



**COLLABORATIVE INNOVATION IN FAMILY FIRMS:  
COLLABORATING WITHIN AND BEYOND**

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**LANCASTER UNIVERSITY MANAGEMENT SCHOOL**

**COLLABORATIVE INNOVATION IN FAMILY FIRMS:  
COLLABORATING WITHIN AND BEYOND**



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## **Declarations**

I declare that this dissertation is an independent and original piece of research carried out by myself with the guidance from my supervisors and comments from other academics where appropriate.

I declare that this dissertation has not been accepted in any previous application for a degree.

Feranita

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# **Chapter 1**

## **Introduction**

### **1.1 Overview – Collaborative Innovation in Family Firms**

This dissertation is organised in four chapters. In Chapter 1, I present an overview of the thesis depicting rationale behind study, research methodology, empirical settings, and data collection. Further, I reflect on my PhD journey, from a student to an independent researcher. Chapter 2 consists of the first research paper of this dissertation - Collaborative innovation in family firms: Past research, current debates and agenda for future research. The paper presented in Chapter 2 has been published in Journal of Family Business Strategy, volume 8, issue 3, 2017. The paper has been presented at International Family Enterprise Research Academy (IFERA) 2017 Annual Conference Zadar, Croatia and received tremendous positive response. Chapter 3 contains the research paper - The transaction cost approach to collaborative innovation in family firms: A process of internal collaboration through integration of human assets, an empirical research that is based on a longitudinal single case study on an innovative family firm based on the North-west of UK. The paper has been presented at Alliance Manchester Business School Doctoral and Research Conference 2017 and Northern Advanced Research Training Initiative (NARTI) 12<sup>th</sup> Annual Doctoral Conference. The paper has also been presented at the Annual Family Business Day 2017, organized by Centre for Family Business at Lancaster University Management School and received many helpful feedback for improvements. Chapter 4 encloses the research paper – Forming international collaborative innovation and government funding as a double-edged sword. This empirical paper presents a longitudinal comparative case study sampling on Lancaster China Catalyst Programme (LCCP), with the support from the LCCP team. The paper has been presented at a PhD workshop held by the Department of Entrepreneurship, Strategy, and Innovation within Lancaster University Management School on 4<sup>th</sup> December 2017.

The aim of each of the three research pieces of this dissertation is to contribute to the advancement of our knowledge on collaborative innovation in family firms by which collaborations within and beyond enable family firms to innovate. First research paper

provides literature review on collaborative innovation from both general management and family business literature, and opens up future research avenues. While the second research paper examines the internal aspect of collaborations, third research paper examines the external aspect of collaborations.

**Table 1.1.** Summary of Three Papers Included in This Dissertation

Title	Nature of Study	Theoretical Approach	Methodology	Data	Journal/ Conference/ Workshop
Collaborative Innovation in Family Firms: Past Research, Current Debates and Agenda for Future Research	Literature Review	-	Review	Secondary data: Scopus database, Google books, and US Library of Congress database	<p>Feranita, F., Kotlar, J., &amp; De Massis, A. (2017). Collaborative innovation in family firms: Past research, current debates and agenda for future research. <i>Journal of Family Business Strategy</i>.</p> <p>Feranita, Josip Kotlar, and Alfredo De Massis (2017). Collaborative Innovation in Family Firms: Past Research, Current Debates, and Agenda for Future Research. The International Family Enterprise Research Academy 2017 Annual Conference, Zadar, Croatia, 28 – 30 June 2017</p>
The Transaction Cost Approach to Collaborative Innovation in Family Firms: A Process of Internal Collaboration through Integration of Human Assets	Empirical	Transaction Cost Economy	Qualitative – Single case study	Primary data: internal documents, non-participant observation, informal discussions, meeting attendance, and interviews	<p>Northern Advanced Research Training Initiative (NARTI) 12<sup>th</sup> Annual Doctoral Conference, Newcastle University Business School, Newcastle, UK, 6-7 June 2017.</p> <p>Alliance Manchester Business School Doctoral Conference 2016/17, Manchester, UK, 15 -17 May 2017</p>
Forming international collaborative innovation and government funding as a double-edged sword	Empirical	Institutionalization, Legitimacy	Qualitative – Comparative case study	Primary data: internal documents, direct observation, and interviews	PhD workshop, Lancaster University Management School, Lancaster, UK, 4 December 2017

## 1.2 Rationale Behind Study

Triggered by the incongruent findings on family firm innovativeness, particularly, family firms are able to innovate more despite investing less in R&D, along with their long-term orientation and risk adverse attitude. I then came across literatures on how firms achieve innovation through means of collaborations with external parties, such as alliance, cooperation, partnership, and agreement. As research dependency theory has pointed out, firms are not able to sustain entirely on their own for everything needed to achieve innovation (Pfeffer, 1987). For example, firms would need to obtain materials from suppliers or technological inputs from customers. Thus, I refined my research on innovation in family firms into the collaborative part of innovation.

How did I derived at the title of “collaborative innovation”? Because, as I read more on the literature, I got more baffled with the different terminologies used in various streams of literature: alliance, corporation, collaboration, joint venture, technology exchange, contractual agreement, licensing, and partnership. Curious, I dug further into the literature. After reading in details the existing literature and comparing different schools of thoughts, I found that these literature all point to achieving innovation through the means of working collaboratively between collaborators within a time frame with an agreement in place. However, the choice of terminology used is based on the theoretical background adopted. For example, strategy scholars call it alliance, management scholar call it collaboration or corporation, and scholars focusing more on the technology and R&D component call it technology exchange or contractual agreement. Therefore, I decided to use a universal term, collaborative innovation, to be inclusive on studies related to firms working collaboratively with external partners to achieve innovation.

This dissertation starts with state of the art review on the topic of collaborative innovation in family firms, specifically on the collaborations with external parties. When I first started on the topic on collaborative innovation in family firms, I didn't find many studies on this topic with search in various databases. When it comes to “collaborations”, most of the family business scholars point to family firms are unwilling to collaborate due to risk adverse and fear of losing control. Yet, research on collaborative innovation from the general management field dates back as far back as 1960's (Osborn & Hagedoorn, 1997). Moreover, if the claim that family business

contributes to more than 90% of the economies worldwide (La Porta, R., Lopez-de-Silanes, & Shleifer, 1999) is true, then there is a big flaw in the existing literature as these studies from general management fail to take into consideration the family element, such as the unique governance structure of family firms, long-term orientation, family influence, and generational effect. Thus, I believe collaborative innovation does exist in family firms and is an important topic as it is through collaborative efforts that a firm would be able to innovate, but the existing literature on this topic is fragmented. I therefore delve deeper into this topic, to consolidate the literature from the more mature field of general management and nascent family business field, providing future research avenues with more sound theoretical framework, incorporating theories like resource based view (Barney, 1991), transaction cost economics (Williamson, 1979), and network (Uzzi, 1997). It is my hope to spark more conversation on this topic in the field of family business research, thus aids the maturation of research on this topic. The in-depth literature review also helps me to better understand the international collaborative innovation in comparing between family and nonfamily firms in my third paper.

The second paper of this dissertation examines the “internal” part of collaborative innovation in family firms, collaborating internally between different departments to achieve innovation. The reason for looking into the internal element is because, again, I was triggered when I was searching for literature on collaborative innovation in family firms. The result from the search on collaborative innovation in family firms, other than the usual stance of family firms are unwilling to collaborate, are the collaborations between family members. Yes, I agree that family members are the integral part of why family firms exist in first place (Schulze & Gedajlovic, 2010) and require much attention in research, but that shouldn't be “everything” that is being studied in the family business literature. As family firms grow in size, along with many family owned and managed large corporations, don't they have more nonfamily workforce than family members? What about the contribution of these nonfamily workforce whose loyalty is often comparable to that of family members? Thus, using the single case study with in-depth longitudinal data, I pondered upon the internal collaborations between departments in achieving innovation, which has to do with the “deployability” of human assets in different functions.

The third paper of this dissertation looks into the role of government funding at the early formative stage of collaborative innovation, comparing between family and nonfamily firms. The idea of this paper was initially to explore the difference between family and nonfamily firms in forming collaborative innovation, with the international setting. However, as I probed deeper into the data, I found the interesting effect of government funding, which is the negative effect in oppose to positive effect assumed by the existing literature. Again, I was triggered by the claim from existing literature that government funding is found to have positive effect on collaborative innovation, while these are sampled on firms that have already been granted the funding, neglecting how and why firms got the funding in the first place. Moreover, as I have been researching on collaborative innovation in family firms, I find that the institutional factors are less known. Thus, I went back and forth between the existing literature and data, to investigate the effects of government funding and the interaction effect of family influence.

### **1.3 Research Methodology, Empirical Settings, and Data Collection**

Since of young age, I have always enjoyed observing things happening around me. Specifically, people, things they do, the way they do, patterns of the things they do, meaning of the things they do, and most importantly, the reasons behind doing so. To me, it has always been fascinating and intriguing to observe and guess the meaning behind one's action and predict their next move, in this socially constructed reality where our thoughts and actions are deeply influenced by the society (Berger & Luckmann, 1991).

I was first introduced to research methodology in my undergraduate study, which I was taught the quantitative method of research – theory testing with deductive method drawing on a sample from the population to support my hypotheses. Although it gave me sense of achievement being able to use SPSS, specifically, playing around with my data using ANOVA, factor analysis, and ANCOVA, I felt something was missing. My history of using qualitative research methodology traces back to my MBA dissertation back in 2012, that's when I was introduced to the concept of answering the “how” question (Yin, 2015), embracing the inductive method. I was taught the more advanced quantitative research methodologies in my Master of Research programme at ESADE Business School, Barcelona, Spain in 2013, as far as structural equation modelling and



advanced econometrics using STATA. Still, my passion lies with qualitative research methodology. Thus, my choice of adopting qualitative research methodology for my Doctoral dissertation.

My empirical papers in the PhD dissertation adopt a variety of qualitative research methods, single and comparative case studies with grounded theory approach. The case study method allows the direct observation of phenomena and patterns over time, proving more in-depth insights leading to theorizing (Eisenhardt, 1989, Yin, 2013). The grounded theory approach (Glaser & Strauss, 1973) allows the “discovery through direct contact with the social world studied coupled with a rejection of priori theorizing”, involving using my own ability to make sense out of the observed events (Locke, 2001, p. 34). The adoption of qualitative research methods enabled me to combine my personal interests of observing things around me in the process of conducting my doctoral research; keeping me hooked to finding out more and to know more to answer the burning questions in my mind as I uncover the phenomena step by step. Of course, one should not assume that without priori theorizing is to go “completely” without knowing the literature in the process of research. Through lectures, conferences, workshops, listening to other people’s experience, and own stumbles, I came to understand that, while we want to build theory without the influence or biases from the existing literature, we are still required to have adequate understanding of the existing literature. The understanding of the existing literature, just the right amount that enables us to find out the gaps, what is interesting and what has been done by others. It is with this understanding that we would be able to identify interesting research gaps and give sense to what we observed from our data without bias.

Paper 2 uses a single case study approach on a founder-led family firm in the construction industry situated in North West of UK. Being in the niche industry, facing constant changes in rules and regulations, the family firm is required to be innovative to constantly come up with innovative solutions to its customers. The family firm has been operating for more than 36 years and currently has a third generation family member in the business, thus a perfect example to study the internal collaboration aspect in becoming an innovative firm and an industry leader. To protect the privacy of the family firm, all names involved in this family firm have been anonymized in the paper.

Thanks to the generosity and supports of the founder, I was granted access to conduct research on the firm early on from the first year of my PhD. Half way through my first year of PhD, I visited the family firm twice to gain initial understandings of the firm and refined my research questions. Starting from spring 2016, second year of my PhD, having had enough understanding of the existing literature and overall direction of my doctoral research, I began data collection on the family firm with weekly visits. During which, I visited the family firm once a week, for three months, spending the whole day in the location I would be visiting, rotating between R&D department, design department, and head office. Visiting the firm posed quite a challenge, as each journey would take me approximately 2 hours, combining bus, train, and with one of the staff members picking me up at the train station. I also had to be very adaptive to everyone's schedule.

At the start of my data collection, I had sets of interview questions to interview my selected informants. However, I learned that, despite having been introduced as a PhD student conducting research and explained to the interviewees about the research, some became hesitant and reluctant to speak once a recording device appeared. I found that managerial level and above were less hesitant in being recorded while the employee level became uneasy when they were told that the interview would be recorded. Thus, I changed my tactic towards interviewing the employees. Instead of approaching them for a formal recorded interview, I approached them with pen and paper, and sat by their desk to have informal chats, while writing down notes. Due to time constraint and employees being busy with their own schedule, it was unfeasible to interview everyone. Thus, I made use of lunch time to mingle around with the employees to gain trust and hear their insights during informal chats. I also interacted with them as much as possible throughout the day. This experience was a great learning journey as I learned that conducting qualitative research is not as simple as going by the book, e.g. going around interviewing everyone, but to be adaptive and quick to react to be able to gather insights.

Paper 3 is a comparative study sampling on 4 chosen firms from cycle 1 of a unique programme, Lancaster China Catalyst Programme (LCCP) at Lancaster University. The programme started the same year as I began my PhD in 2014. Thus, I was fortunate to be given the chance to study the programme from the beginning and follow through the cycles. Cycle 1 was chosen among the three cycles of the programme due to the completeness of the data available, which I closely monitored the involvement and

interactions between the programme, participating firms, and students from October 2014 to the end of cycle 1 in October 2016.

From the beginning of the cycle, I participated various events held by the programme, even taught the MSc International Innovation programme students Chinese language, who later on work on the collaboration projects in both UK and China as part of their requirements for the degree. These participations gave me the opportunity to closely observe the programme to further give sense to what was happening.

Towards the end of my 3<sup>rd</sup> year PhD journey, in September 2017, I was given the chance to work as programme assistant at LCCP, thus was given direct access to the archival data, on top of what I had already acquired previously. The access to archival data, data collectively collected and maintained by both UK and Chinese team, was a big leap and breakthrough for development of paper 3. This enabled even more in-depth understanding of the sample firms, the programme, and the role of government support. The access to the Chinese side of the data was also incredibly useful, which allows me to have a holistic view of the programme and the development from both UK and China side.

The two empirical papers using the qualitative method of inductive case study method adopted the longitudinal approach. Both empirical setting allowed me to observe and give sense to unique phenomena. The triangulation of data from different sources was intellectually challenging, as I had to go back and forth different sources of data to make the connections and linkage. This experience was a great opportunity to put what I have learned in lectures to put in practice, as well as further enhance my qualitative research skills.

#### **1.4 Reflection on Doctoral Journey**

Pursuing a PhD has been on my agenda since of young age and the journey along the different degrees makes me grow fonder of research and I enjoy the process of continuously challenge myself intellectually. As I was approaching the finishing line of my PhD dissertation, I started to actively look out and apply for academic positions. Almost every job interview for academic position I've been to asked why I hold an MBA degree as MBA is not normally associated with pursuing a PhD. The history of me applying for a PhD degree traces back to my last year of undergraduate study, which I ambitiously applied for institutions like Insead. Nevertheless, my applications to the

top tier institutions were rejected. Determined to pursue a PhD degree, I first went for an MBA degree in Singapore to upgrade myself. The reason behind choosing MBA programme was because I was geographically limited to Singapore due to family obligations. Thus, I thought to myself, MBA would be a safe choice if later on I decided to not go ahead with PhD, I could at least find a job with the degree. Among the choices to fulfil the criteria to graduate from MBA, I opted for writing a dissertation on my interest in the topic of family business. Upon graduation from MBA, I was head hunted and offered associate consultant at top consulting firms. Nevertheless, I gave up the job opportunities and went on to pursue PhD, which is a tough journey as not many people understand why I did so.

As it turned out, MBA did prepare me for job market, but the experience of doing an MBA dissertation was just a scratch on the surface of the research world. Thus, I went on to pursue a Master of Research (MRes) degree in Spain, to equip myself with the foundation to pursue a PhD degree. Towards the last trimester of my MRes programme, I started to look for an institution to apply for PhD programme. I was determined to find a university with a family business research centre, to ensure the lack of support on the family business side during my MRes time does not repeat. At my MRes time, my topic was in the intersection of innovation, family business, and management accounting. Specifically, how the use of management control systems can help family firms to innovate. As I did my homework of finding a suitable place to pursue my doctoral research, I came across Alfredo De Massis and Josip Kotlar, at Centre for Family Business, Lancaster University, whose research on innovation in family business fit right into my line of research. Not only the research topic fits perfectly, also their research output is just impressive. Therefore, I proceed to contacting Alfredo and Josip, enquiring about the possibility of pursuing a PhD degree at Lancaster University, under their supervision. After some hours of nervous waiting, I received warm and positive reply from them. Of course, productive people like them, no surprise the reply came so soon. From there on, I proceed to submitting formal application to Lancaster University, went through the panel interview, and got accepted into the programme.

Prior to starting PhD at Lancaster University in October 2014, I had the opportunity to meet my by then “future” supervisors in person to discuss further. I met Alfredo at the 10th workshop on family firm management research, organized by EIASM at Bergamo, Italy, May 2014. Then I met both Alfredo and Josip at the IFERA conference at Finland

in June 2014. These encounters gave me the head start to discuss their expectations and further refine the research path for the doctoral research. It was especially great experience to participate in the early stage doctoral consortium at IFERA, as it gave me to glimpse of current and future research in the family business field, as well as building the network within the field that I was going to start researching on.

So then I arrived in Lancaster last week of September 2014, embarking on my PhD journey. First year of my PhD journey was busy and exciting. Inspired by my productive supervisors, I was determined to work hard. It was an exploration year, reading articles from different streams of research, assisting courses taught by Alfredo and Josip, interacting with other PhD students and other postgraduate students, attending workshops and conferences, and reviewing manuscripts submitted to journals for publication. Of course, all these activities were under the guidance, monitoring, and pressure from my two role model supervisors with scrutiny. This process further refined me in becoming an independent researcher, as I started to have more and more burning questions in my mind and wanting to know more. I started to be more and more critical, also, better able to formulate research questions and identifying research gaps, although at times I still struggle to justify why a particular study deserves being researched or why it is interesting.

Second year of my PhD was the most difficult period of the journey, as I felt lost and depressed, as I did not see the end of this long-winded process, where I was constantly picked on having to improve and coming up with better ideas. The feeling of what I had been doing was never good enough lead to losing my way to progress further. It felt like I was in a darkness, I didn't know why I was here, what I was doing here, and how I could get out of this darkness. Deteriorating mental and physical health didn't help. It was tough when I started the data collection process, which I had to travel the long journey to the family firm for data collection, adapting the interviewees' schedule, and fighting off illness that gets into me every other week. Nonetheless, I kept reminding myself this journey was my own choice and I kept pushing forward. During this period, I continued pushing forward for data collection for paper 2, preparation for publication of paper 1, and solidifying my understanding of existing literature on collaborative innovation in family firms.

Having collected survey for quantitative research and multiple data sources for qualitative research, I must say that both methods are equally challenging. Although, at times, I wished I was doing quantitative research, where I could just plug in all the numbers, let the machine analyse the data, and torture the data till it speaks the truth. Nevertheless, I enjoyed very much the process of analysing the qualitative data I have collected, following the historical events through the timeline, recognizing the themes and patterns, giving sense, and most importantly, linking to theories. Though at times it gets frustrating when I was hitting nowhere going back and forth between the data and literature. Thankfully, my supervisors were always there to clear the clouds. Each time I solved a piece of puzzle, I felt satisfied and energised for the next challenge.

