

**Business Incubators as International Knowledge Intermediaries:
Exploring their role in the internationalization of start-ups from an
emerging market**

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Abstract

This paper investigates how business incubators facilitate the international growth of start-up clients originating from emerging markets. Drawing key insights from a network perspective, we explore the processes by which business incubators create international linkages between the networks of knowledge creation and knowledge application. Our analysis of interviews and archival data on five Chinese high-tech business incubators reveals that clients-interface, market-interface, and knowledge recombination practices of the business incubators create international knowledge linkages, which in turn facilitate the international growth of their start-up clients. This role of incubators as knowledge intermediaries is achieved through several networking and learning mechanisms, including clustering and coaching of international clients, upstream and downstream networking in international markets, and client-market matchmaking internally. This study demonstrates business incubators as an efficient modality of internationalization for locally bound international knowledge and network scarce start-up clients.

Keywords: business incubators, internationalization, knowledge intermediary, start-up clients, emerging markets, network

1. Introduction

Business incubators provide important intermediary services facilitating the growth of start-up clients. From an institutional perspective, researchers argue that business incubators are a form of institutional intermediary (Dutt et al., 2016; Mair et al., 2012) which connect start-up clients with various market actors such as investors and customers, while providing physical and intellectual resources internally (Phan et al., 2005; Rothaermel and Thursby, 2005). These connections and resources are often difficult and costly for start-up clients to acquire in the open market, especially when facing underdeveloped market institutions and a lack of support from intermediaries in their local markets (Mair et al., 2012). As institutional intermediaries, business incubators utilize their knowledge and network-based assets to substitute for the underdeveloped market institutions that are prevalent in emerging markets (Aernoudt, 2004; Khanna and Palepu, 2010).

From the institutional perspective, existing studies of business incubators tend to focus on their expertise in dealing with location-specific institutional conditions, typically within a single emerging economy (e.g., Dutt et al., 2016; Mair et al., 2012). Such location-specific institutional expertise is insufficient for business incubators to facilitate the growth of start-up clients who have global scalability potentials. As many start-ups possess new-to-the-world innovation and therefore high potential to succeed globally (Cannone and Ughetto, 2014; Zahra et al., 2000), we need an understanding about how business incubators expand their intermediary role beyond the local context.

In this study, we address this knowledge gap from a network perspective that emphasizes the role of networks in the internationalization of firms (Aharonson et al., 2020; Johanson and Vahlne 2009), especially as vital sources of experiential knowledge in the process of the international growth of firms (Autio et al., 2000; Blackburne and Buckley, 2019). From this perspective, we consider business incubators as knowledge intermediaries

that connect and leverage the international networks of knowledge creation and knowledge application through their client-interface (supply side of innovation) and market-interface (demand side of innovation) activities. Based on this premise, this study aims to answer the following research question: *how do business incubators perform the role of knowledge intermediary to facilitate the internationalization of start-up clients?*

Empirically, we adopt the multiple case study method to explore the specific client-interface, market-interface, and internal activities of business incubators that facilitate the internationalization of start-up clients originating from emerging markets. We draw on longitudinal and comparative case evidence from five business incubators from China that have international operations. As state-led economic upgrades in China increasingly promote entrepreneurship and innovation, Chinese business incubators are expanding rapidly (Xu, 2010), where a number of them, by expanding their operations internationally, are re-positioning themselves from local experts to international entrepreneurial platforms (Chen et al., 2013). By triangulating and analyzing in-depth interviews and archival qualitative data, our findings reveal that the client and market-interface activities and internal knowledge recombination activities of business incubators play significant role for the international growth of start-up clients. We conclude that the knowledge intermediary role of business incubators consists of the mechanisms of clustering and coaching international clients—upstream and downstream networking in international markets, and client-market matchmaking internally.

This study contributes to three streams of research. First, our findings provide novel insights to the network perspective of international business (IB) by focusing on the role of cross-border knowledge networks in facilitating the internationalization of start-up clients from emerging economies (Musteen et al., 2014). Compared to large multinationals, SMEs and young start-ups typically rely more extensively on network relationships as they pursue

international opportunities, due to the liabilities of newness and smallness (Musteen et al., 2010). Network relationships afford SMEs access to complementary resources, experiential knowledge and capabilities at relatively lower costs than if they had to develop them internally. Although the role of networks in the internationalization of firms has figured prominently in recent research (Chetty and Agndal, 2007; Johanson and Vahlne, 2009), how SMEs and young start-ups obtain necessary network relationships remains largely underexamined (cf. Su et al., 2020). Our findings demonstrate the role of business incubators in facilitating the internationalization process of start-up clients by bridging the gap between the international networks of knowledge creation and knowledge application.

Second, this study also contributes to the knowledge management literature. This literature has focused predominantly on internal trial and error learning and the knowledge management practices of firms (e.g., Ries, 2011; Camuffo et al., 2019). By investigating the intermediary role of business incubators interacting with business actors across knowledge networks, we advance the understanding of the inter-organizational mechanisms of knowledge management (Kothari et al., 2013; Sarala et al., 2016). Our findings show that knowledge is developed within relationships and networks, where business incubators provide efficient mechanisms for start-up clients to create, complement, and ultimately commercialize their proprietary knowledge, breaking the boundary of knowledge flow inter-organizationally and internationally.

Third, this study also answers the call for a deeper understanding of business incubators in an IB context (Blackburne and Buckley, 2019). Prior studies of business incubators have primarily investigated their role as institutional intermediaries in a domestic context (Dutt et al., 2016; Mair et al., 2012). This study contributes to the emerging literature on business incubators as a modality of foreign market entry (Blackburne and Buckley, 2019; Li, 2009). Beyond showing *what* role business incubators play in supporting new modalities of

internationalization (Blackburne and Buckley, 2019; Li, 2009), we provide insights into *how* they perform the role of knowledge intermediary in an increasingly globalized and innovation-driven economy, where network capitalism and cooperation play fundamental roles in enabling firms to develop a competitive advantage.

2. Literature Review

We review three streams of research to establish the knowledge foundation of this study. Specifically, we first examine the current state of research on business incubators, especially its intersection with IB. Second, we review the network perspective of IB which is the theoretical lens through which we analyze the role of business incubators in facilitating the internationalization of start-up firms. Third, we highlight the intersection of the knowledge management literature with the network perspective and business incubator research.

2.1. Business incubators as intermediaries

Business incubators are increasingly prevalent in knowledge and innovation-driven economies. They provide intermediary services to their clients – entrepreneurial start-ups—who possess innovative and valuable core assets but face substantial challenges in accessing supplementary assets and business know-how (Etzkowitz et al., 2005). A growing stream of research is dedicated to understanding the role of business incubators in connecting start-up clients with required supplementary assets and knowledge, which are difficult or costly for start-up clients to access from the open market, especially in environments that lack sufficient market-supporting institutions such as those observed in emerging markets. By taking an institutional perspective, many of the existing studies conceptualize business incubators as institutional intermediaries (Dutt et al., 2016; Mair et al., 2012). Business incubators can substitute for the missing market institutions and connect start-up clients with supplies of capital, facilities, and market services that support business growth (Sullivan and Sheffrin,

2003). They can also act as agents for their clients to deal with external institutional environments, by interacting with institutional actors, for example lobbying for lower business taxes and clarifying investment protocols (Phan et al., 2005), as well as being actively involved in institutional related activities (Etzkowitz et al., 2005; Hsu et al., 2003). Moreover, they can bypass the external market and directly supply physical and intellectual resources in-house to start-up clients, such as office space and management training (Rothaermel and Thursby, 2005).

Research on business incubators remains silent on whether and how such intermediary activities can be extended to an international setting to help start-up clients connect with potential international knowledge and learning sources. The institutional intermediary role of business incubators is highly related to the institutional conditions faced by start-up clients in their specific locations. In an international context, however, network barriers create challenges for internationalizing firms beyond the local institutional conditions. This is highlighted by the network perspective of IB outline below.

2.2. Internationalization from the network perspective

Borgatti and Halgin (2011) observe that a network consists of a set of actors or nodes along with a set of ties of a specified type, and those ties interconnect through shared end points to form paths that indirectly link the nodes. In the context of internationalization, a multinational enterprise can be considered a network of exchange relationships among different organizational units, including headquarters and subsidiaries (Ghoshal and Bartlett, 1990). Multinationals also depend on external knowledge networks consisting of organizations such as customers, suppliers, competitors, distributors, and regulators in home and host countries, from which the multinationals seek complementary resources, including location-specific knowledge and key know-how (Foss and Pedersen, 2002).

