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## Building an internationally oriented open regional innovation system: a paradox perspective

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## Building an internationally oriented open regional innovation system: a paradox perspective

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**Abstract:** An open regional innovation system is often characterised by the firms' adoption of an open innovation strategy, which is closely linked to absorptive capacity. This study explores the effects of the firms' absorptive capacity on open regional innovation systems by investigating how regional firms respond to the development of an internationally oriented open regional innovation strategy. A living lab approach is adopted in this study based on the case of Sino-Finnish innovation capacity building in the Vaasa region in Finland. By addressing the tensions between exploitation and exploration innovation strategy, this research identifies three types of organisational paradox in relation to organisational absorptive capacity: (1) knowledge bases, (2) organisational policies, and (3) dominant logic. This paper also indicates the gradual evolution of the regional innovation system—the move from a centralised regional innovation system to a distributed regional innovation system, driven by the trend of globally distributed knowledge sharing.

**Keywords:** ORIS; open innovation strategy; absorptive capacity; exploitation; exploration; organisational paradox

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### 1 Introduction

In recent years, there has been increasing research on open regional innovation systems (ORISs), which are often characterised by the firms' adoption of an open innovation strategy (Belussi et al., 2010). Some studies argue that various linkages with external actors outside the RISs are key to accelerate technology development and innovation (Belussi et al., 2010; Tödtling and Trippl, 2005). Despite of the academic attention on ORISs, so far there has been a lack of studies on the usage of external resources in an international context. Absorptive capacity can be seen as the key in understanding the success or failure of a firm's open innovation strategy (Spithoven et al., 2010). At the organisational level, the concept of open innovation in relation to absorptive capacity is relatively well understood. Little attention has, however, been paid to how the

development of an ORIS might be affected by local firms' absorptive capacity. Especially, in the context of an internationally oriented ORIS, the firms often face the tension between exploitative innovation through experimentation based on existing local knowledge and explorative innovation through extensive search for potential new knowledge internationally (March, 1991; Smith and Tushman, 2005; Teece, 2012). A paradox lens has been increasingly adopted addressing how firms can manage competing demands simultaneously (Lewis, 2000; Smith et al., 2010). Some studies have indicated that choosing among competing demands might offer short-term benefits, long term success is rooted in strategic efforts to manage contradictory demands (Cameron and Quinn 1988; Lewis, 2000). So far, however, there has been lack of studies on the paradoxical tensions presented during the firms' adoption of open innovation strategies.

Thus, the purpose of this study is to examine the effects of the firms' absorptive capacity on building an internationally oriented ORIS from a paradox perspective. According to the definition of the ORIS (Belussi et al., 2010), an internationally oriented ORIS can be characterised by the firms' adoption of an internationally oriented open innovation strategy that crosses the national boundaries with the characters of integrating international partners in their innovation process. More specifically, the aim of the paper is twofold. First, the study examines how regional firms' absorptive capacity affects the extent to which the firms actively respond to the development of an internationally oriented ORIS. Second, we investigate how the structure of the RIS is evolved during the process.

We empirically pursue the research questions through a case study of Sino-Finnish innovation capacity building in the Vaasa region in Finland. Since 2016, the development of an internationally oriented open regional innovation strategy in the region has been ongoing, with particular focus on seeking innovation opportunities with Chinese partners. A series of policy initiatives and measures have taken place in order to help the local firms acquire knowledge and resources from China. Addressing the tensions between exploitation and exploration innovation strategy during the process, this research identifies three nested organisational paradoxes in relation to organisational absorptive capacity: (1) knowledge bases, (2) organisational policies, and (3) dominant logic. This paper also reveals the RIS is moving from a centralised structure to a distributed structure, driven by the trend of globally distributed knowledge sharing.

## **2. Open regional innovation systems and paradoxical tensions (we cut off the literature view due to the word limit)**

### *2.1 Open regional innovation systems and absorptive capacity*

According to Cooke (2004, p. 3), RIS can be defined as “interacting knowledge generation and exploitation sub-systems linked to global, national and other regional systems for commercialising new knowledge. To put it simply, RIS can be seen as the “institutional infrastructure supporting innovation within the production structure of a region” (Asheim and Gertler, 2004, p299). An ORIS is typically “characterised by the firms' adoption of an open innovation strategy, which overcomes not only the boundaries of the firms but also the boundaries of the region”(Belussi et al., 2010, p711). According to Chesbrough's observation (2017), firms has increasingly replaced the close model with the open model in order to boost the variety and speed of knowledge flows essential to

innovation. In turn, these external ties outside regional boundaries have been widely recognised as fundamental in speeding up technological change and innovation processes in the firms.