One takeaway about qualitative research methodology for me would be the detachment of emotional bias to ensure unbiased data and analysis. On the one hand, I find the need to build some relationship and trust at the personal level to get the interviewees to open up and speak. On the other hand, once the relationship is somewhat established, they can sometimes bring in personal emotion or opinion during interviews. In such situation, I will first ensure I myself is not emotionally involved and yet show empathy. By showing empathy, I mean to let the interviewees express what they wish to express, whether emotion or personal opinion, then go back again to get their view on the questions I originally intended on knowing. I find this approach especially useful, rather than cutting them off, because then they would be expressing more after they have vet out their emotion.

Fast forward to third year of my PhD, the feeling of being lost and depressed was somewhat lifted. Seeing the two PhD students who started a year earlier than I did graduated was encouraging. After all, there is an end to this challenging process. As I received revise and resubmit for my first paper for publication, finishing up with writing the second paper, and progressing for the third paper, things started to piece together and I saw the light at the end of the tunnel. So, the end of the tunnel was near but still a bit of efforts to reach there.

At this stage, I was already a veteran at reading research papers, compared to when I first started reading research paper back in 2009 during undergraduate time for my undergraduate dissertation. I started a routine of first scan through the paper to get an overall idea of the paper, then I would proceed to have through reading to identify the

research gap(s), research question(s), theories used, research methodologies, and most importantly, if the findings actually tally what the researchers started the paper with. As I go through this reading process, I would then ask myself: “Do I agree with the research gap(s)? Do I agree with the author(s) reasoning on why this topic deserves attention? Does the discussion really answer the research questions spelled out up front? Do I agree with the author(s) suggestions on future research?” Then I try to put myself into the shoes of the readers who would be reading my research papers, to further furnish my own research papers. The process has made me more and more critical, where I acquired the skill to criticize other researchers’ research, as well as my own research, compared to the method of pointing out positive and negative points during my MRes time. The sense of achievement kicked in when I was visiting my alma mater during summer in Jakarta, BINUS International University, I was having discussions with the faculty members, where we were discussing about our research methodologies and compare different methodologies we each adopted.

Throughout the three years and two months of my PhD journey, aside from the three research papers presented in this dissertation, I also had the opportunity to publish a teaching case study. The teaching case study is co-authored with Alfredo De Massis, Joseph C. Santora, and Josip Kotlar, which has been published by SAGE Business Cases, the first edition of the family business case series in January 2018. It is based on my own participant observation, interviews, and data collected previously for my MBA dissertation but with a different perspective. Over the summer of 2017, whilst I was in Indonesia, I further furnished the case with more detailed data to suit the direction of the case study. Although the purpose of the teaching case study was not for the purpose of generalization or theorising, I used the research approach in treating the data, specifically, triangulation of data from different sources, recognizing patterns, giving sense to the phenomena, and linking to theories. Thus, the teaching case study is not just storytelling, but a compelling story of an Indonesian family firm with a framework explaining the different stages in the family firm over the time span of over 30 years and providing theories to explain what had happened in each stage.

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## **Chapter 2**

### **Collaborative Innovation in Family Firms: Past Research, Current Debates and Agenda for Future Research**

#### **2.1 Introduction to Chapter 2**

The second chapter of this dissertation provides a review of collaborative innovation in family firms, which consolidates literature from the more matured field of general management and the nascent field of family business, proposes research gaps for future research avenues. This study addresses the important gap of innovation in family firms, “how do family firms innovate more with less”, pointing to family firms innovate through collaborations with external parties. This paper was written by Feranita Feranita, Dr. Josip Kotlar from Lancaster University, and Prof. Alfredo De Massis from Free University of Bozen-Bolzano and Lancaster University. The paper has been published in *Journal of Family Business Strategy*, volume 8, issue 3, 2017. DOI: 10.1016/j.jfbs.2017.07.001. Published online 21<sup>st</sup> September 2017.

#### **2.2 Abstract**

Collaborative innovation can boost family firms’ innovation performance by enabling them to tackle their resource constraints and tap into knowledge, financial capital, technology, and information from other organizations. Unfortunately, existing research on collaborative innovation in family firms is still in its infancy. We systematically review and organize fragmented findings and arguments from prior research along three perspectives: strategic, transactional, and relational. In doing so, we provide a summary of the current state-of-the-art in this literature, point to the importance of collaborative innovation to resolve the innovation dilemma in family firms and identify promising opportunities for future research.

#### **2.3 Introduction**

Collaborative innovation is becoming increasingly important because it enables firms to tackle their resource constraints and tap into the knowledge from other organizations

in order to boost their innovation potential (Hitt, Dacin, Levitas, Arregle, & Borza, 2000). The importance of collaborative innovation can be seen from its positive effect on innovation performance both at collaboration level, measured by joint patent/invention (Hoang & Rothaermel, 2005; Kim & Song, 2007), and firm level, measured by items including new patents applied, new products developed, new/modified product/service/processes introduced, industry awards, and innovation radicalness (Fang, 2011; Kang & Park, 2012; Keil, Maula, Schildt, & Zahra, 2008; Lahiri & Narayanan, 2013; Mention, 2011; Sampson, 2005; Soh, 2010; Stuart, 2000; Tomlinson, 2010; Un, Cuervo-Cazurra, & Asakawa, 2010; Vasudeva, Zaheer, & Hernandez, 2013; Zeng, Xie, & Tam, 2010). The positive effect of collaborative innovation can also be found in financial performance at firm level, measured by items such as net income, profitability, sales, growth, and market share

(Lahiri & Narayanan, 2013; Lavie & Miller, 2008; Lu & Beamish, 2001; Singh & Mitchell, 2005). Research on collaborative innovation has grown substantially over the last three decades, with more than 52,000 collaborations analyzed from 1990 to 2005 (Schilling, 2009). The growing importance of collaboration is also witnessed by the rapid diffusion of ‘open innovation’ paradigms among innovation practitioners, where firms leverage on external sources rather than relying entirely internally (Chesbrough, 2006).

This trend is particularly important for family firms, and researchers have called for more insights on how family firms embrace an “open” approach to collaborations in order to innovate (Kellermanns & Hoy, 2016). Due to the unwillingness of family members to lose control (e.g., Gómez-Mejía, Takács Haynes, Núñez-Nickel, Jacobson, & Moyano-Fuentes, 2007), resource constraints shaped by their governance structures and size (e.g., Carney, 2005), distinctive aspects of their social capital (e.g., Arregle, Hitt, Sirmon, & Very, 2007), and long-term orientation (Miller & Le Breton-Miller, 2005), collaborative innovation can be an effective means to overcoming innovation barriers and a major source of competitive advantage for innovation in family firms (De Mattos, Burgess, & Shaw, 2013; Hitt et al., 2000; Sirmon, Arregle, Hitt, & Webb, 2008). Family conglomerates are a good example where such form of family business diversifies into a wide variety of industries to have access to resources needed and yet retain family control. However, less is known on how family firms tackle the issue of

the unwillingness to lose control when collaborating with external parties, such as the governance mechanisms used to prevent knowledge leakage. Also, how family firms can capitalize on the unique family firm characteristics like social capital and long-term orientation to build successful collaborative innovation is still far from being understood.

Existing research on innovation in family firms splits into two broad areas of inquiry, one focusing on innovation inputs (e.g., R & D investments) and the other on innovation outputs (e.g., new product introduction, patent registrations) (De Massis, Frattini, & Lichtenthaler, 2013). Studies focusing on innovation inputs have shown that family firms generally invest less in innovation than nonfamily firms (Chen & Hsu, 2009; Chrisman & Patel, 2012; Czarnitzki & Kraft, 2009; Kotlar, De Massis, Frattini, Bianchi, & Fang, 2013; Munari, Oriani, & Sobrero, 2010). However, research on innovation outputs has shown that family firms achieve higher innovation performance than nonfamily firms (e.g., Block, 2012; Czarnitzki & Kraft, 2009). This points to an apparent paradox named by some scholars as the “family innovation dilemma” (Duran, Kammerlander, Van Essen, & Zellweger, 2016). Therefore, family business scholars are highly interested in understanding why and how family firms can “do more with less” (e.g., De Massis, Audretsch, Uhlaner, & Kammerlander, 2017) and outperform nonfamily firms despite lower innovation inputs.

In this review article, we argue that external sources of innovation can be particularly important to address this dilemma, hence we focus on the critical role of collaboration in explaining the innovation performance of family firms. Drawing on the existing research on innovation collaborations (Das & Teng, 2000; Gulati, 1995; Kale & Singh, 2009; Un et al., 2010) and consistent with prior family business research on the topic (Block, 2012; Matzler, Veider, Hautz, & Stadler, 2015; Munoz-Bullon & Sanchez-Bueno, 2011), we define collaborative innovation as a form of inter-firm relationship that involves the exchange and sharing of resources such as financial capital, information, knowledge, and technology with external parties in order to achieve innovation. Collaborative innovation includes alliances, joint ventures, technology exchange, contractual agreements, licensing, and partnerships, and encompasses a broad spectrum of external parties such as customers, suppliers, competitors, universities and research institutes.

During the past few years, scholars have started looking at the collaborative aspects in the innovation strategy and operations of family firms, particularly focusing on how collaborations with external organizations lead to access of resources like capital, information, knowledge, and technology. For example, leaning on resource based view (RBV) and behavioral theory, Classen et al. (2012) have examined how family involvement influences the depth and breadth of search for external resources leading to innovation in family small medium enterprises (SMEs). Block and Spiegel (2013) have studied the role of family firms in promoting knowledge spillovers within a region, where the propensity of family firms to collaborate with other firms have possibly contributed to the regional innovation output by boosting successful patent applications. Others have examined the behavioural barriers that prevent family firms from acquiring external technology (Konig, Kammerlander, & Enders, 2013; Kotlar et al., 2013). However, although this body of research is rich in insights, existing literature remains highly fragmented in terms of theoretical perspectives, constructs and relationships, and empirical approaches. Fragmentation is a typical trait of research fields that undergo an initial “excitement” and growth phase, but the lack of a coherent framework can inhibit the accumulation of knowledge and hamper the maturation of the field (Hirsch & Levin, 1999). The purpose of this article is to assist the development of the field by systematically reviewing and organizing existing research on collaborative innovation in family firms and integrating findings and arguments from prior research. Our ultimate goal is to guide future academic work towards a more coherent and robust understanding of collaborative innovation in family firms. In order to achieve this goal, we organize the existing literature on collaborative innovation into categories based on emerging themes and patterns to identify research gaps and guide future research.

We do so in three major steps. First, we define and discuss key constructs and assumptions in prior research on collaborative innovation and outline a guiding framework for our subsequent analysis of collaborative innovation in family firms (Gulati, 1995; Kale & Singh, 2009). In doing so, we identify three streams of perspectives on collaborative innovation: strategic, transactional, and relational. We note that, while research on collaborative innovation from the general management field has picked up its pace back in the 1990’s, this vast literature has been developed without explicitly considering family firms, thereby overlooking the unique characteristics of family firms and their distinctive advantages and challenges in the context of

collaborative innovation. Thus, in the second step, we synthesize prior research findings and arguments in relation to collaborative activities undertaken by family firms in achieving innovation and map them onto the three streams of perspectives on collaborations outlined earlier. Through this process, we develop a framework that integrates the different theoretical perspectives used in examining the topic of collaborative innovation in family firms. Finally, we draw from this framework to identify the research gaps and potential paths to guide future research. These gaps point to important but nonetheless little known antecedents and intervening factors that can possibly enable or constrain collaborative innovation in family firms. Overall, we thus contribute to an integrative and systematic understanding of collaborative innovation in family business, offer a framework of current thinking categorized by theoretical perspectives, and provide a coherent research agenda that we hope will assist the creation of cumulative knowledge in future work.

By systematically reviewing the past and present debates on collaborative innovation in family firms, and integrating the literature from the fields of family business and general management, we intend to contribute to existing literature in two main ways. First, we aim to offer a solid ground for opening up a new agenda for research that sparks and guides the conversation on collaborative innovation in family firms. Such guiding framework can help direct future research toward the maturation of the field, including the use of coherent theoretical perspectives, valid measurements, and an appreciation of different study contexts in addressing research questions and building cumulative knowledge (Hirsch & Levin, 1999). Second, we aim to address the “family innovation dilemma” (Duran et al., 2016), theorizing on the role of collaborations in reconciling the gap between innovation input and output in family firms, and between “what we know” and “what we need to know”. In doing so, we will not only advance current understanding of how family firms use collaborations to innovate, but will also provide a new, integrative standpoint for studying family firm innovation from a broader and more coherent perspective.

## **2.4 Review Scope and Method**

To provide an overview of existing research, we started searching for published articles on inter-firm collaborations in relation to innovation using the Scopus database in a systematic way. First, we determined the combinations of two sets of keywords: (1)

alliance, collaboration, cooperation, coordination, partnership; and (2) R & D, innovation, internationalization, globalization. Second, we conducted the search with the above combination of keywords in titles, keywords, and/or abstract. Our review of the collaborative innovation literature from the general management field was intended to develop a guiding framework to be used for the subsequent review in the family business field, therefore we only included collaborative innovation articles with sound theoretical perspective(s) from the leading management journals. As existing literature is vast, we limit the scope of review to interfirm relationship with the intention to access resources in achieving innovation. Overall, we found 58 articles: 44 quantitative, 3 qualitative, 5 mixed methods, and 6 conceptual/review articles.

Next, the first author read each article in detail, constructed a table tabulating the type of study, research question(s), research gap(s), theoretical perspective(s), focus of collaborations, study context, sample(s) used (type of data, source of data, time span, country and industry), constructs, level of analysis, and key findings of each article. With this process, we noticed emerging themes and patterns, leading us to the use of thematic analysis to further examine the articles (Boyatzis, 1998). We used mind mapping method to map out the emerging themes and patterns, based on types of collaborations, functions of collaborations, theoretical perspectives, research questions, constructs, study context, and key findings. During this process, we developed codes based on the emerging themes and patterns in terms of research questions asked, the theoretical perspectives used, and the outcome examined in these studies. When disagreement arose among the authors, we discussed until agreement was found. This process led us to identify three main perspectives: strategic, transactional, and relational. These perspectives are defined more clearly below.

First, starting from viewing collaborative innovation through the lens of the RBV, collaborations are used by firms as a means of strategic move in accessing the resources needed, leading to the outcome of knowledge transfer in achieving innovation. We code this stream as strategic view as it incorporates the use of collaborative innovation in tackling resource constraints. Second, we noted a stream of literature analyzing possible opportunistic behaviors by collaborating partners on the basis of game theory and the transaction cost economics (TCE). The governance mechanisms chosen to curb perceived opportunistic behaviors in collaborative innovation relationships are found to

have effects on performance at both firm and collaboration levels. We code this stream as transactional view. Lastly, we observed a stream of literature that studies collaborative innovation using social exchange and network theories, emphasizing the social exchange relations between partnering firms in a collaborative relationship. These social relationships emerge as crucial to the firms' willingness to collaborate and share knowledge, and are thus central to building collaborative innovation networks. We code this stream as relational view.

By organizing the literature into the three perspectives, we provide a systematic overview and understanding of the relationships among major constructs and theoretical perspectives. The organization of literature into these three perspectives reconciles the discontentment by researchers on the claim that one theory prevails another. For example, Yasuda (2005) argues that the use of RBV better explains the motivations for firms to form collaborative innovation. Gulati (1995) claims that the use of TCE views collaboration relationships as transactions and overlooks the trust built over ongoing relationships. Put simply, instead of arguing for the prevalence of one theory over another, we offer a holistic understanding of the construct measurement leading to outcomes. For example, under the strategic view, RBV points the need for resources as the antecedents of forming collaborative innovation (Eisenhardt & Schoonhoven, 1996), while the TCE approach in the transactional view analyzes whether the benefits of collaborative innovation outweigh the consequences (Parkhe, 1993). The relational view, based on social theory, provides understanding of the evolution of collaborative relationship (Gulati, 1998). These three perspectives are not mutually exclusive; rather, they serve as a guiding framework to understand the relationship between key constructs and outcomes.

In the second stage of our literature review, we focused on building a robust and systematic literature review on collaborative innovation in family firms. To do so, we searched the published articles on collaborations in family firms in relation to innovation using the Scopus database (De Massis et al., 2013). In order to be inclusive of all literature covered on this topic, we allowed the span of studies going forward and backward in time with no constraints. We used combinations of three sets of keywords by combining keywords related to family business (family business, family firm, family management, family enterprise, family control, family ownership, family involvement,

family governance, and family influence) with either (1) alliance, cooperation, collaboration, and partnership, or (2) open innovation, innovation, R&D, internationalization, and network. Consistent with our focus on the topic of collaborative innovation in family firms, our selection process only includes articles that look at internationalization and network as a means to achieve innovation where such channels are used for accessing the resources needed, such as technology and know-how. For example, we included studies on internationalization conducted for the purpose of acquiring knowledge and network leading to access of resources that ultimately enable innovation.

Based on the criteria described above, we identified a total of 37 journal publications for the purpose of our review, including 31 empirical studies and 6 conceptual/review studies. To be more comprehensive in our review efforts, we examined the list of family business books reviewed by De Massis and Kotlar (2015) and examined the Google Books and US Library of Congress database by using the same keywords. Finally, we searched conference papers in the Scopus database with the same keywords in order to be inclusive on the latest debates. This process further yielded two book chapters, three books, and three conference proceedings, thus bringing the total number of materials for review to 45. For the purpose of a robust review, these extra materials are not included in the table but add on to our review to provide further evidence of the importance of collaborative innovation in family firms. To create an organizing template to systematically review existing research on the topic of collaborative innovation in family firms, we analyzed each study in-depth, going through the research gaps, research questions, theories, assumptions, arguments, sample, data used, and findings.

