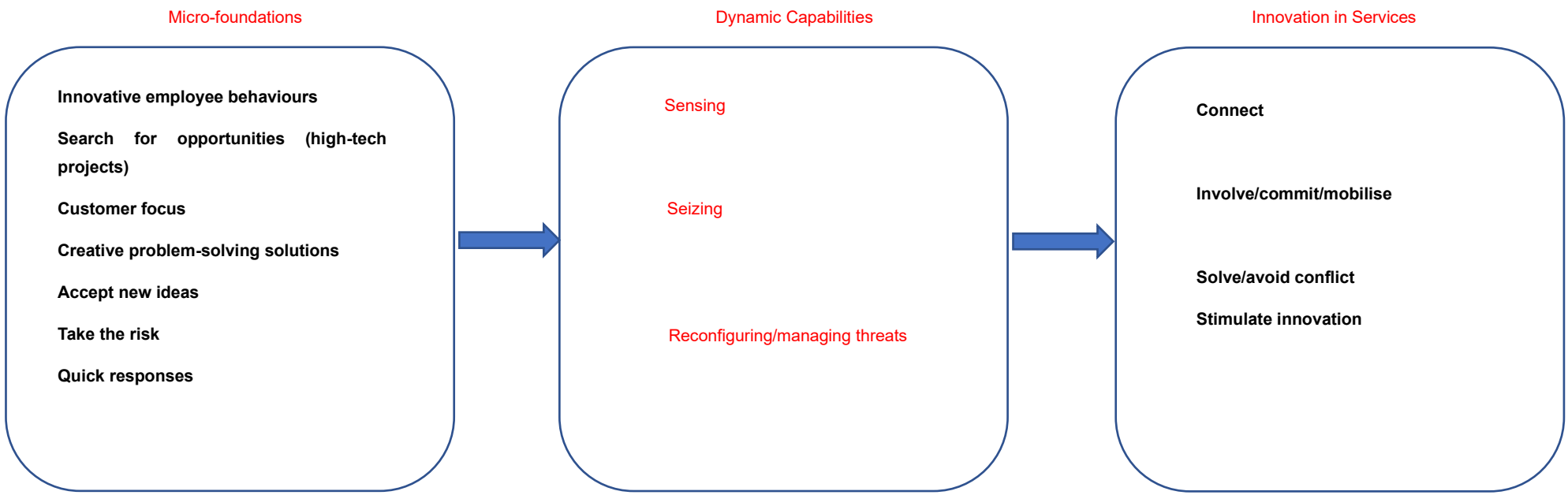
The existing research on dynamic capabilities has gradually moved from macro perspective to micro level (Ambrosini & Bowman, 2009; Helfat et al. 2007; Regnér, 2008). Teece (2007, 2009) defines micro-foundations as 'the

processes and routines that underpin capabilities,' while Eisenhardt et al. (2010) describe them as 'underlying individual-level and group actions that shape strategy, organisation,' and, more broadly, 'dynamic capabilities.' In research relating to dynamic abilities, the micro-foundation has always been used to explore the role of the top management level, focusing on leadership and cognitive knowledge, expertise, and abstraction at the top of the ladder (Eisenhardt et al., 2010; Teece, 2007). There are also academics who concentrate on mid-level managers (Jones, 2006; Mantere, 2008; Whittington, 2006).

2.4.3 Theoretical framework

Acting as an intermediary and broker, OIP only offers services and products that support the regional innovation ecosystem. Because of this, Figure 2.3 (overleaf) is not quite suitable to use as an exact representation. With this in mind, this study's second research question is as follows: How, and in what ways do OIPs help high-tech start-ups to grow?

Figure 2.3: Theoretical Framework (Author's own)



2.5 Intellectual property protection in the home country

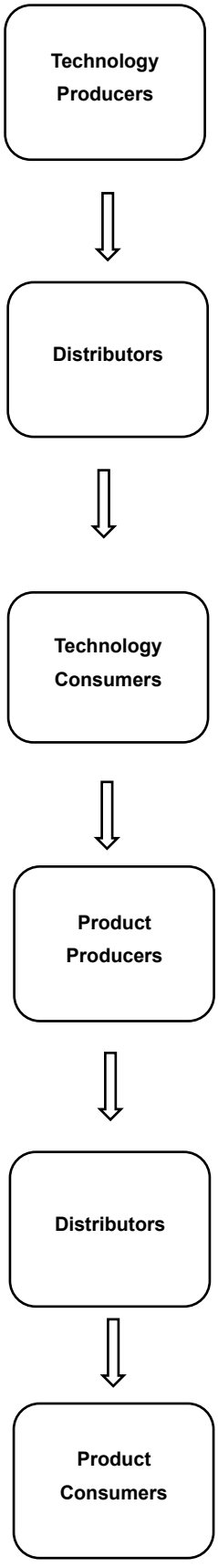
2.5.1 International Technology Transfer

Technology transfer has been playing a vital role in developing countries in boosting economies and upgrading industry for years. This can take many forms, such as commercialisation, investing in adaptive R&D, training, and application (Maskus & Saggi, 2014). This research has used the definition from WIPO, which has described the technology transfer as 'the flow between two or more participants of technological information and its successful integration into production by the recipients' (Maskus & Saggi, 2014). The TRIPs Agreement further promotes activities of technology transfer cross-border. International Technology Transfer (ITT) refers to the process of disseminating technology cross-border, which is an effective tool to increase productivity by importing innovations from abroad (Hoekman et al., 2004). ITT could be achieved in different forms, including FDI, licensing, joint ventures (Maskus, 1998), knowledge spill over, and some direct market ways (Prud'homme, D. et al. 2018). Table 2.9 overleaf has summarized different types of ITT and their forms of achieving the technology transfer. Figure 2.4 has analysed the technology transfer process based on supply chain, summarised different actors on the route.

Table 2.9 Different Types of ITT (Author's own)

Type	Example
Investing in adaptive R&D	Licensing; Support Contract; Direct Foreign Investments
Training and application	
Cooperation between enterprises	Joint venture; Franchising; Turkey agreement; Equipment acquisition; Management Contract; Foreign Company Acquisition
Direct Purchase	Buy-Back Contract; Original Equipment Manufacturer (OEM)

Figure 2.4 Supply chain of ITT (Author's own)



Independent inventors; researchers in universities; state laboratories; private laboratories

Government agencies; inter-governmental institutions and donors; financial sector; technology transfer intermediaries

Private sector manufacturers, government agencies; intellectual property brokers

Private sector manufacturers; value-added retailers

End-users; professional service providers

2.5.2 Intellectual Property Protection

According to the World Intellectual Property Organization (WIPO) in 2008 (Idris, 2008), intellectual property (IP) refers to 'the legal rights of intellectual activity in the industrial, scientific, literary, and artistic fields. It is classified into two main categories: industrial property and copyrights.' This study focuses on industrial IP, which includes patents for inventions, trademarks, and industrial designs. As supported by Wang (2004) intellectual property protection (IPP) plays a key role in giving the patent owner the rights to gain profits in a certain period.

Although some academics argue that IPP might hinder technology transfer in some conditions (Jensen, Johnson & Lundvall 2007), more and more studies have observed that the efficient IPP could accelerate national technology innovation (Gould & Gruben, 1996; Helpman, 1993). For example, Maskus (1998) claims that the IPP is positively related to the technology transfer by reducing licensing costs and increasing technology diffusion. IPP could offer the protection of legal rights to the patent holder in a specific period. Both the personality theory and utilitarian theory (Posner, 2014) claim that such protection is essential and significant and echoes Schumpeter's economic thoughts (1939). Specifically, IPP offers an environment that could guarantee the technology transfer, and in doing so, could nurture innovation and finally bring further economic growth.

Stronger IPP not only encourages the transfer of advanced technologies to less-developed nations but also benefits the growth of developed nations' innovation and technology. The same phenomenon applies on a regional level. For example, strengthening IPP in the southern part of the United States with relatively weak technology has not only increased the total amount of technology transfer from the more technologically advanced north, but also changed the structure of the transfers themselves. Therefore, as demonstrated by Fink et al. (1998), IPP plays a positive role in technology and innovation diffusion when patents are granted in exchange for publication of the patent claims.

2.5.3 Relationship between IPP and ITT

IPP plays a key role in ITT in two aspects. Park & Lippoldt (2014)'s empirical analysis on developing countries claims that the strength and mode of IPP have a significant impact on ITT. Also, Barton (2003) compared the domestic and international industrial structure of two different high-tech intensive sectors (pharmaceutical and agricultural biotechnology sectors) and found that in the high-tech sectors whose needs are not that 'urgent', there would possibly be a weak IPP system. This always slows the pace of ITT. IPP is most likely to be used by existing large firms who could apply for the innovation and afford the cost over a broader market. Thus, large enterprises are likely to consider healthy IPP strictly as one of their standards and a barrier to entry when getting into a new market. In this case, the ITT process would highly rely on IPP and the IP rights could slow down the technological capability of developing countries (Barton, 2003). In countries with weak IPP systems, technology holders may not provide the new generation technology, but an older version to avoid their technology from getting revealed. The 'markets for technology'

could only be set up with a standard and reliable set of IPP (Athreye & Cantwell, 2007).

On the other hand, different voices highlight the weak relationship between IPP and ITT. Braga & Fink (1999)'s study claims a weak link between IP rights and high technology trade, which is a form of technology transfer. This may be due to strong IP protection increasing the cost, while high technology already dominates the market. In other words, it is unnecessary to accumulate additional costs when a high-tech company has already maximised its profit. Another possible explanation is that by providing different IP protection modes, the forms of technology transfer may change. It may cost less by simply international trade (exporting and importing) comparing to FDI, licensing or some other forms.

The role of IPP in technology transfer seems more complicated on a practical level when it comes to China. Increasing significance has been attached to IPP in China since the 1990s. With 9.648 suits filled in 2014, China has become a global leader in the patent litigation area (Love et al. 2015). However, IPP in China is still in its early stages, and has not yet become a mature and complete system to guarantee the legal rights of patent holders. Research such as de Rassenfosse & Raiteri (2020) and Yu (2007) claim that the patent reform in China seems more like a protectionism policy, than one which protects innovation. Barton (2007) and Maskus (2010) suggest that the immature IPP system of one region may lead to high-tech companies being unwilling to transfer technologies to those regions, because of potential infringements. However, weak protection of technologies could benefit the technology-holder in China, in the end. One such example demonstrates the free and wide

use of Windows China in the 1990s. Free copies could be a way to establish its reputation (since the marginal cost is seen as 0), while content providers could benefit from the services and relationships afterwards (Schlachter, 1997). Illegal copies of Microsoft in China were used as patent weapons to win the battle with Linux in the very early stages of the Chinese market. ~~L~~ax IP enforcement in China has successfully brought a massive number of users into Microsoft's ecosystem, which could be seen as a stable and reliable base for its third-party applications and other complementary products (Chesbrough, 2006a).

In addition to the benefits of actual profits and technology upgrading that ITT could bring to China, there is also the additional bonus of promoting its domestic innovation. Dinopoulos and Segerstrom (2010) claim that stronger IPP in the developing countries could offer mass profits and markets. This would finally decrease the global wage gap and increase innovation in industrialised countries. Stronger IPP could also accelerate the technology upgrade of firms. Liegsalz and Wagner (2013) show that patent grants in China, on average, takes less time than other countries, which can be a good foundation for innovation spread.

Other studies working on IPP in China claim government policies were established to increase ITT while decreasing the appropriability of foreign innovations (Grimes & Sun, 2014; Holmes et al., 2015). Such policies have been described as Forced Technology Transfer (FTT) policies in the work of Prud'homme et al. (2018). Mey (2009) also blames loopholes in China's youthful IP laws that can be used by infringers. These national policies could be seen as damaging the IPP system in China. Prud'homme et al. (2018) have

discussed the situation. They state that the foreign party fails to win more favourable judgements based upon the legal merits, in lawsuits in IP (usually related to patents) civil litigation when competing with Chinese companies. However, they used surveys, extensive interviews, and case studies, and therefore lack total global statistics.

Research on FTT is also evidence of from another aspect that reflects the urgent need for improving the IP legal system in China in terms of ITT. However, the current situation of IPP remains controversial. This paper therefore seeks to bridge the gaps in the literature with data analysis. This resultant hypothesis is therefore:

Intellectual Property Rights are positively related to imported technology transfer in China.

3. Research Methodology

3.1 Research Strategy

This thesis aims to contribute to the well-known empirical pattern that previous studies have not yet fully considered. This will be achieved by developing a revised framework based upon existing theories and making suggestions for resolving the outstanding puzzle. The researcher of this study strives to follow the research philosophy of pragmatism and must therefore 'recognise that there are many different ways of interpreting the world and undertaking research, that no single point of view can ever give the entire picture and that there may be multiple realities' (Saunders et al. 2009). The researcher strongly agrees with this nature of pragmatism. Likewise, the researcher believes that reality is consistent and could be influenced by different situations. Similarly, the researcher believes the best research method to be the one that truly answers the research questions. This philosophy should give the researcher a broader view when it comes to selecting and integrating different research methods, which would better serve the study.

This thesis has utilised a qualitative research strategy for the first two research questions. The rationale for using a qualitative approach is based on the emphasis placed on inductive theory and pragmatism ontology. Given that one of the strengths of a qualitative strategy is its application in uncovering 'deeper processes in individuals, teams and organizations and understanding how those processes unfold over time' (Bluhm et al, 2011). A qualitative approach

should enable the thesis to generate empirical-based knowledge. In turn, this should therefore provide an in-depth understanding of the roles of OIP as well as the impact it could have on high-tech entrepreneurs and other relevant stakeholders in its regional innovation ecosystem.

Two main functions and characteristics of OIP contribute to the third research question. Onshore entities go abroad to create opportunities and approaches that will facilitate international collaboration and to create more opportunities for the country; both onshore and offshore. In offshore countries, OIP focuses on innovation collaboration and on nurturing high-tech entrepreneurs. Thus, it is important to explore the causal relationships between the intellectual property protection in the home country and the transfer of imported technology. As China is the home country of the OIP cases selected for the purposes of this thesis, panel data from China from between 2001 and 2013 has been used.

3.2 Research Design

3.2.1 Qualitative research methods

Qualitative methodology has been widely applied within the literature on business incubators. For example, Mian (1997)'s study of University Technology Business Incubator (UTBI) conducted interviews with facility staff, managers, and state and local officials from a business incubator initiative. The interviews were complemented with mail surveys sent out to 87 of UTBI's companies. Rice (2002) collected data using comprehensive surveys and in-depth interviews with open-ended questions of 32 entrepreneurs participating in business incubation programs and 8 business incubation managers. Soetanto and Jack (2013) investigated how incubatees used the internal and external networks of one business incubator based on questionnaire answers from 62 respondents and seven post-survey interviews. Löwegren (2003) applied a case study approach of four NTBFs divided into small and large companies. These case studies were followed by–surveys, which were based on the case studies of 158 companies from 15 Swedish science parks. Ebbers (2013) collected 101 completed questionnaires from four different business incubators in his research on participants of incubators and their networking behaviour.

Since emergence of OIPs in the UK is still at its early stages, panel data is not sufficient when it comes to exploring the current status of OIPs here. There are only a few OIPs running in the UK currently, and qualitative methods will be of great value in the data collection process in this context. Selection as

well as identification of a number of applicable cases for analysis is difficult in any study, however. Thus, the following section recounts the selection process of two cases of OIP with 45 participants. Stakeholders close to these two OIPs have been widely interviewed. Staffs and entrepreneurs were followed and interviewed many times (2-5 times depending on different interviewees and with their suitable time slots) over a 6-month period.

Compared to relevant literature which identifies other studies based on case research, Löwegren (2003) drew on four cases within her dissertation about NTBFs in science parks, based on a selection process of different industries and different company sizes. Conversely, Aaboen (2007) conducted a case study of one business incubator in search of network ties among three business incubation business developers and eight founders of NTBFs using 11 semi-structured interviews. However, Bigliardi et al. (2006) based their study of evaluation of science parks' performance in Italy on four different science parks. And Voisey et al. (2006) examined an individual case study of one business incubation project by interviewing 12 entrepreneurs. Thus, there seems to be no preferred number of cases for the research of relevant innovation platform concepts.

The author has conducted a number of qualitative case studies to explore the first two research questions. Case studies are an important research method in the field of social science, as they are more conducive to breaking away from the constraints of existing literature and experiences compared with other qualitative methods such as experiments and questionnaires. Thus, case studies are 'suitable for use in understanding the perceptions of actors' (Eisenhardt, 1989). This research focuses on how OIPs working in the region

revise the big picture of how the new cross-border participants could change and impact on the regional innovation ecosystem. This is achieved by using semi-structured interviews when interviewing both the staff in OIPs, and the representatives of relevant stakeholders (especially within high-tech start-ups and SMEs). This research further explores the innovation collaboration processes, which involves individual and organisational agents and their interactions in the collaboration process. Using the concept of innovation ecosystem, interactions between a variety of agents, various dimensions of innovation. They range from beyond science and technology, to a variety of economic and institutional conditions, which have been further explored. Furthermore, this research could also make comparative analysis on the selected two OIP cases on their preference when selecting start-ups, ways to collaborate and cooperate, and how they attract stakeholders and hold events to match resources.

As a new stakeholder in the regional innovation ecosystem, OIP is unique. In providing a mixture of services to entrepreneurs, organisations, and governmental institutions, one can argue that it is better to use qualitative data to gain rich and in-depth insights and analyse the roles of OIP when working as an international innovation intermediary in the regional innovation ecosystem. Yin (2015) explains how a case study can work especially well when boundaries between the phenomenon and the context are blurred. When a comprehensive, detailed, and integrated investigation is required, a case study is the most robust research method to choose.

Unlike questionnaires and structured interviews, a semi-structured interview provides in-depth data using open-ended questions, which is suitable for the

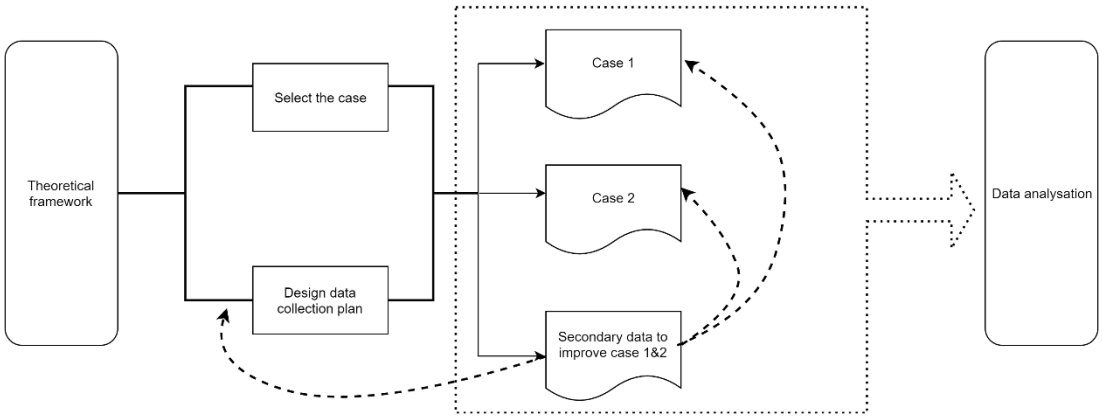
research questions currently being considered. The researcher used semi-structured interviews to collect data from OIP staff (at manager level and above), as well as OIP users (entrepreneurs), and relevant stakeholders in the regional innovation ecosystem. Open-ended questions were applied in a series of questions. The core of the interviews focused on what services/functions an OIP can bring to the users and stakeholders in terms of how it can benefit the group and how the resources of an OIP can be used to help start-ups and other stakeholders. Semi-structured interviews enable the interviewees to explain their answers. This helped the researcher identify important characteristics in the theoretical framework. An OIP offers a variety of resources to all users and stakeholders in the ecosystem. By providing examples, interviewees help clarify which resources are important when they are using services and facilities in the OIP. For example, interviews show what activities are important to them, and how the transaction cost can be reduced when using the OPI's services. Appendix III contains the question series for reference.