Absorptive capacity has been seen as critical in understanding the success or failure of a firm's open innovation strategy (Spithoven et al., 2010). While developing an internationally oriented ORIS, the firms are encouraged to engage with international partners in their innovation and the learning is rooted at knowledge flowing across national boundaries. Consequently, the complexity of such an innovation environment, which mixes local knowledge and internationally distributed knowledge (Acha and Cusmano, 2005), is most likely to raise great challenges to SMEs' absorptive capacity. Organisational absorptive capacity refers to the firm's ability "to recognize the value of new, external information, assimilate it, and apply it to commercial ends (Cohen and Levinthal, 1990). Early research has confirmed that absorptive capacity, which in essence is path dependent (Cohen and Levinthal, 1990) and linked to "a set of organisational routines and processes" (Zahra and George, 2002, p. 186), can to large determine how the firms reconfigure their resource/knowledge base in response to emerging business opportunities (Spithoven et al., 2010). Hence, it seems naturally to assume that absorptive capacity should have strong impact on the development of an internationally oriented open regional innovation strategy.

## *2.2 Managing exploitation-exploration tensions with a paradox lens*

Exploitative innovation pursues intensive search-it refers to experimentation along an existing knowledge dimension and leverages a firm's existing knowledge. In contrast, exploration stands for extensive and distant search for potential new knowledge and seeks a departure from the firms' store of current skills and capabilities (March, 1991; Quintana-García and Benavides-Velasco, 2008). Previous research proves that excelling at both exploitation and exploration is critical to a firm's long-term success (Andriopoulos and Lewis, 2009). Primarily, however, as posited by March (1991, 1996), exploitation and exploration are associated with different and inconsistent organizational routines and knowledge processes. So the emergence of exploitation-exploration tensions seems inevitable. (Andriopoulos and Lewis, 2009; March, 1991; Prahalad and Bettis, 1986).

Research on organizational tensions has often taken either/or contingency approaches to explore how organizational contexts affect the effectiveness of competing alternatives. Driven by the increasing complex and dynamic organizational environment, a paradox approach has been increasingly adopted addressing how firms can manage competing demands simultaneously (Lewis, 2000; Smith et al., 2010). Achieving exploitation and exploration simultaneously enables organisational success but, in the meantime raises challenging paradoxes concerning key organisational elements such knowledge bases, structural arrangements and control mechanisms (Andriopoulos and Lewis, 2009; Sun and Lo, 2014). Under the paradox approach, the firms facing the exploitation-exploration tensions should respond to these nested paradoxes proactively and address such tensions as interrelated contractions rather than trade-offs. Consequently, as Smith and Lewis (2011) pointed out, the outcomes of managing such tensions depend on the firms' ability to embrace them rather than avoid them. While the significance of firms' capabilities to manage the strategic contradictions has been well recognised (e.g. Cameron and Quinn, 1988; Poole and Van de Ven, 1989; Smith and Tushman, 2005; Sun and Lo, 2014), so far there has been little in-depth empirical investigation on the relationship between managing contradictory strategic demands and organisational absorptive capacity. There

has also been lack of studies on the paradoxical tensions presented during the firms' adoption of oriented open innovation strategies in an international context.

### 3. Methods

This paper draws on an EU funded project where a living lab approach is adopted in the policy study of Sino-Finnish capacity building towards an internationally oriented ORIS in the Vaasa region in Finland. Instead of collecting feedbacks from key actors in the RIS, we collaborated with regional officials on promoting Sino-Finnish innovation cooperation with the aim of developing an effective internationally oriented open regional innovation strategy collaboratively. The data is mainly obtained via participant observations; in-depth interviews, focus group discussions and workshop discussions.

#### 3.1 Research context

China has planned to invest in green technologies almost six billion euros by 2030. The Chinese have been particularly interested in cooperating with Finland for clean energy solutions, which are the core innovation competences of the Vaasa region. The Vaasa region is home for EnergyVaasa, the leading energy cluster in the Nordic countries- Its export rate is over 80 %, and it covers 30 % of the total export of energy technology in Finland. Hence, policy makers at the region have set up one of the region's policy priorities being promoting Sino-Finnish STI cooperation towards energy transition. The region is developing its internationally oriented open regional innovation strategy around the policy priority. Since 2016, a series of policy initiatives and measures have been undertaken by the region addressing the policy priority. Among these, the region's investment in developing the operating model of the newly established Sino-Finnish Research Centre on Science, Technology and Innovation (Hereafter Sino-Finnish STI Centre) in 2018 can be seen as the most significant policy instrument for setting up a sustainable platform for fostering regional Sino-Finnish capacity building.