## **2.5 Three Perspectives on Collaborative Innovation**

Collaborative innovation refers to voluntary agreements among independent firms, involving exchange and sharing of resources such as capital, information, knowledge, and technology to achieve a common innovation goal (Das & Teng, 2000; Gulati, 1995; Kale & Singh, 2009; Un et al., 2010). We conceive such inter-firm relationships as temporary agreements with a specified time frame, on the basis of exchange and sharing, involving only partial internalization as the resources are still owned by the

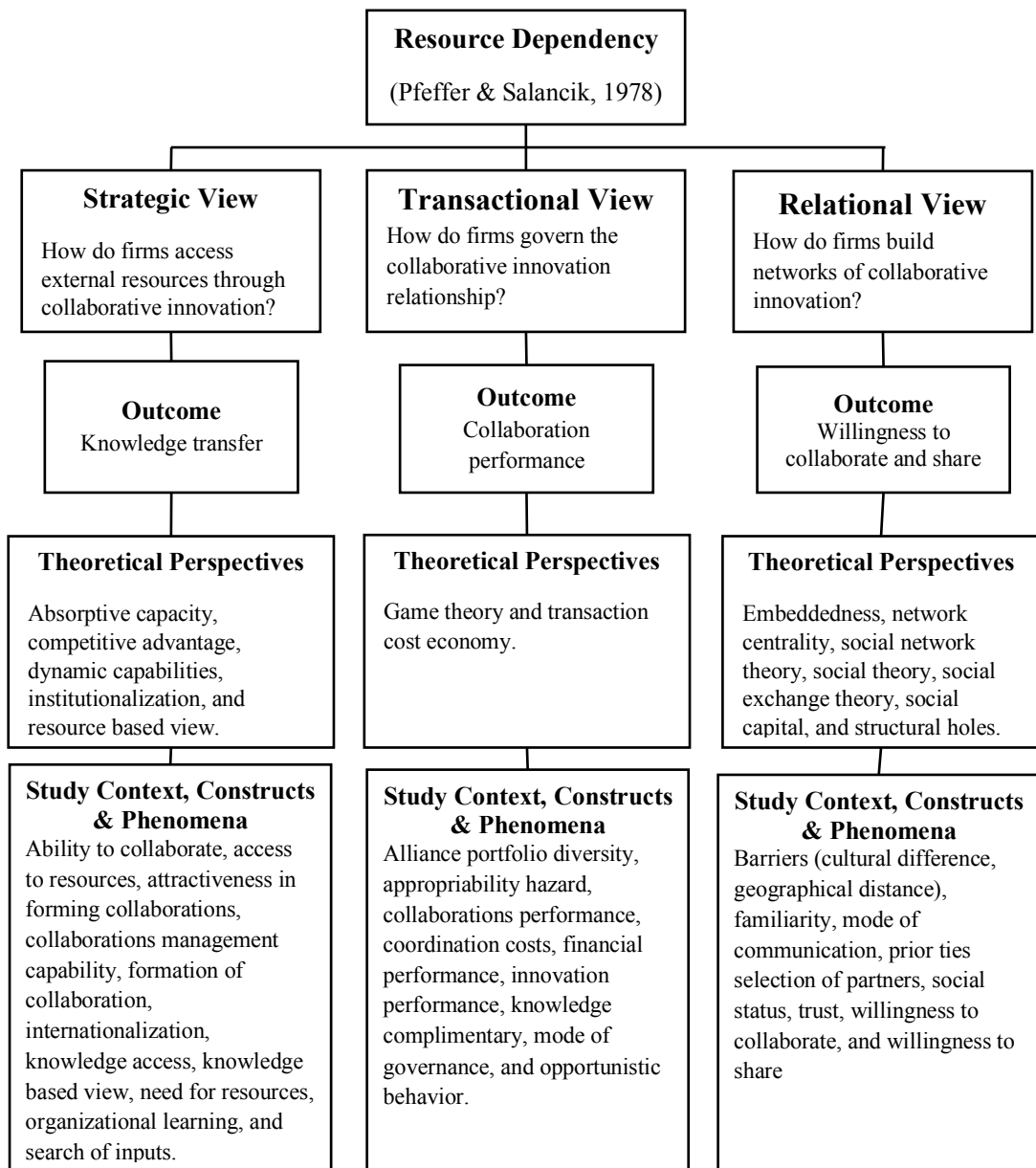


respective owner. Thus, we exclude mergers and acquisitions from our focus (Kale & Singh, 2009).

In achieving innovation, including product, process, and technological innovation, firms search for sources of inputs (Dosi, 1988). Leaning on Resource Dependence Theory (RDT) (Pfeffer & Salancik, 1978), we contend that no firm can be entirely self-sufficient in terms of resources needed in achieving innovation. The need for resources leads firms to access and exchange resources through collaborations as a strategic tool with external organizations. However, interdependence between organizations does not necessarily imply symmetric use and control of the resources (Pfeffer & Salancik, 1978), thus pointing to the importance of governance structure in managing collaborations in deterring opportunistic behavior, and ultimately achieving the intended innovation goal. Nor does the interdependence dictate which organization a focal firm chooses to partner with. As firms engage in the interdependence relationship, network and trust influence the choice of the collaboration partner during the selection process, and in turn such relationship evolves over time.

Literature on collaborative innovation is vast, incorporating a wide range of theories from different schools of thought, and spreading across different types of industries and countries. We limit our review scope to collaborations specified as collaborative relationship with external organizations in relation to innovation. The three major perspectives identified in our review (i.e., strategic, transactional, and relational) are illustrated in Figure. 2.1, along with their outcomes of interests, underlying theoretical perspectives, study contexts, and key constructs.

**Figure 2.1.** Three Streams of Perspectives on Collaborative Innovation



We organized our review around these perspectives as each involves a consistent pattern of constructs and relationships in the general management literature. The strategic view on collaborations builds on the foundations of RBV (Penrose, 1995; Wernerfelt, 1984) and competitive advantage (Barney, 1991), and focuses on how firms rely on access and recombination of external sources of resources to achieve innovation. The transactional view on collaborations builds on TCE (Williamson, 1979, 1981) and game theory, and focuses on assessing the different modes of governance structure in curbing possible opportunistic behaviors by partner organizations that would have an impact on the intended innovation goal. The relational view of collaboration builds on network

(Burt, 1987, 1997) and trust evolved over time (Zaheer, McEvily, & Perrone, 1998), and focuses on the implications of network and trust.

Although we identified a pattern of theories used according to the study context, there are some overlaps among theories used in some studies. However, we focus on the key constructs and relationships in each perspective to provide a coherent overview. The strategic view focuses on the use of collaborations as strategic means to access different sources of resources, the importance of absorptive capacity, knowledge transfer between firms at the collaboration level, and the effect of external factors such as institutional structure on formation of collaborative innovation and knowledge transfer. The transactional view focuses on performance implication from collaborative innovation, governance mode, opportunistic behavior, and partner diversity. The relational view focuses on the network point of view and how different relational aspects influence willingness to collaborate/share, trust, and partner selection.

### **2.5.1 Strategic View on Collaborative Innovation**

Firms need various resources as inputs for innovation, and those resources need to be valuable, rare, inimitable, and non-substitutable (VRIN) in order to create sustained competitive advantages (Barney, 1991). Firms search first internally to recognize the resources they possess in relation to their competitive stance in the environment, and the resources needed to gain that competitive advantage. In achieving innovation, firms constantly search for inputs needed, including but not limited to capital, information, knowledge, and technology. As pointed out by RDT (Pfeffer & Salancik, 1978), no firm is self-sufficient for all inputs needed in attaining innovation. Thus, in search of inputs, firms seek inputs from outside firms through collaborations in various forms, such as vertical and horizontal collaborations.

Early empirical work using RBV as a basis to examine collaboration (Eisenhardt & Schoonhoven, 1996) points out how strategic position in the competitive market and innovation strategies drove firms to form alliances. In contrast with expectation, growth-stage firms have the lowest rate of collaboration. This is possibly due to the fact that they yet to have the capability to innovate and at the same time lack resources to lure collaborative partners. Although the work of Eisenhardt and Schoonhoven (1996) has been seminal in researching collaborations using the RBV perspective, it covers

only limited aspects of RBV. The later work by Ahuja (2000), drawing upon RBV and social network theory, sheds additional light on how different forms of firm resources affect the opportunity to form collaborations.

Das and Teng (2000) are the first to systematically examine collaborations using RBV and apply the RBV perspective in guiding future research. These authors argue that the RBV is suitable to examine collaborations because firms use collaborations as a means to gain access to valuable resources that other firms possess. In the study, they further propose that (1) the characteristics (VRIN) of the resources that firms possess lead to formation of collaborations with other organizations; (2) resource types possessed by the partnering firms, that are either property-based or knowledge-based, determine the structure of the collaboration; and (3) collaboration performance is related to resource alignment between the partnering firms. Comparing the predictive power of RBV and TCE, Yasuda (2005) finds that RBV is better suitable than TCE to explain collaborative activities between firms in high technologies industries.

Combining RBV and organizational learning perspective, Hitt et al. (2000) find that collaborative partners are selected based on possibilities to access their resources and possibilities for organizational learning. Leaning on RBV and knowledge access theory, and using internationalization as the study context, prior research also suggests that accessing resources is a motivation for forming collaborations by SMEs due to their resource limitation and the need for resources (De Mattos et al., 2013; Dickson, Weaver, & Hoy, 2006; Lu & Beamish, 2001; Narula, 2004; Ulubaşoğlu, Akdiş, & Kök, 2009). In addition, Lu and Beamish (2006) show that the lifespan of an international joint venture may be decreased as the SME acquires host country knowledge from the partnering firm through collaboration. Also, different types of resources possessed by the partner firm would have different effect on the international collaboration's performance. Furthermore, as firms seek resources needed in forming collaborations, possession of resources such as in-house R & D capability and technology may make a firm be seen as more attractive partner (De Mattos et al., 2013; Fontana, Geuna, & Matt, 2006). Acknowledging that firms form collaborations to gain access to resources, Vasudeva, Spencer, and Teegen (2013) further use institutional theory (DiMaggio & Powell, 1983; Meyer & Rowan, 1977) to argue that institutional structure would have

an influence on knowledge transfer. A firm is able to extract more knowledge from the partner firm when the partner firm is from a more corporatist country.

Using Korean biotechnology SMEs as sample, Kang and Park (2012) find that SMEs with international and domestic collaborations achieve more innovation than their counterparts without the collaborations, supporting the notion that collaborations lead to access to resources needed for innovation. Wiklund and Shepherd (2009) find that the ability to recombine resources between partnering firms play an important role in bringing actual benefits from collaborations. In addition to recognizing the need to collaborate in order to gain access to resources, researchers have also underlined the importance of absorptive capacity within each firm to facilitate knowledge transfer between partnering firms (Chen, 2004; Faems, Janssens, & Looy, 2007; Hall & Bagchi-Sen, 2007; Kumar & Nti, 1998; Mention, 2011; Mowery, Oxley, & Silverman, 1996). Focusing specifically on access to knowledge, Un et al. (2010) show the different impact of collaboration on innovativeness among different collaboration partners, namely, suppliers, universities, customers, and competitors. Other research uses a knowledge complimentary perspective to analyze the effect of collaboration on innovativeness (Fang, 2011).

Highly innovative firms continuously pursue innovation and thus may have more than one collaboration for different purposes. This then points to the need for building collaboration capability through collaboration experience to better manage collaborations for the best outcome to achieve innovation, which we categorize under strategic view (Kale, Dyer, & Singh, 2002). Sampson (2005) examines the topic using a learning curve and shows that prior experience with collaborations has implications on learning to manage collaborations. However, Hoang and Rothaermel (2005) find diminishing returns of the positive effect of general alliance experience on the likelihood of alliance success. Rothaermel and Deeds (2006) claim that collaboration management capability is key for high-tech ventures to achieve competitive advantage. In addition, firms must be aware of the risks that alliances pose if a firm forms more alliances than it can manage (Rothaermel & Deeds, 2006).

In sum, under the strategic view collaboration is used as a means to access valuable resources that firms otherwise do not possess to achieve innovation. Under this perspective, scholars focus on the strategic actions that firms undertake in collaborative

innovation, namely, recognizing the need to collaborate, search of resources, collaborations management capability, attractiveness of a firm as collaborative partner, transfer of knowledge between partnering firms, the importance of absorptive capacity in combining and assimilating resources, and the effects of external factors.

### **2.5.2 Transactional View on Collaborative Innovation**

Transaction cost economics (Williamson, 1979, 1981) is initially designed to explain when transactions are internalized within a firm or left to the market, or how firms address “make” versus “buy” decisions. According to this perspective, firms wishing to attain innovation face the dilemma of whether to have full ownership of the resources needed to attain innovation or to share it with other firms (Hennart, 1991). At the same time, the TCE approach points out the bounded rationality and opportunism characterizing human nature in pursuing self-interest. In collaborative relationships, firms are incentivized to take advantage to maximize the value from the collaboration at the expense of partnering firm(s) (Hennart, 1991). Using game theory, Parkhe (1993) illustrates that opportunism situations in collaboration are isomorphic to the prisoner’s dilemma, where each firm would like to have maximum payoff in pursuit of individual competitive advantage. Because each firm possesses valuable resource(s) that lure the partnering firm(s) in forming collaboration, concerns arise over the possible leakage of firm’s core competency, such as knowledge and technology.

Asymmetric control and use of resources in collaborative relationships between firms lead to appropriability hazards and opportunistic behavior, hence firms need to design different governance structures to address these issues, depending on internal and external context. Going back to the make or buy debate, scholars aim to know whether collaborations lead to achieving the intended goal of innovation, some indicators include improved innovation and financial performance, both at firm and collaboration level.

Oxley (1997) is among the earlier scholars who systematically examined the appropriability hazards using TCE. She shows that the collaboration form, contractual or equity based, depends mainly on the attributes of the transaction nature of the collaboration rather than firm-level characteristics. Moreover, Robertson and Gatignon (1998) extend this view using the notion of asset specificity, showing that the decision

to engage in collaborative innovation is influenced by product category-specific assets, technology uncertainty, the ability to measure innovation performance, and prior experience of successful collaboration. In their later work, Oxley and Sampson (2004) further examine the probability hazard associated with potential leakage of intellectual property (IP) and find that, when risk is high, firms protect themselves from possible knowledge leakage by replacing governance arrangements with limitations to the scope of the collaboration. Continuing on the concern over knowledge leakage in collaborative innovation, Li et al. (2008) find that, depending on the appropriation risk, firms use partner selection, governance structure, and alliance scope as substitute mechanisms for protection.

Studies under the transactional view suggest that factors both at the firm and the collaboration level influence the effects of collaborations. Using financial measures, Kalaignanam, Shankar, and Varadarajan (2007) find that when a collaboration is formed between firms with different sizes, both large and small firms can benefit. Analyzing the relationship between age and alliance performance, Deeds and Rothaermel (2003) find a U-shaped curve, such that performance of collaborations first declines and then increases as the collaboration relationship ages. At the collaboration level, Parkhe (1993) finds that governance mode is related to collaboration performance, where perceived potential opportunism influences both governance mode and performance. The asymmetry of information between collaboration partners makes them wary of potential knowledge leakages. With governance structures in place, the perceived risk is reduced and thus firms are able to better achieve joint goals.

In achieving innovation, firms may have more than one single collaboration formed for different innovative projects. With the increased number of collaborations that a firm forms, managing collaborations is more than just a matter of curbing opportunisms, but also involves increased costs in managing the collaborations. Kale and Singh (2009) introduce an alliance portfolio approach to better examine the benefit of collaborations on innovation and financial performance. In this regard, Lahiri and Narayanan (2013) examine the relationship between alliance portfolio size, innovation, and financial performance. Their findings show that highly innovative firms benefit less from increasing alliance portfolio size than less innovative firms. In relation to internationalization, Lavie and Miller (2008) suggest that when firms expand their

portfolio of collaborations internationally, they face the challenges in managing the increasing degree of foreignness that comes with cross-national differences among firms. Their results suggest that although firms' financial performance decreased initially with the internationalization of the alliance portfolio, the liability of foreignness can be overcome with accumulation of experience. This research also points to the need to set up organizational routines to manage foreign partners. Sampling on both domestic and international collaborations, Duysters and Lokshin (2011) find an inverted U-shaped relationship between alliance portfolio complexity and innovation performance.

In sum, under the transactional view we see how firms face appropriability hazard and opportunism in collaborative innovation due to asymmetry of information and control/use of resources, affecting performance at different levels. Under this stream of research, we focus on firm performance, innovation performance, collaboration performance, governance mode, coordination costs, organizational routines, opportunistic behavior, and partner diversity.

### **2.5.3 Relational View on Collaborative Innovation**

Using social theory, Granovetter (1985) argues that the economy is made up of social relations between firms and trust is developed through repeated transactions rather than institutional arrangements. From the social network point of view, inter-firm relationships are not limited to transactions, but also involve continuous exchange of tangible and intangible resources within the embedded network over a specified period of time (Uzzi, 1997). Once a collaborative relationship is formed, for example to co-develop a new product, firms engage in a process that involves the exchange of resources like financial capitals, ideas, knowledge, know-how, and technology. As firms have limited knowledge about other organizations, they gather information about potential partners through the network. Therefore, social capital is contingent to firms in search of the right partner who possess complementary assets within the network where they can obtain information about the potential partner (Burt, 1997, 2004).

Gulati (1995) is the first to begin examining the governance mode of collaborations using social theory. He initially criticized the TCE view of collaborations as independent transactions and emphasized the importance of prior interactions between the collaboration partners. Although the findings support the TCE claim that firms use



equity-based collaboration to curb possible opportunistic behavior, they also point to the need to further examine the role of trust that is formed through repeated formation of collaborations. In his later work, Gulati (1998) proposes to examine several aspects of collaborations using the social network perspective. In particular, under the relational view we focus on three research questions: (1) how do firms select partners to form collaborations; (2) how do prior ties and familiarity influence this choice; and (3) how do collaborative relationships evolve over time.

As suggested by the strategic view, recognition of the need for resources happens within the firm, as firms assess internally the resources needed to achieve innovation. However, the relational view suggests that the opportunities to form collaborations lie outside the firm (Ahuja, 2000; Eisenhardt & Schoonhoven, 1996). In his study, Ahuja (2000) finds a positive relationship between formation of collaborations and social capital: the more linkages a firm possesses in prior industry network, the more technical collaborations are formed. Familiarity is increased through prior ties as firms acquire more information through direct or indirect contacts, thereby increasing the likelihood of forming a collaboration (Reuer & Lahiri, 2014; Vanhaverbeke, Duysters, & Noorderhaven, 2002). Direct contacts come from formal transactions and indirect contacts come from network.

In addition to assessing resources, firms need to attract collaborative partners in order to form collaborative relationships, which can be attained through building a social status (Stuart, 2000). Using high technology industry as sample, Stuart (2000) shows if a firm wishes to upgrade its reputation through collaboration, with whom the focal firm partner with is more important than just the ability to form collaboration. This research suggests that a firm benefits from collaborations even if the ultimate goal is not achieved, because then the focal firm's reputation in the network is upgraded from surviving the due diligence of partner firm. This is especially the case when the partner firm is more reputable in the industry and more technologically sophisticated.

More recent work by Soh (2010) examines the implications of network centrality and finds that firms that position themselves centrally in the collaborative network achieve higher innovation outputs. In particular, the more centrally a firm is positioned in the collaborative network, the better its access to network resources such as information and opportunities. Continuing on the benefits of collaborative network, Fernhaber and

Li (2013) find that international exposure through collaborative networking enhances the opportunities for internationalization. Firms become more willing to share knowledge as trust bred through prior ties (Gulati, 1995). As the willingness to share knowledge increases, the gap in knowledge asymmetry becomes lower, facilitating achievement of joint goals in collaborative innovation (Kim & Song, 2007; Tiwana, 2008).

Familiarity increases through direct contact from prior ties or indirect contact through the network, thus building trust and increasing the willingness to both form collaborative innovation and share resources (Gulati, 1998). Using the relational perspective, we view collaborations as involving continuous exchange of resources and interactions over time. Thus, we focus on building the collaborative network that provides firms with more opportunities and resources.

#### **2.5.4 The Case for Studying Collaborative Innovation in Family Firms**

In the previous sections, we have outlined three distinct research perspectives within existing literature on collaborative innovation: the strategic, transactional, and relational views. Using these three perspectives as a guiding framework, we review research on collaborative innovation in family business. Several scholars have emphasized the heightened importance of and unique challenges associated with collaborative innovation in family firms. In order to innovate, family firms need to be entrepreneurial and take risks. These priorities are particularly important for family firms to survive in the highly dynamic and competitive markets and to achieve their long-term vision (James, 1999). Furthermore, strategic entrepreneurship also points to the importance of collaborative network, providing access to resources that firms need for innovation (Hitt, Ireland, Camp, & Sexton, 2001). Yet, due to the unique characteristics of family firms, such as the unification of ownership and control, governance structure, family involvement and long-term vision, family firms behave differently from nonfamily firms (Chrisman, Chua, Pearson, & Barnett, 2012; Chua, Chrisman, & Sharma, 1999; Mazzelli, Kotlar, & De Massis, 2017; Sharma, Chrisman, & Gersick, 2012). Within the family firm, family members work together, forming the corporate entrepreneurship ability to innovate and accomplish the family oriented vision (Sharma & Chrisman, 1999). Thus, family firms would have different concerns and considerations in forming collaborative innovation with external organizations.