This research method may address the recent gap encountered when using the data collected from the employers, which could have led to deficiencies and limitations identified by Macky & Boxall (2007). By exploring the perspectives of employees, this research contributes to existing literature by providing a deep discussion on the internal organisational processes and their relationship with actual outcomes at a micro level.

A joint data-collection method has been used to collect as much data as possible from outside locations: from archives, interviews, questionnaires, and observations (Eisenhardt, 1989). The unstructured observations involved the researcher joining two innovation competitions (run by OIP A), ten accelerator

programme team meetings (run by OIP B), five daily communication meetings (run by OIP B) and twenty staff meetings (OIP A & OIP B). It also observes the activities in the physical spaces. Secondary data has been collected to support the interview content and to adjust the data collection plan (see Figure 3.1 below).

Figure 3.1 Research map (Author's own)



This framework approach has been provided during the data analysation process.

3.2.1.1 Case description

The analyses in this paper are based on data collected from related organisations. Two OIP cases have been selected for in-depth interview:

(1) OIP-A from Greater London.

(2) OIP-B from Northeast England (Northumberland, County Durham, Tyne and Wear and the Tees Valley.)

The two cases were selected using two main types of incubators: (1) incubators

operated by government agency or university and (2) private incubators.

OIP A has the experience of hosting high-tech start-up competition. The final round of the competition each year is held in China. This could be a great chance for British start-ups get further overseas investment or expand business to China. OIP B also offers membership with different levels of service.

On the other hand, OIP B provides hot-desk service and membership for the high-tech start-ups to get involved. A co-funded accelerator programme (supported by Innovate UK) aims to offer the start-ups a certain scale of funds and opportunities to expand its business into Chinese market. This accelerator programme is the first one to successfully implemented across borders.

3.2.1.2 Sample and data collection methods

The data has been collected from two sources: (1) in-depth semi-structured interviews and (2) secondary data including the archival documents.

The in-depth semi-structured interviews were guided by a protocol based on input from three research streams: (i) resource-based view, (ii) regional innovation ecosystem, (iii) dynamic capability.

The key research subject is the Offshore Innovation Platform. All relevant communities will be involved to draw the picture of its local innovation ecosystem. The sample groups include (a) OIPs, (b) users in the selected OIP cases, (c) other relevant stakeholders related to OIP. For reasons of

confidentiality, all participants' names and participating company names are not revealed.

Sample group (a) represents the employees (on and above manager level) from two selected OIPs. Using in-depth semi-structured interviews, the data collected was used to explore the role OIP plays in regional innovation ecosystems from the inside. By interviewing the employees in the management teams on different aspects, this research may be used to explore different sights of OIP roles in the Regional Innovation Ecosystem (RIE), and the capabilities it provides to users.

Sample group (b) represents the high-tech start-ups who benefitted from the two OIPs. Both OIP A and B have experience in successfully achieving international technology transfer, holding pitching events, and helping start-ups find funds. They also provide hot-desking services and membership for high-tech entrepreneurs. The researcher collected interviews from users (members), participants in the co-funding business accelerator scheme, and innovation competition programmes. Due to time limitation, the researcher could not interview all members or participants in the programmes. There were 24 interviewees in sample group (b). Interviews on group (b) can help the reserchers to make analysis on the resources the entrepreneurs actually need and how OIP charateristics contribute to their growing process.

Sample group (c) consists of the investors (individuals and firms), partners (organisations, other innovation platforms, universities and research institutions who have signed the Memorandum of Understanding (MOU) with

the selected OIPs), and other relevant stakeholders in both the regional innovation ecosystem and from networks within the OIP's home country. One unique point, which is also the motivation of OIP, is to bring foreign funds into the UK, or to create international innovation collaboration. Thus, one of the most important sides is to observe the unique resources that could be brought in by OIPs. How does the OIP act during innovation collaboration and which roles do they think OIPs have played in regional innovation ecosystem? Answers to these questions can provide a deep insight on how OIP works and interact with regional stakeholders. A clear picture can be drawn to define the networks, resources and stakeholders OIP brings to the region and how it affects the region.

Participants in sample group (a) (n=14), (b) (n=24), (c) (n=9) were given an invitation and information sheet. They could also ask for more details about the research before accepting the interview. A further consent form followed once they agreed to take part in formal interviews. The researcher made audio recordings if consent was given. In some cases, interviewees refused to be recorded, but agreed to make detailed field notes during the interview process. The ~~r~~researcher followed up to avoid losing data. Sample group (c), some of sample group (b) and most of sample group (a) consisted of Chinese participants. In those cases, the author used Chinese after English to double check during the interview and guarantee the accuracy of the records. All interviews and informal discussions were transcribed into Word documents after they were conducted (Sliverman 2000).

The interview length varied from 20 minutes to more than two hours, depending on the content they were talking about. The researcher did not

follow the question series completely or use the same questions. Some participants gave more details without asking and some were either new in the OIP or used one or two facilities there. The researcher obtained permission to use the secondary data and records to have an overall perspective (see Table 3.1 below).

Table 3.1 Secondary Data Used for Analysis (Author's own)

Data Sources	Data Collected	Analytical Purpose
Secondary Data and Archiving Documents		
Online OIP details, reports and relevant news:		Understand OIP background, management team background, view and aims, reputations, impressions it gives to local business.
Slides used to explain open-source engagement to other stakeholders and gain their support:	5 main slides (OIPA=2, OIPB=3)	Understand the role OIP wants to show on the other stakeholders.
The records of previous incubation programme and competition process:		Understand the process of OIP that runs the programme and how it could have impact on the entrepreneurs and what kinds of effect they want to bring to its regional

Data Sources	Data Collected	Analytical Purpose
		innovation ecosystem
Meeting Minutes:		Understand the routine of OIP, what kinds of service they could offer to the high-tech start-ups and how could it benefit them.
Plan and Agenda:	Listed by weeks/months	Understand the routine of OIP: what kinds of service they could offer to the high-tech start-ups? How could it benefit them? What kinds of activities they plan to do? How could them benefit? What is the actual result? What kinds of reactions they could bring?
Event records, materials, and documents:		

For the data analysis, the researcher has followed the proposed procedure by Eisenhardt (1989) and Zimmermann et al. (2015) to maximize internal and external validity (Lütjen et al., 2019). The first step was to critically review existing literature and gain a basic understanding of the theoretical assumptions. Thus, the author has built up two theoretical frameworks for the first two research questions. The second step adopted open, axial, and selective coding procedures (Strauss & Corbin, 1998) for all the data collected. The researcher synthesised the original data into first and second order coding categories as a result. The next step was to build tables to place both relevant

interview contents and other data as the supporting evidence for the categories. With the existing theory, the author gradually moved the data to higher levels of theoretical abstraction.

3.2.2 Quantitative research methods

The benefit of quantitative research is the ability to make statistically based predictions. Researchers can use statistical tests on their data to generate descriptive quantities and make predictions. Research question 3 was presented to test whether the worries from high-tech start-ups in the offshore country were true. When transferring technology to the developing countries, would the patent right be hold fairly? As an emerging organisation working as an international innovation intermediary, there is limited cases regarding OIP, to be explored. Additionally, single cases are not strong enough to reflect the whole trend for a country. Thus, it is essential to use quantitative research methods to test the relationship between intellectual property protection and international technology transfer in the onshore country (‘home country’).

To control invisible distinctions in these variables among samples, one can include dummies for province and time. As China formally joined the World Trade Organization (WTO) in 2001, time intervals were set from 2001 to 2013 to exclude the years of absence of a binding multilateral agreement signed between China and the other WTO members. The implementation of relevant policies towards WTO would cause differences in FDI and openness, and thus make the discussion less reliable. As Tibet and Hainan provinces lacked IPP data from 2008 and 2009, the research sample excludes the two provinces, and therefore only covers 30 provinces. The final total sample amount is 388. The

researcher has used Generalized Method of Moments（GMM) methods to avoid endogenous problems.

3.3 Research ethics

At all stages of the research process, research ethics were considered. Participants and incubator management actors in the study were all notified of the purpose of the research, as well as how the research would be utilised for the needs of this thesis. To ensure multiple stakeholders participated and contributed to data collection, with their permission, an invitation and information sheet to interview were also sent to the participants' partners.

This research aims to design neutral and non-harmful questions for the research participants. This aim allowed the researcher to avoid potential risks that could be associated with questioning, and also protect interviewees' privacy by signing an agreement before the semi-interviews (Bryman & Bell, 2007). The semi-structured interviews were recorded to avoid any deception or exaggeration, and guarantee honesty and transparency through communication. However, some participants did not agree to be recorded, as they thought that the questions or their answers were sensitive. In these cases, the author used field notes to keep the extent of the data. Full consent was obtained from the participants prior to the study. The study also declared any affiliations in any forms, sources of funding, as well as any possible conflicts of interests (Bryman, 2012).

Interpretation is also worth a mention. As the selected interview groups contained many Chinese people, interpretation was considered. However, since all interviewed Chinese were from sample group (a), (b), and (c), this meant they all had the ability to talk about the question in English. Nevertheless, the author used Chinese after English during the interview to double check during the interview to guarantee the accuracy of the record, and

there was no need to use external approaches to transfer between the languages. The author also follows Poland (1995) to avoid potential threats that can affect the quality of the interview transcript.

3.4 Summary

This chapter explained the methodological approach undertaken in this thesis. First, the rationale for selecting a qualitative research strategy was explained. Second, the research design was discussed including the choice of a multiple case study design, which was influenced by the qualitative research strategy and analysis of prior research approaches that had been utilised in existing literature on the subject. Third, the choice of qualitative research methods utilised was explained. Specifically, this centred around semi-structured interviews; used to explore how incubation process's function, from the perspective of the entrepreneurs. Additionally, the data collection approach was explained in detail, and broken down into each incubation process, as there were slight differences between the three approaches. Next, the data analysis process was highlighted to show how it involved a combination of the 'framework' approach and NVivo. These were seen to both be in line with the agreed methods within the case study-based research approach. Finally, a research ethics section explained that, throughout the research process, participants were treated ethically and were informed on how the research would affect them.

4. Roles of OIP and its Impact on the Regional Innovation Ecosystem

4.1 OIP roles in RIE

Table 4.1 shows the facilities and basic features the two OIP provides to their local RIE.

Table 4.1 Features of OIP (Author's own)

Features / OIP	OIP-A	OIP-B
Investment (directly from OIP)	√	√
Investment (corporate with the other stakeholders)	√	√
Investment (run by other stakeholders)	×	√
Office/Workspace (Basic)	√	√
Workspace (Specialised: laboratories)	×	×
Human capital (training programmes)	√	√
Community	√	√
Networking Events (External)	√	√
Selective	×	×
Fixed duration	×	×

OIPs are with the feature of financial capacity, incubation capacity, basic facilities, and the workplace. Since they are not established for a single industry, they do not provide the laboratories which can only be used with start-ups in specific area.

Table 4.2 Phrase 1 and 2 codes on the roles of OIP (Author's own)

Second order codes	First order codes	Representative quote
Network capacity	Access to local market and clients	- *'... we also look for opportunity to find more customers'* - *'Without it, it is difficult to collaborate.'* - *'...even though attending events is important, the most important thing is still our business development, the marketing and selling the products eventually. Just like the prototype we want to build in Norwich, direct introduction by the people with high reputation is what we want, it will push the process'.*
Network capacity	Access to Overseas market	- *'We wanted to go into the Chinese market for a long time but find it hard to go through.'* - *'The previous cooperation attempt failed, and the cooperation with OIP B is really effective. In March we are going to launch our research centre in Yantai, China. Without OIP B this could not ever happen. OIP B has strong*

Second order codes	First order codes	Representative quote
		network in China, and in the future, we want to bring more offshore energy companies to China and to look for more investment and market opportunities.' *- 'I think it is our connections with China. Our Chinese team can dock us the government visits and venture capitals who want to look for good high-tech start-ups to invest. Some provincial and city level government departments also want to attract good company and talents back to China, and I don't think the local platforms could contact those resources directly.'* *- 'She has participated in three pitching events: OIP B internal network pitching event, Shanghai government visits, Zhenjiang government visit (from Jiangsu). All these activities gave her confidence to start the first step to China.'*
Ability to extend network capacity	Attract new participants	*- 'I live in Teeside, and I am going to rent a seat here. It doesn't mean that I don't go back though, it is valuable for me to be here looking*

Second order codes	First order codes	Representative quote
		for more opportunities as I said, OIP B is really a growing and attractive place.' - *'More big organisations are here collaborating with OIP B and people feel interesting to be here to find more networks.'* - *'More big organisations are here collaborating with OIP B and people feel interesting to be here to find more networks.'* - *'I am applying the UKTI funding together with Yitu. Yitu is a Chinese company registered in the UK and it focuses on the machine learning, which is really close to what we are doing. Using the knowledge, we can assist the company and develop some research projects and upgrade their products, I think it is meaningful. But as I live in Newcastle, we meet in OIP B sometimes.'*

Second order codes	First order codes	Representative quote
Incubation capacity	Benefit from OIP partners	- *'We have the intention to go overseas, and it is OIP B helped us come true. We want to expand our business to Europe, and it is a great opportunity and OIP B have this site here. Using OIP B's network could we start business every place they have a branch, that's really nice.'* - *'I guess ... (BO01) and ... (BO03) have attracted lots of different people to get involved and combined with Eagle lab.'* - *'I am applying the UKTI funding together with Yitu. Yitu is a Chinese company registered in the UK and it focuses on the machine learning, which is really close to what we are doing. Using the knowledge we can assist the company and develop some research projects and upgrade their products, I think it is meaningful. But as I live in Newcastle, we meet in OIP B sometimes.'*
	Bring Chinese resources and networks into the	- *'Introduces the Chinese element to the UK innovation community.'*

Second order codes	First order codes	Representative quote
	region.	- *'Our Chinese team can dock us the government visits and venture capitals who want to look for good high-tech start-ups to invest. Some provincial and city level government departments also want to attract good company and talents back to China, and I don't think the local platforms could contact those resources directly.'* - *'After we participate in the competition, I talked with the Chinese investor and the specialists, and even after the competition we still keep in touch. They really give me a lot of help and continue to introduce me with the big companies.'*
	Build up collaborations with universities and help commercialisation	- *'As a joint venture established by KAM Futures and the University of Huddersfield, ... (startup company of BS06) is mainly engaged in providing intelligent traffic solutions for cities in combination with artificial intelligence. The company's integrated solution platform can quickly analyse the traffic conditions and provide traffic management and diversion solutions through access to the urban traffic management systems, so as to replace*

Second order codes	First order codes	Representative quote
		conventional traffic light time settings and road speed limits. The system has already been on trial in Manchester.' - *'I work in my university incubator programme, the Quantum Technology Enterprise Centre. My university recommended me to join this programme so I come here.'* - *'The Chinese innovation competition in Dalian. I worked for Openlab in Newcastle University, and we have some projects underhand that can be commercialised and put onto the market. And a manager in OIP A has reached me to see if we have the idea of start a business and invited us to the competition organised in Dalian. It sounds interesting so we got prepared. And then we passed the first round and the interview, then travelled to Dalian for the pitching.'* - *'We already invested on the first 3d printed human corneas using the bio-ink in Newcastle University with the help of OIP A. OIP A has*

Second order codes	First order codes	Representative quote
		built up the connections with the research team in Newcastle University already, and they helped with the agreement.'
Ability to extend network capacity	Build up connections with home country	- *'ORE catapult developed their business strategy in China (Clark wants to witness the ceremony 220 million deal and define 15% should be source from UK).'* - *'The previous cooperation attempt failed, and the cooperation with OIP B is really effective. In March we are going to launch our research centre in Yantai, China. Without OIP B this could not ever happen. OIP B has strong network in China, and in the future, we want to bring more offshore energy companies to China and to look for more investment and market opportunities.'* - *'North Star & generator invests in Ignite. Vulnerable funding from EU. OIP B could strengthen the connections with China so that we don't have to rely on EU funding.'*

Second order codes	First order codes	Representative quote
		- *'If we are not in this programme, I will not think about the Chinese market as we are still early at stage. OIP B offered us this opportunity to think about it and it's not bad. And we enjoyed the network, it is a nice community.'* - *'We look for Chinese partners, Chinese market. And we also look for the Korean market now, as we are doing the education and we see both Chinese and Korean markets as our consumer is there. We are a bit of confident with the trip to China.'* - *'After we participate in the competition, I talked with the Chinese investor and the specialists, and even after the competition we still keep in touch. They really give me a lot of help and continue to introduce me with the big companies.'*
Trust and reputation establishment	Elements of trust	- *'Could always find good audience in OIP B'* - *'Feel safe to share thoughts cause no one else is standing on your toes'.* - *'The space is designed good to have meetings.'*

Second order codes	First order codes	Representative quote
		- *'We can use them as referrer when we want to build up the connections during those events, and it gives us confidence.'* - *'We cooperate with them because we share the same culture, it is easy to build up connections and save the cost.'*
	Collaboration between the other IPs	- *'I am a coach and mentor of Randstad Accelerator program and I provide coaching and mentoring to mainly digital entrepreneurs. I have a set up start of Accelerator program is like search camp in the Tees Valley. I'm passionate about the innovation ecosystems and a framework for enterprise and entrepreneurship and I'm keen to involve diverse groups and entrepreneurship.'* - *'The presence of OIP B park here is a focus for things like Newcastle start-ups week run by Lancaster. Founds' Friday which is also one of Paul's and he is a resident here and it's a focus for people to come and attend events. There are Tech user groups to come here and other user groups there are events relating to corporate innovation here.'*

Second order codes	First order codes	Representative quote
		- *'We have participated the FinTech Online Forum held by Northeast England, we want to get some Chinese investment to help develop the FinTech ecosystem in China and seek relevant channels.'* - *'As the ... blockchain centre locates in OIP A and we meet the people there, we can use them as referrer when we want to build up the connections during those events, and it gives us confidence.'*
	Community	- *'We help (OIP B) organising events, and the start-ups, if they know you are Barclays, they will come over and talk to you with a variety of questions. We help the start-ups do the prototype. We hold our own events for AI, Law tech and video workshop'.* - *'Good at building connections and now we have fascinating events hold together with universities and big companies, it is good for the start-ups to participate.'*

Second order codes	First order codes	Representative quote
		- *'Connecting universities, organisations, and big companies together to create more partnerships.'* - *'It is a good community here, more support, more honesty'.*
Incubation capacity	Connect with local universities	- *'We are going to do the education work together with universities, which is good; and the partnerships are fancy.'* - *'OIP A has built up the connections with the research team in Newcastle University already, and they helped with the agreement. Signing the agreement with university in the UK takes a long time, because the university also holds the patent right together with the patent holder who is working in the university. It means that the university wants the share as well. And thus whenever we sign the agreement, we need to go through the related department of the university, and it really takes a long time. But this time we cooperate with OIP A, the experience is nice, it cost only less than three weeks to make the deal. We are quite new in the UK, OIP A offers us a*