#### 3.2 Data collection and analysis

Since October 2018, we as researchers have started to collaborate with key regional policy actors on developing an effective internationally oriented open regional innovation strategy around Sino-Finnish capacity building in the Vaasa region. We participated in four major Sino-Finnish STI cooperation related strategic planning meetings involving regional officials and companies. We also interacted with local firms for promoting Sino-Finnish RDI cooperation projects, which is a policy instrument set up jointly by the Finnish public agency Business Finland and the Ministry of Science and Technology in China. For this purpose, we held three focused group discussions, which lasted, on average, 1 hour and 20 minutes. Each focus group had six to eight participants (only one group had eight participants). We also conducted a workshop with 16 participants on the theme "*how to use Business Finland Sino-Finnish RDI projects as a platform for pursuing business opportunities in China*". Furthermore, fieldnotes for participant observation was taken throughout our involvement in the policy development process. Finally, we conducted 14 in-depth, semi-structured interviews. The rich primary data set is complemented by data collected from secondary sources.

We used a systematic inductive approach in our data analysis (Gioia et al., 2013) -this approach fits well with the nature of the living lab approach adopted in this study, which is in essence one type of action research engaging stakeholders in joint value co-creation

towards shared goals in a real-life setting (Reason & Bradbury, 2008). We first coded our transcripts (interviews, focused group discussions and workshop discussions), meeting minutes, and fieldnotes to develop an inductively generated code list. This is to give voice to the key actors/informants engaged with us in the policy development process and also have their voice represented significantly in the findings of the research. By doing so, we were able to identify empirically grounded new concepts rather than just confirm concepts in existing literature. Afterwards, we developed a coding system that is more theoretically oriented in order to identify types of paradox facing regional firms in response to emerging Sino-Finnish STI opportunities. Such coding process draws our attention on three main analytic dimensions: (1) knowledge base; (2) organisational policies; (3) dominant logic. Finally, we used the three dimensions to recode all the data. We coded texts related “knowledge base” with labels “knowledge similarity” and “knowledge diversity. For texts related to “organisational policies”, we coded them with the labels “marketing policies”, “Human resource policies” and “R&D policies” respectively. For dominant logic, we coded relevant texts with the labels “goods-dominant logic” and “service-dominant logic”. In addition to coding our data for the three analytical dimensions addressing emerging paradoxes, we also generated themes on the evolution of regional structure. We deepened our understanding of the key themes with our study of secondary materials (i.e. policy reports, and online news archive).

#### **4. Findings**

Our empirical data indicated three types of organisational paradox in relation to organisational absorptive capacity: (1) knowledge bases; (2) organisational policies; and (3) dominant logic. Our investigation also revealed the gradual evolution of the RIS in Vaasa.

##### *4.1 Paradox 1: Knowledge base*

Although the export rate of EnergyVaasa companies is over 80 %, their products/services are mostly sold in the European Single Market, especially other Nordic countries. Given the nature of the single market, it is understandable that the firms seek exploitative innovation on the basis of locally developed knowledge base, as illustrated by the following quote from one focus group discussion:

*“well...I do not think we are international players although our products (services) are mainly sold outside Finland. It does not feel this way... we are in the EU market...everything is similar... Especially our big clients are in Sweden and Norway - We almost do not need to make any efforts to adapt the so-called foreign markets (laughing)... We do everything locally...”*

Our data analysis suggests that most innovation activities by the firms have been focused on strengthening existing products/services through exploiting and defining existing knowledge. Knowledge similarities have been the key feature at the local innovation network of a focal firm.

In order to accomplish the objectives set up for the Sino-Finnish STI centre by the region, we worked on some strategic initiatives (e.g. *Business Finland Sino-Finnish RDI projects*) to the firms in order to offer them the opportunities for RDI cooperation with Chinese firms. The firms’ responses to the strategic initiatives demonstrated the contradictory demand for the knowledge base. The following quota for example is illusive of the responses:

*“...of course, the companies can see the huge growth opportunity by cooperating with Chinese firms- However, few of them have the knowledge...It is too risky and too complex for them. That might be why they have shown little interest to the program. ”*

In light of the development of an internationally oriented ORIS, the firms are expected to conduct exploration innovation based on internationally diversified knowledge system while exploit knowledge spillovers at the network. A paradox in the knowledge base seems inevitable, which suggests the competing demands between the regionalisation and internationalisation of firms' knowledge base.