Seeing markets as networks of relationships, Johanson and Vahlne (2009) propose that obtaining insidership in networks plays a pivotal role in firm internationalization. This network perspective has gained prominence in the IB literature in addressing two criteria for successful internationalization. First, insidership in critical international networks helps firms to overcome liabilities of foreignness and outsidership, which would otherwise disadvantage them against incumbent firms in the host market. Second, from the network perspective, firms are constantly engaged in a knowledge creation and exchange process that extends far beyond their organizational boundaries and strategic horizons (Claver-Cortés et al., 2018; Kogut, 2000). In other words, knowledge does not accrue only from a firm's own activities, but also from its interaction with its partners and networks. Therefore, knowledge acquisition and learning from network linkages allows firms to continuously adapt, augment, and upgrade their core competencies, thus sustaining their competitive advantages in international markets (cf. Khan et al., 2018).

Adopting the network perspective, IB scholars conceptualize internationalization as a process of interacting within broad networks, where resources and information flows among members to facilitate knowledge and technology acquisition and information exchange (Borgatti and Halgin, 2011; Eapen, 2012). Accordingly, networks play an important role in sensing and seizing international opportunities as well as shaping the patterns of the international growth of multinationals (Tan and Meyer, 2011). From this theoretical perspective, empirical studies have shown that leveraging knowledge networks and linkages developed prior to internationalization plays an important role in enabling firms from emerging economies to enter developed markets (Musteen et al., 2014), and especially for start-up clients who are facing substantial challenges in accessing business know-how (Etzkowitz et al., 2005). For instance, firms are more likely to engage in international venturing and with an accelerated speed, when they hold advantageous home-country

network positions to effectively acquire and utilize foreign market knowledge (Yiu et al., 2007).

Given that networks are important for knowledge acquisition and exchange in the internationalization process—a critical question emerges as to how firms participate in knowledge networks. Prior studies have observed that the strength and quality of network ties vary substantially across firms (Li et al., 2017). Firms may need to devote on-going resources to cultivate and maintain network relationships, resources ill afforded by start-ups due to their liabilities of smallness and newness. As a result, standalone and less connected start-ups are unlikely to obtain the level of access to knowledge networks that large and established multinationals experience (Oehme and Bort, 2015; Xing et al., 2020). The question as to how start-up clients can access the knowledge networks necessary for their internationalization remains unanswered in the extant literature. Nonetheless, the knowledge management literature sheds lights on the mechanisms of knowledge creation and application, which can be extended to the inter-organizational level for understanding the knowledge intermediary role of business incubator.

2.3. Knowledge management and business incubators as knowledge intermediaries

Knowledge management is a process involving creation and exchange of knowledge, using knowledge to improve the capability and performance of firms (Khalfan et al., 2010). Knowledge management emphasized the mix of information composed of experiences, practices and procedures (Davenport and Prusak, 1998). At the inter-organizational level, a critical part of knowledge management is knowledge sharing, which refers to the knowledge exchange process (Crupi et al., 2020; Tallman et al., 2004) focusing on the relationship with external partners and the knowledge delivery process (Simao and Franco, 2018). Research shows that development of inter-organizational networks for knowledge exchange is a

common practice of firms (Rathi et al., 2014), through which firms seek and extract value from business networks (Del Giudice and Maggioni, 2014).

Therefore, the network perspective provides a theoretical lens to understand knowledge management at the inter-organizational level. International networks are global pipelines of knowledge which have emerged as an important vehicle for developing different types of innovation in emerging markets (cf. Khan et al., 2018). These networks are formed through inter-organizational relationships that facilitate the flow of knowledge, which then allows firms to recognize and capture entrepreneurial opportunities (Coviello and Munro, 1997, Ellis 2011; Su et al., 2020). These networks are especially valuable sources of vicarious learning and collaboration for resource-constrained firms, such as start-ups and SMEs, particularly those originating from emerging markets (Cano-Kollmann et al., 2018; Oehme and Bort, 2015; Puthusserry et al., 2020; Yli-Renko et al. 2001). International knowledge networks are therefore critical for start-up clients pursuing international growth and innovation (Khan et al., 2018).

Applying the network perspective to knowledge management at the inter-organizational level sheds lights on the potential knowledge intermediary role of business incubators. Prior studies demonstrate the network brokerage activities of business incubators (Amezcuca et al. 2013; Patton 2014). By providing access to external networks, incubators can enable start-up clients to develop social capital and acquire tacit knowledge through networks that would not be otherwise available to them (Davidsson and Honig 2003; Hansen et al., 2000), especially given their liabilities of newness (Mudambi and Zahra, 2007) and smallness (Maekelburger et al., 2012) limiting their own abilities to participate in international knowledge networks (Khan et al., 2015; Su et al., 2020). Specifically, business incubators can perform an intermediary role to bridge the gap between the network of knowledge creation and the network of knowledge application. The network of knowledge creation consists of start-ups

with innovative technologies or business ideas that can be identified and organized by business incubators into their client bases. The network of knowledge application consists of upstream and downstream market participants who provide the inputs and channel resources necessary for the commercialization of new technologies or business ideas.

3. Research Methods

3.1. Research context and case selection

We focused on the Chinese context based on the following three reasons. First, knowledge-seeking is a key motivation for the internationalization of many Chinese firms (Cui et al., 2014). Prior research suggests that their inexperience with the international market and their knowledge gap to global industry leaders present significant knowledge barriers for Chinese firms (Luo and Tung, 2007), and especially for start-up firms. Therefore, we expect that some form of knowledge intermediary will play a key role in the international growth path of these firms. Second, there is a growing number of Chinese business incubators actively engaged in international networks. This rising phenomenon affords us several cases with established domestic and international operations, which presented us with a diverse range of data sources for in-depth, relevant, and complementary insights. In contrast, business incubators in matured economies tend to focus on institutional intermediary roles in domestic operations, as opposed to the roles of knowledge intermediaries who facilitate the internationalization of client firms. Third, given the increasing role of business incubators in China's transition towards an innovation-oriented economy, evidenced by their rapid growth in recent years (Xu, 2010), Chinese business incubators have become an important element of the entrepreneurship ecosystem to support start-up clients as a key component of China's social and economic development (Tang et al., 2014). We secured high quality access to the chosen cases. We were able to access multiple key decision-makers in each of the incubators,

conduct multiple rounds of in-depth interviews with key managers, and triangulate information from secondary sources.

We purposefully selected five Chinese business incubators who were involved in internationalization to different degrees and who were from different industries. These were PKUcare Industrial Park (PKUcare), Beijing Changping Technology InnoDevelop Group (BCTID), TusStar of Tsinghua University (TusStar), China Communications Construction Industry Investment (CCCII), and China IPPR International (IPPR). This theoretical sampling of multiple cases allowed for replication logic, and thus produced stronger theoretical generalizations. To ensure a sufficient variety in responses, the five cases were significantly varied and were also at different stages in their internationalization and in the development of their roles as international knowledge intermediaries. PKUcare was in the earlier stages of incubator internationalization and mainly focused on the pharmaceutical industry; BCTID had more involvement and experience in IB; TusStar had set up international incubators in various markets, including the United States (US), the European Union (EU), and Southeast Asia, and represented various industries, including information technology (IT), artificial intelligence, and financial services; CCCII had mainly set up its international incubation parks in various markets/countries, focusing on different industries (i.e., real estate, transportation); and IPPR's international engineering and service incubating took place mainly in Cuba, the Dominican Republic, and countries in Southeast Asia and Central Asia.

3.2. Data collection

The cases were primarily composed of open-ended narrative data based on first-hand interviews, as well as secondary sources such as websites for information related to company histories, incubating layout, and critical growth events. The interviews we conducted were with general managers, heads of internationalization departments, heads of incubating departments, and managers at headquarters who had responsibility for specific regions or

businesses. An average of two interviewees per case company were conducted and each interview lasted one hour to one and a half hours. To ensure we obtained diverse views on the mechanisms by which business incubators perform the role of knowledge intermediaries to support the international growth of start-up clients and to reduce potential bias, we invited the manager and employees who had significant involvement in each incubator's internationalization process to participate in the interviews, which ensured the credibility (internal validity) and dependability (reliability) of our case study.

The interviews were semi-structured. Our interview protocol included three main open-ended questions related to the client-interface, market-interface, and internal activities of the business incubators.¹ We collected data until we reached the point of theoretical saturation, which means no further information could be uncovered when collecting new data to indicate the need to refine the theoretical framework (Shah and Corley, 2006). Our archival search also employed other secondary sources, as shown in Table 1.

[Insert Table 1 about here]

All eleven interviews were recorded and transcribed, with all interview data coded and inductively organized into categories. We began by reading, and then summarizing, the raw data, which then provided the basis for detailed coding and categories. During the coding process, diverse units of coded data were extracted and evaluated. Consistencies in the emerging codes were checked and diverse categories were combined as the analysis progressed. By doing this, higher order themes could be identified.