Second order codes	First order codes	Representative quote
		good place to locate and introduces us good connections.'
Incubation capacity	Create connections with industry	- *'Seek for some production guidance to prepare an 8-bit CPU kit that is convenient for programmers to learn and understand the working principle of the computer.'* - *'Good at building connections and now we have fascinating events hold together with universities and big companies, it is good for the start-ups to participate.'* - *'Connecting universities, organisations, and big companies together to create more partnerships.'*
Ability to extend network capacity	Create connections with local institutions	- *'Connecting universities, organisations, and big companies together to create more partnerships.'* *... '(BO03) is busy connecting universities, organisations, and big companies together to create more partnerships. We have the AI event every month and we have Newcastle University; we have Google team and sometimes the guests from London will join us as well. We have*

Second order codes	First order codes	Representative quote
		partnership with Barclays, I think this is rare and it has strong meanings.'
Financial capacity	Cooperate funds	*'The programme has created one million funds for start-ups, and we know that … (OIP B) has invested 26 billion pounds in total...'*
Ability to extend financial capacity	Funding from home country networks	*'ORE catapult developed their business strategy in China (Clark wants to witness the ceremony 220 million deal and define 15% should be source from UK).'* *'The competitions and events like that will cover their return tickets, they could have the opportunities to go to China and directly talk with the investors and venture capitals.'*
	Funds from partnerships	*'ORE catapult developed their business strategy in China (Clark wants to witness the ceremony 220 million deal and define 15% should be source from UK).'*
Financial capacity	Self-funds	*'The motivation is to get the fund.'* *'The investment department will bring us some investment targets and other outbound missions which host in our building as well.'*

Second order codes	First order codes	Representative quote
Incubation capacity	Help start-up find partners	*'Gearbuddy has met his new co-founder here in our co-working space. His co-founder was working for IT services and construction services.'* *'By joining the programme, the company has made use of the science park's network and has formed partnerships with investors and universities in China. These connections will be used later when the firm expands globally.'* *'We are going to do the education work together with universities, which is good; and the partnerships are fancy.'*
Incubation capacity	help start-ups find collaboration opportunities with big companies in the industry in the region	*'After we participate in the competition, I talked with the Chinese investor and the specialists, and even after the competition we still keep in touch. They really give me a lot of help and continue to introduce me with the big companies.'* *'They will introduce the possible entrepreneurs directly to us.'*

Second order codes	First order codes	Representative quote
Ability to extend incubation capacity	IP rent the space in OIP	*'Blockchain centre locates in (OIP A).'* *'We have some other tenants from China. The Chinese government or agencies set branches or service centre in our building; it helps them to understand the culture and have direct access to the entrepreneurs better and quicker. We can arrange meetings with them and the high-tech start-ups.'*
Incubation capacity (RIE)	Local services (agents, lawyers, etc)	*'... (OIP B) has provided us the local agents and lawyers; they are quite helpful, and we really appreciate it.'*
Incubation capacity (Onshore)	Networking events in the home country	*'The participants of the funding programme spent two weeks in China and visited our branches in China, we help them set up connections with large companies in Shenzhen, Beijing, and Qingdao.'*
	Networking events with external resources (home country)	*'Wider network in groundsheet in China are extremely important to create arm like a heart in Newcastle.'* *'We help them set up connections with large*

Second order codes	First order codes	Representative quote
		companies in Shenzhen, Beijing and Qingdao.' *'We have been the official partner of London Tech Festival (this year first time outside London, in Shanghai and Shenzhen).'*
	Networking events with local governments	*'We also engage with the events hold together with government department.'*
	Networking events with other local IPs	*'Barclays have their own company events, and there are also events hold by us together for the entrepreneurs. Founders' Friday and start-up week are hold by Paul Lancaster, he founded Campus North and has his own company Plan Digital UK. He is our member and he really helped us a lot. His event has a lot of participants, and by attending his event they get to know more about OIP B, and that is what we want – to expand our impact.'* *'We have our machine learning club: google is based in kings cross, but we could be their representative. (the machine learning club is well built and run every month now, so that*

Second order codes	First order codes	Representative quote
		Openlab or Google does not need to create a platform or build up the connection. We create it for them. Same thing is Catapult.'
	Networking events with stakeholders in the UK but outside the region	*'We have Google team and sometimes the guests from London will join us as well.'* *'We cooperate with both (OIP A and B) looking for suitable companies, and we are not only limited to the two organisations. I look for the suitable companies myself, cooperation with the OIP can save my time. But the process would be quite long, it is uneasy for this kind of investment. We locates in Manchester and now we have a workplace in OIP A which means that we can look for the company in London with more ease. We also hold competition events with OIP B to encourage more innovative start-ups.'*
	Networking platform in OIP - collaboration	*'Eventbrite is a strong tool for people to explore more suitable events. However, the solutions need to be done by people (who holds the networking event), and he is here in (OIP B).'* *'Networking events: last Friday every month. In*

Second order codes	First order codes	Representative quote
		OIP B Newcastle July (1st) 80 members; August (2nd) 88 members.'
Ability to extend incubation capability	New ideas about finding overseas market	*'If we are not in this programme, I will not think about the Chinese market as we are still early at stage.'* *'In the past we have not thought of going to China. Recently we are looking forward to expanding our market to China and also look for the Chinese funds.'*
	Overseas government	*'We have been the official partner of London Tech Festival (this year first time outside London, in Shanghai and Shenzhen).'* *'Our Chinese team can dock us the government visits and venture capitals who want to look for good high-tech start-ups to invest. Some provincial and city level government departments also want to attract good company and talents back to China, and I don't think the local platforms could contact those resources directly.'*

Second order codes	First order codes	Representative quote
Ability to extend the network capacity	Create partnership with local financial institutions	*'We work as the partnership with OIP B and we mainly help them with those events. We are here for the entrepreneurs who has the interests or queries of how they start a business. ... The start-up needs to have a business account in Barclays and run the business less than a year, then it will have 1000 pounds when he applies for it.'* *'I have opened my bank account with Barclays.'*
Ability to extend the network capacity	Create partnership with local research institutions	*'We have our machine learning club: google is based in kings cross, but we could be their representative. (The machine learning club is well built and run every month now) , so that openlab or google does not need to create a platform or build up the connection. We create it for them. Same thing is Catapult.'* *'ORE catapult developed their business strategy in China (Clark wants to witness the ceremony 220 million deal and define 15% should be source from UK).'*

Second order codes	First order codes	Representative quote
Incubation capability	Provide access to the UK networks (for home country) Bridging service	*'When they come here, we are happy to introduce them with the local organisations and enterprises as we aim to help the collaboration between China and the UK, but I think at the beginning the Chinese visitors are more likely to search for someone like us to give assistance. And also we are famous for the name.'* *'If there is no OIP's help, our journey will be extended forever. We just used half day to finish all the registration work to officially registered in the UK. OIP B has provided us the local agents and lawyers; they are quite helpful, and we really appreciate it. We have the intention to go overseas and it is OIP B helped us come true. We want to expand our business to Europe and it is a great opportunity and OIP B have this site here. Using OIP B's network could we start business every place they have a branch, that's really nice.'*
	Selective on members	*'There is one start-up founded by two graduates, and they met the other four people here and want them to get involved and start another new business. However, the cooperation failed due to the low credibility. When things became serious,*

Second order codes	First order codes	Representative quote
		the low-credibility entrepreneur has left our space.'
Incubation capability	Training courses & workshops	*'We help OIP B organising events, and the start-ups, if they know you, they will come over and talk to you with a variety of questions. We help the start-ups do the prototype. We hold our own events for AI, Law tech and video workshop.'* *'We attend like 70% of the whole mentoring workshops, and 4/6 they are useful.'* *'I am very new, very early-staged company and I know nothing about how to do business. I have my unique findings during my PhD and I start a business based on this. I don't know financing, marketing, and a lot of things, and now I understand them a bit.'*
Facility support - RIE	Facilities	*'Events, workshop, perfect location, high security, windows to make it a bright place and benefit communicating, style nicer. More professional.'* *'A lot of our services are free of charge, and that is how we attract the entrepreneurs. Everyone*

Second order codes	First order codes	Representative quote
		could be here around our free desking to work and make friends, that is how the networks built. And one company will move the headquarter to Newcastle because of OIP B and the activities they are doing.' *'Larger community, 24 hr access, good pricing, central location, focused on tech and start-ups.'*
Facility support - RIE	Free hot desking	*'Gives me a place to hotdesking freely.'* *'We have not made profit from this site so far.'* *'We provide free hot-desking in the basement office for all members registered (no fee).'*
Facility support - RIE	Price & Location	*'Close to home, more open atmosphere.'* *'The environment is nice, …'* *'I am here for the location and low rent.'* *'I think (OIP B) is pretty good: they get place better connected, I have more conversations and more introductions. Office space is very good, better than the other two. And the space is designed good to have meetings.'*

There are 9 second-code phrases generated from the interviews and as listed below:

(1) Network capacity; (2) Ability to extend network capacity; (3) Trust and reputation establishment; (4) Financial capacity; (5) Ability to extend financial capacity; (6) Incubation capacity (RIE); (7) Incubation capacity (Onshore); (8) Ability to extend incubation capability; (9) Facility support (RIE).

Looking more closely at '(4) financial capacity', it is possible to see that access to finance is a key component of creating an economic environment in which enterprises can grow and flourish. Evidence shows that financing obstacles affect small businesses twice as much as large ones. Small businesses not only report higher financing obstacles, but they are also more adversely affected by these obstacles. Specifically, Beck et al. (2005) find that financing constraints reduce enterprise growth by six percentage points on average in large firms and by ten percentage points in small firms. The availability of external finance has been positively associated with the number of start-ups, as well as with firms' dynamism and innovation. The size distribution of firms can also be affected by the availability of external finance. For example, financial development aids entry of small firms much more than that of large ones, but small firms usually struggle more to get finance when the environment is weak (World Bank, 2008). Finance capacities of OIP not only integrate external financing channels, but also strengthen the internal synergy of incubating enterprises (Zhao et al., 2017). For instance, Bruneel et al. (2012) and Zhao et al. (2017) note the potential importance of internal synergy for incubating enterprises. With secured financial backing however, incubating enterprises have sufficient capital to acquire advanced technology or hire technical experts specialised in product research and development. This naturally

improves their efficiency in new product development, reduces R&D costs and eventually boosts their regional innovation performance (Bruneel et al, 2012; Wang et al., 2020; Zhao et al., 2017).

Next, it is worth looking more closely at '(7) Incubation Capability.' Incubation capability of OIPs relates to an OIP's capability to provide intangible support mechanisms, such as training programmes, mentoring and incubation communities or networks to facilitate knowledge transfer. The World Bank (2010) argues that training programmes have a visible, immediate impact on enterprises. As a result, participants change their business routines immediately after the training and this leads to improved business performance. The study of The World Bank (2010) assesses the impact of training programmes provided to small enterprise members of two industrial clusters. In terms of business routines, those who participated in the training programmes showed a stronger tendency to adopt new business routines in financial management (bookkeeping), production management (organisation of workshops) and marketing. These results indicate a positive effect of business training on business practices. Furthermore, Garvey and Garrett-Harris (2008) carried out a systematic review of over 100 studies and evaluations of mentoring schemes across a range of industry sectors. They found that mentoring schemes have definite benefits to the enterprise. Benefits include strategic change, facilitation of partnerships, innovation and change, problem solving and better project management. Previous researchers have also highlighted the role of business incubators in developing networks between innovators and incubating businesses. For example, Chesbrough (2000) highlights how even if ~~the~~ business incubator managers cannot directly provide services. However, he states that they can facilitate social networks for research and development (R&D). This type of network is extremely

important for the sharing of information and knowledge. Similarly, Wang et al. (2020) also believe that the business incubator integrates various technology entrepreneurship and innovation resources in the region, serves SMEs and enhances the overall innovation capacity in the region through better knowledge sharing.

The findings of '(2) ability to extend the network capacity,' '(4) financial capacity,' and '(7) incubation capacity' are important. The value an IP can bring to the entrepreneurs is limited if the IP only has similar kinds of resources and markets. The network will extend but will slow down when the same kinds of people accumulate. As a result, the marginal value of each succeeding will drop. New, non-redundant resources and networking nodes are also important, particularly to the entrepreneurs who need the information flow to search, negotiate and monitor (Burt 1992). With resources and networks in the OIP's onshore country, OIPs can continuously induce the new ties across borders. However, such cross-border activities increase transaction costs to some extent and the OIPs can use their dynamic capabilities to help with the process and also help high-tech start-ups grow.

OIP holds more opportunities for high-tech start-ups who go to China to raise awareness about becoming internationalised. The incubator and accelerator programmes are designed differently from the usual incubator and accelerator programmes. With the connection in China, the participants will have the chance to have a visit in China real-time and finish pitching events there. There are also some pitching events and competitions that invite the high-tech start-ups to attend events in China. Most local innovation platforms do not have the budget and the motivation to do so. Similarly, they cannot find the right person

to support the process. The cultural difference and language barrier have stopped most high-tech start-ups from a step further communication or collaboration. Consequently, events held by OIPs aim to help high-tech start-ups learn about the Chinese culture more closely and build up a direct connection between the start-ups and the Chinese investors and Chinese market.

OIP holds free events which can help interaction between innovative entrepreneurs, large high-tech companies, research institutes, investors, and the other stakeholders. These events can create meeting opportunities for the entrepreneurs and help the community building. During the community building and meeting activities, entrepreneurs can get to know the relevant stakeholders and gain their trust.

Technology commercialisation and knowledge transfer are the inner core of OIP. With the aim of international technology commercialisation, a main goal of OIP is to gather a large number of innovative start-ups from different industries. Next, they combine them with attractive benefits, events and workshops, and create interaction through meetups and mating. It gives positive evidence on the research results of Rijnsoever (2020), who has developed an agent-based model on how innovation intermediaries help high-tech start-ups overcome the weak network problems.

Unlike the traditional incubators and accelerators, OIP specialises in bringing in Chinese funds. OIP can use its advantage of the network in China to attract stakeholders in regional innovation ecosystems and expand networks.

4.1.1 Coding design

The following coding phases (listed below) were used to create in-house materials. These import all the personal interview transcripts in order to code the information in the literature:

4.1.1.1 Coding Phase 1: Open coding

Open coding, also known as open logging, is a process of decomposition, validation, comparative conceptualisation, and data categorisation (Corbin & Strauss 2014). In open coding the researcher is required to focus both on consistency within categories and the discovery of new categories and attributes, and a balance needs to be maintained between this consistency and discovery. The level 1 codes were obtained by refining the raw data. 70 codes and 533 reference have been analysed for the functions, services, connections, and activities of OIP. Some of the data and codes from phase 1 are shown in tables 3.2 and 3.3 overleaf:

Table 4.3 Partial data and Phase 1 coding (Author's own)

4.1.1.2 Coding Phase 2: Axial coding

The collected data has been analysed with NVivo software for more transparent and visible results (Crowley et al., 2002).

Axial coding, also known as associative registration, is the process of further analysing and comparing the many different classes, types and deep relationships that have formed during the open coding. Special attention is paid to the correlations between the various genera, and the categorisation is adjusted so that the genera are organically linked together to form the main genera.

Table 4.4: Partial data, Phrase 1 and Phrase 2 coding (Author's own)

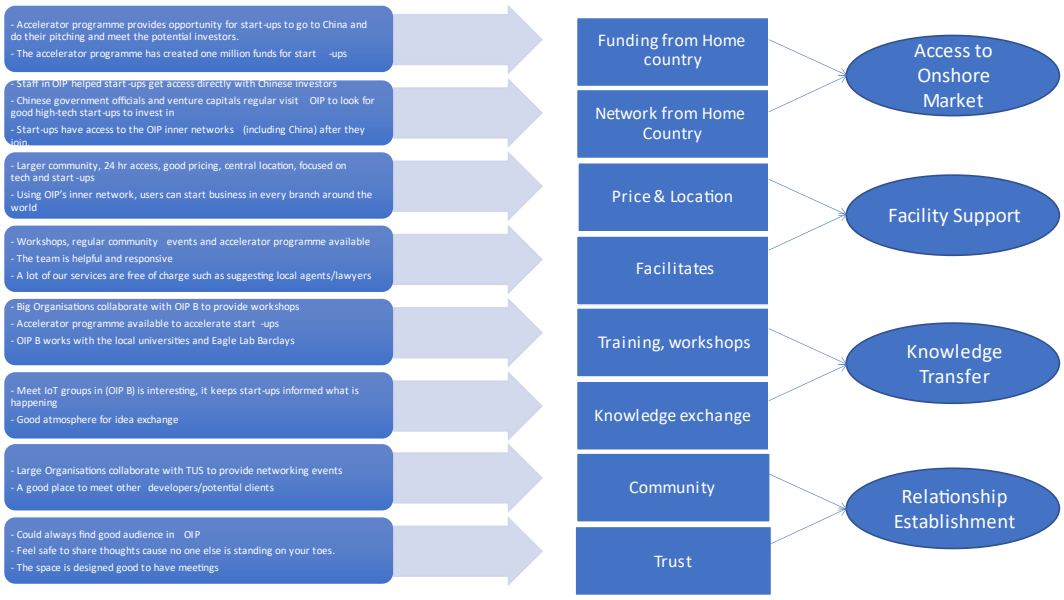
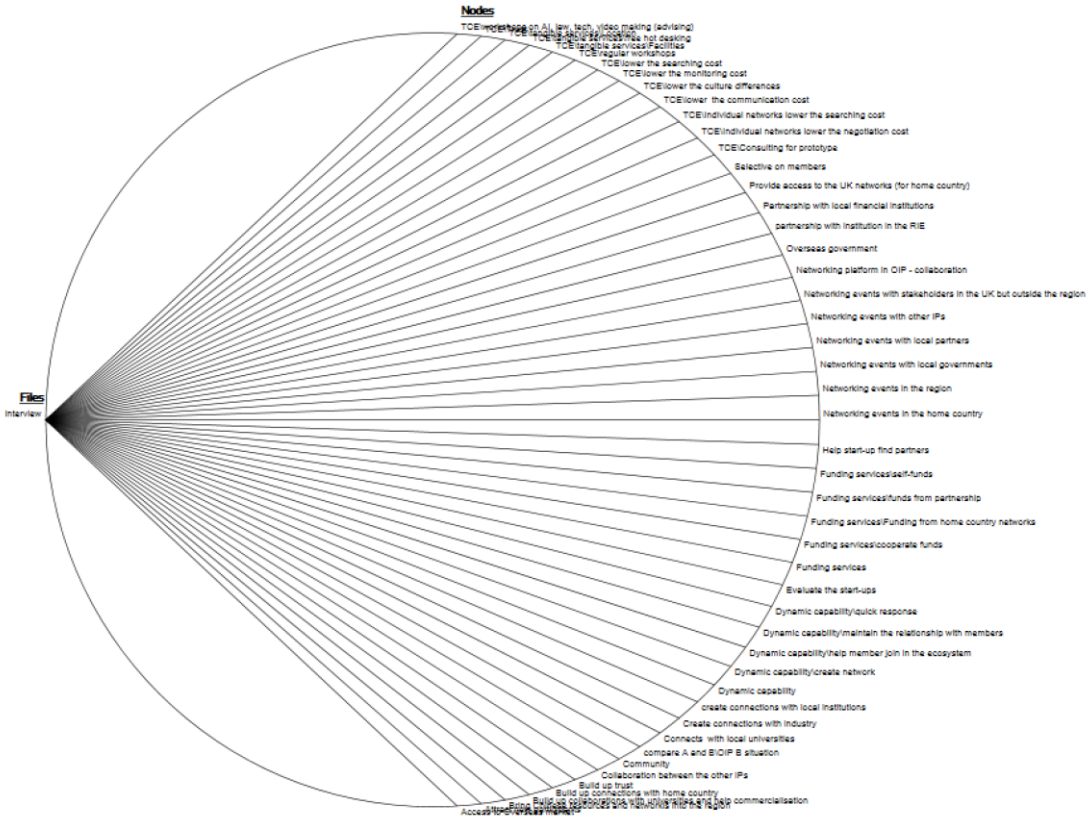


Figure 3.2 Coding connection map (Author's own)



4.2 Comparative Analysis of OIP A and OIP B

4.2.1 Main activities

By reviewing the data from (a) interviews from staff in OIP A and (b) data collected from internal documents, event records, news and eventbrite.com, the researcher has summarised the main activities in OIP A and B. The researcher found there to be ten main activities provided by both OIP A and B:

Activity 1: Serving as a co-working space

Activity 2: Holding networking events on different topics

Activity 3: Conference organiser for different industries (as service)

Activity 4: Providing the space for other incubators

Activity 5: Organising innovation and entrepreneurship competitions (between China and the UK)

Activity 6: Building up formal partnerships with universities

Activity 7: Organising visits for Chinese investors and venture capitalists

Activity 8: Organising visits for the Chinese government

Activity 9: Organising visits for universities and research institutions in China

Activity 10: Provide membership benefits.