Existing research has shown that family firms prefer a lower level of R&D investments compared to nonfamily firms. Despite this, they are still able to innovate (Block, 2012; Duran et al., 2016). The RDT prediction that no firm is self-sufficient for all the resources needed for innovation (Pfeffer & Salancik, 1978) points to the need to further investigate how family firms access external resources needed for innovation. Despite the call for more in-depth understanding of collaborative innovation in family firms (De Massis et al., 2013), knowledge on this topic remains limited and fragmented.

**Table 2.1.** Selected Studies on Collaborative Innovation in Family Firms

<b>N o.</b>	<b>Authors</b>	<b>Type of Paper</b>	<b>Sample Description</b>	<b>Data</b>	<b>Comparative Study</b>	<b>Theoretical Perspectives/ Key Constructs</b>	<b>Focus of Alliance/ Collaboration/ Cooperation</b>	<b>Findings/Conclusions on collaboration</b>	<b>Strategic</b>	<b>Analytical</b>	<b>Relational</b>
1	Alberti et al. (2014)	Empirical - Quantitative	276 questionnaires, SMEs, mid-high tech, Italy	Primary data	Family versus nonfamily firms	Behavioural theory, open innovation	Open innovation - external collaboration for innovation process.	(Findings) Family firms have a lower search breadth than non-family firms. Generation effect, presence of external experts/scientists, practice to consult external experts, and willingness to shorten time of innovation have varied impact on search breadth.	N/A	N/A	The effect of family influence on search breadth affecting partner diversity.
2	Anderson et al. (2005)	Empirical - Quantitative + Qualitative	68 questionnaires, 12 interviews, Scotland	Primary data	Only family firms	Entrepreneurial network	Strong ties/embedded - personal and professional ties.	(Findings) Family members who do not work for the family firm continue to provide help and assistance in instrumental and functional way that is close to that of business ties, where such support is of high quality and at low or non-existent cost.	N/A	N/A	The benefit of network outside family firms.

3	Block and Spiegel (2013)	Empirical - Quantitative	526 FFs, Germany	Secondary data	Only family firms	Knowledge spillover	Cooperation with universities or research institute, allowing access to complementary technological resources, faster development of innovation, improved market access, scale and scope economies, cost sharing and risk reduction.	(Findings) A positive relationship is found between family firm concentration and regional innovation output.	The effect of location for access to knowledge for innovation.	N/A	N/A
4	Broekaert et al. (2016)	Empirical - Quantitative	2604 firms, EU	Secondary data	Family versus nonfamily firms	Competitive advantage	Collaborations with external partners can yield external ideas and stimulate different types of innovation, such as customers and suppliers for incremental innovation, and universities and research organizations for radical innovation.	(Findings) Family firms are found to be more flexible than nonfamily firms, thus able to manage external relations better and achieve better innovation performance.	Organizational flexibility as collaboration capability in family firms in better manage external relations.	N/A	N/A

5	Carrasco-Hernandez and Jimenez-Jimenez (2013)	Empirical - Quantitative	282 FFs, Spain	Primary data	Only family firms	Social Capital	Network of inter-firm relationships providing access to knowledge, resources and technologies.	(Findings) There is a positive relationship between social capital and innovation in family firms, although familiness has a moderating effect.	N/A	N/A	Capitalizing family firms' social capital
6	Carney (2005)	Review	Asia	-	-	Agency perspectives	Network of business partners.	(Conclusions) Owner-managers have greater liberty to utilize and benefit from both arm's length and relational contracting. Owner managers are likely to generate more diverse networks relations comprised of different forms of contracts	N/A	The effect of owner manager on managing collaborations	The effect of owner manager on generating networks.
7	Cassia et al. (2012)	Empirical - Qualitative	10 firms, Northern Italy	Primary data	Family versus nonfamily firms	-	Collaboration with external parties for new product development.	(Findings) Family firms are found to be less willing to collaborate compared to non-family firms and this has a negative effect on new product development.	N/A	N/A	The effect of family variable on the willingness to collaborate and share.
8	Classen et al. (2012)	Empirical - Quantitative	167 SMEs, manufacturing industry, Belgium & Netherlands	Primary data	Family versus nonfamily firms	RBV, behavioural theory	Collaboration with external firms for innovation activities, such as customers, suppliers, competitors, or other organizations like research	(Findings) Family SMEs have a lower search breadth than nonfamily SMEs. The search breadth gap may be filled by selecting either a better educated family CEO or increase nonfamily managers.	N/A	N/A	The effect of family influence on the diversity of partners.

							institute or consultant.				
9	Deng et al. (2013)	Empirical - Quantitative	43,728 SMEs, manufacturing firms, China	Secondary data	Family versus nonfamily firms	Agency theory	Collaboration with external parties.	(Findings) Investment in R&D, human capital, and location within a special economic or technological development zone have a positive impact on product innovation.	The effect of family ownership on innovative activities.	N/A	N/A
10	Denicolai et al. (2015)	Empirical - Quantitative	302 small firms, Italy	Primary data	Only family firms	Upper echelon (UE) perspective	Internationalization - entering new market.	(Findings) Firms based on "family" characteristics are the most limited in terms of innovation and internationalization, while the team-founded firms have the widest set of innovation.	The effects of entrepreneur(s)' characteristics on strategy implementation on innovation and internationalization.	N/A	N/A
11	Gomez-Mejia (2007)	Empirical - Quantitative	1,237 FFs, Spain	Secondary data	Only family firms	SEW	Part of a cooperative.	(Findings) Willingness to collaborate is related to economic prospect as well as SEW.	N/A	N/A	The willingness to collaborate, using SEW as reference point.

12	Gurrieri (2008)	Empirical - Quantitative	166 FFs, Italy	Primary data	Only family firms	Network	Relationship between firms.	(Findings) Entrepreneur's characteristics influence firm's innovativeness, absorptive capacity and social capital, impacting the relationships in the network.	The effect of absorptive capacity on obtaining knowledge from network.	N/A	The influence of entrepreneur's characteristics on network creation.
13	Harms et al. (2015)	Empirical - Quantitative	21 surveys and financial data of 1,488 firms, tourism & hospitality, Germany	Primary +secondary data	Family versus nonfamily firms	Cooperative behavior	Formal and informal cooperative agreements (competitors or non-competitors).	(Findings) FFs favour formal cooperation predominantly with non-competitors.	N/A	N/A	The effect of family influence on partner selection.
14	Hatak & Hyslop (2015)	Empirical - Qualitative	A dyadic cooperation between 2 family firms, Austria	Primary	Only family firms	Resource dependency theory	Inter-firm cooperation on a long-term basis with learning and access to knowledge, leading to innovation.	(Findings) Trust embedded in the collaboration eliminates the needs for formalized contract.	N/A	N/A	The role of trust in enabling family firms to share.
15	Hausman (2005)	Empirical - Qualitative	6 family firms, US and Spain	Primary +secondary data	Only family firms	-	Cooperation between firms to commercialize technologies and manage resources.	(Findings) Having collaborative relationship with other firms influence the adoption of innovation.	Collaboration as strategy in obtaining know-how and new technology.	N/A	N/A



16	Kim et al. (2004)	Empirical - Quantitative + Qualitative	19 Emerging markets	Secondary data	Only family conglomerates	Growth pattern	Joint ventures, international alliances, and licensing agreements	(Findings) Family Conglomerates seek know-how and technology through licensing arrangements and JV with foreign partners when face threat from new entrants.	Collaboration as strategy in obtaining know-how and new technology.	N/A	N/A
17	Kontinen and Ojala (2011)	Empirical - Qualitative	8 family SMES, 16 interviews, manufacturing, Finland	Primary data	Only family firms	Network	Internationalization - measured by entering a foreign country (France).	(Findings) FSMES mainly recognize international opportunities by establishing new formal ties, while informal ties and family ties have less significant role in providing international opportunities.	N/A	N/A	International opportunity recognition through new formal ties.
18	Kraus et al. (2012)	Empirical - Quantitative	533 firms, food, media and maritime industry, Finland	Primary data	Family versus nonfamily firms	Competitive advantage	Managing R&D network to acquire external knowledge.	(Findings) A positive relationship is found between managing external relationships and innovation performance.	Organizational innovation as collaboration capability in managing external relationships to obtain external knowledge and achieve innovation.	N/A	N/A
19	Li et al. (2015)	Review	China	-	-	Competitive advantage, network	Nonmarket social and political network.	(Conclusions) Family firms need to expand beyond familism-based social networks, such as alliance.	The need to expand beyond family-based network into cooperation and alliance with external parties	N/A	The benefit of nonmarket network possessed by family firms.

									to access resources.		
20	Miller et al. (2009)	Empirical - Quantitative	170 firms, Korea	Primary data	Family versus nonfamily firms	Organizational commitment to employees (OCE)	External relationship such as alliances and JVs as opposed to "one shot" transaction, supplying knowledge, social, and financial capital.	(Findings) Investment in community and connection are germane to success in emerging-market and high-technology environments, and both are more helpful to family firms than to non-family firms.	N/A	N/A	The need for investment in network to be innovative.
21	Nieto et al. (2015)	Empirical - Quantitative	15,173 firms, manufacturing, Spain	Secondary data	Family versus nonfamily firms	Innovation behavior	Equity-based agreements where firms pool their capabilities (i.e., JVs), as well as non-equity form of alliances.	(Findings) Family influence has negative effect on willingness to collaborate and family firms are significantly less prone to collaborate technologically.	N/A	N/A	The effect of family influence on willingness to collaborate.
22	Pant and Rajadhya ksha (1996)	Empirical - Qualitative	India	-	Only family firms	-	Alliances that provide cost-effective platforms for entering new countries and in return, foreign firms provide access to international markets and technologies.	(Conclusions) The unique family firm characteristics, e.g. succession, authority, and decision-maker are the things foreign companies must watch out for when partnering with them.	The effect of family firm characteristics on forming collaborations with foreign firms.	N/A	N/A

23	Pérez (2007)	Review	Spain	Secondary data	Only family firms	RBV, resource dependency theory, network theory	Cooperation - trade associations.	(Conclusions) Refers to the survival of family firms, where they cooperate among themselves for knowledge transfer and innovation.	Collaboration as strategy for knowledge transfer and innovation.	N/A	N/A
24	Pittino and Visintin (2011)	Empirical - Quantitative	272 SMEs, Italy	Primary data	Family versus nonfamily firms	Comparative transaction governance mechanisms and RBV	Inter-organizational cooperation which organizations work together to achieve a common goal.	(Findings) Family firms are less willing to collaborate compared to non-family firms. Generation effect and succession period have effect on propensity to collaborate.	N/A	N/A	The generation effect and succession period on the propensity to collaborate.
25	Pittino et al. (2013)	Empirical - Quantitative	508 firms, 259 alliances, Italy	Primary data	Family versus nonfamily firms	Innovation strategies	Technological alliance	(Findings) Family firm increases the likelihood of adopting exploration-based technology sourcing strategies.	Strategies adopted by family firms in accessing technology to pursue innovation.	N/A	N/A
26	Roessl (2005)	Review	-	-	-	Cooperation capabilities	Cooperation as coordinated behavior between agents, the advantages of which will not manifest until some point in the future, depending on the (uncertain) behavior of the other agent.	(Conclusions) Typical characteristics of family businesses as factors that hinder or encourage cooperation.	The effects of family firm characteristics on the collaboration capability.	N/A	N/A

27	Serrano-Bedia et al. (2016)	Empirical - Quantitative	110 firms, Spain	Primary data	Family versus nonfamily firms	Transaction cost economies, knowledge based view	Collaboration through contractual arrangements in accessing external knowledge in the market in order to gain knowledge unrelated to the firm's current areas of knowledge or to use knowledge that advances its existing technologies and products.	(Findings) There is a positive relationship between collaboration and innovation performance, although family involvement has a negative moderating effect on the relationship between use of knowledge from collaboration and innovation performance.	Using collaboration as a strategy in obtaining external knowledge in achieving innovation.	Family involvement exerts higher transaction costs of collaborations	N/A
28	Singh and Gaur (2013)	Empirical - Quantitative	16,337 firm-year observations over eight years, India	Secondary data	Family versus nonfamily firms	Governance	Business group - a set of legally independent entities, share several formal and informal linkages and take coordinated actions in multiple product and/or geographic markets.	(Findings) A positive effect of family ownership and group affiliation on R&D intensity and new foreign investments.	The effect of family ownership on the ability to collaborate.	N/A	N/A

29	Sirmon and Hitt (2003)	Review	-	-	-	RBV	Alliances can be formal, such as JVs and nonequity ventures, or informal, especially for family firms.	(Conclusions) Effective management of social capital in family firms leads to effective utilization of alliances, allowing for access to external resources.	The effect of unique family resources on social capital management, in relation to collaboration capability.	N/A	N/A
30	Sirmon et al. (2008)	Empirical - Quantitative	2,531 SMEs, manufacturing, France	Secondary data	Family versus nonfamily firms	RBV & threat rigidity	Internationalization - measured by selling outside home country.	(Findings) Firms that respond to high imitability with higher levels of R&D investments and internationalization achieve higher levels of firm performance, as internationalization provides access to new knowledge.	The effect of family influence on adopting internationalization for knowledge access.	N/A	N/A
31	Sorenson et al. (2008)	Empirical - Quantitative	193 questionnaires, US	Primary data	Only family firms	Collaborative network orientation (CNO)	Collaborative relationships among networks made up of customers, family members, community members, and, inside the organization, employees.	(Findings) Collaborative network orientation is positively associated with business performance regardless of the gender of the managers.	N/A	The positive effect of collaboration on firm performance.	N/A
32	Spriggs et al. (2012)	Empirical - Quantitative	199 questionnaires, US	Primary +secondary data	Only family firms	RBV	Collaborative network, such as customers.	(Findings) No moderation effect of collaborative network orientation found on innovative capacity and firm performance.	N/A	The interaction effect of innovative capacity and collaborative	N/A

										network orientation on firm performance.	
33	Stanley and McDowell (2014)	Empirical - Quantitative	149 questionnaires, supplier to university, US	Primary data	Family versus nonfamily firms	Social capital: organizational efficacy and interorganizational trust	Partnership - customer/supplier.	(Findings) Positive relationship between interorganizational trust and performance in both family and nonfamily firms.	N/A	The effect of interorganizational trust on firm performance.	N/A
34	Tsao and Lien (2013)	Empirical - Quantitative	3,103 firm-year observations with 776 firms, Taiwan	Secondary data	Family versus nonfamily firms	Agency theory	Internationalization - measured by ratio of foreign sales to total sales, ratio of foreign assets to total assets, and the number of countries where a firm operates.	(Findings) Family management and ownership positively moderate the performance and innovation implications of internationalization.	The role of family ownership and management on mitigating negative effects and extracting benefits of internationalization.	Performance implications of internationalization.	N/A
35	Yeoh (2014)	Empirical - Quantitative	110 FB SMEs, electronic and electrical industry, Malaysia	Primary data	Only family firms	Competitive advantage	Relationships with external entities (e.g., partnerships, suppliers, and research institutes).	(Findings) External CEO's international experience has positive effect on sourcing external technology and financial performance.	Hiring external CEO with international experience as a strategy in obtaining external source of technology.	N/A	N/A

36	Zahra (2010)	Empirical - Quantitative	779 responses, manufacturing industries, US	Primary data	Only family firms	Relational perspective	Organizational social capital (OSC) results from family firms' interactions, communications and relationships with diverse external stakeholders, and serves as a major relational capital that makes it possible to obtain resources from other companies.	(Findings) Family firms use their OSC to develop alliances and JVs with new ventures, as these alliances are a key source of learning and achieving innovation.	N/A	N/A	Exploiting family firms' social capital.
37	Zamudio et al. (2014)	Review	-	-	-	Social capital, network	Collaborations, internationalization, and network.	(Conclusions) There is a need to further examine network and social capital, how family firms collaborate with external firms and generate competitive advantage.	N/A	N/A	Family firms collaborating with external firms through their network and social capital.

## **2.6 Overview of Prior Research on Collaborative Innovation in Family Firms**

In this section, we discuss prior research on collaborative innovation in family firms, examine the samples used, theoretical perspectives/key constructs, focus of collaborations, and key findings/conclusions. We outline these articles in Table 2.1.

### **2.6.1 Methodological, Empirical, and Theoretical Issues**

Our analysis of 37 journal publications on collaborations in family firms shows that existing research ranges from micro factors such as family involvement (Nieto, Santamaria, & Fernandez, 2015; Pittino, Visintin, Bau, & Mazzurana, 2013) to macro factors like network (Anderson, Jack, & Dodd, 2005; Carney, 2005; Gurrieri, 2008; Kontinen & Ojala, 2011; Li et al., 2015; Miller, Lee, Chang, & Le Breton-Miller, 2009; Zahra, 2010; Zamudio, Anokhin, & Kellermanns, 2014), samples include SMEs (e.g., Alberti, Ferrario, Papa, & Pizzurno, 2014; Classen, Gils, Bammens, & Carree, 2012; Yeoh, 2014), private firms (e.g., Gurrieri, 2008; Miller et al., 2009; Sorenson, Folker, & Brigham, 2008), and publicly listed firms (e.g., Singh & Gaur, 2013; Tsao & Lien, 2013), across different industries including both primary and secondary data. With the distinct characteristics of family firms, some studies incorporate theoretical perspectives such as agency theory, behavioral theory, socioemotional wealth (SEW), and social capital to explain the relationship between unique family firm characteristics and collaborative innovation.

Of the 37 published articles reviewed, the studies with empirical data are quite evenly distributed between studying only family firms or comparisons of family firms versus nonfamily firms. The studies are also quite evenly distributed between primary and secondary data. In terms of geographical coverage, the studies cover a wide range of regions: Asia (Carney, 2005), Austria (Hatak & Hyslop, 2015), Belgium and Netherlands (Classen et al., 2012), China (Deng, Hofman, & Newman, 2013; Li et al., 2015), Emerging markets (Kim, Kandemir, & Cavusgil, 2004), across EU countries (Broekaert, Andries, & Debackere, 2016), Finland (Kontinen & Ojala, 2011; Kraus, Pohjola, & Koponen, 2012), France (Sirmon et al., 2008), Germany (Block & Spiegel, 2013; Harms, Memili, & Steeger, 2015), India (Pant & Rajadhyaksha, 1996; Singh & Gaur, 2013), Italy (Alberti et al., 2014; Cassia, De Massis, & Pizzurno, 2012; Denicolai,



Hagen, & Pisoni, 2015; Gurrieri, 2008; Pittino & Visintin, 2011; Pittino et al., 2013), Korea (Miller et al., 2009), Malaysia (Yeoh, 2014), Scotland (Anderson et al., 2005), Spain (Gómez-Mejía et al., 2007; Hausman, 2005; Nieto et al., 2015; Serrano-Bedia, López-Fernández, & Garcia-Piqueres, 2016; Pérez, 2007), Taiwan (Tsao & Lien, 2013), and US (Hausman, 2005; Sorenson et al., 2008; Spriggs, Yu, Deeds, & Sorenson, 2012; Stanley & McDowell, 2014; Zahra, 2010).

With the nature of the topic on collaborative innovation, the sample firms in the studies include brewery, electronic and electrical industry, mid-high tech industry, manufacturing industry, SMEs, small firms, and tourism and hospitality. Some studies focus on family influence and external relationships without specifying any particular industry. Unlike the more mature field of general management with sound theoretical perspectives studying various causal relationships, the studies in the family business field use a broad range of theoretical perspectives and constructs in examining the relationship between unique family firm characteristics and various types of collaborative innovation.