Given the exploratory nature of this research, we shifted between data collection, coding, and theorizing by intermittently revisiting the raw data and gathering new information (Welch et al., 2011). Emerging information and concepts were evaluated

¹ Please see Appendices 1-5 for exemplar responses from interviewees.

according to the data and existing literature. We developed a single case analysis for each firm based on data collection and sorting. Any uncertainties were checked and validated by interviewees. Subsequently, we moved to a cross-case analysis by contrasting cases across multiple categories. The cross-case analysis approach increased the trustworthiness and transferability of the case study's findings by sharpening the findings from the five single case analyses and also by generating new themes and concepts by comparing and contrasting the combined cases (Adcock and Collier, 2001).

3.3. Data coding and analysis

We conducted the analysis following the grounded theory approach (Glaser, 1998; Kotabe et al., 2007), which led to the construction of a conceptual model via four steps. The essence of the analysis of the qualitative data was to move between data and literature to identify a chain of evidence, and subsequently to develop a theoretical framework (Shapiro et al., 2008). First, we put all the transcribed responses from the interviewees and other secondary documents together for each case. Second, a case-by-case analysis was conducted², to allow us to go back and forth between the data and the emerging theoretical arguments (Strauss and Corbin, 1998). Themes were identified by constantly visiting and revisiting data until no more new insights about the factors emerged (Miles and Huberman, 1994). Third, a cross-case analysis was conducted (Eisenhardt, 1989) by comparing the cases and identifying any similarities and/or differences between them (Kotabe et al., 2007). Finally, a conceptual model was formulated to demonstrate the links between the emergent themes and patterns. Figure 1 provides a schematic overview of the analytical process.

[Insert Figure 1 here]

² For detailed examples, please see Appendices 1-5.

More specifically, to create provisional categories and first-order codes we identified descriptions and expressions from our qualitative data and placed them into relevant thematic categories by performing open coding. Following the procedures suggested by Miles and Huberman (1994), our first-order codes provided descriptive labels for the different expressions we recorded in the interviews. We also followed the suggestions of Pratt et al. (2006) to either correct a category or to re-conceptualize it if it did not fit well with the data upon further review. We then clarified themes by comparing the first-order codes with one another (Strauss and Corbin, 1998). Through this step, we created second-order themes which were more abstract and theory-rich. The analytical coding process was inductive and recursive. The coding was first done by individual researchers and then reviewed by the research team, ensuring the auditability of the data analysis. The team met numerous times to assess the categorical fidelity of the emerging codes, which helped to refine the code base (Creed et al., 2010). As a result of these processes, the important dimensions from the sets of second-order themes were identified. Finally, we developed the conceptual framework as shown in Figure 2.

[Insert Figure 2 here]

4. Findings

As shown in Figure 2, we classified the three processes that business incubators perform in their role of knowledge intermediary to support the international growth of start-ups (their client firms) as: (1) facilitating knowledge creation and networking through client-interface activities; (2) developing upstream and downstream international market networks for client firms; and, (3) utilizing knowledge from market and client interactions to achieve successful incubation.

In order to focus more specifically on how the above processes are realized, we identified clustering, coaching, upstream networking, downstream networking, and

matchmaking as the five mechanisms by which business incubators can connect with other interfaces and facilitate the internationalization and growth of start-up clients based in emerging markets. First, business incubators and international start-up clients can be connected by a clustering mechanism to facilitate the emergence of internal innovation clusters as a source of novel proprietary knowledge. This also includes business incubators and international start-up clients being connected by the coaching mechanism, where client firms are provided with training services to develop business know-how that is complementary to their novel proprietary knowledge. Second, business incubators and international markets can be connected through the upstream networking mechanism to provide access to productive assets for start-up clients. The connection by the downstream networking mechanism between business incubators and the international market can provide easy access for client firms to overseas consumers. Finally, by combining the supply and demand knowledge required for innovation, business incubators can work as a knowledge intermediary to seek matches between international client firms and international markets. Through integrating these insights, our analysis informs a conceptual model which explains how business incubators perform the role of a knowledge intermediary (see Figure 2). We discuss these findings in greater detail below.

4.1. Business incubators as a cradle of knowledge exchange and internationalization

Regarding knowledge creation by international client firms, business incubators respond to the challenges of their client firms, who are facing resource and capability constraints when they scale internationally, by facilitating the emergence of both novel proprietary and complementary knowledge. They are primarily able to do this by relying on innovation clustering, through expanding their client base internationally, and enabling information exchange. Business incubators also help start-up clients develop supplementary knowledge by providing coaching services to their client firms. In this strategic response,

knowledge will in turn contribute to the generation of innovation and variation during the internationalization of start-up clients. By doing so, business incubators can facilitate the generation of variations through client-interface activities, or the knowledge variation process through client-interface activities between business incubators and international start-up clients in the case study incubators as outlined below.

PKUcare was established in 2010, after having established a strong position in the pharmaceutical and medical industries in Beijing. It faced several challenges and complexities in terms of a lack of advanced technologies, a lack of an extensive and high quality client base (due to its new position in the domestic market), and a lack of knowledge and skills specific to the medical/pharmaceutical industry. Client firms of PKUcare are focused on the medical biotechnology and health industries which comply with the incubating industrial domain of PKUcare. In these industries, technology and innovation are essential resources for start-up firms. However, due to the constraints they face in becoming global, it is necessary for their incubators to assist them in seeking original knowledge and technologies from advanced countries. To mitigate these challenges, the top management team of PKUcare visited Israel several times to negotiate a cooperation mode with an innovation incubator named Treadlines, in order to exchange updated information about novel technologies and industrial knowledge, as well as to seek more firms to become clients of PKUcare's incubator. As one manager noted:

*We Chinese firms lagged behind, to be frank, more than ten years ... we travelled to find the source of technology and the ability to innovate, information, knowledge...I believe these are not in China, they are outside ... we consciously go globally and find what we need, like new pharmaceutical knowledge, medical innovation talents ...our client firms need these for their development...
It was a challenge to find out start-ups with good project potential to come into our business incubator ... incubators should be in different countries, our team should be in different locations ... by the way, clients should also be based in different locations and different countries...*

PKUcare hence overcame these challenging conditions in the internationalization process of their international client firms by actively interacting with them. By doing so, new knowledge could be exchanged among the enlarged client base, and novel knowledge for innovation could be generated. PKUcare's ability to do this stemmed from its willingness to expand their client base and to provide information to their clients who did not have easy access to that information. It easily connected with the international firms who were sources of novel proprietary knowledge and could provide essential information and expertise to help PKUcare's clients. As reported by the General Manager of PKUcare:

We need information and open minded way of thinking for start-ups as well as the development of PKUcare incubator... this is not about money, but about most valuable sources that must be explored globally for long term internal innovation... industrial resource ...they are in different places...there should be a platform provided by us with enough information and knowledge to encourage emergence of more knowledge from start-ups internally...

BCTID was established in 2015. The firm lacked the resources required to increase their infrastructure, innovation capacity, and investment funds. This is a government-supported business incubator and as part of their responsibilities to the government they must facilitate local start-ups and entrepreneurial firms. BCTID also faced significant competition from other incubating organizations, especially the non-government ones who were market-oriented and possessed leading innovation capacities. As reported by the BCTID Manager:

We have a long-standing relationship with ... government and other regulators ... while we are pressured for lacking new technology and a vigorous innovative team ... The only way is to establish some mechanism to go abroad... Previous practice on this show that this knowledge is good for firms to develop further knowledge ... It is believed that we are moving quickly on the way to internationalization ... we established subsidiaries in America and other countries, we have real business, we brought very good projects back to Beijing, these projects can bring us some new ideas of the most advanced technology... we accumulate and expand our client firms...they can be partners, can exchange information and experience, can work together to generate innovative ideas...

BCTID sought to overcome the challenges experienced by their client firms by working intensively with foreign incubators and by enlarging their client base for information

exchange and knowledge generation. This included working with the managers of other incubators and start-up clients, as well as consulting with professors from various universities. They broke their location boundary and established close linkages with international firms to help their clients generate proprietary knowledge. A senior manager in charge of the IB department reported:

We see it as a location-flexible platform to nurture our start-up clients... our start-ups are very competent in terms of generating new ideas, learning advanced knowledge, so our function is to support them with innovative ideas, with proprietary knowledge...we give them information exchange platform, international client resources, market knowledge in foreign markets...We also teach them cultural differences of different countries...we are supposed to be the middle-man to connect them with the possibility of knowledge generation ...

Although BCTID are far more advanced in internationalization than PKUcare, the efforts of both incubators stemmed from the need to establish information and knowledge connections on the incubation platform. The two cases both illustrate the client-interface activities of business incubators, as well as how they initiated the role of “middleman” or intermediary to facilitate variation as the source of novel proprietary knowledge for their client firms.

Founded in 1999, TusStar, a university-run business incubator, specializes in incubating and seed stage investments. The firm started to internationalize and established its first global incubator in America in 2012, named Innospring, and subsequently started moving further toward internationalization. It now has more than 270 innovation incubators and scientific parks globally. For example, one incubator specializes in energy saving solutions in Thailand, and another cooperates with the University of Michigan and specializes in intelligence manufacturing.