All the main activities aim to build a bridge between investors and high-tech start-ups. The main activities also seek to help other stakeholders by serving as an intermediary as it fits the definition of the term, as justified by Howells

(2006): ‘an organisation or body that acts as an agent or broker in any aspect of the innovation process between two or more parties.’

The usual co-working spaces have three main types of tenants: individuals, small groups, and large groups. Individuals are mostly freelancers or those who run a business alone. For them, the co-working space is like a large, quiet café with a strong sense of community. Small groups usually constitute early-stage entrepreneurs, while large groups are usually companies of up to 30 or 50 people. Co-working spaces rely on the stable large groups and see them as a stable revenue outcome. OIP offers a competitive low rent for the users and focus on the individuals and large groups. However, it does not rely on the large groups to bring them profits. In OIP-B, there is no large company located in the space, and there is even one company which is moving out because it is growing, so there is with not enough working place. In OIP-A, most of the tenants are individuals or small groups, but there is one special case. OIP-A has offered free rent for a company to create a Fintech hub for the whole floor.

With the aim of searching and transferring innovation, OIPs focus more on the potentials, they are willing to take the risks and cooperate with start-ups at the very early stage. Both OIP-A and OIP-B choose to open free desking services to attract start-ups go to the place and join in the community. By lowering the operation cost, OIP has the opportunity of getting more contacts of innovation. The management teams of both OIP sites have mentioned about the free service they offer as below:

‘A lot of our services are free of charge, and that is how we attract the entrepreneurs. Everyone could be here around our free desking to work and make friends, that is how the network built.’ – AO03

'…we also provide the free space for the incubator programmes to hold here. You can only pay a small fee to become our member then you can enjoy our network.' – BO06

4.2.2 Case in OIP-A

OIP-A does not focus on the implementation process as there are no activities that involve this. Instead, OIP-A has been doing a lot to support other organisations' innovation efforts and has been solution hunting to foster better technology transfer and innovation commercialisation. It does more than the other innovation intermediaries due to its unique competitive advantage. Its competitive advantage is that it can bring more links from overseas compared to the other local innovation intermediaries. All the events and visits aim to deepen understanding between different stakeholders and offer them a new vision. OIP-A gives Chinese investors an opportunity to access information and identify technology gaps. One interesting thing is that OIP-A also provides service for the Chinese government's visits. A staff member in the marketing department reports:

'We could always get the job as to help Chinese visitors from local government to arrange meetings and visit some other incubators, accelerators and universities. The local governments also want to set up their overseas offices here in the UK and our building is always an option'. – AO01

OIP-A can thus support institutional change as it can facilitate and lobby for policy innovation. It can also contribute to the regional innovation ecosystem by promoting the region to Chinese local governments. The researcher has used second-order coding (See figure 4.4 below) to summarise these activities into OIP-A. This further expands the regional innovation ecosystem by

absorbing new participants in communities and thus triggering more collaboration opportunities.

Figure 4.4 Functional Services and Relevant Cases (Source: The Author)

Functional Services OIP A Can Offer	Cases
S1: Integrating information flows	One main job of the investment department of OIP-A is to search and update the existing project database, look for potential high-tech projects, integrate the information and then provide it to the Chinese investors and venture capitalists. The other job is to list the existing funding projects and provide them to the members of OIP-A.
S2: Inducing investors	Managerial level and above individuals (directors) in OIP-A help to induce investors from China to create new opportunities for investment.
S3: Building up communities and providing general social networking	Communities built up by OIP-A vary in different industrial clusters and memberships. These communities aim to create extra connections between different individuals, organisations, and business entities.
S4: International patent protection services	The IP department in OIP-A can provide consulting services relating to IP regulations, brands, trademarks, and company registration in China.
S5: Consultancy and recommendations (for pitching)	The investment department of OIP-A also works to collect the data for pitching events, relevant investors and venture capitalists and their

	interested investing sectors. It can recommend appropriate projects and build up connections between companies and investors, which can benefit the pitching process and reduce search costs.
S6: Creating international functional funding	The directors of OIP-A have created several international functional funding sources which help search for investment opportunities in the UK. The international functional funding projects have support from local universities and other research institutions in the UK.
S7: Pushing (promoting) the city of London	OIP-A continues to expand the influence of London. As the capital city of the UK, London is widely known among Chinese investors, though many of them are still hesitant to choose this region for their investments because of various unknowns. OIP-A can solve this problem by providing a physical space and direct communication without language barriers. This can also greatly reduce screening costs.
S8: Bilateral, political business information exchange	OIP-A helps the exchange of other information for both investors and companies so both can make better decisions.

These functions of OIP-A can support the development of regional innovation ecosystems in four ways: (1) facilitation of information flows in multiple directions (2) providing guidance for research, policy, and investment

priorities for cross-border transactions, (3) providing the Chinese market information and (4) creating momentum for change.

The China–UK Innovation and Entrepreneurship Competition has created opportunities for Chinese investors and start-ups. In this process, the stakeholders can be defined clearly, and it is more like a 'closed' ecosystem. To illustrate, OIP-A used two or three employees (usually from the investment IP departments) to set up a specialised group focused on the competition event. They first needed to use existing external resources to send invitation tickets to the guest speakers and referees. The guest speakers and referees were mainly professional people from universities or entrepreneurs with prominent reputations. Then, the OIP-A team used social media to expand its influence and call for more participants. This is essential because a small voice cannot attract high-quality start-ups. In previous competitions, there have been phenomena where many of the start-ups that registered for the competition actually had nothing to do with high-tech. These start-ups may have started a business in international trading, but without a new business model. Even though these kinds of participants would not be considered according to the competition's purpose, they would still increase the search costs for OIP-A. This is because OIP-A must review all companies who registered for the competition. Next, all the participants who obtain the qualifications participate in 1–3 rounds to pitch their company overview and business plan.

Judges in all three rounds include investors, industry and domain experts, innovation specialists, professionals from universities and successful entrepreneurs from both the UK and China. They also provide presentations for the entrepreneurs on innovation policies, funding, and the Chinese

entrepreneurship ecosystem. The participation expenses of the entrepreneurs are covered by joint funds, and the entrepreneurs have many chances to show their projects, innovations, and business plans at investment roadshows and to project matchmaking to interested investors. All finalists also receive numerous advantages. These are: significant publicity, introductions to investment organisations in the UK and China and free consultations on market development, IP protection in China, regulations and laws and related information on the procedures of project landing in China from the partners of the competition. In this case, the participants (especially the finalists) benefit from this competition programme through the reduction of search costs, screening costs, bargaining costs, monitoring costs and enforcement costs. The stakeholders in the whole programme are limited and it is easy to study them using Adner (2017)'s theory. Adner's (2017) theory involves the concept of ecosystem as structure. Unlike the case of Michelin's PAX run-flat tyre innovation, this competition programme focuses on the innovation commercialisation process, in particular the new business model and investment model. Participants who do not fail and quit the programme receive the chance to stay and establish partnerships with the Chinese investors. However, a similar problem relates to when the value proposition changes from the shifting ecosystem structure. This relates to how the innovator will create the impetus for the other indirect actors. During the innovation competition process, there are lots of possibilities, as the high-tech start-ups are presenting themselves. The stakeholders who participate in running this programme be interested in creating collaboration opportunities in business or technology areas, which could lead to changes in roles and positions.

4.2.3 Case in OIP-B

OIP-B has developed an accelerator programme that it runs with a local incubation enterprise. This project sought and received support from the UK government, and the accelerator programme was established even before the official operation date. It is important to mention that the local incubation enterprise is not located in the same region as OIP-B. One of the interviewees (the director of OIP-B) explained; 'We search for experienced groups to set up a stable cooperation by which we could get professional assistance. We don't see it as a one-time thing; instead, we want to make the accelerator programme a long-term regular project. The beginning is quite important.'

By identifying the challenges, OIP-B initiated a process of demand articulation. It thus contributes to the regional innovation ecosystem by inducing professionals who can support its development. The main activities of OIP-B focus on two things: (a) offering access to specialised knowledge in a variety of forms such as workshops, conferences, events, and free consultations and (b) improving the existing network in the region and adding more value to it by expanding its range and deepening the work that is generated. To achieve this, OIP-B creates connections between stakeholders from China and the UK, including North-East Regional Development Agency, the city council, Tech Nation, Innovate UK, Durham University, Newcastle University, Sunderland University, Northumbria University, Chinese universities and research institutions and Chinese local governments in Yantai, Shenzhen, Shanghai and Beijing. OIP-B also helps high-tech companies in the UK to 'land' in China and carry out capacity building. The researcher has used second-order coding to summarise OIP-B's activities as follows: (1) demand articulation, (2) inclusive and participatory action, (3) institutional support, (4)

network brokering, (5) knowledge brokering, (6) innovation commercialisation brokering and (7) capacity building. Even though the manner of performance is quite different from OIP-A, the results of the activities remain the same, which also supports the research of Kilelu et al. (2011).

Figure 4.5 Functional Service of OIP-B (Source: The author)

Functional Service OIP-B could offer	**Cases**
S1: Facilitate information flows (in multiple directions)	OIP-B helps relevant stakeholders by encouraging information exchange and spreading information effectively through its networks. The co-working space is more like a communication hub where local stakeholders gather together, which could accelerate the transfer of information and benefit entrepreneurs.
S2: Induce investments	OIP-B has its own investment plan. By setting up physical space in the UK OIP-B could conquer the barriers of distance, cross-border communication, and information asymmetry. The investment team could make better decisions based on direct relationships, which could reduce screening and monitoring costs.
S3: Help bridge communities and initiate networking activities	The community partnerships in Northeast England have become stable: the community programs have run for years, and community members are passionate about helping local entrepreneurs. Providing physical space for

Functional Service OIP-B could offer	Cases
	relevant stakeholders will deepen these connections. It will also create great opportunities for the entrepreneurs who use OIP-B as a co-working space, saving them time by allowing them to communicate directly with the communities and services they are seeking. For example, one of the legal service agencies will work in OIP-B every Wednesday, and the entrepreneurs could benefit from free consultancy. The specialists and experts who run other incubators also work in OIP-B, and the entrepreneurs could consult with them about the situations they are facing.
S4: Build entrepreneurial skills	OIP-B holds many workshops and invites expert speakers to give access to specialised knowledge regarding marketing, branding and other essential business skills. OIP-B also gives presentations to help entrepreneurs understand its venture capitalist business model, the use of WeChat and Chinese culture. All members of OIP-B can now use WeChat to communicate.
S5: Develop policy (for the Chinese side)	OIP-B could offer policymakers a vivid example by establishing OIP in the UK, which could trigger policies to encourage more commercial

Functional Service OIP-B could offer	Cases
	activities like this.
S6: Create functional international funding	OIP-B could create functional international funding on its own to invest in high-tech companies.
S7: Mobilise resources	OIP-B has already caused cluster agglomeration in Northeast England with its physical space. Universities, research institutions, financial ventures, agencies, and communities all use the space to communicate. With this opportunity to brainstorm, entrepreneurs could generate more ideas and even change their business structures by establishing new business partnerships there.

The accelerator programme launched by OIP-B included a group of entrepreneurs (nine start-ups) on the Internet of Things (IoT) sector. OIP-B invested £50,000 in each start-up and provided them with two months of mentoring workshops and one month of 'show time' in three cities in China (Beijing, Shanghai, and Shenzhen). The director of OIP-B described the accelerator programme as follows: 'It is a really good opportunity for those start-ups, and I feel great honour to help the companies to get the funding or grow up and learn from this project. It is a quite meaningful programme. We select the nine start-ups from 800 companies. It was a really hard job but quite worthy to do so.'

The first step in creating the accelerator programme was to find appropriate

partners who had experience running successful accelerator programmes. The second step was to apply for support from the British Council to generate funding to run the programme. The funding provided by the Council could not cover all of the costs. However, OIP-B viewed it as more than just funding. instead, to some extent, a sign of the British government's approval. OIP-B hoped this would help boost the project's reputation, as it was the company's first accelerator programme, and the first time OIP-B's investors were investing in a project in the UK. The third step was to find participants. They used all available channels: Facebook and Twitter, emails to known incubators and other organisations, and word-of-mouth recommendations.

The accelerator programme did not focus on start-ups in the region but instead expanded the horizon to the whole of Europe. This made the final pool quite large – more than a hundred start-ups signed up for the programme. The director then spent several days selecting the projects which qualified. In the end, nine groups were selected as the final participants. Interestingly, none of the participants were from Northeast England. However, programme participants spent two months in Northeast England, which could also be seen as an approach to promote the region. In fact, two of the start-ups stayed in the area after the programme.

The mentoring workshops focused on financial support, business plans, pitching skills and Chinese culture. The workshops' guest speakers were invited through existing channels and volunteered to help. OIP-B created a platform for Chinese investors and the nine groups to meet each other in China and strengthen their connections over a period of a month. Travel costs were covered by the joint programme (OIP and UKTI), which lowers the operation

cost for the start-ups as well. This programme is beneficial to the participants among different aspects: the participants benefited from reduced search and screening costs; the information asymmetry has been lowered; the transaction cost caused by cultural identity has been reduced and the networks has be broadened.

As the participants did not need to be invested in or start a business in China, all of them decided to take the investment from OIP-B and focus on their original markets at this time. These results are entirely different to the case of OIP-A. This is mainly due to the different technology readiness levels (TRL) achieved by those high-tech entrepreneurs. TRL was initially developed by NASA as a method for estimating the maturity of a technology (NASA 2019). ~~A~~ Technology at TRL 4 means it has just passed component and/or breadboard validation in a laboratory environment. TRL 7 means that the technology has matured such that a prototype has demonstrated successful performance in the operational environment. OIP-A holds an innovation and entrepreneurship competition in which most of the participants have only a business plan and most of the technologies are at TRL 4 or above. The companies participating in OIP-B's accelerator programme had already reached TRL 7, and most of them had already begun selling their products on the market. The director of OIP-B explained; 'They are quite busy. Most of them need to focus on their business and the communication with their customers while participating in the programme. They really have no time to spare on the Chinese market. They only have one or two employees; some only run by themselves. That is the reason they visited China and were impressed but did not stay. The current market already took up all their time. But what we hope to gain is their future performance and collaborations.'

There are three main differences between OIP-A and OIP-B:

1. They operate different strategies for getting in touch with the high-tech projects:

Both OIP-A and OIP-B aim to explore the potential investment opportunities for high-tech commercialisation projects. OIP-A uses four main approaches: (a) China-UK innovation and entrepreneurship competition; (b) collaboration with universities to search the high-tech projects; (c) daily work for the investment department; and (d) participation in other high-tech entrepreneurship events to build up new relationships. There are some successful cases. With the first approach, every year there are three or more high-tech projects which win the competition prize and established partnerships with Chinese investors. There have also been two successful cases of collaboration with universities. Figure 4.6 has compared the approaches two OIPs have used to attract high-tech projects.

Figure 4.6 Different Approaches for High-tech Projects (Source: The Author)

	Approach	**Advantages**	**Disadvantages**
OIP-A	Innovation and Entrepreneurship Competition	Focus. Participants are willing to expand into the Chinese market. Easier for participants to do the preliminary work.	Limited. Each competition could attract 30-40 high-tech entrepreneurs. Most technological innovation is not mature enough for the market.

	Approach	Advantages	Disadvantages
		Participants have fewer concerns about IPPs in China.	The industrial sector of the innovation projects has limited options.
	Collaboration with universities	Focus. Reduces screening and bargaining cost, as the universities' selections could imply a degree of approval.	The Process can be quite slow. Most universities hold part of the researchers' existing IP. Complicated to sign up for the IP commercialisation. Negotiation process is slow because it must go through the university office.
	Daily work of research and investigation	Expanded database. Could save on future search costs.	Not reliable. Searching and screening costs are relatively high inside OIP-A.
	Attend relevant events and build new relationships	Focus. Almost all the events have specific topics and include guest speakers.	Hard to follow-up. Usually takes a long time.

	Approach	Advantages	Disadvantages
		Easy to get in touch with the interested project partners.	
OIP-B	Accelerator programme	Focuses on IoT area, including health care, robotics, electronics, and advanced engineering.	Limited number of participants. Only nine companies joined the programme.
	Recommendation by others	Participants have applied for accelerator programmes based upon recommendations by others. Two companies have become final participants in the programme.	Few disadvantages. May face risk of 'trust' during collaborations.
	Membership	OIP-B has flexible membership registration. All entrepreneurs could register for 'free-desking', meaning that they could use space in specific areas with time limitations; another two tenants used 'hot-desking and 'fixed-desking', which could be used 24/7.	The information exchanged may be limited. Takes time to review all the projects.

	Approach	Advantages	Disadvantages
		Registered people then could become members of OIP-B, meaning they could attend all workshop events hosted by OIP-B. Exchange of information on slack (mobile app). Can explore potential partnerships in the working spaces.	
	Community events	Events organised or hosted by OIP-B could attract many participants. A community in Northeast England aims to provide a regular home for new, existing, and potential business start-up founders, who will than join the members of the wider business community to share knowledge and support each other. Start-up weekly events have attracted more than 600 people	The participants come from different industrial sectors, so it is difficult to collect information. Basic Information is collected from an event holder questionnaire, but it is too general. Events are mainly for entrepreneurs have not yet started their businesses, so the

	Approach	Advantages	Disadvantages
		to join, while their regular events could have more than 70 people per month.	database contains only very basic information.
	Collaboration with research institutions and universities.	OIP-B runs a joint project with a research institution to attract more high-tech start-ups in specific industrial sectors. The research institution uses its reputation and impact to spread their voice and call for more companies to join.	

2. They maintain different services:

OIP-A has both an investment department and an IP department to collect and integrate information for stakeholders from multiple sources (such as investors, entrepreneurs, and the other organisations). OIP-B does not provide these services. This difference could be due to two main reasons: (a) different regional innovation ecosystems; and (b) different business models. The second reason will be discussed in chapter 5.