As specified in the previous section, we included all studies where collaboration with external organizations is formed in order to innovate. Therefore, reviewed articles include studies on collaborations such as open innovation, external ties, cooperation, network, internationalization for the purpose of accessing resources, cooperative agreements, JVs, alliances, licensing agreements, business groups, and partnership.

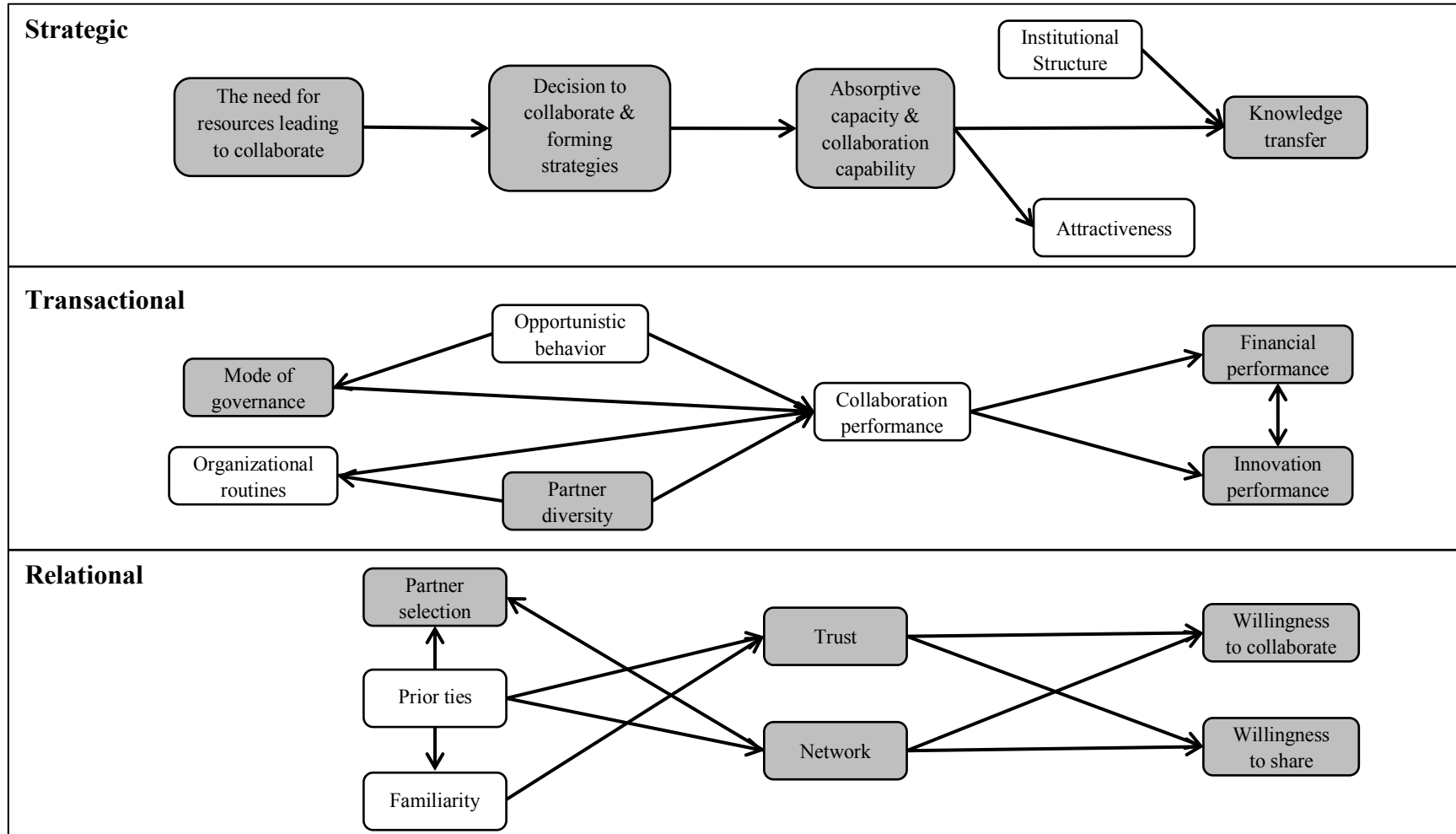
## **2.7 Examining Collaborative Innovation in Family Firms**

As reported in our review of collaborative innovation in general management and family business literatures, while the topic has been well studied in the general management field with theoretically sound assumptions and clear measurements, current knowledge on collaborative innovation remains quite fragmented in the family business field.

In this section, we examine what we know and what we do not know about collaborative innovation in family firms. The extant literature on collaborative innovation from general management has not specifically considered the unique characteristics of family firms that are likely to play a role in inter-firm collaborations. For instance, Pant and Rajadhyaksha (1996) point out that, when forming collaborations with a family firm,

the firm should pay attention to the unique characteristics of family firms including succession planning, authority structure, and centralized decision-making. In the last decades, family firm characteristics have been well studied in broad context and wide geographical span (Sharma et al., 2012). Therefore, we will not delve deep into the family firm characteristics themselves. Instead, we incorporate major constructs and relationships detected from our review of the general management field and take into account the influence of family firm characteristics on each construct at different levels of analysis, to identify research gaps for future research (Figure. 2.2). We use grey boxes to indicate constructs that have been studied previously in the family business literature.

**Figure 2.2.** Framework on Collaborative Innovation with Major Constructs and Relationships



Note: Grey color boxes indicate topics that have been addressed in the extant family business literature.

### **2.7.1 Strategic View of Collaborative Innovation in Family Firms**

Under the strategic view, we mainly focus on the antecedents to forming collaborative innovation for the purpose of accessing resources at the family firm level to attain knowledge transfer and ultimately achieve innovation. Despite existing research largely suggests a lower willingness to engage in collaborative innovation among family firms, evidence of family firms relying on international alliances and JVs in order to acquire the resources in terms of knowledge, technology and financial capital that are needed for innovation is found in many countries around the world (Lubinski, Fear, & Pérez, 2013). Kim et al. (2004) find that, when facing competition from entry of foreign business, family conglomerates seek collaborations with foreign partners to obtain know-how and the latest technology. Focusing on family firms, Block and Spiegel (2013) find a positive relationship between family firm concentration and regional innovation output, where concentration of family firms in one region leads to better access to knowledge for innovation. Looking into the disappearance of Chinese family firms and their revival in the history, Li et al. (2015) emphasize the need for family firms to expand beyond family-based networks into collaborations with external parties in order to access resources. A conference proceeding using Italian companies as sample also acknowledges that collaborations lead family firms to information acquisition and growth opportunity (Bannò & Trento, 2016).

In terms of using collaborations as a strategy to tackle the need for resources, Pittino et al. (2013) examine the innovation strategies adopted by family firms in accessing technology through technology alliances to pursue innovation. Looking into strategy implementation in family firms in achieving innovation, Denicolai et al. (2015) investigate the effect of entrepreneur(s)' specific characteristics on implementation of collaborative innovation strategy through internationalization. Yeoh (2014) finds that external CEOs' international experience has positive effect on sourcing external technology, thus family firms can use hiring of external CEO as a strategy to access external technology.

Before diving into how and when family firms use collaborative innovation as a strategy to innovate, researchers should first explore the antecedents at firm level that lead family firms to form collaborative innovation. As pointed out in the existing literature, any firm starts by looking internally at the resources possessed and by assessing the

resources needed to achieve innovation in order to remain competitive in the market. However, family firms are characterized by distinctive features such as risk aversion and unwillingness to relinquish control, which leads them to behave differently from their nonfamily counterparts (Chrisman et al., 2012; Chua et al., 1999; Kotlar & De Massis, 2013; De Massis, Kotlar, Chua, & Chrisman, 2014).

The question of how and when family firms assess the need to form collaborative innovation has been sparingly researched in empirical studies, with scholars emphasizing the effects of entrepreneurs' characteristics on innovation and internationalization (Denicolai et al., 2015), the effect of generation and composition of management team (Pittino et al., 2013), and the effect of external CEO (Yeoh, 2014). Nevertheless, this topic remains largely unexplored. Researchers may explore factors such as the aspiration level of the family firm to remain competitive, long-term orientation to survive the fierce market competition, family-centered non-economic goals to keep the family together, or SEW in keeping the family legacy (Berrone, Cruz, & Gomez-Mejia, 2012; Chrisman et al., 2012; Kotlar, Fang, De Massis, & Frattini, 2014; Kotlar, Signori, De Massis, & Vismara, 2017).

The only study we found that addresses family firm reaction to resource constraints is the book chapter by Grozdanić and Radović-Marković (2015). Using a sample of family SMEs in Serbia, the study shows that the perceived resource constraints in terms of finance, labor, and new technology lead to the use of internationalization as a means to access the resources needed by family firms. With just one study available, we still know little about the antecedents that lead family firms to form collaborative innovation. While nonfamily firms generally have professional corporate governance structures in place and board of directors making strategic decisions, family firms have to constantly perform a balancing act between the firm and the family needs.

Yeoh (2014) suggests that family firms hire external CEOs with international experience to rely on their network as a strategy to obtain external technology. Existing research has outlined location (Block & Spiegel 2013), expanding network beyond family-based network (Li et al., 2015) and group affiliation (Singh & Gaur, 2013) as possible strategies to form collaborative innovation. Given the unique family firm characteristics, future research may look into the need to collaborate as an enabling factor to form collaborative innovation strategies.

Research Gap S1: *How and when do family firms' need to collaborate and family goals influence the decision to collaborate and the collaboration strategy?*

Having conceptualized collaborative innovation as a means to gain access to the resources needed for innovation, the next topic is family collaborative innovation. Drawing on a sample of private family SMEs in China, Deng et al. (2013) examine the effect of family ownership and control on innovation activities such as investment in R & D, human capital, and location to access external resources for product innovation. Part of the study by Gurrieri (2008) examines the influence of entrepreneur's characteristics on firm absorptive capacity in relation to obtaining knowledge from the network. Drawing on a sample of emerging market firms in India, Singh and Gaur (2013) find a positive effect of family ownership and group affiliation on R & D intensity and new foreign investments. Sirmon et al. (2008) illustrate the effect of family influence on R & D investment and on adopting internationalization in order to access knowledge in response to competitive threat of imitation.

Family firms need to invest in absorptive capacity in order to extract the benefit from collaborative innovation and attract collaboration partners. Although Gurrieri (2008) has examined the influence of entrepreneur's characteristics on family firm's absorptive capacity in extracting knowledge from the network, we still do not have an overall picture of other factors affecting absorptive capacity as family firms have many other concerns that reside in the need of the family. Thus, it is worth investigating the decision to form collaborative innovation as a determinant of investments in absorptive capacity. Drawing on RBV, Sirmon and Hitt (2003) argue that the uniqueness of family firms enables them to possess unique resources that differentiate them from nonfamily firms, namely, human capital, social capital, patient financial capital, survivability capital, and governance structure. Therefore, future research could explore the mechanisms through which family firms' resource endowments lead to building absorptive capacity.

Taking into account a number of unique family firm characteristics, Roessl (2005) explores the tendencies and capabilities of family firms in forming collaborations. He argues that although family firms have certain characteristics that may hinder the willingness to collaborate, they do possess capabilities that would enhance their collaboration capability. For instance, long-term orientation, organizational slack,

family decision-making, and communication skills are all aspects that may have an effect on collaboration capability. Although Roessl (2005) points out that family firms possess unique capabilities that would enhance their collaboration capability, we still lack empirical evidence examining family firms' collaboration capability. For example, the general management literature emphasizes the critical role of organizational learning in collaborative innovation (Sampson, 2005). Future research could examine how family involvement and family firm characteristics, such as centralized decision-making and family goals, influence such learning and collaboration capabilities.

Given family firms' unique characteristics, such as unification of ownership and control, governance structure, and centralized decisionmaking, nonfamily firms may be hesitant to form collaborative relationships with family firms. However, researchers have also pointed out unique resources that family firms possess (Sirmon & Hitt, 2003). Thus, future research could further examine the advantages and disadvantages of family firms in forming collaborative innovation and how family firms can leverage such advantages to build absorptive capacity and collaboration capability that would in turn increase a family firm's attractiveness as a collaboration partner.

*Research Gap S2: How do individual family firm characteristics, absorptive capacity and collaboration capability influence family firms' attractiveness as collaboration partners?*

Moving to the collaborative innovation relationship level, we now focus on knowledge transfer between collaboration partners. Pérez (2007) uses a historical view of Spanish steel wire industry to show how family firms chose to collaborate among themselves for knowledge transfer to achieve innovation. Drawing on RBV, Sirmon and Hitt (2003) argue that family firms possess unique capabilities that can better facilitate knowledge transfer in collaborative innovation compared to nonfamily firms.

Using Taiwanese public listed family firms, Tsao and Lien (2013) show that family managers are better in overcoming the negative effects of the increased complexity and uncertainty arising from collaborative innovation and in extracting the benefits from collaborative innovation in comparison to nonfamily firms. If family firms do in fact have unique resources and capabilities, future research could further examine how these

unique resources and capabilities would enable family firms to differently overcome potential obstacles and extract knowledge from collaborative innovation.

*Research Gap S3: How do individual family firm characteristics, absorptive capacity and collaboration capability influence knowledge transfer in collaborative innovation?*

We finally examine the impact of an external factor, namely institutional structure. While the effects of institutional structure on collaborative innovation have been studied in the general management field, this factor remains largely unexplored in the family business literature. For example, Kang and Park (2012) find that support in the form of funding from the government has far-reaching impact on stimulating SMEs' internal R&D investments and forming collaborations, and in turn, promotes innovation output at both firm and collaboration level. In terms of knowledge transfer, Vasudeva et al. (2013) argue that firms would extract more knowledge from collaborative innovation if the partner firm were from a more corporatist country.

In the case of family firms, Pérez (2007) shows that family firms collaborate with each other and are able to transfer knowledge among them despite adverse institutional conditions arising from the economic environment and government policies. Still, we know little about the effects of institutional structure on collaborative innovation formed by family firms and about whether family firms possess more resilience than their nonfamily counterparts towards institutional structure. Future research could investigate the role of government support and other institutional factors in affecting formation of collaborative innovation and knowledge transfer in the family business context.

*Research Gap S4: How do institutional structures influence family firms' willingness and ability to form collaborative innovations and manage knowledge transfer?*

### **2.7.2 Transactional View of Collaborative Innovation in Family Firms**

In this section, we examine collaborative innovation in family firms from the transactional view, further clarifying the different constructs at different levels and how these attributes affect collaboration performance and ultimately affect performance at



firm level. The assumptions in this stream of research are primarily based on TCE and focus on whether collaborative innovation will bring benefits to family firms in terms of financial and innovation performance. Put it differently, whether the benefits derived from collaborative innovation will outweigh or not the transaction costs of collaborations. Consistent with studies from general management, we build on game theory to examine the effects of perceived opportunistic behavior by collaboration partner (s) in choosing between different contractual forms of collaborative innovation by family firms, and in turn, affecting collaboration performance. Consequently, we draw on behavioral theory to examine the effect of family influence on partner diversity and the effect of partner diversity on other constructs. In addition, we examine the role of organizational routines in family firms and the effects of organizational routines on collaboration performance. Subsequently, we draw on agency theory and stewardship theory to further examine the effect of family influence on collaboration performance.

We found no study on family firms' perceived opportunistic behavior in collaborative innovation. From the review of the general management literature, Parkhe (1993) finds that perceived opportunistic behavior by collaboration partner would affect collaboration performance, as the focal firm would limit the exchange of various resources that would in turn limit the innovation capability in collaborative innovation. Owing to the different priorities that reside in family firms, they would have different concerns over opportunistic behavior by collaboration partner and perceive opportunism differently compared to nonfamily firms.

In terms of governance modes used by family firms in collaborative innovation concerning possible IP leakage, we argue that how family firms choose the governance mode for collaborative innovation is deeply influenced by unique family firm characteristics. Carney (2005) argues that owner-managers have more liberty in the way they manage the external relationship(s) and are free to discriminate between different transactional modes. Thus, the author suggests that owner managers tend to form preferential business relations with specific organizations and may act in an instrumental manner with collaboration partner(s) as their priority is to maximize personal wealth. Interestingly, using financial modeling, Chiesa (2005) argues that collaboration is more likely to be used by family firms where agency problem is less severe.

In forming collaborative innovation, firms are generally concerned about unintended IP leakage, thus the use of different contractual forms of collaborations, such as equity vs. non-equity, limits the scope of collaborative innovation to better protect IP owned (Li, Eden, Hitt, & Ireland, 2008; Oxley, 1997; Oxley & Sampson, 2004). As pointed out by Carney (2005), owner-managers' priority is to maximize personal wealth and they have high degree of freedom in choosing between different contractual forms of collaborative innovation. As family firms have different priorities compared to nonfamily firms, they will likely have different concerns when forming collaborative innovation. Existing research on collaborative innovation in the general management literature has shown that different governance modes would affect collaboration performance, as governance modes bind the partner firms in the collaborative innovation relationship and limit the exchange of crucial IP for the purpose of protecting IP owned individually (Parkhe, 1993). Yet, we know little in the context of family firms.

*Research Gap T1: How does perceived opportunistic behavior influence the choice of governance mechanisms in family firms' collaborative innovations, and how do the governance mechanisms chosen in turn affect collaborative innovation performance?*

In terms of partner diversity, the study by Classen et al. (2012) points to family firms having lower partner diversity in collaborative innovation. Family firm characteristics and search breadth in relation to partner diversity in the context of collaborative innovation have been studied by scholars in the family business literature (Alberti et al., 2014; Classen et al., 2012). Sampling on family SMEs, studies have shown that family firms have a lower search breadth in scouting collaborative partners compared to nonfamily firms (Alberti et al., 2014; Classen et al., 2012). In relation to search breadth, Classen et al. (2012) also find that family firms use a less diversified set of collaboration partners to access resources for innovation compared to nonfamily SMEs. They suggest that family firms have a lower search breadth and a less diversified set of partners due to their lower willingness to collaborate.

Collaboration partner diversity is another sparingly researched topic in family business literature. To our best knowledge, only Classen et al. (2012) have examined the diversity of collaboration partners used by family firms in accessing resources for innovation. Although the study has attributed the lower diversity of partners used by

family firms to lower willingness to collaborate, little is known about the effect of family influence on partner diversity. We cannot conclude that family firms have lower partner diversity with the support of just one study.

It can be argued that the more diversified partners a family firm has, the more knowledge is obtained by the family firm. However, the relationship between partner diversity and innovation performance is not always linear (Duysters & Lokshin, 2011). The higher is partner diversity, the more divided become the resources owned by the family firm as such resources are spread across different collaborations. Moreover, the effect of partner diversity on collaboration performance can be detrimental when the family firm has reached its capacity in managing various collaboration relationships.

Organizational routines have not been studied in family business literature in the context of collaborative innovation. Continuing on the topic of partner diversity, Lavie and Miller (2008) have pointed out the need for firms to set up organizational routines in managing a diversified set of collaborative innovation. There is scant research about organizational routines in family firms and no study in the context of collaborative innovation.