In the case of TusStar, its client firms have numerous technical and innovation requirements that can only be found in global markets, which motivated TusStar to undertake internationalization. There was a need to establish a bridge and platform to connect with

technologies and advanced innovation capabilities globally. In addition to university-run enterprises, TusStar followed the call of China's overseas strategy of scientific innovation. As one manager said:

Tsinghua University very much emphasized knowledge and innovation. TusStar was born with the mission to generate proprietary knowledge. So we were very early to try to go abroad...what we did from early 2000 is to build a platform or bridge for domestic start-ups seek connections with outside...they urgently need core technologies upgraded...

Building on their experience from learning and practice, TusStar actively and continuously seeks connections, and has been able to enhance information exchange and advanced technology acquisitions by bridging their existing client firms with both domestic and foreign incubators.

Based on the case findings, we suggest the following proposition:

Proposition 1. *By expanding the client base internationally and enabling knowledge exchange among domestic and international start-up clients, business incubators facilitate the emergence of internal innovation clusters as sources of novel proprietary knowledge.*

As the preceding cases show, business incubators perform the role of knowledge intermediary to support the knowledge creation of start-up clients. Business incubators take their international client network as enablers to facilitate the emergence of internal innovation clusters (i.e., novel proprietary knowledge). It also undertakes a coaching position, providing training to their client firms on general business knowledge.

For example, PKUcare has the position "Training Manager" in their Incubating and Innovation Department. They oversee collecting information and expertise from international markets and organize regular training and coaching. As one manager noted:

...we want to help our clients become familiar with how to do business in foreign markets...provide them with updated industrial regulations and policies...This can provide them some general business knowledge and make them move forward...

Similarly, CCCII's embeddedness in acquiring international market information and expertise made it easier for its client firms to develop their business know-how knowledge.

As the Manager of the International Capacity Cooperation Department noted:

Our internationalization strategy is based on the character of our industry platform... our role is intermediary or middle man... we value training very much ...we have a lot of great local knowledge and experience to be shared among our client firms....we regularly collect their requirement in survey or telephone interview about training and coaching, including what topic they think are helpful, what kind of help when operating in international market they need. We also provide them a lot of international market information and culture knowledge which can help them better survive in host country...

In the case of IPPR and TusStar, they also have systematic training and internal routines to share experience. IPPR pays great attention to industrial regulations and policies and provides this kind of supplementary knowledge to its client firms. TusStar emphasized supplementary knowledge in business know-how as being helpful for their start-up clients in generating innovation and novel proprietary knowledge.

Based on the case findings, we suggest the following proposition:

Proposition 2. *By drawing on the knowledge and expertise acquired from international markets, business incubators can provide coaching services that help their start-up clients to develop the business know-how that is complementary to their novel proprietary knowledge base.*

4.2. Developing networks for start-up clients in the upstream and downstream value chain

In the aspect of selection from international markets, business incubators respond to the constraints of scale internationally by moving one step further to build networks with access to supply and demand. On the one hand, through this supply network, which provides upstream access to overseas productive assets, business incubators can support the survival of client firms in international factor market selection. On the other hand, through the demand network, which provides downstream access to overseas consumers, business incubators can support the survival of client firms in international product market selection. In this way, the

generated knowledge variations can be selected by international markets to survive during the process of internationalization of start-up clients. By doing so, business incubators can increase the chances of firms surviving selection during international market-interface activities. We found evidence of the selection process through market-interface activities between business incubators and the international market in our sample cases.

In the case of PKUcare, the primary work in market-interface activities is to establish different kinds of networks to support the international market entry of start-up clients. In functioning as an intermediary, business incubators acquire and learn market knowledge from international markets that are seen as a venue of market selection. In particular, PKUcare focuses only on medical and pharmaceutical areas, and the notable professional network it has built is very supportive of its start-up clients. As one manager said:

Our global connections, including medical, pharmaceutical, doctors networks, all of these industrial guanxi will go like the snowball...they themselves will attract more linkages and connections...become bigger and better on our platform...we emphasize a lot of the networks due to great competition our clients face...we attract service providers...Otherwise it may be easy for them to die...

One of the salient challenges faced by BCTID when supporting the internationalization process for their client firms was to build efficient supply and demand international networks. Although BCTID had established connections globally, this resulted in the need to find a mechanism to make best use of these global connections. For BCTID, this challenge was a situation it faced when it entered a certain stage of internationalization. They realized that the industrial value chain was not only competitive locally (e.g., land/infrastructure providers, funds, manufacturing companies), they were also the exact resources that could support start-up clients to become competitive in the global market. Meanwhile, these resources are also attractive to new clients. As BCTID became increasingly aware of the importance of these competitive advantages in internationalization for their clients and themselves, they actively built upstream networks to access international productive assets. As one manager noted:

We have an online system, build the upstream and downstream linkages and keep the information updated regularly... We updated this system regularly and keep it updated when we have some new service providers... this is essential for them (start-ups) to become competitive in global market... We also organized online projects enrol, and offline roadshow to help more start-ups have the chance to be selected...

TusStar also valued their international network in attracting clients. TusStar had already established an international network, which was largely characterized by its attention to leverage the network to increase the chances of clients surviving. The company also sought to build its networks with One Belt One Road countries. The international incubating strategy was to set up corresponding networks in both home and host countries. To be specific, when TusStar invested in Egypt, they enrolled some manufacturing start-ups to connect with a start-up in China to support the manufacturing demands of the Chinese start-up. As one manager noted:

On our platform, we provide packaged networks to all start-ups ... why packaged networks? this is our advantage compared with other incubators ... we have a lot of professional market resources from these networks, like manufacturing, public relations, advertising and sales... they need these help to be outstanding in market competition...

Another manager of TusStar explained:

We attract start-ups from America in our incubator in Beijing ... meanwhile, we introduce local projects into our incubator in Silicon Valley ... management experience, technologies and lower labour cost, and market channel are freely mobile on our resource platform... easy bridge means easy survival...

Like PKUcare, BCTID, and TusStar, CCCII also values the upstream networks. Its international incubating strategy was to set up corresponding networks in both home and host countries. For example, when CCCII invested in Pakistan, they realized that the land provider, infrastructure company, and manufacturing company were very important for their client firms as well as themselves to survive and be competitive in the global market. Hence, they actively built upstream networks to access international productive assets. Meanwhile, they established a corresponding base in mainland China as an industrial match for further cooperation. As one manager noted:

Most of our client firms are very green hand in how to connect with international service providers ...so we accumulate the network for them and provide them with access to these local companies when they match...

Building on the realization that upstream networks were very much valued in supporting the likelihood of being selected by international factor markets and international product markets, IPPR managed to encourage their client firms to be highly involved in these networks and to have clear targets regarding their involvement. As one senior manager noted:

We depend on our clients, investors, government, and third parties internationally... We would like to power us by connecting with more good projects and investors...we have a lot of professional market resources from these networks, we are good at building public relations, finding qualified local workers...our client firms they need these help to be outstanding in market competition...

Our findings suggest that the international market-interface activities focus on upstream networking with firms in the global value chain, and such mechanisms can be enabled by overseas productive assets, which contribute to the chances of start-up clients surviving in international factor markets.

Based on the case findings, we suggest the following proposition:

Proposition 3. *Business incubators build upstream networks to acquire knowledge of international factor markets, which enables their start-up clients to access complementary productive assets overseas.*

The findings from the five cases indicate that business incubators perform the role of knowledge intermediary to provide services on knowledge selection to their start-up clients. They all focus on upstream networking to provide easy and systemized access to international productive assets and resources given that start-up clients lack access to such international networks. Additionally, business incubators also perform as knowledge intermediaries to build downstream networks which are complementary to their productive assets overseas.

BCTID also built downstream networks to access important international consumers. They have a customer recording management system which provides detailed customer

networking information. BCTID emphasizes customer networking due to the network resources being essential to the survival of, and successful operation by, their clients in foreign markets. As one manager mentioned:

On our platform, customers and market share are important for our client firms to survive in the fierce global competition...we encourage them to specify what they need first because some of them are diversified...

Similarly, Tuspark, CCCII, and IPPR also emphasized market and consumers when they performed as knowledge intermediaries to support the internationalization of their clients. An essential part of training in Tuspark is consumer knowledge in the global market, including consumer preference, changes in consumer behaviours, and marketing skills. This is the same with IPPR and CCCII. Managers from IPPR noted:

...we want to help our client firms become familiar with how to do business with foreign consumers...provide them with updated consumer information, knowledge. Sometimes we also introduce consumers to them directly...This can provide them more opportunities to make profit...

Such findings show that business incubators engage in the market-interface activities of internationalization. In addition to upstream networking, international market-interface activities also focus on downstream networking, which can be enabled by the overseas consumer resources provided by business incubators to facilitate the successful internationalization of their start-up clients.