3. A more 'volunteer' environment in OIP-B exists:

'Building up an innovation ecosystem is more like voluntary work… Most of the services are free, and there are a lot of people happy to work for it. By doing so, we could contribute to our ecosystem.…Most of the entrepreneurs intend to have "free" services to save the money. For example, when we run our accelerator programmes, the speakers did not charge us. We would pay

for the transportation fees for them but that is all. That's how an innovation ecosystem works. Most of the speakers were entrepreneurs before, and they know their problems, and they are glad to help.' – AO03

In London, the situation is quite different. For instance, OIP-B can offer free, weekly legal services with the assistance of the other organisation, while OIP-A must hire an IP manager on its own. It appears that the regional, innovative ecosystem of OIP-B is highly connected compared to OIP-A. OIP-B offers space for the other stakeholders, so that the other stakeholders can provide their services to entrepreneurs for free; by clustering, there is an agglomeration effect.

Both OIPs have already completed start-up programmes to help them enter the Chinese market, but the results were different. In OIP-A's competition programme, the winners obtained the required investment from China to start their business venture. After that, they focused on the Chinese market and securing investors to help them locate market opportunities. OIP-A did not engage in an investment process or become one of the investors. Rather, they tended to work more like a broker in such programmes.

In OIP-B's accelerator programme, the participants received financial assistance from OIP-B with one of two options: (a) they took the funding as liability and then paid it back with interest; or (b) they took the money and OIP-B became the shareholder according to the market value. With this financial assistance, companies can also locate markets elsewhere if they do not want to start the business in China at that time. They may also look for

other investors or venture capitalists, which could give them more choices.

An interesting finding is that those OIPs are not in competition with each other, but rather tend to act more like collaboration relationships. The reasons might be due to the following factors:

1. The OIPs are not located in the same region, so there might be great distance between the two. Thus, the collaborative activities could save on travel costs.
2. Even though London and Northeast England look quite different and are far from each other from a British viewpoint, it is almost like co-locating for Chinese investors and venture capitalists; a three-hour trip by train does not make any difference to the potential investors.
3. OIP-A runs the innovation competition every year, and they need more channels to spread their voice.

As a new participant in the local innovation ecosystem, OIPs are required to make a structural transition to its local ecosystem. However, this impact has a correlation with the fulfilment condition of the ecosystem. In Northeast England, this transition is significant. Compared to conditions there, the newcomer in London has the same degree of impact because the regional innovation ecosystem has already been active and has matured.

The engagement of an OIP leads to a structural change in the regional innovation ecosystem. Most start-ups and small and medium-sized enterprises (SMEs) do not select the Chinese market as their first choice. The incubator

programme run by OIP-A focuses on high-tech start-ups to enter the Chinese market, which requires a strong motivation of the start-up itself.

Besides the incubation programme, there are significant motivating factors for start-ups who locate in the OIP. Advantages include rent, location, and further funds for its development in the UK market and factors since the previous incubator may have shut down. However, whatever the motivations that high-tech start-ups have behind the scenes, an OIP still maintains a key role for making an impact on a regional innovation ecosystem when it is engaged as a brand-new stakeholder. Due to an OIP's unique resources, it could change the current regional innovation ecosystem by attracting relevant agencies to explore more collaboration opportunities.

On the other hand, regardless of the reasons for high-tech start-ups choosing an OIP as their workplace, there are also interactions between start-ups inside an OIP. These can begin a process of quantitative change. Even if the high-tech start-up does not enter the building for the purpose of China-UK collaboration, with the influence of the building trust, collaboration opportunities still exist, which can eventually lead to qualitative changes. The impact of these changes can be clearly seen in both the incubation programmes of OIP-A, and the high-tech start-ups competition events of OIP-A (such as the Entrepreneurship Competition and the Dot FORGE programme.) Trust has been created and has increased dramatically, which is the result of Chinese investment in British high-tech start-ups. The process of this quantitative change to produce a qualitative change is rapid.

In terms of structural impact, Northeast England has undoubtedly gained a creative boost. There are only a few local incubators in Northeast England, and OIPs take up a considerable portion. With Greater London being the inherent centre of innovation, the overall impact that could be brought by an OIP is relatively weak. As a new stakeholder, however, OIPs in London make British technology companies consider more possibilities between China and the UK when seeking cooperation.

Another interesting phenomenon with both OIP-A and OIP-B is the flow of human capital between entrepreneurs. SMEs and large companies do find appropriate talents via the events held by OIPs. Sometimes, the entrepreneurs themselves join the other enterprises or research institutes. For instance, a high-tech entrepreneur recently joined a research institution in OIP-A. For those entrepreneurs, experiences are quite different. This is because a start-up at its early stage does not require many staff members. Some entrepreneurs, however, find their partners at the co-working spaces provided by OIPs.

The community manager in OIP-A demonstrates two typical cases. One is an unsuccessful case, where two female entrepreneurs (also high-tech patent holders) met a male entrepreneur who had design skills, thus they planned to collaborate. The plan failed as one entrepreneur was accused of being a ‘liar’ who did not finish the work as promised. He thus lost the others’ trust and quit the business.

The other case is a successful case, with all entrepreneurs collaborating without conflict. The community manager in OIP-A states:

‘I feel the environment of our co-working space has created a trustworthy atmosphere, so entrepreneurs here are more open to each other. They always chat and encourage each other. In this case, more ideas and thoughts could be put up just like you go brainstorm anytime if you want. I also think that could be the reason why the three entrepreneurs failed to work together. This atmosphere creates too much trust. People may trust too much on those entrepreneurs without knowing each other.’

Similar collaborations happened with OIP-B. They use the entire building to provide co-working space for start-ups. Many of these assist each other when a business case needs help. For example, online video-making start-ups always assist the other start-ups to do the online show whenever it is needed.

5. Dynamic Capabilities of Offshore Innovation Platform

5.1 Dynamic capabilities in technology transfer process

This section presents details of how OIP helps high-tech start-ups to grow either by providing international collaborations, or international technology transfer with adequate capabilities and resources. Based on interviews, efforts were made to determine the role of offshore innovation platforms in ITT. Several roles were found and were listed in the table below:

Table 5.1 Roles of OIP in technology transfer process (Author's own)

1st Order Codes	2nd Order Codes	Theoretical Categories
Promote cooperation with Universities	Build University and Industry Connection	Technology Identification
Parnership with companies		
Central location, Good Interior Design	Hot Spot for technology	
Low rent, 24 access		
Good atomosphere		
Value added services		
Provide Physical space for relationship building	Relationship Building	Trust Establishment
Organising events and workshops to promote relationshipt building		
Tech industry insider identity	Trust Building	
Sharing of tehcnology and industry information		
Accommodate investor visit		
Help start-up understand Chinese Market		
Acting as an intermediate to recommend professional services	Technology verification support	Tehcnology Transfer
Provide own opion about the technology		
Accelator programme to help UK start-ups enter Chinese market	Technology adoption support	
Provide funding to incease success rate of technology commercialisation		
Small funding need mitigate investor risk		

5.1.1 Technology Identification

International technology transfer starts with identifying the technology venture and its counterparts. Sourcing an 'appropriate' technology overseas is often plagued with different barriers. Lack of information is the first barrier for ITT. The information for technology ventures in the host country is not widely available. In order to gain the information, technology investors usually need to go through agents or visit the host country. This implies substantial transportation or agency cost. Even though technology investors may manage to get in touch with the technology ventures in which they intend to invest, they may also face latency in information and communication. This

constitutes the second barrier.

Technology investment is different from product purchases, and investors often require a longer time to make an investment decision. To make a wise investment decision, they spend a longer time and more effort gathering information about the technology. Investors need to constantly update their information, especially when a technology is in the development stage. In reality, technology ventures might communicate with several technology investors at the same time, which implies that technology investors might need to compete with each other for the technology. 'Investors being located close to research centres or in places where technology ventures are available may have more advantages' (Castelli & Castellani 2013). Since investors have less information and communication latency, being located close to research centres helps them make investment decisions faster. For instance, a technology investor from China might come to the UK to source the technology for international transfer. Given that there is little information available, they will spend the time to understand the technology market they want to invest in and find the target technology ventures. They then approach the target technology ventures and leave their contact information before returning to China. They keep in contact with the technology ventures from overseas, though other local investors may have already invested in these ventures. Long geographical distance implies substantial transportation and communication costs, either in the process of negotiation or in the ex-post coordination between the technology venture and technology investors (Portes & Rey, 2005).

OIPs can potentially help technology investors to overcome the

aforementioned ITT barriers. First, OIPs tend to have a better knowledge of the state of technology and its possible marketability (Lockett et al. 2003). In addition, as host country technology industry insiders, OIPs maintain closer ties with technology ventures than outsiders (Lockett & Wright 2005), and these abilities are enabled by the organisational, financial and human resources available in OIPs. Organisational resources relate to the OIPs' operating objectives. OIPs are innovation platforms backed by a private equity firm in its home country. One of the objectives of OIP operation is to provide its parent company with a better source of investment. Rather than making a profit from the physical operation, the OIP parent company is more interested in finding a valuable investment via this platform. Given that the parent company can make a profit or reduce risk by co-investing or earning agency fees by providing investment information, they are also willing to share information with other technology investors from their home country. Financial resources relate to OIP ability to provide services via capital investment, and OIPs tend to have abundant financial resources as they are backed by their parent company.

'We have not made a profit from this site so far.' – Interviewee AO02

'OIP greatly reduced our cost of communications and cost of travel during the acquisition process.' – Interviewee AB01

Given the organisational and financial resources available, OIPs tend to portray themselves as an 'attractive place for technology ventures' to gain knowledge of the state of the technology and possible marketability. OIPs attract technology providers by providing excellent basic services, such as great location, office size, interior design or added services (e.g. providing a

gym). From the interview answers, it was discovered that OIPs tend to have a large basement and a central location near the investment company. This allows them to put in the effort to create a nice environment for work with new services. The two OIPs investigated in this study were found to be large, and both OIP-A and B turn out to be one of the biggest physical spaces in their regional innovation ecosystems. They are also situated in the heart of its city and located near investment companies.

'We moved from Campus North. OIP is better for the location.' – Interviewee BS04

'I have been to Campus North, but this place (OIP) is the best, the location is really good. It does not really have any disadvantage.' – Interviewee BS10

'The location is close to the train station with universities. Entrepreneurs want to attend many meetings to find opportunities, so the location here (OIP) is perfect for the entrepreneurs. And it is close to the train station, so it is quite easy to go elsewhere if you want to go to York or Teesside.' – Interviewee BS18

OIPs also tend to invest in interior design to provide a good environment for working, and excellent added services. Local innovation centres may only offer standard services, such as meeting rooms and event space rental. However, OIPs offer some newly added services that local innovation centres might not. For instance, OIP-B cooperated with Barclays bank to offer in-house banking services for entrepreneurs to open their bank accounts within the innovation platform. Likewise, OIP-A is the first innovation platform to

offer an in-house gym and the second innovation centre to offer an in-house café (Google campus was the first). Even workspace giant *WeWork* had not provided these services.

‘Events, workshop, perfect location, high security, windows to make it a bright place and benefit communicating, style nicer. More professional.’ – Interviewee BA04

‘Chinese company, great modern interior, good number of meeting rooms on each floor. Building interior is under construction as of 2017. Each floor has about 4 meeting rooms, locker room, break-out area, and varied offices (6–12 people). Gym, coworking hot-desks, shower rooms, meeting rooms and cafe in the basement. Less than four mins walk from Liverpool Street station.’ – Interviewee AS04

‘Great facilities provided and good working atmosphere.’ – Interviewee AS10

‘Barclays here can help the entrepreneur to open a bank account. I have opened a business account here with their help, and I don’t need to go to the branch.’ – Interviewee BA06

‘Attended a gym class here, really enjoyable but the changing facilities are something to be desired.’ – Interviewee AS04

‘A coworking environment with an in-house coffee shop (Biscuitea) that is open to the wider public.’ – Interviewee AS05

Aside from seizing technology ventures, OIPs also actively seek technology ventures by building connections with universities and industries. Universities and industries are places where new technologies emerge. By building a connection with these, OIPs can gain access to the latest technology venture. OIPs build connections with universities and industries in several ways. For example, both OIPs investigated were found to have set up the designated personnel responsible for building these connections. The responsible personnel will actively seek to build the connection by inviting universities and industry talents to participate in events and workshops hosted by the OIPs.

‘When we first expanded to UK, we have little knowledge about the UK’s tech industry, and it is hard for us to get in touch with tech start-ups. It was through the introduction of OIP A, we managed to get in touch with the cornea 3D printing start-ups based in Newcastle and invest in them. OIP A helped us build connection with UK universities and helped us invest in cutting-edge technology.’ – Interviewee AB02

‘A lot of our services are free of charge, and that is how we attract the entrepreneurs. Everyone could be here around our free desking to work and make friends, that is how the network is built.’ – Interviewee BO01

5.1.2 Trust Establishment

Establishing trust between the technology venture and technology investors is

considered by interviewees to be an important stage in ITT. Establishing trust starts with relationship building, and a successful knowledge transfer often happens between people with strong ties or membership in groups as per Davison et al. (2013).

In an international technology transfer context, overcoming the language and geographical barriers is the key to building a quality relationship. However, besides language and geographical barriers, information asymmetry is considered the main obstacle that investors encounter when investing abroad according to Gelos & Wei (2005) and Javorcik et al. (2011). From the technology investor's perspective, they face a great risk in technology investment given the limited information and communications available. Likewise, they also have little to no information about their counterparts or the resources they can gain by collaborating with their counterparts and by entering the counterparts' market. Cultural factors are potential sources of information asymmetry in cross-border investments (Sarkissian & Schill, 2004; Siegel et al. 2011). An M&A deal, especially a successful one, demands sufficient information on the target country's work ethics, tastes, and beliefs. Halkos and Tzeremes (2011) and Chen et al. (2018) demonstrated that cultural conflicts increase the integration costs and agency costs required to manage foreign subsidiaries. Guiso et al. (2013) also found that frequent cultural flows promote cooperation among employees from different countries and enhance synergy gains. The success of establishing trust can be inferred by the extent of information asymmetry generated by cultural distance.

OIPs were found to provide a new way for establishing trust which is achieved through relationship building and trust-building. First, OIPs provide a physical

space where technology ventures and technology investors can meet with each other. Both OIPs we investigated were found to be equipped with a large event space and also have a dedicated event team to organise various events and workshops. The topics of the events are across various industries (such as MedTech, AI and Robotic, IoT, and Fintech) and are usually co-hosted with universities or leading institutions or companies in their respective industries. Most events and workshops are not only open to OIP tenants, but also the wider public, such as university innovators, industry innovators and investors. Apart from workshops, networking events are also regularly organised to promote relationship establishment.

'Events, workshop, perfect location, high security, windows to make it a bright place and benefit communicating, style nicer. More professional.' – Interviewee BA04

'We work as the partnership with OIP B, and we mainly help them with those events. We are here for the entrepreneurs who has the interests or queries of how they start a business.' – Interviewee BA06

Aside from providing a physical space for the technology provider and its counterparts to establish a relationship, OIP staff also actively connect the technology provider with its counterparts. Start-up competitions were held to provide an opportunity for investors to get to know start-ups, but also for start-ups to raise funding from investors. OIPs also accommodate visits from investors and invite certain start-ups based on the investors' needs. They also follow-up pitch events (with the presence of translators) are regularly held to

provide more opportunities for relationship establishment. In essence, OIPs created a community where the technology provider and its counterparts can meet with each other and make it much easier to establish relationships.

'My job title is community manager, but I am a multi-tasker taking care of almost every aspect of OIP B. I work mainly for the community building to build up our network and maintain the membership. I need to deal with our partners here in Newcastle, to introduce our members to the investors and visitors and to organise events and workshops - not hold by OIP only' – Interviewee BO01

OIPs were also found to play an important role in building trust between technology ventures and technology investors. First, OIPs' 'multiracial' identity (physical presence in the UK and parent company in China) reduced the cultural distance between technology ventures and technology investors. OIPs' physical presence in the UK's tech industry gives the impression to Chinese investors that OIPs are insiders in the UK's tech industry. OIPs also have a specific investment, or personnel department set up to constantly translate and pass the latest information about the tech industry to Chinese investors, which strengthens this impression. Having a physical presence in the UK and being able to transfer information in Chinese, the OIPs can enter the trust circle. On the other hand, OIPs also actively provide information or support to UK entrepreneurs. In addition, workshops are held regularly to provide information about the Chinese market, and advice was given on how to enter the market. OIP employees also provide direct support to help UK entrepreneurs to understand and enter the Chinese market (translation, setting up communication software, etc.) Furthermore, OIPs collaborate with Chinese

local governments or Chinese investors to provide UK entrepreneurs with free business tours to China. These tours give entrepreneurs a chance to visit the Chinese market and meet with the investors, which help establish trust.

'Before I move in OIP B, most of time I was working in home. Now I can get pitching practices, meet investors, talk to other members, give more suggestions to each other, made a lot of progress—not sure because of OIP B or myself. I could always find good audience in OIP B and get access to government funding (from innovate UK).' – Interviewee BS17

5.1.3 Technology transfer

After trust is established, ITT enters the contract signing and enforcement stage. Two main obstacles in this stage are: information asymmetry and contract enforcement (Gelos & Wei, 2005; Javorcik et al., 2011). It is well-documented that the international transfer of technology through arm's length contracts can be subjected to an information asymmetry (Caves, 1982). Specifically, the owner of the technology knows its true value or type, while potential buyers do not. Under asymmetric information, a licensee will be reluctant to undertake specific investment in the technology without some assurance of its profitability (Teece, 1986). Therefore, technology transfer will usually need to undergo due diligence and a legal process to be completed. In particular, for international technology transfer, the process might be even more complicated given the different laws and regulations in different countries. Language barriers and lack of information about the UK market may also make the due diligence harder to be carried out. Even if the due diligence and legal process can be completed, investors may also face risks or difficulties in adopting the technology in their own market. There is the risk

that technology commercialised in the UK market might not be able to be commercialised in the Chinese market. Similarly, the technology might still be in the early stage, and it is therefore not known whether it can be commercialised. OIPs can potentially overcome these barriers by providing technology verification support and technology absorption support. OIPs have good connections with professionals specialising in due diligence and legal solutions for international technology transfer. For instance, the investigated OIPs have close collaborations with intellectual property protection and transfer experts both in the UK and in China. Based on different intellectual properties, they will recommend the respective professionals to the technology provider and its Chinese counterparts. Besides acting as an intermediate to recommend professional services, OIPs also share information or their views about the respective technology, industry, and counterpart as a reference in the ITT process.

‘OIP B attracts a lot of start-ups with latest technologies, especially those with the intention for international cooperation. We like to source our investment object from OIP A because it knows these start-ups well and maintain a long-term and trustful relationship with them. We also choose to set up our office in OIP A and being part of the ecosystem.’ – Interviewee BA03

Technology investment is considered risky given that a technology commercialised in the UK market might not be commercialised well in the Chinese market. Alternatively, the technology may still be in the early stage and may not be able to be commercialised in the end. As mentioned above, technology absorption support provided by OIPs can mitigate these risks. OIPs

can provide company formation expertise for technology ventures (evaluating markets, writing business plans, raising funds, etc.) (Chugh, 2004). Additionally, OIPs can help the technology venture to manage the spin-off process and develop business skills (Caldera & Debande, 2010; O'Shea et al., 2005; Van Looy et al., 2011; Vinig & Van Rijsbergen, 2010).