*Research Gap T2: How do organizational routines influence family firms' ability to deal with partner diversity in collaborative innovation?*

Lastly, we examine the effect of collaborative innovation on performance. Differently from the general management literature that studied the relationship between collaborative innovation and performance, in the family business literature family firm characteristics play a major role in various aspects. A conference proceeding explores family management and collaborations as one of the antecedents of family firm performance (Brenes et al., 2015). Integrating the family variable into the equation of collaborative innovation and performance, Tsao and Lien (2013) find that family management and ownership positively moderate the innovation and performance implications of internationalization. On the other hand, the study by Serrano-Bedia et al. (2016) finds that family involvement determines higher transaction costs in collaborations, as family involvement has a negative moderating effect on the relationship between use of knowledge from collaboration and innovation performance. While Sorenson et al. (2008) find that collaborative network orientation (CNO) is

positively associated with innovativeness and firm performance in family firms, the study by Spriggs et al. (2012) finds no support to the notion that CNO moderates the relationship between innovative capacity and firm performance. Drawing on a sample of family and nonfamily firms working as suppliers for universities in the US, Stanley and McDowell (2014) find a positive relationship between interorganizational trust and performance in both family and nonfamily firms.

Family firm performance in the context of collaborative innovation has been studied sparingly in the family business literature. Moreover, the findings are still fuzzy with inconsistent measurements, thus not able to provide insights on the effect of collaborative innovation on family firm performance. While the studies by Deng et al. (2013) and Tsao and Lien, (2013) have specifically measured family firm innovativeness as a result of collaborative innovation, other studies measure family firm performance with different measures. For example, Sorenson et al. (2008) measure firm performance with five items covering aspects such as profit, growth and market share against major competitors. Spriggs et al. (2012) use seven items covering aspects like profit, growth and market share against competitor and industry, and Stanley and McDowell (2014) use seven items to assess buyer satisfaction as indicator of firm performance as a supplier. To our best knowledge, the only study that distinguishes between financial performance and innovation performance is the one by Tsao and Lien (2013). We propose that future research should measure family firm innovativeness and financial performance separately. For example, higher financial performance can possibly lead to higher family firm capability to innovate and higher innovation capability can eventually lead to higher profits. With these two firm-level attributes clearly defined and measured, we can then examine the effectiveness of collaborative innovation on family firm performance.

The implication of collaborative innovation at the collaboration level has not been studied in the family business literature. In particular, virtually no study has focused on the outputs of collaborative innovation at the collaboration level, such as joint patents or new products.

Research Gap T3: *How does collaborative innovation influence innovation and financial performance in family firms?*

### **2.7.3 Relational View of Collaborative Innovation in Family Firms**

Finally, we examine the studies on collaborative innovation in family firms under the relational view, based on social exchange and network theories, to further examine the role of network and trust in the case of family firms, ultimately leading to willingness to collaborate and share. Network possessed by family firms has been well studied, thus we focus on the effects of network and how family firms utilize network to form collaborative innovation. We examine the external partner level, prior ties and familiarity, and their effects on network and trust at the relationship level. At the family firm level, we examine family firms' willingness to collaborate and share as well as the effect of network and trust on their willingness.

Looking at interactions with external partner firms, research from general management has shown that familiarity increases through prior ties and repeated transactions, and in turn concurs to build trust (Gulati, 1995). Prior ties include direct interactions through formal contractual ties and indirect interactions through informal means such as network. Familiarity, such as knowing the operational style of a firm or traditional ways of doing business by a firm, increases with repeated interactions as firms get to know more about one another. As family firms are long-term oriented, they tend to be community oriented and invest in social capital in building long-lasting relationships with external parties (Miller & Le Breton-Miller, 2005). A book chapter by Schumann (1999) illustrates how German family firms formed their own network among entrepreneurial family firms through the social ties they possess or through marriage. The network formed by these German family firms is so significant that it is able to exert political influences, substituting business trade association during the industrialization era. The study by Carrasco-Hernández and Jiménez-Jiménez (2013) finds that the network possessed by family firms has a positive influence on innovation. This points to the need to further examine the role of prior ties and familiarity in the family business context, which will likely have implications on network and trust at collaboration level, as we will discuss further in the following sections.

Family firms are believed to possess strong social capital derived from strong ties that lie in family relations. Zamudio et al. (2014) argue that there is need to further examine network and social capital in the family business field: how do family firms collaborate with external firms and generate competitive advantage? Indeed, several studies have

illustrated the benefits of the network possessed by family firms (Anderson et al., 2005; Li et al., 2015; Miller et al., 2009). Drawing on a sample of Scottish family firms, Anderson et al. (2005) find that family members who do not work for the family firm continue to provide help and assistance in an instrumental and functional way that is close to that of business ties, where such support is of high quality and at low or non-existent cost. Given their cultural background, Chinese family firms possess unique network, as they tend to form strong ties with family, relatives, and friends, as well as using marriage as a means to secure or maintain ties in building a supportive network (Li et al., 2015). Sampling on Korean firms, Miller et al. (2009) find that investments in community and connection are indeed germane to success to emerging market and high technology industry. Additional insights from a study using Spanish family firms also supports the notion that family firms build collaborative network through their strong social capital, eventually leading to innovation (Carrasco-Hernández & Jiménez-Jiménez, 2013).

Research Gap R1: *How do prior ties influence family firm's ability to build trust and networks in collaborative innovations?*

Partner selection for collaborative innovation is another important, yet under-researched topic. To date, we have identified only one study by Harms et al. (2015) exploring family firms' propensity towards partner selection for collaborations. Sampling on tourism and hospitality sector in Germany, Harms et al. (2015) find that family firms favored formal cooperation predominantly with non-competitors. While nonfamily firms choose collaboration partners among friends, acquaintances or strangers (Li et al., 2008), family firms have the additional option of choosing from network and prior ties formed through family ties. In addition, due to the unification of ownership and control in family firms, the decision on partner selection would be deeply influenced by the owning family.

In contrast to the transactional view according to which family firms have lower search breadth and less diversified collaboration partners, Carney (2005) argues that owner-managers have more liberty in choosing the contractual relations and thus are better able to generate a more diversified network of relations comprising diversified business partners. Further dissecting network owned by family firms into formal and informal ties, Kontinen and Ojala (2011) find that family SMEs mainly recognize international

opportunities by establishing new formal ties, while informal ties and family ties have a less significant role. Aside from looking at network formed by family firm's informal ties, Gurrieri (2008) points out the influence of entrepreneur's characteristics on network creation. If family firms possess a wide range of network, how do family firms form collaborations with external organizations through their network and social capital (Zamudio et al., 2014)?

*Research Gap R2: How does the network possessed by a family firm influence partner selection in forming collaborative innovation?*

The ability and willingness paradox in family firm innovation argues that although family firms have superior ability to innovate, they are less willing to do so (Chrisman, Chua, De Massis, Frattini, & Wright, 2015; De Massis, Di Minin, & Frattini, 2015). In this section, we examine studies in relation to family firms' willingness to collaborate. Based on a multiple case study on Italian firms, Cassia et al. (2012) find that family firms are less willing to collaborate and share in comparison to nonfamily firms, and this in turn hampers innovation performance. Using 54-years data from Spanish family firms in olive oil mills, Gómez-Mejía et al. (2007) shows how family firms' willingness to collaborate varies in relation to economic prospects and perceived threats to SEW. Looking into the innovation behavior, Nieto et al. (2015) find that family influence has a negative effect on willingness to collaborate and family firms are significantly less prone to engage in technological collaborations. Pittino and Visintin (2011) find that family firms are less willing to collaborate compared to nonfamily firms, though generation effect and succession plan are found to affect family firms' propensity to collaborate. Prior research from general management has shown that familiarity and prior ties increase the probability and willingness of collaboration formation (Reuer & Lahiri, 2014; Vanhaverbeke et al., 2002). However, these streams of research have yet to consider family firm variables. Therefore, future research could further examine whether the network possessed by family firms and trust increase family firms' willingness to form collaborative innovation.

*Research Gap R3: How do network and trust influence family firms' willingness to engage in collaborative innovation?*

Looking from the relational view, little is known about the factors affecting family firms' willingness to share resources. Network as one of the knowledge sources for family firms has been addressed in the book by Del Giudice, Della Peruta, and Carayannis (2010), who identify knowledge sharing as a critical success for higher innovation output. Using a case study of a dyadic collaboration between two family firms in Austria, Hatak and Hyslop (2015) find that trust enables family firms' willingness to share and eliminates the need for formalized contracts. In the same case study, both family business owners grew up in the same region in Austria and belong to the same network of friends, which also provides evidence on the role of prior ties and familiarity in building trust in family firms.

Firms engaged in collaborative innovation are likely to share their resources to achieve the common innovation goal. Family firms, given their unique characteristics and long-standing legacy, may have different concerns compared to nonfamily firms in sharing resources such as know-how and technology. Gulati (1995) finds that firms are more willing to share knowledge with trust bred through prior ties. Moreover, Gulati (1995) has shown that the more the transactions among partnering firms are repeated over time, the less likely is the subsequent collaboration to be equity based. Given the unique characteristics of family firms, trust can be built differently in family firms and in turn have varying effects in comparison to nonfamily firms. Nevertheless, the role of trust and how it is developed by family firms in collaborative innovation from the perspective of the relational view has only been sparingly explored through a single case study by Hatak and Hyslop (2015).

Future research could look into the role of trust and network in deterring concerns arising from family influence in relation to knowledge sharing. Furthermore, future research could look into the temporal dimension, incorporating unique family firm characteristics to shed further insights into the trust that is built over time in relation to forming collaborative innovation by family firms. Ideally, such studies should be longitudinal.

*Research Gap R4: How do network and trust influence family firms' willingness to share knowledge and resources in collaborative innovation?*



## 2.8 Conclusion

Family firms are ubiquitous and play a crucial role across all world economies (La Porta, Lopez-De-Silanes, & Shleifer, 1999), hence the relevance of investigating collaborative innovation in family firms. However, given their unique characteristics, family firms behave differently from nonfamily firms, and this leads to strong conceptual reasons why their collaborative innovation behavior is likely to be distinct at many levels.

We started by proposing external sources of innovation as a key aspect to address the family innovation dilemma, according to which family firms tend to invest less in R&D and are yet able to innovate more compared to their nonfamily counterparts. Based on this contention, we first reviewed the literature on collaborative innovation in the general management field and outlined a guiding framework for our subsequent analysis of collaborative innovation in the family business field. We then organized the studies on collaborative innovation in family business according to three main perspectives: strategic, transactional, and relational, each outlining constructs at focal firm level, collaboration relationship level involving firms engaged in the collaborative innovation, and external level dealing with partner organization(s) and external factors. This was done by examining the research questions, study contexts, theoretical assumptions, relationship between each constructs, and findings. Overall, this article attempts to enhance current understanding of past literature on collaborative innovation by bridging the general management and family business research streams, developing a framework that combines the literatures from both fields and helps identify research gaps in current knowledge about collaborative innovation in family firms. Interestingly, there are recent articles that appear to take on our research agenda and thus support our claims regarding the need for further research along the directions previously outlined. For instance, Lambrechts, Voordeckers, Roijackers, and Vanhaverbeke (2017), through a multiple case study on four family SMEs, explore how family SMEs operating in low- and medium-technology industries can successfully engage in open innovation by managing multiple and conflicting goals within the family business in distinctive ways and by taking up orchestration roles within their own open innovation networks to minimize the concern for the loss of control. Likewise, Casprini, De Massis, Di Minin, Frattini, and Piccaluga (2017) start addressing one of the gaps that we examined above (i.e., RG

S3) by highlighting, through a single case study of an Italian family firm, how this family firm managed to overcome the barriers to the acquisition and transfer of knowledge in open innovation processes.

Given the many constructs and relationships that might affect collaborative innovation in family firms, we have only started to scratch the surface of the issues that need to be investigated. For instance, going beyond firm boundary, future research on collaborative innovation in family firms could explore the use of family conglomerates to gain access to resources and yet retain ownership and control. In this business structure, it is a matter of looking into collaborative innovation in business families. The business subsidiaries collaborate with one another as stand alone businesses and yet are controlled by one or more enterprising business families. Thus, the concept of “boundary”, that is crucial to identify the external parties involved in collaborative innovation, may vary depending on whether we are referring to a family business or an enterprising business family governing a number of businesses with a portfolio logic, and the implications of such differences are yet to be unearthed. Nevertheless, it is our hope that this review article and the research gaps that we identified will stimulate and guide future academic work in this promising research avenue, with important implications for both the family business and the general management research streams.

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## Appendix 1: Selected Studies on Collaborative Innovation in General Management Literature

No.	Authors	Type of Paper	Sample Description	Data Type	Data Period	Theoretical Background/ Perspective	Focus of Collaborations	Study Context	Findings
1	Ahuja (2000)	Empirical - Quantitative	97 firms, 469 collaborations (178 research agreements & 291 joint ventures), chemical industry, global.	Secondary data, archival research, such as news media, print media, government publications, and consultant reports.	1979 - 1991	RBV, social network theory	Collaborative arrangements including JVs and research agreements, involve a technological component such as developing a new technology or sharing a manufacturing process.	Collaboration capability	First, linkage formation behavior is systematically related to both inducements and opportunities. Second, the possession of technical, commercial, and social capital significantly influence both the linkage formation inducements and opportunities facing firms. Third, a firm's creation of an important invention provides an additional path to linkage formation for firms that lack the three tenure-based advantages.
2	Chen (2004)	Empirical - Quantitative	137 firms, semiconductor, computer, communications, precise equipment, photo, electronics, and biotechnology, Taiwan.	Primary data, questionnaire.	Not mentioned	Knowledge transfer, absorptive capacity	Strategic alliance is defined as an inter-firm cooperative arrangement over a given economic space and time for the attainment of some strategic objectives.	Knowledge transfer	Knowledge transfer performance is positively affected by the explicitness of knowledge and firm's absorptive capacity; that equity-based alliance will transfer tacit knowledge more effectively while contract-base alliance is more effective for the transfer of explicit knowledge; and that trust and adjustment have positive effects while conflict possesses curvilinear effect on knowledge transfer performance.
3	Das and Deng (2000)	Review	-	-	-	RBV	The use of alliances to gain access to other firms' valuable resources, including: (1) JVs; (2) minority equity alliances; (3) bilateral contract-based alliances; and (4) unilateral contract-based alliances.	-	-
4	De Mattos, Burgess and Shaw (2013)	Empirical - Quantitative	49 firms, biotechnology, 26 British, 23 German.	Primary – questionnaire.	1998 - 1999	Knowledge access	SMEs in developed countries with limited resources forming international alliance with large emerging economies (LEE) for knowledge access leading to new product development opportunities.	Attractiveness, need for resources	R&D-specific factors influence the likelihood of firms to be attractive alliance partners. In particular, firms showing an in-house innovation history focused on one or few products are more likely to be attractive alliance partners with LEE firms than those that do not. Another R&D-specific predictor that enhances the chances of alliance partner attractiveness with LEE firms is the firm's focused searching and identifying. A third predictor refers to the firm's awareness regarding non-cost obstacles for its own technological development.

5	Deeds and Rothaermel (2003)	Empirical - Quantitative	115 alliances, biotechnology, US.	Primary + Secondary data (personal F2F and telephone interviews, plus secondary data to support).	Not specified	Relational contract theory, organizational ecology	Strategic alliance is defined as interorganizational relationships that firms enter voluntarily with one another.	Collaboration performance	The relationship between age and alliance performance seems to be U-shaped curvilinear rather than linear, with the minimum point of alliance performance occurring after approximately four and one-half years. Thus, strategic alliances appear to face a liability of adolescence rather than a liability of newness. Important alliances exhibit generally shorter honeymoons.
6	Dickson, Weaver and Frank (2006)	Empirical - Quantitative	456 SMEs, manufacturing, Australia, Costa Rica, Finland, Greece, Indonesia, Mexico, The Netherlands and Sweden.	Primary data, questionnaire.	1997 - 2001	RBV	Alliances for resource acquisition, technology transfer, market entry and internationalization among other activities, including technological R&D alliance, JV, and equity investment.	Governance mode	The resource base of the SME, as reflected by firm size, significantly moderates the relationship between the attributes of the institutional environment of the SME and owner or manager perceptions of opportunistic behavior within their R&D alliance relationship.
7	Duysters and Lokshin (2011)	Empirical - Quantitative	334 firms, Netherlands.	Secondary data, Community Innovation Surveys (CIS) and production statistics database.	1998 - 2000	Portfolio approach	The alliance types include international and domestic cooperation links with competitors, customers, suppliers, universities, and research centers.	Innovation performance	Alliance complexity is found to have an inverse U-shape relationship to innovative performance.
8	Eisenhardt and Schoonhoven (1996)	Empirical - Mixed method	98 firms, semiconductor, US.	Primary data, interview & financial data + secondary data for supplementary info.	1978 - 1985	RBV	Alliances are cooperative relationships driven by a logic of strategic resource needs and social resource opportunities.	Collaboration formation	Firms cooperated when they needed to, when they were able to, and perhaps when it was popular. Strategic alliance formation is a complex phenomenon involving both strategic and social factors operating within a logic of needs and opportunities for cooperation.
9	Faems, Janssens and van Looy (2007)	Empirical - Qualitative	3 inter-firm R&D relationships, Belgium.	Primary data, interview and archival data.	1995 - 2003	Process perspective	Inter-firm R&D collaborations for knowledge transfer.	Knowledge transfer	The important conditions in facilitating the process of knowledge transfer: legal knowledge-transfer clauses and expectations of a long-term relationship. The presence of similar technical equipment substantially influence the ability of firms to acquire and assimilate knowledge shared in the collaboration.

10	Fang (2011)	Empirical - Mixed method	117 alliances, paired responses from both parties, high-tech, China.	Primary data, questionnaire.	not specified	Knowledge complimentary	Strategic alliances with partners that have complementary knowledge to achieve important strategic objectives, such as innovative new product development (NPD), sampling on equity-based alliances.	Innovation performance	Process interdependence positively moderates the relationship between knowledge complementarity and new product innovativeness. Knowledge complementarity relates positively to innovativeness when process interdependence is high, but the relationship becomes negative when process interdependence is low. In China, environmental dynamism positively moderates the relationship between knowledge complementarity and innovativeness, and this relationship is moderated by expropriation risk.
11	Fernhaber and Li (2013)	Empirical - Quantitative	448 high-technology new ventures, US.	Secondary data, The Securities Data Corporation's (SDC's) Global New Issues database.	1995 - 2005	Network and attention-based view	In alliances, firms pool their resources and capabilities to accomplish tasks that (1) they cannot accomplish on their own, or (2) they can complete on their own but likely at a much higher cost/with more risks.	Internationalization	International exposure from both geographically proximate firms and alliance partners enhances new ventures' internationalization. Further, the positive relationship between international exposure from geographically proximate firms and venture internationalization is lessened when the venture has more international exposure from alliance partners. International exposure from alliance partners is found to be more influential to older ventures than to younger ventures.
12	Fontana, Geuna and Matt (2006)	Empirical - Mixed method	675 SMEs, food & beverage, chemicals, communication equipment, telecommunication, and computer services, 7 EU countries.	Primary - questionnaire & interview.	Data collected in 2000	Absorptive capacity	R&D projects between firms and public research organizations such as universities and other public research centers, involving knowledge exchange in attaining innovation.	Attractiveness	The propensity of firms to engage in R&D projects with public research organizations (PROs) is positively affected by their absolute size, R&D activity and degree of openness, but not by the type of innovation they generate. Larger firms with a high absorptive capacity generally tend to cooperate with the academic world. Openness of the firm to the external environment affects the propensity for and level of collaboration with PROs. The general searching activity does not influence the propensity for cooperation. Screening activities, however, constitute important explanatory variables of R&D cooperation.
13	George and Farris (1999)	Empirical - Qualitative	24 interviews in 1 company on major 10 alliances, pharmaceutical/healthcare.	Primary data, interview.	Not mentioned	Life cycle	Including R&D, clinical research, manufacturing, and commercialization of new products based on proprietary compounds and technologies.	Collaboration success	Identified four formative stages of an alliance: (1) Recognition, (2) Research, (3) Relationship Set-up, and (4) Ramp up. The primary predictors of success across these stages are not identical, nor their effect uniform. Further, proper completion of all the preceding stages is essential for the success of subsequent stages. Finally, the compaction of the various successful stages, in particular of the Ramp-Up stage, is one of the best predictors of overall success of an alliance.