Based on the case findings, we suggest the following proposition:

Proposition 4. *Business incubators build downstream networks to acquire knowledge of international product markets, which enables their start-up clients to access foreign market demands.*

4.3. Matchmaking by integrating supply and demand side knowledge

Functioning as a knowledge intermediary between the international markets and clients, business incubators respond to and provide solutions for the challenges of their client firms who experience difficulties in managing knowledge during their quest for

internationalization. We find that through the networking mechanisms (see Proposition 3 and 4), business incubators search for the most efficient and profitable patterns to recombine the knowledge from an international client-interface (the upstream ‘supply’ side) and from an international market-interface (the downstream ‘demand’ side). They actively match the two interfaces (i.e., start-up clients and international markets), and serve in the role of knowledge intermediaries to facilitate the innovation of products and services from their clients. Successful incubation can become routine and replicated in future’s internationalization practice. The strategies of the five incubators in performing the role of knowledge intermediary to support the international growth of start-up clients are clear case examples of this mechanism.

For instance, PKUcare utilizes knowledge from the international market, as well as from the interaction among different clients. It achieves successful incubation by recombining and configuring the supply and demand side knowledge for innovation. Business incubators facilitate the generation of knowledge through client-interface activities and support their start-up clients surviving from market selection. They replicate the successful incubation through matchmaking. This mechanism is enabled by the interactions between market and client, who are then linked by business incubators who perform the role of knowledge intermediary. As the case of PKUcare shows, complementary knowledge for innovation is accessible due to the network and client base of business incubators, which is beneficial to the recombining process.

BCTID also uses the recombining response to manage knowledge from international market and client interactions to replicate successful incubation. It also emphasizes market requirements when combining and matchmaking for higher efficiency and profit. As mentioned by a BCTID manager:

As international business incubator, on the one hand, we have international clients, on the other hand, we connect tightly with international market...our role is to get things

combined in different patterns and matched according to market requirements...match knowledge between client and market, between supply and demand...

TusStar supports the international growth of its start-up clients. It performs the role of knowledge intermediary, matching supply and demand knowledge innovation. TusStar has established branches in most of the big, as well as some of the medium and small, cities in China, as well as in many other countries. In particular, the incubator provides comprehensive and extensive matchmaking support to its start-up clients. It incorporates knowledge components into its functioning and thus has increased the intermediary complexity, which has made the retention more stable and energetic and has also provided an enormous range of diversity across different locations. As noted by one TusStar manager:

Our existing customers in our Beijing incubator are very happy when we established the incubator in Israel and America...they can attract more resources themselves when they registered in our foreign platform ... they prefer our platform since the same concept, business model, resource allocation, knowledge supply, professional matching...

As shown, CCCII makes matches between international clients and markets in a more efficient and profitable way. It has established international subsidiaries, branches, and/or offices in different cities to provide professional and quick matchmaking services to its client firms. It also established corresponding local subsidiaries, branches, and/or offices in China for better “point-to-point” industrial matching, which can bring more energetic retention across different industries. As mentioned by a CCCII manager:

For us, it is important to compare different elements of knowledge in different locations for our clients and then match the fit to each other... After finding out the most efficient and profit way, we can purposely work on configuring different kinds of knowledge on our international platform to maximize its successful value...

Similar to the other four companies, IPPR also replicates the successful mechanism through matchmaking and retention of network relationships. IPPR itself works as the knowledge transfer middleman, providing a platform between the market and client. As mentioned by an IPPR manager:

Our business knowledge is accessible because we have network, this is beneficial to the knowledge recombining process. You have to re-process it, and then you can reach efficiency...it will take time and better to develop it as a routine; I think it is worth the effort...

Based on the case findings, we suggest the following proposition:

Proposition 5. *By recombining the supply and demand side knowledge for innovation, business incubators can efficiently identify profitable matches between their start-up clients and international market opportunities.*

Taken together, the above findings constitute the specific mechanisms by which business incubators perform the role of knowledge intermediary to support the internationalization of emerging market start-up clients. As demonstrated in our analysis of the case firms, the processes are facilitated by the mechanisms of clustering, coaching, upstream networking, downstream networking, and matchmaking. The framework in Figure 2 shows how particular processes and mechanisms of business incubators perform as knowledge intermediaries to facilitate the internationalization of start-up clients.

5. Discussion and Conclusions

Business incubators have emerged as an important new form of support organization to start-up clients across developed and emerging markets. Existing studies have highlighted the institutional intermediary role of incubators. Yet there are relatively limited studies that have investigated the roles of business incubators from the international network and knowledge perspectives, as well as the mechanisms that facilitate the internationalization of their start-up clients. The aim of this study was to investigate how business incubators serve the role of knowledge intermediary between international markets and their client firms. Our findings contribute to the network perspective of IB research by providing insights of how knowledge networks facilitate the internationalization of emerging markets' start-up clients.

5.1. Implications for theory

First, this study contributes to our understanding of the business incubator beyond its role of institutional intermediary in the domestic context (Aernoudt, 2004; Dutt et al., 2016; Mair et al., 2012). In the international context, recent research has begun to explore the role of business incubators as an efficient modality that can provide low cost and high control options to local start-ups (Blackburne and Buckley, 2019; Ulrich and Hollensen, 2014). Our study expands on this research and documents the important knowledge intermediary role of incubators. Business incubators are not only knowledge broker connecting start-up clients but also work as an important knowledge sources themselves serving as an international knowledge platform. The longitudinal case findings, including propositions and the conceptual framework presented in Figure 2, drill into the roles of business incubators during the internationalization of their start-up clients as well as the underlying mechanisms for knowledge creation and application (i.e., clustering, coaching, upstream networking, downstream networking, and matchmaking). Thus, this study is a valuable addition to the emerging stream of research on incubators in the current IB literature, by explaining the roles of business incubators in the internationalization of start-up clients (Blackburne and Buckley, 2019; Li, 2009). More importantly, our findings explain *how* business incubators serve as an internationalization platform for internationally disconnected small local start-up clients. Incubators provide the important function of network broker to start-up clients based in emerging markets. By gaining access to international networks of knowledge creation and knowledge application, these start-up clients can develop absorptive capacity which is critical for their internationalization and innovation (Khan et al, 2018; Patton, 2014; Santoro et al., 2020). These findings resonate with the recent research, which highlight the important role of global networks for exploratory innovation for emerging economy-based firms.

Second, our findings demonstrate that business incubators span the boundaries between international markets and the international clients of their start-up clients as a knowledge intermediary through the aforementioned five mechanisms (see Figure 2). Through these mechanisms—business incubators help resolve knowledge issues, such as knowledge access, acquisition, and learning, and thus overcome some of the liabilities of smallness and newness of emerging markets’ start-up clients in their internationalization processes. With few exceptions (e.g., Khan et al., 2015), extant IB and knowledge transfer studies on the boundary spanning knowledge intermediary role of business incubators have focused on the individual level, such as foreign expatriates and managers (cf., Johnson and Duxbury, 2010; Minbaeva and Michailova, 2004; Patriotta et al., 2013). As the findings of this study demonstrate, the business incubator role of knowledge intermediaries is critically important—particularly for knowledge scarce start-ups and SMEs originating from emerging economies, in order to build networks in international value chains as well as for knowledge exchange and learning (Hansen et al., 2000; Su et al., 2020). More specifically, the findings suggest that business incubators play important knowledge intermediary roles in matching and integrating knowledge from both the supply and demand sides through spanning international client and market-interfaces (see Proposition 5) and underlying mechanisms for knowledge creation and application (see Figure 2). Thus, our research captures the role of business incubators as a facilitator of knowledge exchange and transfer in the internationalization of emerging market start-up clients.

Third, this study also contributes to the research on the network perspective. More start-ups and SMEs are interested in global markets, yet remain fearful of the risks and difficulties involved due to several liabilities such as smallness, newness, and having a weak resource base, and this opens the way for the use of business incubators, as knowledge networks in order to gain foreign market entry (Blackburne and Buckley, 2019). Accordingly, our

findings shed important light on the network role of business incubators in connecting emerging markets' start-ups with the international sources of knowledge, which in turn enable their internationalization through gaining direct experiential and vicarious knowledge (Huber, 1991; Johanson and Vahlne, 2009). We provide a novel understanding of the role of cross-border knowledge networks in facilitating the internationalization of high-tech start-ups from emerging markets. The growth of high-tech start-ups is hindered by the gap between the network of knowledge creation and the network of knowledge application. While the high-tech start-ups possess innovative ideas with commercialization potential, the application of their novel knowledge requires understanding of the institutional environment and complementary resource inputs from upstream and downstream markets (Cavusgil and Knight, 2015; Yoon and Hughes, 2016). With the liabilities of newness and smallness, high-tech start-ups rely on the knowledge intermediary role of business incubators to bridge the gap between the networks of knowledge creation and application. Unlike prior studies which have focused on the inter-organizational arrangements between large and mature multinationals or the positioning of those firms in a network, we expand this research stream by investigating the intermediation mechanisms between networks as an important conduit for the internationalization of start-up clients.