#### *4.2 Paradox 2: Organisational policies*

The paradox concerning the knowledge base can be linked to the paradox in the firms' human resource policies, as reflected in the quote below:

*“Our employees are all local... Occasionally we have some international students here for internship but just a very short period.... they are not involved in our main activities... None of the international students could be employed because they cannot communicate in Finnish-English is not used for internal communication. “*

For the exploration of opportunities in the Chinese market, the firms need to have the knowledge and competence in cooperating with Chinese organisations. The local focused Human resource policies have stopped some firms away from taking the opportunities. For examples, the CEO of one company engaged in our focus discussions regrettedly suggested their saying that “last year we were in discussions with a Chinese company about possible cooperation with the support of a Chinese intern.

The tensions are also emerging in marketing policies. The firms' ways of marketing is according to the Finnish business culture- “go to the business directly” For example, one interviewee stated “we want to meet our customers directly- we do not see why we need to have the involvement of regional officials and researchers/consultants”.

When asking how the Sino-Finnish STI centre can help the company, one interviewee said frankly: “I'm a little sceptical. I believe that only we can help ourselves. Of course we are happy to listen to what is happening in the big picture; power transmission, distribution in China.” However, in the Chinese context, the participation of regional officials and other organisations like the Sino-Finnish STI Centre can actually help the firms gain potential Chinese partners' trust due to the uniqueness of China's political system, according to the feedback for potential Chinese partners.

In addition, there are strategic contradictions in RDI policies. The firms' locally oriented RDI policies address the technological output of the activities. The internationally oriented RDI policies request the firms to consider the value-cocreation of RDI partnership. More specifically when considering cooperation with Chinese firms, the firms should not only look at their technological competences but more importantly their resources and competences for the commercialisation of innovations to maximise the value creation.

#### *4.3. Paradox 3: Dominant logic*

Eventually the paradoxes in knowledge base and organisational policies are rooted in the tensions of dominant logic in exploitation and exploration. These exploitation related

routines and procedure reflect a goods-dominant logic where the firms consider the enhancement of product efficiencies their highest priority. That is perhaps why during our strategic planning meetings, the term “products” and “selling” has been mentioned very often. Some firms also explicitly expressed their interests of serving as the European distributors for Chinese companies. One participant at our meeting addressed one question repeatedly “*how can we find right business partners in order to sell our technological products to the Chinese market?*” The selling orientation has been reflected by different actors in the system consistently.

These exploration related practices in Sino-Finnish cooperation, on the other hand, requested a service-dominant logic where firms work with their customers, as well as other partners in their value networks cross national boundary as opposed to producing and distributing units of output.

Apparently the two types of dominant logic are self-enforced therefore incompatible in nature. Not wonder that one informant pointed out: “these (local and international practices) *actually refer to two different thinking models... fundamentally different. Very challenging for us to manage them at the same time.*”

#### *4.4 The evolution of the regional innovation system*

Traditionally the RIS in Vaasa has been set up around Wärtsilä Oyj Abp (hereafter Wärtsilä), the leading enterprise in the region. The multinational Finnish company manufactures and services power sources and other equipment in the marine and energy markets. The majority of SMEs and research institutes in the region have collaborated with Wärtsilä in different ways. Over the years, Wärtsilä has served as a knowledge gatekeeper for the region-it has actively searched for knowledge nationally and internationally and then transfer it to other key actors in the region. For example, Wärtsilä recently makes significant investment on building the Smart Technology Hub, next-generation innovation and production centre, in Vaasa. The Smart Technology Hub are inviting other operators in the sectors and researchers to collaborate. The vision is to create a partners' campus where research and product development take place together with Wärtsilä's customers and suppliers, start-ups in the sector and universities.