14	Gulati (1995)	Empirical - Quantitative	Over 2,400 alliances, biopharmaceutical, new materials, and automotive economic sectors, America, Europe, and Japan.	Secondary data, the Cooperative Agreements and Technology Indicators (CATI) database and industry consultants.	1970 - 1989	TCE & sociological theory	Interfirm strategic alliances encompass a variety of agreements whereby two or more firms agree to pool their resources to pursue specific market opportunities. Including JVs, joint R&D agreements, technology exchange, direct investment, licensing, and a host of other arrangements.	Familiarity, priorities, trust	Familiarity between organizations through prior alliances does indeed breed trust.
15	Gulati (1998)	Review	-	-	-	Social network, embeddedness	Strategic alliances as voluntary arrangements between firms involving exchange, sharing, or codevelopment of products, technologies, or services.	-	Identifies five key issues for the study of alliances: (1) the formation of alliances, (2) the choice of governance structure, (3) the dynamic evolution of alliances, (4) the performance of alliances, and (5) the performance consequences for firms entering alliances.
16	Hall and Bagchi-Sen (2007)	Empirical - Quantitative	126 firms, biotechnology, US.	Primary – questionnaire.	2003	Innovation strategy	Collaboration as an innovation strategy allows individual firms lacking the specific resources or expertise to advance scientific discoveries.	Innovation performance	Innovation performance is a function of firm-level characteristics (e.g., R&D intensity) as well as specific innovation strategies, depending on the stages of innovation firms focus on. Collaboration is a strategy for advancing innovation by providing the complementary assets and technologies firms need to achieve success.
17	Hitt, Dacin, Levitas, Arregle and Borza (2000)	Empirical - Quantitative	202 firms, emerging market: Mexico, Poland, and Romania and developed market: Canada, France, and US.	Primary data, questionnaire & interviews.	1995 - 1998	RBV, organizational learning	International strategic alliances that are cooperative arrangements, formed between firms in emerging and developed market, to share risk and resources, and gain knowledge.	Partner selection	While the emerging market firms emphasize on financial assets, technical capabilities, intangible assets, and willingness to share expertise, developed market firms emphasize more on unique competencies and local market knowledge and access.

18	Hoang and Rothaermel (2005)	Empirical - Quantitative	158 collaborative projects between pharmaceutical companies and biotechnology partners, global.	Secondary data, SIC listings and a variety of industry publications.	1980 - 2000	Organizational learning	Strategic alliances are voluntary arrangements between firms to exchange and share knowledge as well as resources with the intent of developing processes, products, or services (Gulati, 1998: 293).	Collaboration performance	There are diminishing returns to general alliance experience: prior general alliance experience has a positive effect on the likelihood of alliance success that decreases as alliance experience increases. Also, partner specific alliance experience may decrease alliance performance.
19	Joshi and Lahiri (2015)	Empirical - Quantitative	45 cross-border R&D alliances formed by MNCS and design firms, semiconductor.	Secondary data, SDC database, Global Semiconductor Alliance, directory, annual reports, company websites, and patent data from the US Patent and Trademark Office (USPTO).	1988 - 2001	Language friction, cultural friction	Cross-border R&D alliances involving technical and knowledge exchange.	Partner selection	Language friction plays a nuanced, but discernible role when MNCs select R&D partners. Imply that language friction may play a meaningful role in other types of cross-border strategic interactions (e.g., JVs, M&A, FDI, and technology transfer, etc.) and in other corporate functions beyond R&D, especially if these functions are characterized by highly interdependent workflows (Luo & Shenkar, 2011) and organizational processes involving abstract reasoning and problem-solving activities.
20	Kalaigannam, Shankar and Varadarajan (2007)	Empirical - Quantitative	75 large firms and 150 small firms, 167 dyadic alliances, IT and telecommunication, US.	Secondary data, SDC database.	Between January 1993 and September 2004	Financial return	New product development (NPD) alliances between large, well-established firms and small, growing firms, involving disparately sized firms as asymmetric alliances.	Financial performance	Both the partners experience significant short-term financial gains, but there are considerable asymmetries between the larger and smaller firms with regard to the effects of alliance, partner, and firm characteristics on the gains of the partner firms.
21	Kale and Singh (2009)	Conceptual	-	-	-	Alliance life cycle	A strategic alliance is a purposive relationship between two or more independent firms that involves the exchange, sharing, or codevelopment of resources or capabilities to achieve mutually relevant benefits (Gulati, 1995).	Collaboration success	-

22	Kang and Park (2012)	Empirical - Quantitative	147 SMEs, biotechnology, Korea.	Primary data, questionnaire and archival data.	2005 - 2008	RBV	Inter-firm collaborations for innovation, including upstream alliances (universities and research institutions) and downstream alliances (marketing and commercialization).	collaboration formation, innovation performance	Government support through project funding had far-reaching direct and indirect influences on firms' innovation output by stimulating internal R&D activities and collaborations. The internal R&D resources, stimulated by government R&D support, had both direct and indirect effects on the innovation output, and the latter were achieved by facilitating inter-firm collaborations. SMEs that had established collaborations with domestic and international upstream partners and international downstream partners performed significantly better in innovation output than did their counterparts without the collaborations, and the magnitude of the influence of international partnerships was greater than the influence of domestic partnerships.
23	Keil, Maula, Schildt and Zahra (2008)	Empirical - Quantitative	110 public listed firms, information and communications technology, US.	Secondary data, SDC database, patent info from Derwent patent database, and financial data from Compustat.	1993 - 2000	Organizational learning theory	Learning, knowledge and resources sharing leading to innovation.	Innovation performance	Collaborations in related industries are positively related to increases in innovative performance. Each governance mode can be used to stimulate a company's innovative performance, yet the benefits depend on relatedness of the partners and targets and only JVs show an aggregate positive relationship with innovative performance.
24	Kelly, Schaan and Joncas (2002)	Empirical - Mixed method	59 firms, 409 alliances, IT, manufacturing service, and R&D based, Canada.	Primary data, questionnaire + interview.	Not specified	Relational aspects	Strategic alliances	Collaboration capability	The major challenges at the beginning of an alliance relate to relationship issues between the partners. Underestimating their importance, or failing to consciously manage them during the implementation and operation phases of a strategic alliance has caused the failure of many ventures.
25	Kim and Song (2007)	Empirical - Quantitative	102 firms, 414 alliances, pharmaceutical industry, US.	Secondary data, SDC.	1988 - 1995	Path dependency	Collaborative R&D alliance resulting in joint patents.	Collaboration performance	Prior collaborative ties is positively related to joint invention, therefore trust built through prior collaborative relations make partner firms more willing to share technologies.
26	Kumar and Nti (1998)	Conceptual	-	-	-	Absorptive capacity, dynamic theory	Firms enter into knowledge intensive alliances, such as joint R&D and product development, to create economic value and acquire knowledge to enhance their competencies.	-	-

27	Lahiri and Narayanan (2013)	Empirical - Quantitative	282 public listed firms, semiconductor, US.	Secondary data, SDC and Global Vantage, semiconductor industry association databases, and patent data USPTO.	1991 - 2002	Alliance portfolio	Independently initiated interfirm link that involves exchange sharing or codevelopment. Including JVs, R&D or production agreements, marketing or distribution agreements, or technology exchange.	Firm performance, innovation performance	Highly innovative firms benefit less from increasing alliance portfolio size than less innovative firms with respect to financial performance.
28	Lavie and Miller (2008)	Empirical - Quantitative	330 firms, software industry, US.	Secondary data, SDC database, Edgar United States Securities, and SEC.	1990 - 2001	Alliance portfolio	Alliances such as JVs, affiliation in research consortia, collaborative R&D, and joint marketing efforts. Excludes arm's length transactions such as resale, licensing, and supply relationship.	Firm performance	Firms that have gained experience with foreign partners and maintained wholly owned subsidiaries in their partners' countries of origin can overcome some of the liabilities of API and better leverage its benefits. The outcomes of alliance-based internationalization depend not only on the number of foreign partners and their configuration in the alliance portfolio, but also on the physical and psychic distances to these partners.



29	Levitas and McFadyen (2009)	Empirical - Quantitative	180 firms, biotechnology, US.	Secondary data, the National Bureau of Economic Research (NBER) Patent Citations database, USPTO, Cassis database, Compustat, the Center for Research in Security Prices (CRSP) U.S. stock database, Windover Information Inc.'s RX Deals database, the IMS R&D Focus database, Spectrum Institutional Ownership files, and SEC proxy (DEF 14a) filings.	1991 - 1999	Agency costs	Exploitation alliances focus partners' efforts on deepening existing knowledge by improving established designs, products, and services to meet the needs of existing customers and markets. Exploration alliances focus more heavily on the development of new knowledge.	Liquid asset management for collaboration	When faced with increased knowledge asymmetries, firms have to decide between funding or maintaining current projects, or stockpiling cash for future projects. Firms mitigate the costs associated with raising cash through external capital markets by reducing knowledge asymmetries through high valued patenting activity. Exploration alliances, due to their increased knowledge asymmetries, heighten the need to hold liquid assets, and therefore are likely to increase the overall costs of R&D, at least in the near term. On the other hand, exploitation alliances do not increase the need to augment holdings of liquid assets.
30	Li, Eden, Hitt and Ireland (2008)	Empirical - Quantitative	1159 dyadic R&D alliances and JVs, high tech.	Secondary data, SDC database, the Lexis-Nexis database, and the RDS Business Reference Suite.	1994 - 2003	Organizational learning, TCE	R&D alliances involving knowledge sharing for the purpose of innovation.	Partner selection	The more radical an alliance's innovation goals, the more likely it is that partners are friends rather than strangers. However, strangers are preferred to acquaintances, suggesting partner selection preferences are not transitive. Moreover, firms use partner selection, governance structure, and alliance scope as substitute mechanisms to protect valuable technological assets from appropriation in R&D alliances.

31	Li, Eden, Hitt, Ireland and Garrett (2012)	Empirical 1 - Quantitative	2,423 R&D alliances, 1,690 bilateral and 733 multilateral, high technology industries.	Secondary data, SDC, company 10-Ks, the LexisNexis database, and the RDS Business Reference Suite.	1990–2003	Social exchange theory	Trilateral alliances - A multilateral alliance is a single cooperative arrangement involving three or more partner firms. R&D alliances are therefore designed to encourage intended knowledge sharing.	Governance mode	Multilateral R&D alliances are more likely to use equity-based governance structures than are bilateral R&D alliances. Net-based trilateral R&D alliances are more likely than chain-based ones to use equity-based governance structures. Results suggest that there is less need for equity-based governance structures when alliance scope is more focused and/or when intellectual property rights can be effectively protected by external mechanisms such as legal systems. Specific to trilateral R&D alliances, the effect of alliance scope is superficial; for governance decisions, scope seems to be important to partner firms only when the alliance is net-based.
32	Lu and Beamish (2001)	Empirical 1 - Quantitative	164 SMEs, Japan.	Secondary data, FDI information from Kaigai Shinshutsu Kigyō Souran-Kuni Bets.	1986 - 1997	Internationalization, RBV	Alliances formed with firms from the host country, with firms from the home country, or with firms from a third country, help SMEs to overcome shortages in financial capital and tangible resources, and provide different degrees of host country knowledge. Measured by equity JV.	Need for resources	Given their limited resources and capabilities, SMEs are more susceptible to the liability of foreignness than large firms. Forming alliances with local partners is one effective strategy for internationalization, which helps overcome the deficiency in host country knowledge.
33	Lu and Beamish (2006)	Empirical 1 - Quantitative	614 SMEs, 1117 IJVs, Japan.	Secondary data, Nikkei NEEDS tapes and other guides.	1964 - 2000	RBV, Institutional theory	International JV (equity JV), when two or more firms pool a portion of their resources to create a separate jointly owned organization.	Collaboration performance	The lifespan of IJV between a SME and local partner may be decreased when the SME acquired host country knowledge. IJV partners' experience-based and size-based resources have differential effects on IJV performance.
34	Mention (2011)	Empirical 1 - Quantitative	1052 firms, service sector, Luxembourg.	Secondary data, Community Innovation Survey (CIS4).	2002 - 2004	RBV	Co-operation refers to the association of at least two parties pursuing a “distinct assignment together” (Arranz and Fdez deArroyabe,2008) in the context of their innovation activities.	Need for resources, innovation performance	Firms need to access and combine dispersed knowledge in order to achieve higher degrees of innovation novelty. The exploitation and assimilation of both internal and external resources provide firms with a competitive advantage. Co-operation and information sourcing strategies are associated with the degree of innovation novelty targeted.

35	Mowery, Oxley and Silverman (1996)	Empirical - Quantitative	792 alliances.	Secondary data, CATI and Micropatent database.	1985 - 1986	Knowledge based view, absorptive capacity	Alliances, including licensing, contractual agreements, joint R&D projects and JVs, as a means to gain access to technological and other complex capabilities.	Knowledge transfer	(1) Equity JVs appear to be more effective conduits for the transfer of complex capabilities than are contract-based alliances such as licensing agreements; (2) some support for the importance of 'absorptive capacity' in the acquisition of capabilities through alliances; and (3) some alliances are vehicles for accessing rather than acquiring capabilities.
36	Narula (2004)	Empirical - Mixed method	13 SMEs and 12 large firms, electronics hardware, EU.	Primary data, interviews and surveys from part of an ongoing study.	1998	RBV, network	Adopting the MERIT-CATI database: Alliances are taken to be agreements where there is a clear, significant, and systematic interdependence between the parties involved, with both firms undertaking innovative activities.	Need for resources	SMEs benefit from collaborations more than large firms, but are more careful about partner selection as they have limited opportunities to fail.
37	Oxley (1997)	Empirical - Quantitative	3,500 firms, over 9,000 cooperative agreements.	Secondary data, CATT database.	in the 1980s	TCE	Include licensing, cross-licensing and technology sharing agreements, international production JVs, collaborations in product and process R&D, and customer-supplier partnership.	Governance mode	Appropriability hazards are an important consideration when firms enter collaborations. Firms choose mode of governance depending on the level of the appropriability hazards.
38	Oxley and Sampson (2004)	Empirical - Quantitative	208 R&D alliances, electronics and telecommunications equipment, over 20 countries.	Secondary data, SDC Database.	1996	Alliance scope	Alliances involving collaborative R&D activities exclusively or in combination with manufacturing and/or marketing activities. Includes JVs.	Appropriability hazard	Alliance scope decision is an important aspect of alliance management. Restricting alliance scope may substitute for protective governance structure in curbing appropriability hazard.

39	Parkhe (1993)	Empirical - Quantitative	111 firms, chemicals and allied products, machinery, and transport equipment, US.	Primary – questionnaire.	1983 - 1988	Game theory, TCE	Strategic alliances, the "relatively enduring interfirm cooperative arrangements, involving flows and linkages that utilize resources and/or governance structures from autonomous organizations, for the joint accomplishment of individual goals linked to the corporate mission of each sponsoring firm".	Collaboration performance	Governance mode is related to collaboration performance, the perceived potential opportunism influences both mode of governance and performance, and firms use different mode of governance to prevent possible losses from opportunism.
40	Reuer and Lahiri (2014)	Empirical - Quantitative	140 collaborations, semiconductor, US.	Secondary data, SDC database, Fabless Semiconductor Association, the Global Semiconductor Association (GSA), and others.	1991 -2002	Asymmetric information, adverse selection	R&D alliances are formal agreements between independent firms who exchange, share, or codevelop specific resources related to R&D to reach a common goal (Gulati).	Collaboration formation	The likelihood of alliance formation is negatively related to geographic distance, even within clusters, but the negative relationship is diminished when the firms have prior ties, operate in the same product market, or possess similar technological knowledge.
41	Robertson and Gatignon (1998)	Empirical - Quantitative	264 firms, factory automation, biotechnology, chemicals, computers, materials, medical equipment, pharmaceuticals, telecommunications, and transportation, US.	Primary data, questionnaire.	1994	TCE	Technology alliance - a partnership between two or more independent companies which seeks to leverage the resources and competencies of each in order to develop substantial innovations (could be customer, competitor, or supplier, excluding licensing and R&D project contracting).	Collaboration decision	Firms that pursue technology alliances are likely to have less commitment to product category-specific assets, to face higher technological uncertainty, to be more capable at measuring innovation performance, to have more successful technology alliance experiences, and to compete in lower growth product categories.
42	Rothaermel and Deeds (2006)	Empirical - Quantitative	325 firms, 2226 R&D alliances, biotechnology, global.	Secondary data, 1997 BioScan Industry Directory and USPTO.	1973 - 1997	Competitive advantage, path dependency	Strategic alliances are voluntary agreements between independent firms to develop and commercialize new products, technologies or services.	Collaboration Capability	A high-tech venture needs to have the ability to create competitive advantage based on its alliance management capability and aware of the risks alliances pose if the firm's alliance exceeds its alliance management capability.

43	Sampson (2005)	Empirical - Quantitative	487 firms, 464 R&D alliances, across 34 countries.	Secondary data, SDC Database and Micropatent database.	1991–93 inclusive	Learning curve	R&D alliances that firms can spread the cost of technological development, gain access to new capabilities, and speed new technology adoptions.	Collaboration capability	The effect of prior experience on collaborative benefits, both directly and conditionally on alliance characteristics, and have implications for learning to manage organizations more generally.
44	Schilling (2009)	Review	-	-	-	-	Research and technology alliances, those that entail some aspect of joint research or cross-technology transfer.	-	Analyzing the secondary data normally used by the existing research, the findings points out issues such as inconsistency in coverage and difference in geographical scope, thus pointing to the need to supplement research with primary data.
45	Singh and Mitchell (2005)	Empirical - Quantitative	938 firms, hospital software systems industry, US.	Secondary data, business press, corporate reports, government publications, and other public sources.	1961 - 1991	Dynamic perspective	Marketing and R&D collaborations. Resource-access explanation for the observed performance improvements: collaborative relationships provide access to a wider scale and scope of information, technology, manufacturing capabilities, financial resources, products, and markets than would be available if a firm operated independently.	Firm performance	There is a pattern of bidirectional relationships between collaboration and sales performance. At the same time, the outcomes of collaboration are conditional on the characteristics of firms and the nature of their collaboration, and often change over time.
46	Soh (2010)	Empirical - Quantitative	49 firms, 318 alliances, LAN technologies for Ethernet and Token Ring, US.	Secondary data, vendor list published in trade publication Network World 1996.	1989 - 1996	Social network, competitive advantage	An alliance network consists of a focal firm that is allied through technology and marketing with other firms, including its competitors, to expand its product variety to different markets.	Innovation performance	Firms benefit from collaborative networks consist of partners and rivals. By positioning themselves more centrally in the network, firms can attract suppliers of complementary products, turn market resources away from competing standards, and improve innovation performance.