Forth, this study also contributes to the research on knowledge management. From the perspective of inter-organizational arrangements for knowledge management (Crupi et al., 2020; Del Giudice and Maggioni, 2014), our analysis highlights the business incubation platform as a form of network specified in inter-organizational arrangements for knowledge management, which provides efficient mechanisms for start-up clients to generate, complement, and ultimately commercialize their proprietary knowledge, which in turn enables their international growth. Knowledge intermediary role of business incubators linking networks of knowledge creation and application provides us fresh understanding of

matchmaking as an important function of knowledge management, complementary to knowledge creation, storage and dissemination (Rathi et al., 2014). Specifically, business incubators match client-interface with market-interface among different sources of knowledge, functioning as knowledge match-making intermediary. Our research also clarified the mechanism of how knowledge flows and matches in global market with international clients—thus enriching knowledge management literature in the IB context.

5.2. Implications for practice

The findings of this study have various implications for managers. First, the managers of small start-ups aiming to expand in international markets need to leveraging their local business incubators as important means to overcome their lack of access to international knowledge and networks sources, which in turn can enable their expansion into foreign markets. Second, the findings of this study suggest that the managers of emerging markets' start-ups need to strategically review internationally capable local and/or foreign business incubators at home and choose those business incubators that are well connected both in the domestic and international markets. Such dual embeddedness of business incubator is important for local start-ups to gain direct experiential and vicarious knowledge from their well-connected business incubators. . Such embeddedness is important, as through this, the managers of emerging markets' start-up will be in a better position to take advantage of matchmaking support of business incubators. Through such support, the start-up can then overcome their liabilities of newness and smallness. Third, the findings suggests that those managers of start-up firms seeking to operate internationally need to understand the importance of international knowledge networks as important conduits to develop capabilities which can aid their internationalization. Becoming an insider in networks, even before the foundation of a start-up, can be instrumental to compete in today's dynamic and complex IB environment which is viewed as a web of relationships and networks instead of independent

suppliers and customers (Coviello, 2006; Johanson and Vahlne, 2009). Thus, the managers of start-ups should actively search and integrate knowledge emerging from diverse networks.

The findings of this study have also implications for business incubators. The findings indicate that the business incubators based in emerging markets in order to help their start-up clients rapidly internationalize, they need to develop their own business platforms, which will be capable of gaining more international resources, increasing international connections, and navigating obstacles to international growth. For instance, business incubators can strategically ally with foreign business incubators and industrial clusters in other countries (Lew et al., 2018). Also, it is vital for business incubators to realize the importance of organizing a platform on which they can provide multiple sources of knowledge and network assets to start-up clients in both home and host countries. Overall, our findings suggest that top managers and decision-makers of business incubators need to develop their own organizational capabilities for identifying and clustering innovation activities, in coaching skills and know-how, in developing various networks in global value chains (including potential international clients), and in matchmaking international clients. Such efforts by business incubators will ultimately increase the popularity and participation rate, as well as enhance the sustainability and international growth of business incubators themselves.

5.3. Limitations and future research directions

As with all research, our study has limitations, which provide important opportunities for future research. First, our data was limited to five business incubators, which may reduce the robustness of our results, and caution should be used in making any generalizations from this study. This limitation was partly due to the phenomenon we investigated, the internationalization of start-up clients through business incubators, which has only recently emerged as an important topic of scholarly interest in the field of IB and strategy. To address this limitation, at least in part, we used triangulation approaches with multiple data sources to

ensure the reliability of our findings. It should be noted that, although the developed conceptual framework is based on a relatively small number of cases, the merit of using smaller case numbers to generate theories has been increasingly recognized in IB literature (Kotabe et al., 2007; Tsui-Auch and Mollering, 2010; Welch et al., 2011). We recommend that future research conceptually draw on the evolutionary perspective on the internationalization of start-up clients, and enlarge the sample size, while replicating our research, to incorporate more diverse categories of business incubators from different institutional contexts. The role of incubators can be important in improving the performance and survival of start-up clients. Thus, it would be interesting to explore the survival rate of incubated start-ups versus those which have evolved on their own. Future researchers need to consider the political uncertainty associated with the incubator's government background, incubator policy change, and the influence of physical and institutional embeddedness on the mobility of start-up clients in the incubator.

This research investigated the boundary spanning international knowledge intermediary role of incubators as characterized by different mechanisms. This fresh research approach and context opens avenues for future research in IB. However, our findings may be limited in terms of time span. We cannot entirely exclude other additional mechanisms and dimensions which may emerge in the post-entry internationalization stages of start-up clients. Such variations may appear across a much longer time span than that of our study. In addition, successfully institutionalized start-up clients in a host country, after the post-entry internationalization stage, may reduce their dependence on the platforms of their business incubators, which may lead to more complex social and political post-entry behaviors between internationalized start-ups and business incubators (e.g., relational and structural capital, power, and conflict). To expand the time frame for understanding post-entry evolution issues, future researchers could consider collecting and analyzing longitudinal data

at different intervals. Future studies could also examine the cost and benefits of incubation and examine how do start-ups overcome costs and reap benefits through incubation.

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Tables and Figures

Table 1 Overview of the data

Business incubator	Secondary sources (company histories, company internal documents, industry reports, website etc.)	Number of informants interviewed	Informants interviewed by type
PKUcare	Company introduction, website, company weixin articles, Internal document of internationalization strategy	3	General Manager Deputy General Manager Internationalization Dept. Manager
BCTID	Internal document of internationalization strategy, website, company introduction	2	Director of Internationalization Business Internationalization Dept. Manager
TusStar	Company introduction, website	2	Director of Internationalization Dept Incubator Operation Manager
CCCII	Company introduction, website	2	Manager of International Capacity Cooperation Dept Business Manager
IPPR	Internal document of internationalization strategy, website, company introduction	2	Deputy Manager of International Engineering Dept Staff in charge of Administrative Management of International Engineering Dept