In addition, accelerator programmes provided by OIPs are a form of technology absorption support. These accelerator programmes provide training and advice to start-ups with an aim to help them successfully launch in the Chinese market. This increases the chance of success for the technology to be commercialised in China. The programme also provides a certain amount of funding to start-ups in exchange for a small portion of the share. The funding is usually sufficient for start-ups to continue their technology development and commercialisation process. The programme allows the investors to make a 'pre-payment' to secure the technology and reduce their losses in the case that the technology cannot be commercialised. Moreover, the funding provided in the accelerator programme is usually provided by two to three investors, which further diversifies the risk.

'… (start-up company of BS04) is a good case. They are from Sri Lanka and holding exceptional talent visa. Their company is registered in Newcastle. The company has been accepted onto our … accelerator programme, and by joining the programme, they get £55,000 of investment through the scheme (loan or could be transferred into shares).' – Interviewee BO01

'I have met Investor from … (Investor Group) who want to invest on my company because he is very interested about the inner idea of what I do – to

encourage different culture communication. I didn't accept his investment though, because I don't really need it at this moment, organising those events doesn't really cost that much. But later if I need more investment, I will consider about it.' – Interviewee BS18

5.2 Dynamic capabilities in networking activities

To sense, seize and reconfigure the opportunities are key part in OIP's external environments. Based in different culture layer, staff in OIPs need to be aware of and act upon collaboration opportunities, expand the local network for further matching and pitching events and also contribute to the regional innovation ecosystem.

Table 5.2 Dynamic capabilities of OIP in networking activities

Second order codes	First order codes	Representative quote
Sensing, seizing, and reconfiguring	Help member join in the ecosystem	- *'I came back to Newcastle, and they keep in touch with me and introduce me with some companies based in the UK to see if we can be corporate with, as now they know what I am doing, what I am holding, they introduced me with the suitable companies.'*
Seizing capability	Maintain the relationship with members	- *'Community building. To build up our network and maintain the membership. I need to deal with our partners here in Newcastle; to introduce our members to the investors and visitors, to organise events and workshops - not only from OIP. We rent our big room for the other high-tech and entrepreneur related events, and We they come over I will assist with them as well.'*

		- 'OIP-B has helped a large number of young entrepreneurs who may be the first time to start their own business. We have more than 60 companies registered here (8 months after sending out the form) and we have more than 20 companies on-site.' *- 'First, we organise events for our customers. Second, we send community e-mail to all the registered community people. The community e-mail includes our timetable for the week, all the events there. They could select interesting events to join. We also put the barcode of our google drive on the e-mail so that if they need more details or relevant documents, they could help themselves. Third, we update the social media – linked in, twitter, Instagram, and Facebook – with photos taken and hashtags.'* *- 'We have organised "International Reading Month". We sent books to our clients. There are our promoting channels. The community events also include the new year dinner and events with topics. We have different topics on different industries, different technologies. During those events, I also try to talk with all people who participate in those events, looking for*

		opportunities to introduce our building. Some participants have already registered to become our community members, or rent our hot desk or office, or use our service, ask us to organise their events. With so many clients in our building, as a co-working space, different start-ups could help each other or cooperate to do something. I usually work as a bridge to connect them together.'
Seizing capability	Quick response	- *'Our members can enjoy the inner networks we provide with them, if they have any queries about China, our team and Chinese team are very glad to help, to match them with our best resources.'* - *'Provide some related workshops to learn video production related content and participate in related activities.'* - *'I look for the suitable companies myself, cooperation with the OIP can save my time.'*
Sensing capability	Evaluate the start-ups	- *'The good grown companies, we will evaluate them and talk with them to see if there is any chance that they could be imported to China. Or we still can invest on them.'* - *'The cooperation failed due to the low credibility. When things became serious, the low-*

		credibility entrepreneur has left our space.'
Reconfiguring resources capability	Facilitate ITT by provide visits to the home country	- *'We passed the first round and the interview, then travelled to Dalian for the pitching.'* - *'I think (OIP-A) works good as an intermediary. It introduced me many people, offered me opportunities to flight ticket to China. Build up my personal network, which is really helpful. As a researcher on AI, it is quite good to meet the business and do something together, and the university welcomes the technology commercialisation. It benefits my work and give me support for my future business.'*

There are three main approaches for OIP to expand its community:

1. General search for opportunities, branding and promoting:

In OIP-A, interviewee AO03 is searching for and integrating the information. He aim~~s~~ to find good opportunities. He has searched for the open database and gained open access to 1,400 projects. He now has got in touch with 17 projects with TRL stage 3-4. He talks about his working process on selecting high-tech project with intention of preliminary investment below:

"It is so hard for us to dig up really valuable projects … We try to find the potential projects during the events and meets-ups."

This case has shown that the sensing capability could still benefit the innovation in service of OIP-A as it has created the new resources for the future collaborations.

2. Seizing existing resources and networks:

Networks can be deepened by seizing the OIP existing partners. Relevant stakeholders can be reached through universities, research institutions, and other innovation platforms. Universities will recommend their entrepreneurs to OIP for more opportunities.

3. Reconfiguring the resources:

Efforts have been made by both OIP-A and B to utilise the resources and networks, reduce the transaction cost, and trigger the cooperation.

5.2.1 Reduce Information Asymmetry

Chinese and British enterprises are not very familiar with each other's technology in terms of projects, product markets, capital markets, legal environment, cultural environment and so on. It is therefore initially difficult to find suitable partners. Moreover, even after finding partners, due to the serious information asymmetry, it is difficult to achieve a sustainable cooperation mechanism and promote in-depth cooperation.

5.2.2 Reconfigure resources in investment cooperation

Investors' have a divergence of ideas. When Chinese and British investors cooperate, they are faced with many divergences of views, including the

evaluation and selection of scientific and technological projects, the return rate of funds, the long-term and short-term, the choice of target market, the determination of social benefits, long-term planning, and the specific training of expert teams for enterprises, etc.

5.2.3 Provide information to reduce the communication cost by technical standards

The unification and coordination of technical standards between China and Britain still need extra effort. This is especially true in the high-end manufacturing industry where the inconsistency of technical standards seriously affects the quality of final products. OIP-A and B both provides consultation services and translations to help the international technology transfer.

The main reason that can explain the difference between OIP-A and OIP-B is that the business model behind them. OIP- A is a private company running by itself and OIP-B has onshore government and university support.

6. Analysis of IPP and technology transfer

6.1 Model development and variable explanation

Some researchers started focusing on the indicator design and measurement of IPP in the 1990s (Li & Yu 2015), while the others measured the effect of IPP on ITT in different industry sectors. To test for the relationship between IPP and the scale of technology transfer, the researcher has employed the following empirical model:

$$TECHTRANS_{it} = \alpha_0 + \alpha_1 IPP_{it} + \Gamma X_{it} + u_i + \delta_t + \varepsilon_{it} \quad (1)$$

where $TECHTRANS_{it}$ represents the scale of the imported technology transfer at the provincial level, and IPP_{it} designates the degree of IPP in each province.

While there are other factors that could influence the scale of technology transfer, this needs to be held constant in order to test the relative relationship of dependent and independent variables. Thus, this paper uses X_{it} to refer to all control variables. This includes the overall IPP environment in a certain area (ENVIRON), the importance of state-owned enterprises in a local economy (SOE), the activeness of provincial R&D activity (RD), the amount of human capital in the area (HC), the level of provincial economic development (GDPPER), and the industrial structure of the province (INDU). Additionally, u_i is a dummy variable for the area i, and δ_t is a dummy variable for the year t. This research has made use of a comprehensive dataset that covers the time period 2001–2013.

The main variable, $TECHTRANS_{it}$, is represented by the ratio of the total amount of technology transfer from provincial-level enterprises to the total output of all industrial enterprises. The industrial enterprises are classified according to Adjusted Chinese Industrial Classification (GB/T4754-2017) with code number 06-46 (National Bureau of Statistics of the People's Republic of China, n.d.). The amount of technology transfer is evaluated as being the sum of the technology import fees plus the expenditure of imitation and assimilation. The data on the total amount of technology transfer from the above-designated-sized industrial enterprises has been collected from the China Statistical Yearbook on Science and Technology. The data on the output of industrial enterprise came from the China Statistical Yearbook on Industrial Economy. The term 'above-designated-sized enterprise' is a statistical term from China that refers to enterprises that have an annual operating income of over 20 million yuan (National Bureau of Statistics of the People's Republic of China, n.d.). The original data on the total amount of technology transfer from the above-designated-sized industrial enterprises is expressed in units of 10,000, while the output of the above-designated-sized industrial enterprises is expressed in units of 100 million. To make the measurement easier, in this research, the amount of technology transfer expenditure is divided by the output of the above-designated-sized industrial enterprises and show the results in units of 10,000. Thus, the indicator of $TECHTRANS_{it}$ could reflect the willingness of technology transfer from overseas for the above-designated-sized industrial enterprises by evaluating the proportion of money they have spent on technology transfer. Furthermore, this ratio is more reasonable and reliable compared to the absolute number, and it could avoid the possible impact of inflation over the years.

The key explanatory variable IPP_{it} represents the degree of IPP in each province. However, it is difficult to directly evaluate the quality and quantity of IPP in a country. In Park and Lippoldt's research (2014), they quantified the strength of IP rights on case law and statutes, while controlling other factors. Fang et al. (2017) made a strong analytical attempt at interpreting the relationship between intellectual property right (IPR) protection and innovation in China during the period before and after the privatisation of state-owned enterprises. They noticed local differences in strength of IPP in different provinces in China. They consequently ~~and~~ reported that the coastal provinces, such as Shanghai, Jiangsu, and Zhejiang, have the highest levels of IPR protection. Their data on IPR protection comes from an IPR index published by the Chinese Academy of Social Sciences that is based on a survey of legal professionals, including judges and IPR lawyers, and corporate executives. The survey has built up a ranking sheet with marks from 1 to 5. Considering the size of and number of participants in IPR enforcement in China, this sample is still limited, and it is hard to remove biased or subjective responses from this kind of survey. Moreover, in this study, the number of patents used for the index of innovation and regression analysis was used as the main mathematical tool in dealing with a model adapted from the typical stochastic process AR (1) model. This is easy to handle. The focus of this study was on the privatisation rather than on technology transfer, so~~,~~ the effect of IPP on technology transfer is still open to further discussion. However, a more advanced mathematical model, such as AR (2), might generate more results. By indexing IPP with different data sources and definitions, it may become easier to understand the local differences and impacts of IPP on technology transfer.

Some studies have adopted IPP enforcement in measuring the quality of IPP because they have found that a higher enforcement rate reflects a higher possibility of the plaintiffs (i.e. the IP holders) wining the cases (Ang et al., 2014; Fang et al., 2015). Ostergard (2000) criticised the use of some scaling measurements of IPP. He states they 'overlook the actual enforcement of IPR,' and addresses the importance of having an enforcement component in assessing the strength of IPR protection. He also called for additional quantitative research in the field of IPR protection.

In this research, IPP is measured by patent enforcement in a certain area and by using the claim settlement rate (CR) of patent cases settled in two years divided by the number of patent cases placed on file during the same period. In China, the most reliable way to collect CR statistics is to use a time period of about one to two years. For instance, the Chongqing Fifth Intermediate People's Court used a time period of two years as the average time taken to settle a claim related to patent disputes, while the average duration for hearing in a patent-related case is 140 days (Legal Daily, 2014). IP House published a report analysing the processing time of patent infringement cases among courts in China. Large cities such as The Beijing Intellectual Property Court concluded a total of 229 patent infringement cases within the sampling period, with an average trial period of 186 days; and the Shanghai Intellectual Property Court concluded a total of 119 patent infringement cases within the sampling period, with an average trial period of 196 days. Cities in smaller scale have a longer time period to proceed with cases. Thus, a two-year average to calculate the average CR has been used, as this better fits the current situation in China. The data has been collected from the China Intellectual Property Yearbook.

A specific case study of South Korea claims that patent and utility models are two different kinds of intellectual property (Kim et al., 2012). Patent protection is a more important factor in the innovation and growth path of developed countries than of developing countries. In developing countries, utility models are more beneficial, and they drive innovation. China, as the named home country for the imported technology in this research, does not divide the patent and utility model in its database. However, this thesis focuses on the quality of IP protection. Therefore, the difference between the patent and utility model will not cause any problems in results. Here, the higher the ratio, the more likely it is that a patent case was settled and the stricter the intellectual property protection.

The researcher has first applied Model (1) to the panel data using fixed-effects regression. As technology transfer may have a delayed reaction, the first-order lagged term and second-order lagged term of TECHTRANS have been introduced. Here, a significant positive α_1 of IPP_{it} would indicate that a stronger IPP does indeed lead to a larger scale of international technology transfer, and in a region of IPP_{it}, it should be significantly positive. The author has estimated $TECHTRANS_{it}$ as follows:

$$TECHTRANS_{it} = \tilde{\alpha}_0 + \tilde{\alpha}_1 IPP_{it} + \tilde{\alpha}_1 TECHTRANS_{it-1} + \tilde{\alpha}_2 TECHTRANS_{it-2} + \tilde{\Gamma} X_{it} + \tilde{u}_i + \tilde{\delta}_t + \tilde{\varepsilon}_{it} \quad (2)$$

The researcher then used the systematic GMM method to estimate Regression (2) (Blundell & Bond, 2000), in which the independent variables include the lagged terms of the explained variable. When the IPP is positively correlated

with the scale of the international technological transfer, then $\tilde{\alpha}_1$ should be significantly positive, even when the effect of hysteresis is excluded.

Stakeholder groups in this case could be divided into two main activities: the buyer and seller of technology and the buyer and seller of a product. The technology buyers could be the same as the product seller when the technology buyer could afford the production. This refers to the commercial activities of investing in adaptive R&D and cooperation enterprises.

6.2 Empirical process and result analysis

Table 6.1 below presents descriptive statistics with 388 observations between 2001 and 2013. From these statistics, it can be seen that the mean technology transfer rate of the designated-sized industrial enterprises in different years for each province is 17.393 (in 10 thousandths). This indicates that, on average, their scale of technology import is low to moderate. The minimum IPP and FDI are both zero. This also shows that the development of intellectual property protection and foreign direct investment is imbalanced throughout China. Interestingly, the mean of the IPP rate of settlement is 88.563%, with a variance of 42.655. Considering IPP is evaluated by the total number of cases related to intellectual property in two given years, the enforcement gap of intellectual protection between various regions in different years is quite large. If only the number of patent infringement cases is included, the rate of settled cases drops to 83.608%. This lower than the rate of the total number of cases related to intellectual property. Therefore, the enforcement of patent infringement protection still needs to be improved.

Table 6.1: Data description (observations: n = 388) Source: The Author

Variable	Obs.	*M*	*SD*	Min.	Max.
TECHTRANS	388	17.393	18.387	0.154	146.775
IPP	388	88.563	42.655	0	300
ENVIRON	388	5.653	1.139	2.303	8.780
FDI	388	0.456	0.499	0	1
SOE	388	46.053	20.332	10.790	87.152
RD	388	13.194	1.473	9.039	16.190
INDU	388	47.594	7.482	20.4	61.5
HC	388	14.049	7.001	2.776	35.650
GDPPER	388	0.646	0.745	-1.210	2.284

Table 6.1 illustrates that regional IPP has a significant positive effect on the scale of imported technology transfer. There is only a slight difference in value between the fixed effects and system GMM estimations. This suggests that a stronger application of IPP in developing countries could be associated with an increased FDI index. This could provide confidence in the use of the IPP index, as it qualitatively captures the relationship between IPP and FDI that has been examined in much greater detail in empirical work such as that by

Branstetter et al. (2006, 2011). In all the GMM regressions, the p-values of AR (2) are higher than 0.3, indicating that these estimations are feasible. The Sargan test for testing over-identifying restrictions to guarantee the effectiveness of all instrumental variables was also used. Hence, the estimated results of the GMM system are more reliable when the hysteresis of the explained variable is considered.

Column (6), in the table below, represents the GMM regression results of the empirical regression model. This includes the first-order lagged term of IPP, the first-order lagged term of TECHTRANS and the second-order lagged term of TECHTRANS. Compared to column (5), the time lags have an effect on IPP and the scale of technology transfer. However, the effects are not that significant. For every increment of IPP in one standard variance (42), the scale of technology transfer increases by 2.02 (in 10 thousandths). Hence, with a mean output of 1.4405 trillion yuan for all the sampled enterprises above the designated size, when the CR increases by 1% the expenditure of the technology transfer (the expenses of technology import plus those of imitation or assimilation) increases by 692 million yuan. The coefficients of the first-order and the second-order lagged terms of technology transfer are also significantly positive. This indicates that technology transfer has strong continuity. Therefore, hypothesis of research question 3 is supported.

Table 6.2: IPP and international technology transfer

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	FE	FE	FE	GMM	GMM	GMM
IPP	0.0438**	0.0439**	0.0527**	0.0485**	0.0430**	0.0481**
	(0.0197)	(0.0196)	(0.0227)	(0.0195)	(0.0200)	(0.0228)
First-order lagged term of IPP			-0.00288			-0.0240
			(0.0221)			(0.0223)
First-order lagged term of TECHTRANS				0.312***	0.290***	0.311***
				(0.0533)	(0.0544)	(0.0538)
Second-order lagged term of TECHTRANS				0.113***	0.101**	0.111***
				(0.0406)	(0.0415)	(0.0420)
ENVIRON		0.117	8.191**		-0.418	-0.369
		(2.240)	(3.799)		(1.263)	(1.262)
FDI		-4.813*	-6.880**		-0.219	-0.783
		(2.735)	(2.912)		(2.137)	(2.106)
SOE		0.494***	0.500***		0.0946	0.0714
		(0.145)	(0.162)		(0.0627)	(0.0625)

RD		-2.088	-5.439		1.151	0.840
		(4.766)	(5.302)		(1.281)	(1.285)
INDU		0.336	0.216		0.0212	-0.0245
		(0.314)	(0.337)		(0.115)	(0.115)
HC		0.637	0.288		0.154	0.167
		(0.523)	(0.607)		(0.234)	(0.236)
GDPPER		-5.731	1.610		1.030	1.271
		(11.20)	(12.30)		(2.801)	(2.857)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	388	388	357	358	358	357
R-squared	0.373	0.401	0.394			
AR (2) *p*-value				0.41	0.382	0.403
Sargan *p*-value				0.202	0.211	0.2
Number of provinces	30	30	30	30	30	30

Note: The explained variable is the scale of technology transfer of enterprises divided by the designated size. Columns (1), (2) and (3) report the fixed effect regression results using static panel data, while columns (4), (5) and (6) report those of the GMM estimation results using dynamic panel data. Standard errors are in parentheses, and *, ** and *** represent 10%, 5% and 1% significance levels, respectively.

The result of the positive correlation between IPP and technology transfer offers strong evidence to the market-expansion effect and the previous studies (e.g., Gould & Gruben 1996; Helpman, 1993). It also endorses the conclusion from Branstetter et al. (2006) that the legal reforms that could strengthen IP rights could increase the scale of technology transfer by multinational enterprises to emerging economies. Thus, a view from the policymaker is offered. However, it does differ from Rai et al. (2014), who suggest that weak IP mechanisms do not appear to hinder low-carbon technology transfers. Intarakumnerd and Charoenporn (2015) find that a stronger IPP has a slight impact on knowledge transfers between multinational firms and local suppliers in the case of Thai auto manufacturers.