Nevertheless, our empirical analysis shows there has been a gradual evolution of the RIS-the move from a centralised RIS to a distributed RIS, driven by the trend of globally distributed knowledge sharing. As suggested by one director at Wärtsilä,

*“In the past we (Wärtsilä) often take the lead in the region’s innovation initiatives by organising these activities with the participation of the others. Increasingly we have started to collaborate with other regional actors in setting up programs jointly.*

In light of Sino-Finnish cooperation, the region’s early policy initiatives were mostly set up on the basis of Wärtsilä’s knowledge and resources in China. In other words, Wärtsilä has been directly got involved in the policy development process. The regional delegation, including city official, advisors at public organisations and some business people, visited the Chinese regions where Wärtsilä has strong networks. However, some SMEs have expressed their intention of being detached from Wärtsilä’ in the international activities as illustrated by the quote below:

*“I believe that the relations between partners should be pretty clear. If we go in a large group to China, Chinese leaders will trade with the Wärtsilä Director. We smaller are*



*'air'. If we want to sell something, we must be there and I must be the highest official in the delegation. Otherwise they will not discuss with me. Therefore, we do not participate in these trips."*

In their response to policy initiatives promoted by the Sino-Finnish STI Centre, some SMEs also showed their ambitious to set up their network independent from Wärtsilä and other big companies. For example, one CEO requested to form a thematic group on "Business Finland Sino-Finnish RDI projects" "with potential partners of his companies in the project. He said: *"the Chinese cares about our sizes- we are small but we are competent. The most effective strategy for us to pursue business opportunities through the project is grouping our competences-showing off our muscles. We are the suppliers of Wärtsilä but we should not be dependent on Wärtsilä- it is too risky."*

## 5. Discussions

This study set out to advance our understanding of open regional innovation systems by focusing on the relations between the firms' responses to the development of an internationally oriented open regional innovation strategy and their absorptive capacity. Empirically we investigated this question by looking at how the firms at Vaasa region in Finland responded to the emerging Sino-Finnish cooperation opportunities.

Our empirical analysis confirms the challenges to the firms' absorptive capacity they are in a regional innovation context that mixes local knowledge and internationally distributed knowledge (Acha and Cusmano, 2005). Especially, the path dependent nature of the absorptive capacity (Cohen and Levinthal, 1990) and its link to "a set of organisational routines and processes" (Zahra and George, 2002) allows us to reveal the exploitation-exploration tensions facing the firms while attempt to adopt an internationally oriented open innovation strategy in a regional context. The three paradoxes we identified, consisting of knowledge base, organisational policies and dominant logic, reflect such tensions that are associated with different and inconsistent organizational routines and knowledge processes (Andriopoulos and Lewis, Sun and Lo, 2014). While considering their involvement in these strategic initiatives related to Sino-Finnish RDI cooperation proposed by the Sino-Finnish STI centre, many SMEs at the Vaasa region were very careful -although some of them attempted to get involved in some initiatives, their fears to these potential tensions cross different organisational levels have stopped them from taking the concrete steps. So although the outcomes of managing such tensions might depend on the firms' ability to embrace them (Smith and Lewis, 2011), our empirical analysis suggests that the firms' resources and competences may to large extent determine whether or not a firm would choose to managing such tensions -most SMEs we investigated chose a trade-offs approach rather than the paradox approach. So some discussions on the paradox approach in the literature might be idealism. In addition, our empirical investigation shows although leading enterprises like Wärtsilä have traditionally acted as "knowledge gatekeepers" (Belussi et al., 2008), SMEs embedded the regional innovation networks have been motivated to set up networks independent from the centralised regional network while exploring opportunities in the international market.

Overall, our study attempts to reveal why some regional innovation policies fail in producing the economic and technologic effects on innovation systems from the perspective of organisational absorptive capacity, which has not been addressed

empirically in existing literature. In particular we fill the research gaps concerning why local companies respond to regional innovation policy differently, and to what extent these different responses might be attributed to the differences in the absorptive capacity of the respective firms.

## Conclusions

Our research on internationally oriented open regional innovation strategy is still ongoing. The 2-year project starting from Oct 2018 has so far offered rich empirical data to us to address the research questions proposed in this paper. However due to the nature of the living lab approach we adopted in this study, we are yet to identify suitable theoretical dimensions guiding our empirical analysis. These theories proposed in this paper seems insufficient or too superficial. Hence, we hope to have input during the ISPIM discussions addressing

1. What should be the main theoretical dimensions and key references for our study?
2. How should we redefine our research questions in order to make more concrete academic contribution?
3. What kind of new empirical data should we collect in order to further strength our empirical study?
4. We have chosen a systematic inductive approach in our data analysis (Gioia et al., 2013- any suggestions?

Overall, we are aiming at producing a top journal publication based on our rich empirical data but we have realised our weakness at the theatrical study might stop us from achieving the target. However, as this policy study is still at a very primary stage, we hope to boost the quality of our study with the help from other scholars in the ISPIM community.

## Notes:

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