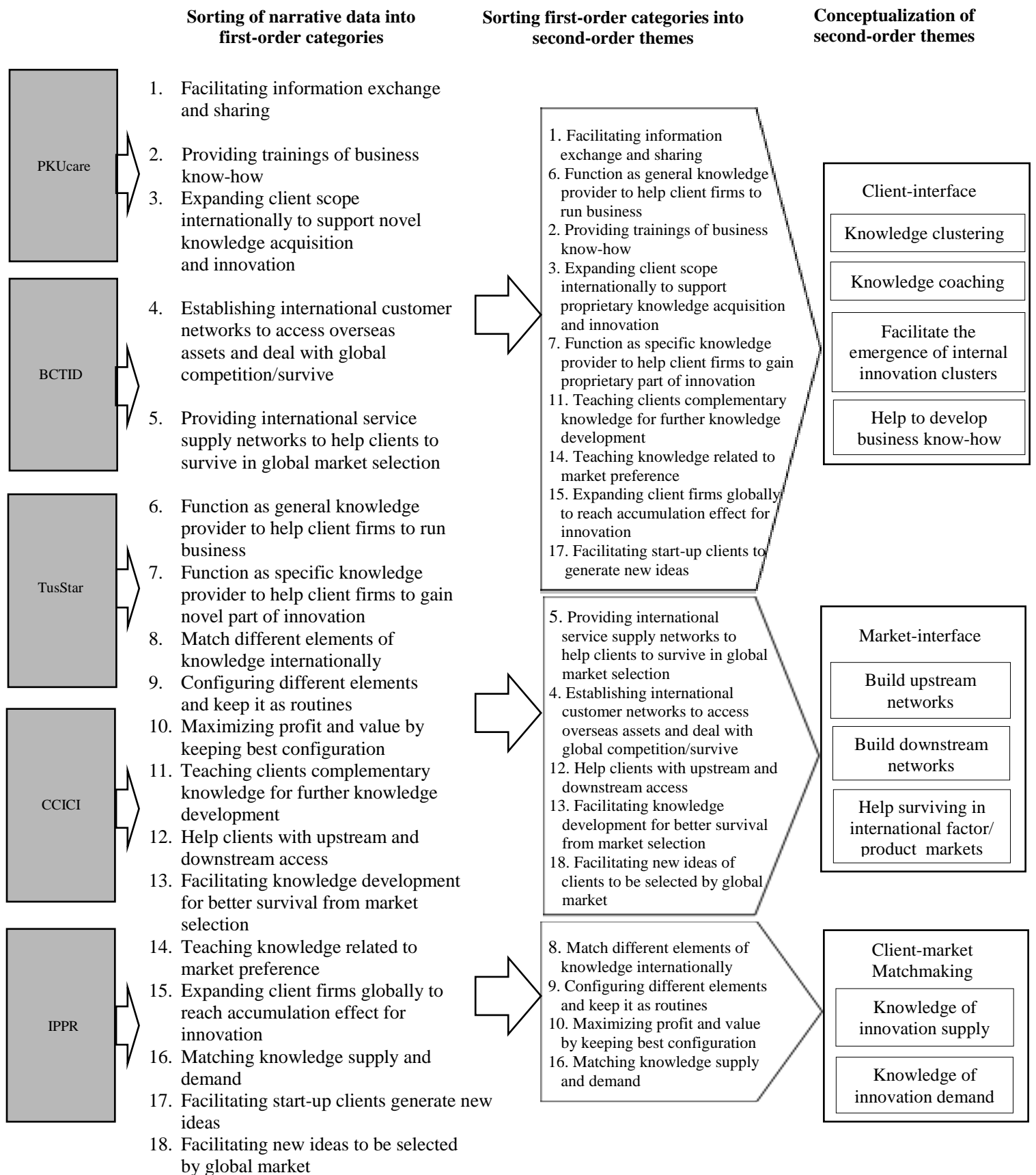


Fig. 1. Progression of data analysis

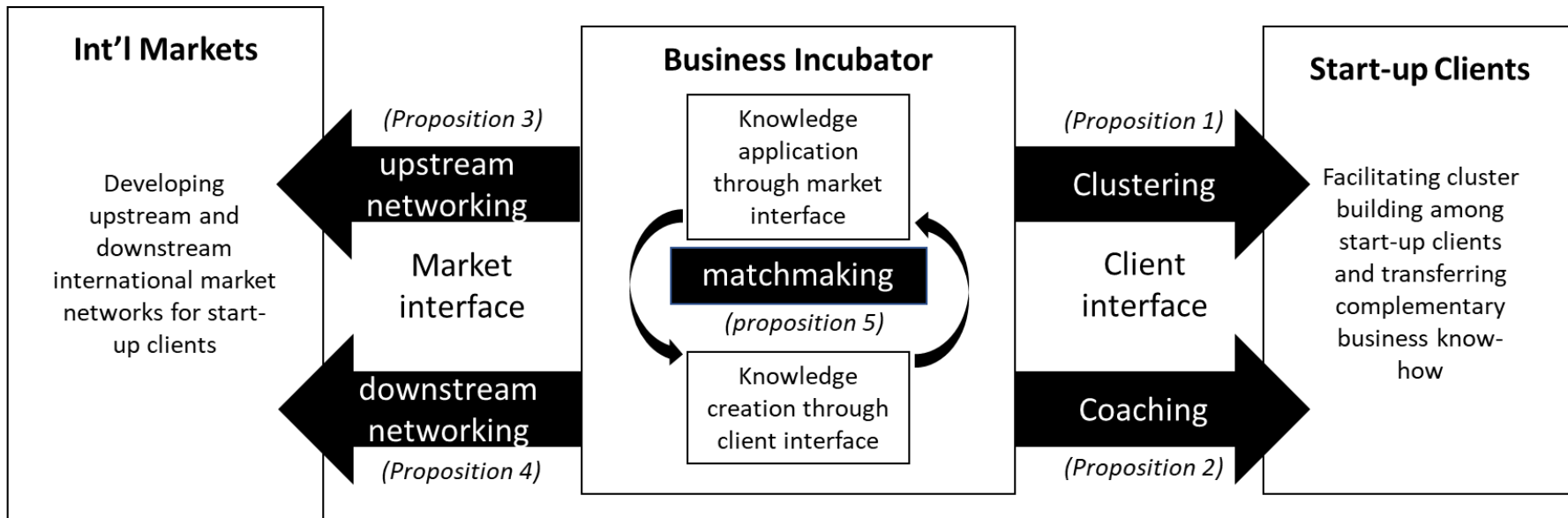


Fig. 2. Business incubators as knowledge intermediaries for the international growth of start-up clients.

Appendix 1. Identified themes from the case of PKUcare

Representative quotes	First-order categorization	Second-order theme
<p>"The information elements we provide in China become similar with that of outside China because we have learnt a lot from them and provide a lot of trainings of business know-how..." (Deputy general manager)</p>	<p>Facilitate information exchange among client firms and provide trainings of business know-how to clients</p>	
<p>"Our incubator and the start-ups, they move flexibly for the most suitable information thus to survive. This is also true for incubators to expand their client scope in foreign markets... This is good for new core knowledge; good for innovation...we need it very much..." (International dept. manager)</p>	<p>Help information move flexibly; incubators expand client scope internationally to support core knowledge acquisition and innovation</p>	
<p>"As a marriage, couples... We also combine market information like marriage in internationalization process. Not only each side can provide some benefits to others but also make the local elements tie closely into a network with foreign elements by exchanging and extending...we want to help our clients become familiar with how to do business in foreign markets...provide them with updated industrial regulations and policies...This can make us move forward." (General manager)</p>	<p>Combine benefits of different parties into a network;</p>	<p>Facilitating knowledge creation and networking through client interface activities</p>
<p>"Our information, including medical, pharmaceutical, doctors information, all of these industrial information will go like the snowball...they themselves will attract more linkages and connections...become bigger and better on our platform...we emphasize a lot of the networks due to great competition...we attract service providers" (General manager)</p>	<p>Build networks to help clients deal with competition</p>	

"We purposely create an on-line service platform that is our core competence...Our clients love this because it helps them to survive... At the very beginning, we only care about local information and provide services to local start-ups but now the location boundary was extended into global markets. We release news, information, demand from other start-ups, government policies, roadshow information from investors, cooperate opportunities, everything..." (Internationalization dept. manager)

Provide service supply networks to client firms and help them to survive in global market

Developing upstream and downstream international market networks for client firms

"Sufficient information sharing and sufficient communication can give us ideas of what to do, what is right, how to speed up. They can also give our clients firms idea of how to innovate, how to make their innovative ideas into real market-loving products...acquiring general information and specific information, or you can say general knowledge and specific knowledge. They have different functions, one is how to run business, the other is core to innovation... but I believe all are our responsibility to facilitate on this..." (General manager)

General knowledge helps how to run business;
specific knowledge is at the core part of innovation;
different functions but are responsibilities of business incubators to facilitate

"We cooperate with Israil incubator named Treadlines, which has very good public policies to support start-ups. Israil government support innovation by providing 65%-85% funds to start-ups in incubator but asking for no shares. Start-ups no need to pay back to government if failed. If success, only pay back the principal and a small amount of interest. This is special in Israil, but we would like to provide it to start-ups in our ecosystem through internationalization. Then if we can provide this, and work well on our incubating system, it is our network advantages. Start-ups will like it because it is good for their survival and development...of course Israil market will select the project that they see with potential...." (Deputy manager)

Network in a global scope can help start-ups acquire good assets to survive and with good potential during market selection

Utilizing knowledge from market and client interactions to achieve successful incubation

"It is important to compare different elements of knowledge in different locations for our clients and then match the most fittable. After find out the most efficient and profit way, we can purposely work on configuring different kinds of knowledge on our incubation platform to maximize its successful value." (Internationalization dept. manager)

Match different elements of knowledge across nations and find out the best configuration to keep it and maximize the value

Appendix 2. Identified themes from the case of BCTID

Representative quotes	First-order categorization	Second-order theme
<p>"The start-ups of our incubator are good at investigating new technical opportunities globally at the same time. They need good technology and talents...Start-ups can be asset of another start-up... This is the reason why we accumulate and expand our client firms...they can be partners, can exchange information and experience, can work together to generate innovative ideas..." (Director of internationalization business)</p>	<p>Accumulate and expand international client to help information exchange and innovative ideas generation</p>	
<p>"Our start-ups are very competent in terms of generating new ideas, learn advanced knowledge, so our function is to support them with generation of innovative ideas...we give them information exchange platform, international client resources, market knowledge in foreign markets...We also teach them cultural differences of different countries..." (Internationalization dept. manager)</p>	<p>Support client firms for their innovation with information exchange mechanism, international client resources, market knowledge and knowledge of cultural difference</p>	<p>Facilitating knowledge creation and networking through client interface activities</p>
<p>"In our incubator, there is no limit for information exchange. We encourage acquiring information from different cities, even countries...Our responsibility is to bundle good information on the platform. This is also one aim of internationalization. I believe there will be some easy pattern to bundle information...This is the basis of innovation, development and even survival..." (Director of internationalization business)</p>	<p>Information and knowledge exchange are basis for innovation, development and survival</p>	

"Our client firms have a lot of new business models, new ideas...we advise them of our knowledge that what can be probably accepted by market and what are far away from existing market, especially foreign markets..." (Director of internationalization business)

Provide client firms with international market knowledge;
teach them knowledge of market preference

Developing upstream and downstream international market networks for client firms