As there is a positive effect between IPP and the scale of technology transfer, strengthening the IPP system would have positive effect and encourage the imported technology transfer to the home country. Recent studies explore the effect of enforcement of IPP on R&D investment and economic growth in a Chinese context. Ang et al. (2014) studied the relationship between enforcement of IPP on the investments in R&D of Chinese firms. However, they did not clarify the effects of IPP on the effectiveness and scale of technology transfer. On the other hand, Rai et al. (2014) analysed the limitations of firm-level data, such as short-term, biased and partially unrevealed data. They adopted a unique case study to analyse the relationship between IPP and technology transfer in China and India. However, the analysis is too general due to the lack of a strict formulised mathematical model. This thesis has covered the research gap and developed model to explore the relationship between IPP and ITT.

IPP is also beneficial to the OIP by lowering the transaction cost during the ITT process. Transactional cost can be reduced by the IPP of the home country. Research of Tanaka et al. (2007) developed a quality-ladder type dynamic general equilibrium model and found that if IPP significantly reduces the transaction cost of licensing – the negotiation cost, stronger IPR protection can promote innovation and international technology transfer. Similar study by Maskus & Yang (2000) has found that monitoring, litigation and the other enforcement transaction costs can be further reduced by stronger IPP.

Foreign & Commonwealth Office, Foreign, Commonwealth & Development Office, Intellectual Property Office, and British Embassy Beijing (2021) offers a case study to Chinese IP laws and regulations and how China and UK can work together to help protect the new high-tech-players from the UK to Chinese market. They also provide suggestions and tips for businesses wanting to collaborate with China. However, these suggestions are still very general. Intellectual Property Office (2015) provides measurements for business entities to avoid potential problems during any collaboration with China. Most of the measurements point out that it is essential to take advice from the experts on IPP in China, or others who have the experience of conducting similar business in that country. Another important tip that the UK government has given to businesses is to create good relationships with those organisations that could help them. The existence of OIPs definitely provides a more convenient and direct way for businesses to deal with the IP problems they encounter.

A study by Li and Yu (2015) claims that IPP in China has already made a lot of positive impacts so far; however, there are still further hidden problems

inside Chinese IPP that need to be investigated through some institutional analysis other than the quantitative index and data analysis.

7. Conclusions and recommendations

7.1 Conclusions

This research has explored the role of OIPs in regional innovation ecosystems. The researcher has performed a comparative analysis using two OIPs located in two different regions, and the key findings are shown below:

OIPs are effective in building regional innovation ecosystems:

This is because of the competitive advantages of OIPs. In this case, the ability to induce Chinese investment and provide a route to the Chinese market. The OIP acts as intermediary and broker and has seven main activities: (1) demand articulation; (2) inclusive and participatory action; (3) institutional support; (4) network brokering; (5) knowledge brokering; (6) innovation commercialisation brokering; and (7) capacity building.

OIPs could help regional entrepreneurs to do the following:

(1) expand or find new markets, (2) reach the talents, (3) establish new partnerships, (4) contribute to the supportive system, (5) activate the connections between other stakeholders with the related government departments, (6) help the talents in high-tech companies to receive training and education, (7) increase the scale of partnerships, (8) create impetus for other actors who may not have previously been linked to the existing partners to connect, (9) create cross-border connections between related government

departments, (10) create new cross-border investment funding; and (11) reduce the transaction cost of the regional innovation ecosystem.

The Chinese-funded OIPs could contribute to the strategic approach to international collaboration from six pillars:

1) promoting the British research and high-tech sectors overseas, 2) supporting access to the overseas market for UK businesses and academics, 3) strengthening the impact of British research institutions and accelerating the path to commercialisation, 4) ensuring China continues to attract talents from the UK, 5) building strong strategic links with high growth economies, 6) building the trust between China and the UK.

High-tech entrepreneurs do not always have the necessary number of employees in a company in the early stages. Thus, it is worth the company extending its boundaries beyond its current ecosystem and trying to explore solutions to reducing the transaction cost of the entire supply chain. It could further contribute to the innovation ecosystem itself by reducing the transaction cost. The ecosystem could then have a more competitive environment in which to push the valuable innovation.

The dynamic capabilities at micro-level have positive effects on the services or products provided by OIPs. OIPs' products include the schemes for visits or pitching events, or consultancy work to provide integrated information to the relevant stakeholders. The innovation inside OIPs is the new ideas generated by the employees by sensing the customer's needs and seizing the resources.

Until now, there have been no specialised, convenient regulations for technology importing, cooperative R&D and capital cooperation between China and the UK. This means that the personnel on both sides still face the constraints of relevant approval and investment restrictions in the process of cooperation. This leads to higher transaction costs. It is suggested that the policymakers should develop a solution to this issue.

Although IPP in developing countries remains controversial, recent theoretical and empirical work has emphasised that the benefits of increased FDI, and associated technology transfer into developing countries resulting from strengthened IPP, may more than offset the cost of the lost imitative ability. Lai (1998), Branstetter and Saggi (2011) and Jakobsson and Segerstrom (2012) have all analysed North–South international product cycle models. Results have shown that, under plausible conditions, developing countries benefit from strengthening their IPP. Empirical studies, such as Nunnenkamp & Spatz (2004), Branstetter et al. (2006) and Branstetter & Saggi (2011), have shown that strengthened IPP is associated with substantially increased FDI and technology inflows in developing countries.

As the purchase of intellectual property has gained popularity among companies in China's market-oriented and innovation-driven economic environment, importing technology has become a key source of technological advancement. In the case of ITT, IPP affects not only the demand side but also the supply side. The direct purchase of foreign technology is one form of R&D investment cooperation. Enterprises can only expect returns when intellectual property is strictly protected. Strict protection on intellectual property is also

necessary on the supply side to prevent products from being copied and used at will. Thus, the amount of technology transfer in each area should be positively correlated with the degree of its IPP. For the policy makers, another resolution should be to evaluate IPP properly.

These findings also shows that China should strengthen its IPP in order to promote technology exchange and enhance companies' R&D activities in the trend of internationalisation. Although IPP's benefits may gradually decline in certain areas of high openness, China should continue investment in R&D because it will be of benefit to technology transfer in those regions. As a corollary, when improving its IPP systems, China should pay attention to the strength and openness of each area.

One of the most recent international collaborations is one between Offshore Renewable Energy (ORE) Catapult, and the Chinese high-tech company, Tsinghua University Science Park (TUS Park). With this £220m deal, the most innovative business will have the opportunity to gain access to the largest renewable energy market in the world. It will also enhance collaboration between research institutions across borders and stimulate more innovation and cooperation (Catapult 2018).

This international collaboration aims to push the technology innovation and deployment in the Chinese market by establishing the UK–China technology growth accelerator. This would create joint applied research projects and demonstrator projects. As a practical win–win solution between China and the UK, this deal shows how such solutions could enhance the international

technology transfer, knowledge spill-over and productivity in China. On the other hand, it would also stimulate the local economy in the UK through inward investment, promotion of co-research and stimulation of innovation in the UK.

7.2 Research Limitations

While every effort was made to create a sound research design in order to answer the research aims and questions set out in this thesis, there are some limitations that need to be addressed. To answer research questions 1 and 2, qualitative research was used; the nature of which brings about some limitations that cannot be avoided. 'As with most qualitative research, there is an inherent researcher bias stemming from the use of qualitative methods' (Bluhm et al. 2011). The OIP is still in its early stages, and there are only a small number of OIPs running in the UK.

The author used comparative case studies to answer the first two research questions. As semi-structured interviews were used to gain in-depth data from the interviewees, they might have given ~~a~~ biased results according to what interviewees thought was expected from them, or what was socially acceptable. Thus, the answers received might not have exactly resembled the truth. It would have been ideal if the researcher could also have used quantitative data to evaluate the hypothesis and verify the answers.

A second limitation, also related to most qualitative research, is the 'inherent lack of generalisability of the theory as a result of using a case study method'

(Eisenhardt, 1989). To help increase the generalisability of the research findings, the selection of cases was not random, as mentioned in the methodology section, but involved the selection of specific cases (i.e. two different types of OIP under different modes: public and private) to contribute to the theory (Eisenhardt, 1989). Additionally, the multiple case study design was also selected to help with this issue as it 'yields more robust, generalisable and testable theory than single-case research' (Eisenhardt & Graebner, 2007: 27).

The limitation that exists in the answering of research question 3 is that quantitative research is easily limited by the scope of existing knowledge and norms. This makes quantitative research validate theories, but not create them, and broadly explain problems, but not deeply understand social phenomena. The actual interaction behind the scenes between intellectual property protection activities and the performance of the international technology transfer needs to be further explored by empirical cases.

7.3 Further research

Future studies could address several important areas that were outside the scope of this thesis. The author has summarised the areas that have not been addressed below:

- How trust works in different innovation ecosystems. This could be further explained using social exchange theory and legitimacy theory.

From the real-life cases, it is clear to see that trust is still an inevitable factor in the technology transfer process, especially for the entrepreneurs. However, there lacks research on the causes and effect on trust and the roles of trust separately particularly in cross-border cases.

- More channels should be explored to help investors find high-tech start-ups.

One interesting finding from the interviews with start-ups in OIP-B's co-working space (sample group b) is that their motivation to work in OIP-B varied. What's more and expanding to the Chinese market might not be their initial choice. Most claimed that the main reason they chose OIP-B was not because they wanted to start a business in China. Their reasons had more to do with location, decorations or recommendations. A typical example is a community leader who used to work in the other co-working space. He was fascinated with the idea of OIPs and moved into OIP B. As a result, 11 start-ups followed him and also moved into OIP-B. This shows the influence of individuals within the regional innovation ecosystem. The previous innovation ecosystem models can be further explored with reference to new factors and cross-border resources. The joining of new participants could lead to new models of innovation ecosystem.

- Knowledge transfer between China and the UK is a key focus.

From interviews with the start-ups (sample group b), it was found that some of the entrepreneurs started their businesses not because they were the patent holder, but because of the experience they had accumulated. Because of this, they were unable to obtain much funding. Most of them were helped by

Catapult but did not get financial assistance. However, this experience may help Chinese companies, as the Chinese market is very attractive to them. More solutions for transferring knowledge to less-developed regions in China should be provided to fit this trend.

- There is a need to explore new business models for innovation, commercialisation, and collaboration.

Government funding through high-tech innovation programmes is helpful, but it is difficult to acquire. This will cause high-tech start-ups to be ineffective. Some funding is offered by Innovate UK, for which entrepreneurs need to submit a detailed project summary and compete with others. Even though the competitive mechanism supports some excellent cases, due to the limited amount of funds, many good projects are rejected and may fall into 'Death Valley'. Furthermore, according to an interview with one SME which had experienced ESPRC's funding programme, the actual results of the programme were not so satisfying. This may be because of the UK government's monitoring mechanisms. Although participants are asked to report in interviews twice a year, there is no support if projects fail or goes wrong. The government is not an actual stakeholder in the project, and funding programmes only aim to encourage businesses to innovate. Other complaints involved the situation of Brexit. One of the interviewees in sample group b said, 'Before Brexit, [more] funding came from the EU. Now it doesn't'. He also mentioned that venture capitalists in this region have no money to invest because of Brexit. This situation also creates more opportunities for Chinese investors. Now that funding has been reduced, they have more opportunities to invest in high-tech entrepreneurs of good quality. Thus, future research should explore new business models for investment and mergers.

- Start-ups have less awareness of the Chinese market than other stakeholders.

Another interesting finding is that entrepreneurs show a neutral attitude about the route to the Chinese market. In contrast, all other stakeholders in the interviews showed a strong positive interest in helping entrepreneurs enter the Chinese market. This may be because these organisations are more experienced and know more about the market, while the entrepreneurs are focused on their current development rather than their future expansion.

Considering the reduction in IPP's effect on ITT may also result from the ability of local independent innovation, the relationship between the ability of independent innovation, IPP and ITT is also an interesting topic to be explored in the future. Research institutions and universities also participate in ITT and deserve attention in future research.

Finally, future research could focus on longitudinally tracking high-tech start-ups in real time. This approach would aim to address the 'multiple calls in literature for further longitudinal research to chart the development of start-ups over time' (Davidsson et al. 2001; Bygrave 2007). Knowledge transfer and technology transfer are important themes in the regional innovation ecosystem. But what happens if the high-tech start-ups fail or quit the market? The individuals who hold the knowledge still survive in the ecosystem and it is possible for the innovation to be nurtured in other forms. For example, individuals gain employment from other companies, participate in the open innovation programmes, or continue to research and develop.

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Appendix I Ethical Form

Participant Information Sheet

Study title:	The offshore innovation platform and its impact on innovation ecosystem
Locality:	Ethics committee ref.:
Lead investigator:	Contact phone number:

You are invited to take part in a study on the offshore innovation platform and its impact on innovation ecosystem. Whether or not you take part is your choice. If you don't want to take part, you don't have to give a reason, and it won't affect the care you receive. If you do want to take part now, but change your mind later, you can pull out of the study at any time.

This Participant Information Sheet will help you decide if you'd like to take part. It sets out why we are doing the study, what your participation would involve, what the benefits and risks to you might be, and what would happen after the study ends. We will go through this information with you and answer any questions you may have. You do not have to decide today whether or not you will participate in this study. Before you decide you may want to talk about the study with other people, such as family, whānau, friends, or healthcare providers. Feel free to do this.

If you agree to take part in this study, you will be asked to sign the Consent Form on the last page of this document. You will be given a copy of both the Participant Information Sheet and the Consent Form to keep.

This document is 7 pages long, including the Consent Form. Please make sure you have read and understood all the pages.

WHAT IS THE PURPOSE OF THE STUDY?

There is increasing literature focus on international technology collaboration and its impact on innovation ecosystem. There are studies focus on key suppliers, resources and other organizations and participants such as the international venture capitals and innovation hubs. However, there is almost no research focus on the increasing number of Offshore Innovation Platforms (OIP). According to the research, OIPs could provide

far more comprehensive collaboration opportunities towards the cross-border innovation collaboration and add value to a variety of participants to co-produce series of products or services for different user groups. OIPs can substantially strengthen the international technology collaboration by deepening trust among relevant parties, injecting solid innovation resources into the regional innovation ecosystem, sharing more valuable and insightful knowledge and creating continuous stream of interactive innovation. With its advantages, it will empower the entrepreneurs, SMEs and large companies, transfer their science and technology from the lab to the broader market comparing to isolated innovation collaborations, contribute to the open innovation and conquer the growth limit of capitalism. Furthermore, empirical researches on the impact brought by OIPs on a micro-foundation perspective are rare. In this paper, the researcher studies the impact of such OIPs on British local innovation ecosystems. On March 2018, China and Germany have already officially announced 11 innovation platforms to strengthen the international cooperation. However, in the UK, the mature OIPs which have already created significant impact to Britain national wide are rare. This paper examines the impact of activities such as high-tech start-ups internationalization process in the selected OIPs on the regional innovation ecosystem development on micro-foundation level by applying the concept of the innovation ecosystem framework. Qualitative methodology has been used in this paper. The study employs semi-structured interviews on different user groups, participants, benefit companies, existing relevant organisations, research institutions and city councils. The paper contributes to the literature by (1) studying the features and functions/operations of OIPs; (2) critically discussing the barriers on the operation process in OIPs by exploring the microfoundations of dynamic capabilities: employee involvement, managerial trust and risk control; (3) exploring the role of offshore innovation platform within the regional innovation ecosystem and (4) evaluating the value and impact of OIPs that bring to its regional innovation ecosystem.

WHAT WILL MY PARTICIPATION IN THE STUDY INVOLVE?

The researcher invites people who have working experience in the offshore innovation platform or the relevant organisations, research institutions and universities. Semi-structured interviews will be conducted. The researcher will ask you a set of questions which are close to the research questions and welcome for new ideas to be brought up during the interview. The researcher can ask in different ways for different participants. The number and duration of visits to the participants may vary. None of the health information will be collected.

WHAT ARE THE POSSIBLE BENEFITS AND RISKS OF THIS STUDY?

We hope that you will enjoy talking to us. Your contribution is going to help others. This research will help the researcher to optimize the operation process inside the OIPs and benefit the third-parties such as the policy makers, investors, entrepreneurs and other relevant institutions to better participate in the innovation ecosystem. As part of them, you will get the benefit in the end. We also hope that you could find something useful to increase capacity and efficiency in the future international technology collaboration.

WHO PAYS FOR THE STUDY?

The participant will not incur any costs. However, the payments or other forms of reimbursement, if any, will be provided in recognition of participation.

WHAT IF SOMETHING GOES WRONG?

If you were injured in this study, which is unlikely, you would be eligible for compensation from ACC just as you would be if you were injured in an accident at work or at home. You will have to lodge a claim with ACC, which may take some time to assess. If your claim is accepted, you will receive funding to assist in your recovery.

If you have private health or life insurance, you may wish to check with your insurer that taking part in this study won't affect your cover.

WHAT ARE MY RIGHTS?

The interviewees are free to decline to participate, or to withdraw from the research at any practicable time, without experiencing any disadvantage. The participants have the right to access information about them collected as part of the study. The participants will be told of any new information about adverse or beneficial effects related to the study that becomes available during the study that may have an impact on their health.

WHAT HAPPENS AFTER THE STUDY OR IF I CHANGE MY MIND?

The content of interview needs to be recorded by cloud-based notes. The data will be stored under the terms of the Data Protection Act. Files need to be encrypted or password protected, and only accessed by the researcher. The hard copies taken during the interview will be kept in locked filing cabinets for six months.

The participants are free to decline to participate without experiencing any disadvantage. The donor will not own any intellectual property that may arise from any future research. You have the rights to withdraw consent and what the process for

doing this is (i.e. who to contact). However, if consent is given for unidentified or de-linked use of tissue, the participant must be informed that they will not be able to withdraw their consent in the future.

WHO DO I CONTACT FOR MORE INFORMATION OR IF I HAVE CONCERNS?

If you have any questions, concerns or complaints about the study at any stage, you can contact:

J Liang

07341 778171

Jiamin.liang@northumbria.ac.uk

If you want to talk to someone who isn't involved with the study, you can contact an independent health and disability advocate on:

Phone:	0800 555 050
Fax:	0800 2 SUPPORT (0800 2787 7678)
Email:	advocacy@hdc.org.nz

You can also contact the health and disability ethics committee (HDEC) that approved this study on:

Phone:	0800 4 ETHICS
Email:	hdecs@moh.govt.nz

Appendix II: Consent Form

Consent Form

Your letterhead

If you need an INTERPRETER, please tell us.
If you are unable to provide interpreters for the study, please clearly state this in

Please tick to indicate you consent to the following *(Add or delete as appropriate)*

I have read, or have had read to me in my first language, and I understand the Participant Information Sheet.	Yes ☐	No ☐
I have been given sufficient time to consider whether or not to participate in this study.	Yes ☐	No ☐
I have had the opportunity to use a legal representative, whanau/ family support or a friend to help me ask questions and understand the study.	Yes ☐	No ☐
I am satisfied with the answers I have been given regarding the study and I have a copy of this consent form and information sheet.	Yes ☐	No ☐
I understand that taking part in this study is voluntary (my choice) and that I may withdraw from the study at any time without this affecting my medical care.	Yes ☐	No ☐
I consent to the research staff collecting and processing my information, including information about my health.	Yes ☐	No ☐
If I decide to withdraw from the study, I agree that the information	Yes ☐	No ☐

collected about me up to the point when I withdraw may continue to be processed.		
I consent to my GP or current provider being informed about my participation in the study and of any significant abnormal results obtained during the study.	Yes ☐	No ☐
I understand that there may be risks associated with the treatment in the event of myself or my partner becoming pregnant. I undertake to inform my partner of the risks and to take responsibility for the prevention of pregnancy.	Yes ☐	No ☐
I agree to my (type of tissue) samples being sent overseas and I am aware that these samples will be disposed of using established guidelines for discarding biohazard waste.	Yes ☐	No ☐
I agree to an approved auditor appointed by the New Zealand Health and Disability Ethic Committees, or any relevant regulatory authority or their approved representative reviewing my relevant medical records for the sole purpose of checking the accuracy of the information recorded for the study.	Yes ☐	No ☐
I understand that my participation in this study is confidential and that no material, which could identify me personally, will be used in any reports on this study.	Yes ☐	No ☐
I understand the compensation provisions in case of injury during the study.	Yes ☐	No ☐
I know who to contact if I have any questions about the study in general.	Yes ☐	No ☐
I understand my responsibilities as a study participant.	Yes ☐	No ☐
I wish to receive a summary of the results from the study.	Yes ☐	No ☐

Declaration by participant:

I hereby consent to take part in this study.