"Our advantages are located in Changping, Beijing but we also go global. We depend on clients, investors, government here. We would like to power us by connecting with more good projects and investors. We organized online project enroll, and offline roadshow for the selected projects. Also we provide some information about the training, like topic and introduction etc. and then organize offline training for our start-ups... They think it is very helpful and encourage us to do more because it can make them more competitive in competition..." (Internationalization dept. manager)

Provide international networks; provide trainings and information knowledge to help client firms survive in competition

"Our client firms and the project they bring to our business incubator are valuable for us and also for all other start-ups create new innovation knowledge, so we expand client firms globally...we want to see accumulation effect...investor networks and customer networks in a global scope are also essential for our client firms survival..." (Director of internationalization business)

Incubators expand client firms globally to reach accumulation effect for innovation of start-ups; investor networks and customer networks are essential for client firms survival

"Not all new things can be kept...most of them are going to disappear in market competition...what we want to do is to facilitate start-ups easy way to come to new ideas and make them be kept by market...our client firms can success and we can have profit..." (Director of internationalization business)

Facilitate start-ups easy way to generate new ideas
facilitate new ideas to be selected by market

Utilizing knowledge from market and client interactions to replicate successful incubation

"As international business incubator, on the one hand, we have international clients, on the other hand, we connect tightly with international market...our role is to get things combined in different patterns and matched according to market requirements...match knowledge between client and market, between supply and demand..." (Internationalization dept. manager)

connect, combine in different patterns and match knowledge between client and market, between supply and demand

Appendix 3. Identified themes from the case of TusStar

Representative quotes	First-order categorization	Second-order theme
<p>"Our TMT positioned us as double-connection and double-incubator for better information and knowledge matching". We set up two incubating parks when internationalize for better cooperation by building the bridges for information and networks sharing...especially international technology and Chinese market. This is good for them to focus on innovation..." (Incubator operation manager)</p>	<p>Establish two counterparts connection for knowledge sharing and network establishment;</p> <p>facilitate innovation of start-ups</p>	<p>Facilitating knowledge creation and networking through client interface activities</p>
<p>"What we did from 1999 is to build a platform or bridge for domestic start-ups go abroad...we attract important connections with outside...our strategy is to emphasize those information...I think our client firms should focus on the core part of technology, develop their core competitiveness...we can provide them basic knowledge support...as complementary..." (Incubator operation manager)</p>	<p>Provide information from foreign markets as complementary knowledge</p>	
<p>"For example, Innospring is our first international incubator located in America. The start-ups there can also come into our incubator in Beijing. Sometimes it won't be very specific, it is diversified, and all people in the group will become informed in a very short time. Then information can move quickly in our incubator platform according to the demand. If something is useful and can be applied to all client firms, like some services, we will do training and teach them to do..." (Director of internationalization dept.)</p>	<p>information move fast, diversified and in multi-points on the incubator platform;</p> <p>general knowledge will be trained and taught</p>	<p>Developing upstream and downstream international market networks for client firms</p>
<p>"For example, once we corporate with Brazil, it was impressively smooth when our network group enlarged. Otherwise it was to be pretty slow. All actors include your clients, suppliers, government, customers, even your competitors are your information and can be beneficial for incubating since information can be exchanged accurately, can save a lot of time. This is our network. Networks can be great resources for start-ups to survival..." (Incubator operation manager)</p>	<p>Network is beneficial for start-ups to survive</p>	

"From our previous experience, we think innovation, or the new knowledge, is like any market product, should consider supply and demand as well as the market condition...international market and our client firms is bridged by our great connections...only by this, things can be matched, otherwise there won't be opportunity for market survival..." (Incubator operation manager)

Innovation and new knowledge should be fit in demand when supply

international market and clients should be matched

"To do the incubator, just like nurturing a lot of kids. It is long term business. So we have to create network to them and make the information can be shared among them...Just like friends or partners, they help each other and move on together...customers are important and we are trying our best to match...due to market rules..." (Director of internationalization dept.)

Create networks to access consumers and match start-ups with consumers internationally

"It is important to exploit complementary policies among different countries. This is our platform advantage. We offer more options and sometimes packaged service for client firms which are pretty attractive to them. Actually this is good for them to generate their R&D results..." (Incubator operation manager)

Provide complementary services to client firms to help them develop knowledge that is good for their innovation

Utilizing knowledge from market and client interactions to replicate successful incubation

"Internationalization means we have more information and more choices when make decision. The only thing is to explore the best suitable choice when you have sufficient information...sometimes we need to recombine and match international market and clients...keep the good and successful experience as routines...we have some sharing mechanism of these routines..." (Director of internationalization dept.)

Recombine and match international market and clients;

keep good and successful experience as routines

Appendix 4. Identified themes from the case of CCCII

Representative quotes	First-order categorization	Second-order theme
<p>"Our platforms locate in different areas and different countries. All of the services, investors can be flexible to reach. We have easy way to exchange ideas, knowledge and experience... Why we have this? because we believe it is good for learning, and learning plus thinking are beneficial for new things... It's easy and fast...especially for international market" (Manager of international capacity cooperation dept.)</p>	<p>Easy and fast information exchange is good for knowledge development and innovation</p>	<p>Facilitating knowledge creation and networking through client interface activities</p>
<p>"We want to help our partners become familiar with how to do business in foreign markets...provide them with updated industrial regulations and government policies...This is what they really needed...This can make us move forward together."(Business manager)</p>	<p>Deliver information and experience to help partners develop knowledge in foreign markets</p>	
<p>"We teach them knowledge related to market preference, we also function as general knowledge provider to help client firms to run business in different countries due to cultural and institutional differences...we have corresponding platforms to connect local and foreign market, this is helpful for innovation..."(Manager of international capacity cooperation dept.)</p>	<p>Teach knowledge of local market for better business run; establish corresponding platforms to help innovation</p>	<p>Developing upstream and downstream international market networks for client firms</p>
<p>"We establish upstream and downstream resources on our incubating platform...we help them to position themselves on the industry chain and they will become each other's international market network...we help them get access of this..." (Manager of international capacity cooperation dept.)</p>	<p>Establish upstream and downstream resources; help client firms establish their international market network</p>	
<p>"We accumulate fund providers, industry resources...we aim to provide better network in industry chain internationally...easy access means high survival rate..." (Business manager)</p>	<p>Industry value chain network internationally can increase survival rate</p>	

"We have a strategy in our platform called "replication", which means we will try first in some countries. And then this mode will be copied and pasted in another proper country if succeed in the previous country. You know we will keep the good and successful experience as routines..."(Manager of international capacity cooperation dept.)

"replication" the successful mode and keep it

Utilizing knowledge from market and client interactions to replicate successful incubation

"From our experience, it is essential to match globally. For example, we learn the advanced technology and new energy innovation from Germany and match it with companies in Sichuan, this company in a highly demand to innovate because it has surprisingly high market demand...so good to manage and integrate and keep it as great experience..." (Manager of international capacity cooperation dept.)

Match different elements of innovation in global market; match knowledge supply and demand as well as market and client

Appendix 5. Identified themes from the case of IPPR

Representative quotes	First-order categorization	Second-order theme
<p>"We share things in a larger scope for our international business inside and outside China among our group...it is very important to exchange and share what we have, what we know...we hold a lot of meetings from different perspectives" (Deputy manager of international engineering dept.)</p>	<p>important to exchange and share things in a large scope</p>	<p>Facilitating knowledge creation and networking through client interface activities</p>
<p>"We always combine some information with other information without any location boundary concerns. We encourage our partners share the complementary ideas. We also give them training for this international knowledge... Previous practice on this show that this initial knowledge is good for firms to develop further knowledge as well as their future development in international market..." (Deputy manager of international engineering dept.)</p>	<p>Provide training to help further knowledge development and international operation</p>	
<p>"We enlarge our projects in global markets...we try to make information flow more smooth although a lot of barriers...we think this is helpful for implement new technology, new design and new ideas...what's more, only by this new ideas and new knowledge can be generated..." (Staff in charge of administrative management of international engineering dept.)</p>	<p>make information easily flow internationally to easy implement new technology and design</p>	<p>Developing upstream and downstream international market networks for client firms</p>
<p>"Customers and market share are important for our partners to survive in the fierce global competition...Sometimes they are very green hand in how to connect with international customers...so we accumulate customer information for them and provide them with access to these customer companies when they match..." (Deputy manager of international engineering dept.)</p>	<p>Provide international customer information and networks</p>	

"We have our own advantages in terms of local government relationships and our international experience, we can help our partners on the platform to be more competitive and easy survive in the market selection..." (Staff in charge of administrative management of international engineering dept.)

survive from global competition in global market selection

Utilizing knowledge from market and client interactions to replicate successful incubation

"Our international platform is growing, we add more elements from different companies and it's good for us to configure them into different combinations, fitting various international market...we will review patterns and keep them" (Deputy manager of international engineering dept.)

configure into different combinations, review and keep them