Participant's name:

Signature: Date:

Declaration by member of research team:

I have given a verbal explanation of the research project to the participant, and have answered the participant's questions about it.

I believe that the participant understands the study and has given informed consent to participate.

Researcher's name:

Signature: Date:

Appendix III: Interview Questions

Users (Entrepreneurs) in OIP:

1. What was your main motivation to be here (in this OIP)?

2. In what ways does the incubator support you and your business? (Do you feel you benefited from this OIP? If so, How?)

3. *Based on the answers given to the previous question, check if

the following types of resources have been addressed and how valuable they are for tenants

a. Physical capital

i. Basic: office space, administrative services

ii. Specialized: laboratories, libraries

b. Financial capital: investments, start-up capital, loans, findings, grants

c. Human capital: training programs, master classes, education

d. Knowledge

i. Business skills (mentor/coach)

ii. Scientific knowledge (role university)

e. Social capital

i. Community: other entrepreneurs

ii. External networking

f. Legitimacy: do you feel that being associated with this OIP can bring credibility to your company?

g. Searching costs:

h. Screening costs:

i: Bargaining costs:

4. Who was involved in delivering business support to you? What was their role in the process? Can you explain how they helped you? What types of interactions were they? How often?

5. Did the regional ecosystem play any role in helping or constraining you? If so, how and why?

6. Did you utilise any regional organisations/actors to help you develop your business during the incubation process? If so, how and why? Was it easy to engage with regional organisations? Why or why not? How did the quality of regional organisations/actors affect how you started a business during the incubation process?

7. How did you utilise regional networks to help develop your business during the incubation process? Which networks? Did anyone from the process help to facilitate access to networks? If so, how did they do that?

8. Do you feel any difference between this OIP and the other local innovation platforms? If so, how?

Staff in OIP:

1. What your role is at the OIP?

2. How do you think this OIP could help the high-tech entrepreneurs here? How you help with them?

a. How do you think the OIP's financial resources affect how the process functions?

b. What are the key components of OIP and how did they function?

c. What types of business support are provided to entrepreneurs?

3. Who supplied the business support to the entrepreneurs and what was their role?

4. Do the entrepreneurs face any barriers when starting a business in the context of the incubation process? If so, what were they and how did you help them overcome them?

5. How do you think the relationship between OIP and the regional innovation ecosystem (the role)?

6. How does the process (do you) utilise external regional organisations/actors? Which ones and why?

7. Do the entrepreneurs have access to regional finance / funding opportunities / collaboration opportunities in OIP? Why or why not? How do you think this affected how the process functioned?

8. Do entrepreneurs utilise any regional networks to help develop their business during the incubation process? Did anyone from the process help to facilitate access to networks? If so, how did they do that?

Appendix IV: Background on the selected countries and cases

Background on selected countries

There has been a variety of problems and challenges in China caused by the rapid economic ascendance such as the unbalanced industry structure, high inequity, and environmental problems. Furthermore, according to the economic forecasts by the World Bank (2019, January 8), the annual GDP growth of China starts to slow down since 2017 and it is estimated to keep the declining trend till 2021. There are many reasons attributed to the decreasing trend, and one of the main reasons may be the imbalanced industry structure and excess capacity (Xiong & Liang, 2017). China has started to transfer its economic model from the central-planned economy to a more market-oriented economy (The Word Bank, n.d.). To conquer the problem, it is essential to achieve the technology upgrading and to adjust the industrial and economic structure from the investment-driven industrial economic model to an innovation-driven and consumption-driven model (Xiong & Liang, 2017). However, the economy model relies more on the low-cost manufacturing industries in those decades. In May 2016, Premier Li Keqiang had already talked about the current barriers in the development of China in a meeting of the State Council, emphasised the importance of emerging industries and particularly the integration of manufacturing and internet plus (Blair, 2017). In the 13th Five-Year Plan of the year 2016 - 2020, a series of supportive policies have been established to support the industrial optimisation system and the transition of industry 4.0, including the important strategic policies and measures for vigorously advancing the popular entrepreneurship and innovation; also, the Internet Plus and Made in China 2025. All these

measurements reflect the strong willing of China to combine the high-tech with its traditional industries; to support the innovation and entrepreneurship and to achieve the technology transfer. In the past decades, the international technology transfer more relies on foreign direct investment (FDI) and most of which is the direct purchase of the equipment. To meet the needs of industrial 4.0 and Made in China 2025, it needs more self-innovation and cross-border technology collaboration rather than the past approach of inducing technologies overseas. While starting the pace of technology upgrading, China has been involved in the trade war brought by the U.S. Under section 301 in 1974, President of the United States, Trump, has signed the retaliatory tariffs on particular to Chinese imports (BBC, 2018). The total amount value of the tariff has been up to $60 billion. He also claimed that his new tactic as one of the initiatives from the U.S. to restrict the unfair behaviour – the "theft" of intellectual property from the U.S. to China (Worland, 2018). Even though the continual talks and negotiations between the two countries till now seems to calm down the episodes and try to solve the conflicts in a milder way; still, it makes the international technology transfer process of China harder – at least in the U.S. Thus, China needs to create more collaboration opportunities with the other developed countries, which makes the research to explore the efficient approach to China-UK collaboration more valuable. Another unignorable truth reflected from the trade war is the "incomplete" intellectual property protection system in China. Interestingly, according to the research of Love, Helmers and Eberhardt (2015), China has already become a global leader in the patent litigation area since 2014 by adding 9,648 suits. In this case, all the activities the U.S. have done have shown distrustfulness to the IPP system in China. One thing that needs to be admitted is that the IPP in China is still on its very early stage. Unlike the long history the IP protection has in European countries, IP protection in China only

starts from the end of the 1970s (Zhang, 1997). The establishment of the first law on intellectual property in China has only been revealed since August of 1982 (World Intellectual Property Organisation, n.d.). The cause of the second wave of major IPP reforms in China is the accession treaty to join the World Trade Organisation (WTO) in 2001. Till now, a set of regulations and laws has been established to cover the IPP area, but it seems that there is still a gap between the laws and the effective enforcement. This gap could be another barrier on the OIP activities and have an impact on the decisions of entrepreneurs, SMEs and the other relevant stakeholders. While selecting China as the targeted developing country for the ITT route, it is essential to explore the actual effect of IPP on the scale of technology transfer in China.

Building innovation clusters is a glowing and urgent mission of many countries. In the UK, the appearance of tech city is obviously an attempt to remodel and restructure city into an entrepreneurial one. With the formulation of the national industry strategy of Northern Powerhouse, the UK has claimed to create a "second London" in Northern England, nurture the local economy by supporting the infrastructure construction, leading innovation and attracting investment on science and technology (IPPR North & NEFC, 2012; Depani & Sandford, 2016). In the report of Innovate UK, the significance of innovation cluster has been strongly emphasised as a key factor in fostering technology transfer and knowledge spillover, enhancing productivity, employment and start-up survival from the "Death Valley". It also admits the complexity of such innovation clusters as an ecosystem with the functions and activities far beyond the science base or supply chain could offer (Cook, 2018).

OIP A: company structure

There are 15 employees in OIP A (including the department heads). The

company structure is shown as below in figure IV.1:

Figure IV.1 OIP A Company Structure (Author's Own)

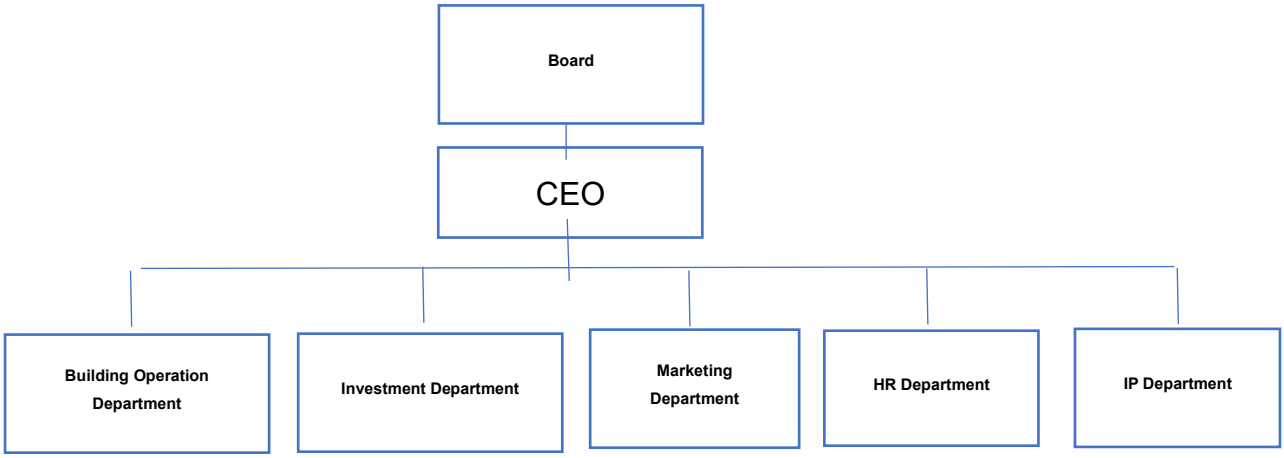

Figure IV.2 Employees in OIP A

Department	Number of Employee	Position
Building Operation Department	4	1 Head 3 Staff
Investment Department	4	4 Staff – (they directly communicate with the director/CEO)
Marketing Department	4	1 Head 3 Staff
HR Department	2	1 Head 1 Staff
IP Department	1	Head

Source: The Author

The whole building is the co-working space which aims to serve high-tech start-ups with low price. It also provides the space for holding events and

meet-ups.

Appendix V: Interview transcript (partial data)

1. BO01

1. How many registered members so far?

OIP-B has helped a large number of young entrepreneurs who may be the first time to start their own business. We have more than 60 companies registered here (8 months after sending out the form) and we have more than 20 companies on-site.

2. What is your job duty in this OIP? How do you think this OIP could help the high-tech entrepreneurs here? How you help with them?

My job title is community manager, but I am a multi-tasker taking care of almost every aspect of OIP. I work mainly for the community building, to build up our network and maintain the membership. I need to deal with our partners here in Newcastle; to introduce our members to the investors and visitors, to organise events and workshops - not only from OIP. We rent our big room for the other high-tech and entrepreneur related events, and We they come over I will assist with them as well.

3. You said that the big room is also rent for the others. Will you pick the customer?

Yes, I mean, of course we want to rent the room for the events relating to our goal – to help the high-tech entrepreneurs, to better join and build the ecosystem. It is very important. And so far, all the clients who want to rent the place are related to entrepreneurship, innovation and high-tech, I think they know who we are and what we do, and I believe this is also the reason they use our place and service. Now we have 2-3 big events per week, we have Founders' Friday, start-up week, tech week, co-working days in regular times and they are the most popular entrepreneurial events in the region. We also engage with the events hold together with government department. Barclays have their own company events, and there are also events hold by us together for the entrepreneurs. Founders' Friday and start-up week are hold by Paul Lancaster, he founded Campus North and has his own company Plan Digital UK.

He is our member and he really helped us a lot. His event has a lot of participants, and by attending his event they get to know more about OIP, and that is what we want – to expand our impact.

4. What is the difference between OIP and the other innovation platforms here?

I think it is our connections with China. Our Chinese team can dock us the government visits and venture capitals who want to look for good high-tech start-ups to invest. Some provincial and city level government departments also want to attract good company and talents back to China, and I don't think the local platforms could contact with those resources directly.

5. Is there any reasons for that?

Because it is our own resources and networks. And I don't think the local platforms have this ability – they must speak Chinese first of all, because most of the times you need to speak with Chinese to coordinate, not only translation in the pitching. And the second, I think the Chinese investors come to us for help is because of we are Chinese as well and we have the connections. When they come here, we are happy to introduce them with the local organisations and enterprises as we aim to help the collaboration between China and the UK, but I think at the beginning the Chinese visitors are more likely to search for someone like us to give assistance. And also we are famous for the name.

6. What do you think is the relationship between OIP and the regional innovation ecosystem?

OIP-B wants to help the regional innovation ecosystem grow. And I can say that we really helped the ecosystem. BO03 is busy connecting universities, organisations, and

big companies together to create more partnerships. We have the AI event every month and we have Newcastle University; we have Google team and sometimes the guests from London will join us as well. We have partnership with Barclays, I think this is rare and it has strong meanings. We help to build and expand the network internationally by the Chinese visitors. We create more opportunities for the start-ups. Our members can enjoy the inner networks we provide with them, if they have any queries about China, our team and Chinese team are very glad to help, to match them with our best resources. The good grown companies, we will evaluate them and talk with them to see if there is any chance that they could be imported to China. Or we still can invest on them.

7. Is there any successful case?

Start-up of BS04 is a good case. They are from Sri Lanka and holding exceptional talent visa. Their company is registered in Newcastle. Start-up of BS04 has been accepted onto our Forge accelerator programme, and by joining the programme, they get £55,000 of investment through the scheme (loan, or could be transferred into shares).

By joining the programme, the company has made use of the science park's network and has formed partnerships with investors and universities in China. These connections will be used later when the firm expands globally.

After that, Start-up of BS04 has also won the backing of Will Murray, former vice president of TurnItIn, who has joined the board of directors.

There are also successful cases for the hot-deskers. Start-up of BS10 has met his new co-founder here in our co-working space. His co-founder was working for IT services and construction services. However, there are also some unsuccessful cooperation cases inside the space. There is one start-up founded by two graduates, and they met the other four people here and want them to get involved and start another new business. However, the cooperation failed due to the low credibility. When things became serious, the low-credibility entrepreneur has left our space.

2. BO02

My job duty is mainly about the space operation. The environment of OIP Newcastle is not so good as our Cambridge space. The development of companies here is limited.

The membership is cheap, and the financial environment is not good. Without funds from outside, start-ups do not want to pay a higher cost. And we have not made profit from this site so far.

I will talk about the first accelerator programme here - the FORGE programme.

There are three main supporters for this programme: OIP, FORGE and Innovate UK. We also have the start-up innovation for FOXCOM, and FOXCOM is our fourth partner. We have a programme manager (me), Community manager and Portfolio manager. We have a lot of supporters who are just volunteering contribute to this programme and they don't have a specific position. Most of them have their own companies and they are just here to help the workshop. We will cover the travel cost but that's all. Oh we need to pay for the speakers from China, they provide the standards, accounting and law regulations in China. When got the connections from China, OIP does this part. It will not cost the money but time. UK accounting and the other workshops won't get paid.

Q: What kinds of workshops do they provide?

A: the common workshops such as the sales, accounting and marketing. They are the professional. We have around 30 to 50 people as speakers to do the mentorship. Their experience counts so much in accelerator programme and in the ecosystem. The credibility is different though. Accelerator programmes only counts a small amount in the ecosystem.

Q: How did you pick up those start-ups for the accelerator programme?

A: Our topic is settled to the tech fit IoT, AI, deep tech, clean tech and smart city. And the stage – the start-ups need the partners or production, we need to figure out if it will be easily copied. I also evaluate their team: how big they are? Who is the team behind? How long they work on it? Basically we will evaluate them comprehensively. And then we need to think: how can we help you? We recruit from specific stage, they have the willing to go to China and they are ready for the production. I did research online, on different platforms, and I email them of this programme. It was an intensive process, from UK and other EU countries I have contacted more than 1000 start-ups in total, and sent around 400. It happened in only two weeks. I also used the social media. I used LinkedIn to founders' name to connect. I talked to some companies face-to-face if I can. I talk in Manchester, in London, Cambridge.

I emailed them personally, and I used different email address. A lot of founders are busy, they want to know if they will get funding from UK as assistance before application. Many replied with their requirements, like they want the grants in R&D sector, they want some additional funding, market, support, and so on.

I have my personal contact with certain companies. I have ten years working experience on incubators and accelerators. I know successful platforms and I do simply introduction. I contacted more than 70 start-ups in this way.

And then by email I scheduled 27-28 interviews in 3 day. Every interview takes about 20 min and most of the interviews were online. We use skype in person. And then we have a 3 min pitch to everyone. Interviewers from FORGE and OIP questioned them. And then we had our final decision, yes or no, and then accepted officially.

Q: how many people are there to make the decision and choose the start-ups?

A: 4 people in total, and the final decision is decided by OIP park. We will reschedule another interview for the good potentials.

Q: How do you run the programme?

A: we have two people remaining, me and Michelle. As mentor and leaders. The other roles are – Sarah help with the legals, we have workshops for the pitch and business development, we have portfolio manager, we have support team, our OIP team is finding connections for them in China. We have Nancy to define what partners and what kinds of connection they need. Josh is the PD manaufacturers. Innovate UK is from the government side, they put up the IoT need and just for the growth. The start-ups in the accelerator programme get the money from OIP: convertible long equity. Other similar programmes are 3-month long and they are still intensive. We only have two months – as we have another month in China – it makes our schedule more intensive.

We now have 9 start-ups signed to join our accelerator programme, still one more seat we can recruit. There are also some start-ups attend the workshops for the accelerator programme and attend those workshops, but they have not officially signed as a member in the programme. They are still invited by us to be academy. Through those workshops they skilled up. Most of the participants are international start-ups, they come from other region of UK or even from Spain and other EU countries. They want to get scale up here and they are really busy at their own business. We are accelerator not incubator, and those start-ups are not that early only having a prototype, most of them have products on the market and they are busy trying to make money while participate the workshops. That is why some of them does not have a plan to go to China, they really don't have time to do the other things. Accelerator programme only offers them free training and consult services, they still need to earn money pay the rent and all the other things, so they really need to do a lot. And the start-ups have different requirements. Some need their business promoted, and we shared their information in other circles; some seek for the partners, we introduce them to the matched potentials.

3. BO03

Our mission is:

1. Glow new early-stage entrepreneurs

2. Help them to get into Chinese market

Our goal is focused, simple and difficult. And I should say, we have no rivals here. Our competitive advantage is the background of OIP. So far, 40+ companies have been served.

How do you think the role of OIP in the regional innovation ecosystem?

First of all, the ecosystem network is informal. I could say the current important participants are Newcastle Invest (marketing company owned by city council;), vc; Technation, and they do not have website yet. The innovation ecosystem is mainly based on the reputation; friendship connection; trust; and there are a lot of people doing free work to compose. A lot of our services are free of charge, and that is how we attract the entrepreneurs. Everyone could be here around our free desking to work and make friends, that is how the network built. And one company will move the headquarter to Newcastle because of OIP and the activities they are doing.

Political convenience: Newcastle city council (not really do actual benefits) they do not have an actual department but Newcastle Invest does. They do a good job

We have our machine learning club: google is based in kings cross, but we could be their representative. (the machine learning club is well built and run every month now), so that openlab or google does not need to create a platform or build up the connection. We create it for them. Same thing is ORE Catapult.