47	Stuart (2000)	Empirical - Quantitative	150 firms, 1,600 dyadic alliances, semiconductor, US.	Secondary data, Dataquest.	1985 - 1991	Social network, embeddedness	Horizontal (intra-industry) dyadic alliances, including joint product development agreements, joint ventures, technology exchanges, licensing, and marketing agreements.	Firm performance	Collaboration with large and innovative partners improve performance but immaterial effect when collaborate with small and technologically unsophisticated partners. However, the results suggest that alliances are more than pathways for obtaining resources but can also be signals that convey social status and recognition.
48	Teng (2007)	Review	-	-	-	RBV, corporate entrepreneurship, competitive advantage	Interfirm cooperative arrangements aimed at achieving firms' strategic objectives (Gulati, 1995a; Parkhe, 1993), including JVs, minority equity alliances, joint R&D, and joint marketing.	Need for resources	-
49	Tiwana (2008)	Empirical - Quantitative	42 project alliances, e-business/software development, US.	Primary data, questionnaire.	2000 - 2002	Network and knowledge integration	E-business project alliance as a formalized collaborative arrangement among two or more firms to jointly develop a previously nonexistent software based system used to create business value through the Internet.	Collaboration performance	Strong ties and knowledge integration are positively and significantly related, and their influence on collaboration performance is mediated by knowledge integration.
50	Tomlinson (2010)	Empirical - Quantitative	436 firms, aerospace, ceramics, IT and software, textiles, and healthcare, UK.	Primary, questionnaire.	The postal questionnaire was sent out in early September 2008	Network	Inter-firm co-operation for access to resource and information in attaining innovation.	Innovation performance	Inter-firm collaborations play an important role with regards to innovative performance. The extent to which it does differs across the industries surveyed, in upstream/downstream and horizontal linkages and also in relation to both product and process innovation. In general though, it appears that vertical ties are particularly important for innovation, with horizontal ties playing the lesser role.
51	Ulubaşoğlu, Akdiş and Kök (2009)	Empirical - Quantitative	257 SMEs, textile, metal products, food products, furniture, and others, Turkey.	Primary data, field survey.	2000	RBV	Forming alliances with foreign capital to gain access to new market, new product and process, technology, and management know-how.	Need for resources	Size-specific, sector-specific, and management-specific factors are identified in the alliance motivation. Specifically, smaller size firms form alliances with foreign capital for the purpose of accessing foreign market, less motivated by transfer of technology and management know-how.

52	Un, Cuervo-Cazurra and Asakawa (2010)	Empirical - Quantitative	781, manufacturing, Spain.	Secondary data, SEPI Foundation.	1998 - 2002	Knowledge based view	R&D collaborations, whose objective is the creation of new technologies. In this case, the firm benefits from establishing R&D collaborations with other organizations to access additional knowledge needed for innovation.	Innovation performance	The ease of knowledge access is the main driver for product innovation in collaborations. This is particularly the case for collaborations with suppliers or universities.
53	Vanhaverbeke, Duysters and Noorderhaven (2002)	Empirical - Quantitative	140 M&As and 145 strategic alliances, semiconductor.	Secondary data, the MERITCATI databank and SDC database.	1985 - 1994	TCE, network	Strategic technology alliances can be described as cooperative efforts in which two or more separate organizations, while maintaining their own corporate identities, join forces to share reciprocal inputs.	Choice between collaboration or acquisition	A series of strategic alliances between two partners increases the probability that one will ultimately acquire the other. Whereas previous direct contacts tend to lead to an acquisition, this is not true of previous indirect contacts, which increase the probability that a link between the companies, once it is forged, takes the form of a strategic alliance. In the case of acquisitions, firms that are more centrally located in the network of inter-firm alliances tend to be acquirers, and firms with a less central position tend to become acquired.
54	Vasudeva, Spencer and Teegen (2012)	Empirical - Quantitative	580 organizations, 171 domestic alliances, fuel cell technology, 14 countries.	Secondary data, USPTO and LexisNexis database.	1981 - 2002	Institutional theory, RBV	Technology alliances to gain access to at least two types of resources that are especially valuable in the early stages of risky technological domains—complementary technological knowledge and the social capital.	Knowledge transfer	Results based on domestic alliance partner selection decisions and knowledge flows show that prospective partners' levels of social value and technological value increase the probability of alliance formation in all countries. Social value and technological value have different levels of influence on alliance formation depending on the level of corporatism.
55	Vasudeva, Zaheer and Hernandez (2013)	Empirical - Quantitative	109 firms in 9 countries, fuel cell industry.	Secondary data, USPTO.	1980 - 2001	Institutionalization, structural holes, network	Participation and exchange among actors within a society in the process of achieving collective goals.	Innovation performance	The degree of corporatism in the home countries of the broker and its alliance partners, both separately and jointly, enhances the innovativeness of the broker, suggesting that incorporating institutional effects is crucial for a more complete understanding of how inter-organizational networks affect innovation.

56	Wiklund and Shepherd (2009)	Empirical - Quantitative	319 small businesses, manufacturing, professional services, wholesale/retail, and other service, Sweden.	Primary data, questionnaire + secondary data for financial info.	2000	RBV, resource combination, dynamic capabilities	Alliances, from a strategic perspective, are partnerships between firms where their resources, capabilities, and core competencies are combined to pursue mutual interests (Human & Provan, 1997).	Absorptive capacity	The effectiveness of collaboration is dependent on management capability, mainly resource combination.
57	Yasuda (2005)	Empirical - Qualitative	40 cases from 10 largest firms in semiconductor industry.	Secondary data, news database supplied by IC Insights.	The selection was made starting from the date of the press announcement on or before June 30, 2003.	RBV and TCE	'Voluntary arrangements between firms involving exchange, sharing, or co-development of products, technologies or services' (Gulati, 1998), or 'purposeful strategic relationship between independent firms that share compatible goals, strive for mutual benefits, and acknowledge a high level of mutual dependence' (Mohr and Spekman, 1994). Including: (a) technology license; (b) joint R&D; (c) sourcing agreement; and (d) joint venture.	Collaboration formation	The resource-based theory prevails over the transaction-cost theory for all of four alliance forms in explaining their motivation for firms to enter into collaborative relationship.
58	Zeng, Xie and Tam (2010)	Empirical - Quantitative	137 SMEs, manufacturing, China.	Primary data, questionnaire.		Network	Inter-firm cooperation with customers, suppliers, competitors, government agencies, intermediary institutions, universities, or research institutes, for know-how and technology access in attaining innovation.	Innovation performance	There are significant positive relationships between inter-firm cooperation, cooperation with intermediary institutions, cooperation with research organizations and innovation performance of SMEs, of which inter-firm cooperation is the most significant.



## **Chapter 3**

### **The Transaction Cost Approach to Collaborative Innovation in Family Firms: A Process of Internal Collaboration through Integration of Human Assets**

#### **3.1 Introduction to Chapter 3**

The third chapter of this dissertation examines the internal aspect of collaborative innovation in family firms, mainly, the collaborations between different departments within a firm in developing new product. This paper adopts transaction cost economics and proposes the recognition of “deployability” as a vital part of integrating nonfamily human assets in assessing new ideas for new product development. The paper has been presented at Alliance Manchester Business School Doctoral and Research Conference 2017, Northern Advanced Research Training Initiative (NARTI) 12<sup>th</sup> Annual Doctoral Conference, and the Annual Family Business Day 2017, organized by Centre for Family Business at Lancaster University Management School.

#### **3.2 Abstract**

Prior research has shown that family firms are able to innovate despite investing less in R&D. But how do family firms effectively turn innovation input to innovation output is not clear. Using a qualitative single case study of a family firm in the construction industry needing to constantly innovate to keep up with the competition and government regulations, I examine how a family firm collaborates internally through integration of human assets to achieve innovation. Whilst the existing literature on family business focus on family members as unique class of asset, I propose that family firms own another unique class of human assets: the long-term loyal nonfamily employees. Using transaction cost economics approach, an inductive analysis suggests that the process of economizing human assets involves identifying the “specificity” and “deployability” of human assets in assessing new ideas for new product development. Failure to identify the deployability of human assets would result in high transaction costs, thus hampering the process of achieving innovation. Therefore, this study contributes to existing

literature about how family firms can do more with less by economizing highly specified human assets through the operationalization of transaction cost economy.

### **3.3 Introduction**

Classical transaction cost economy approach posits that firms exist because of the orchestration of resources (Coase, 1937). Growing competition in the fierce market further require firms to continuously innovate. In achieving continuous innovation that leads to sustained competitive advantage, firms need to coordinate resources available within the firm at its optimum level (Barney, 1991). Human capital, along with their knowledge acquired over time, is known to be a source of sustained competitive advantage (Coff, 1997; Hall, 1993). Human capital, among the strategic assets that are difficult to trade and imitate, scarce, appropriable, and specialized, run the innovation routines in bestowing the firm's competitive advantage (Amit & Schoemaker, 1993).

Recent research has shed more light on the topic of innovation in family firms. To provide more clarification for future research avenue, De Massis et al. (2013) have split the topic into two broad areas of inquiry, one focusing on innovation inputs (e.g., R&D investments) and the other on innovation outputs (e.g., new product introduction, patent registrations). Despite empirical results pointing to family firms being risk adverse, investing less in R&D, and focus more on family-centred goals (Chen & Hsu, 2009; Choi et al., 2015; Gomez-mejia et al., 2014; Kotlar et al., 2014; Kotlar et al., 2014), research has shown that family firms are able to innovate (Block, 2012; Czarnitzki & Kraft, 2009). In fact, a meta-analysis of 108 primary studies covering 42 countries has shown that family firms innovate more than nonfamily firms, despite investing significantly less in innovation (Duran, Kammerlander, Essen, & Zellweger, 2016). The same study also points to family firm being able to turn input to output in an efficacious way. There still exists the missing link between how the innovation inputs in family firms are being turned to the innovation outputs (Kellermanns & Hoy, 2017). Thus, the pressing question, how do family firms effectively turn innovation input to innovation output?

As employees deepen their knowledge over time in the firm and adding more value to the firm with their specific knowledge, their specificity increases (Williamson, 1981). With the increased firm specific knowledge, human capital are less likely to leave voluntarily (Campbell, Coff, & Kryscynski, 2012). Family firms, given their long-term

vision, are often long-standing entities in the market (Breton-miller & Miller, 2006; Gentry, Dibrell, & Kim, 2016). The long-term vision, coupled with unique governance structure, provides family firms with the advantage of developing and retaining a class of unique human assets: long-term employees. These long-term employees are unique human assets retained by family firms. They have years of accumulated firm specific knowledge and skills from learning on-the job, and at the same time, highly loyal and committed to the family firm. Thus, in this paper, I challenge the norm of emphasizing family members, and shift the focus to the overlooked strategic human assets owned by family firms: the nonfamily employees.

The “how” questions are well suited to qualitative research, especially in the context of uncovering the process from input to output over time, involving human actors (Yin, 2009, 2011). Thus, to answer these questions, I conducted an in-depth case study of a family firm. Operating in the construction industry, facing constant regulatory changes, the family-owned small medium enterprise (SME) needs to continuously innovate despite resource constraints to meet customer demands. To ensure the effective and efficient use of limited resources, different departments in the firm work together to assess new ideas for new product development (NPD). In doing so, it enables the family firm in meeting customer demands, as well as keeping up with the industry. Using Alfa Construction as a case sample, this study shows how a family firm achieves continuous innovation through collaborations within, by economizing its highly specific human assets. Using multiple sources of data, including archival data spanning company life cycle of 35 years, observations, meeting attendance, informal discussions, and semi-structured interviews, I uncover the process of coordinating highly specified human assets in achieving innovation.

I first propose to view family firms from a micro perspective, identifying human asset specificity. Next, using an inductive approach, I outline a process model, illustrating the process of integrating highly specified human assets and how transaction costs incurred along the process with specified human assets being deployed for another task over the duration of four years in Alfa Construction. The new insight that emerged from this model is the “deployability” of knowledge specific human assets. Building on transaction cost economy, I argue that family firms retain many long-term employees who are highly specified in knowledge and skills, yet different in deployability. In other words, when highly specified human assets with high knowledge specificity are

deployed for another task within the firm, transaction costs will incur, when not integrated properly. The process model shows how family firms can economize by identifying human asset specificity, knowledge specificity, and deployability, integrating highly specified human asset at optimal, and ultimately achieving innovation.

This study contributes to the literature in several ways. First, it uncovers the strategic human assets owned by family firms, the nonfamily long-term employees. Second, it provides insights to the scantily researched area of collaborative innovation in family firms, specifically focusing on the internal collaborations among nonfamily members. To my best knowledge, this is the first to study collaborative innovation between nonfamily employees in family firm while the existing research looks at the family dynamics involving composition of family members on board. Third, the study examines the missing link between innovation input and innovation output. By doing so, it sheds light on the puzzle of how family firms innovate more with less, revealing the process of turning input to output. Finally, it advances current understanding of collaborative innovation in family firm by developing a process model of integrating highly specified human assets by identifying knowledge specificity and deployability.

### **3.4 Theoretical Background**

One area that has been overlooked in the literature of innovation in family business is the role of nonfamily members. Looking into unique family firm characteristics, Sirmon and Hitt (2003) illustrate human capital as one of the unique resources that family firms have in attaining competitive advantage. At the same time, they stress the importance of managing the human capital to produce value, with effective integration and deployment of human capital. However, the authors seem to point towards human capital as more of family members. Whilst family members have high commitment due to the intimate relationship being family members and possess firm-specific tacit knowledge as they might have been involved from young age, this does not mean nonfamily members will not have such characteristics. With years of on the job learning and long-term serving, coupled with unique family firm culture, nonfamily employees develop high firm-specific tacit knowledge and loyalty with commitment over time.

To build theory on the process from innovation input to innovation output in family firms, I extend the transaction cost economy (TCE) approach, to identify the human

actors in the process of innovation at firm level and how they can be economized (Coase, 1937; Williamson, 1981). The TCE approach is best in explaining the process of innovation, as innovation fits the three criteria outlined by Williamson (1979): (1) frequency, (2) uncertainty, and (3) asset specificity. Facing make or buy, as a firm chooses to vertically integrate and takes innovation within firm, the constant R&D in search of new ideas is recurrent, R&D activities and investments face uncertainty, and it involves highly specific human assets with highly specified knowledge to filter through the new ideas and move forward with R&D efforts.

In his seminal paper, *The Nature of the Firm*, Coase (1937) lays the foundation of transaction costs, specifically, a firm exists because of the direction and organization of resources by an entrepreneur. He also points out that as a firm increases in size, so do transaction costs, and transactions costs take place in different forms in a firm. Although Coase (1937) provides the explanations of why firms exist, it poses operationalization problem, as he does not provide the direct measurement of transaction costs (Geyskens, Steenkamp, & Kumar, 2006). Transaction cost is defined as the friction that “occurs when a good or service is transferred across a technologically separable interface”, where “misunderstandings and conflicts that lead to delays, breakdowns, and other malfunctions” (Williamson, 1981). Further refining transaction costs, Williamson operationalized transaction cost by spelling out assets specificity by site specificity, physical asset specificity, and human asset specificity, where the criteria consists of uncertainty, frequency, and specificity (Williamson, 1979, 1981).

Using TCE approach, Gedajlovic and Carney (2010) explain why family firms exist, by proposing a class of assets termed as generic nontradeables (GNT). The authors argue that these assets are “sticky/specific to the firm in which they are developed, but at the same broadly applicable”, stemming from family members managing the business (Gedajlovic & Carney, 2010). Building on TCE, bounded rationality and bounded reliability, Verbeke and Kano (2010) argue that family firms possess family-based human asset specificity, when equipped with professional knowledge, would lead to the long-term success of a family firm. Further building on family-based asset specificity, bounded rationality, and bounded reliability, Verbeke and Kano (2012) argue that the prosperity and survival of family firms depend on the absence of a dysfunctional bifurcation bias, which is the asymmetric treatment of family vs. nonfamily assets.

Despite the attempt to extend the TCE approach to family business literature, they are largely focused on the family members, thus overlooking the role of nonfamily members. Moreover, these arguments are yet to be empirically tested. On one hand, we acknowledge that family firms are unique due to the unification of ownership and management by families. Such unique trait of family governance with family involvement makes family firms behave differently from nonfamily firms. On the other hand, let's not forget the nonfamily members who run the micro daily routines. As a family firm grows larger in size, the proportion between family and nonfamily members grows larger. In other words, whilst family members may exist in all levels in a family firm, family members won't be occupying every single post in the family firm, which these posts are filled by nonfamily members who run vital operations of the firm.

Innovation, poses riskiness, when left to the market. If a firm outsources new product development (NPD) to suppliers, opportunism emerges when suppliers sell to competitors. Given the unique traits of family firms, family firms tend to be risk adverse and prefer to have total control, thus taking innovation within firm. When a family firm takes innovation within firm, it reduces the transaction costs on the market, but brings the transaction costs within the firm. In this paper, I take the transaction costs into the micro perspective at firm level, examine how transaction costs incur when human assets are in the process of NPD in relation to R&D.

### **3.5 Methods**

#### **3.5.1 Research Setting**

Alfa Construction is a founder led family business in the construction industry, providing equipment for safe excavation. Established in 1981, Alfa Construction has grown from being a merchant in supplying low-end products satisfying customers' needs to innovative industry leader providing solutions solving customers' problems. To date, the company has 365 employees with yearly turnover of 40 million pounds. Headquartered in Northwest of UK, Alfa Construction not only has a separate location as Engineering Centre, also depots and workshops across the country.

Being in the niche industry, continuous innovation is needed, whether new product development or product modification, to meet customers' demand in a timely manner, as well as adhering to the ever changing regulations. Realising that from early on, Alfa Construction has started with in-house manufacturing even in the early days, at the start

of establishment. To date, Alfa Construction is the only firm in the industry that has in-house manufacturing for all equipment supplied to customers, as well as own transportation fleet delivering equipment to customers. With his long-term vision, Mr. Harry M's value has been deeply embedded in the firm's motto: innovation, commitment, and sustainability.

This research takes a longitudinal single case study design to track changes as the case company goes through different phases along different growth stages over the time span of 35 years – from importing products to being innovative industry leader (Figure 1). Focusing specifically on the last 7 years between 2010 to 2016, on the process of becoming innovative industry leader, I tracked 305 projects involving new product development, product modifications, and supporting materials against implementation of various R&D related routines. I conducted in-depth semi-structured interviews with key informants involved in the R&D activities. Direct observations, informal discussions, and meeting attendance provided insights into the running of the company, especially the R&D team in action. Archival internal documents provided additional insights into the historical development of the R&D process on product innovation and the changes over time, allowing me to triangulate against interviews and observations. Data sources and uses are summarized in Table 3.1.

**Table 3.1. Data Sources and Use in Analysis**

<b>Data Sources</b>	<b>Location and Date</b>	<b>Data</b>	<b>Use in Analysis</b>
<u>Internal documents</u> Company profile, R&D archival data (305 R&D projects), R&D time record, R&D procedures, new product and service flowchart, R&D committee meeting minutes, Technical sub-committee minutes, product utilization rate	Most files were provided by the firm, except R&D archival data only can be accessed by logging into computers on site	<ul style="list-style-type: none"> <li>• 216 pages of internal documents</li> <li>• 5,000 pages of new product development files</li> <li>• &gt; 20,000 pages of product modification and supporting materials</li> </ul>	Tracking of innovation inputs, new ideas for NPD, and innovation outputs. Triangulation against interview data.
<u>Non-participant observation</u> R&D department, design department, and operations <u>Informal discussions</u> > 30 informants across different departments <u>Meeting attendance</u> Technical sub-committee meeting, operational meeting, and team brief	Engineering House, Head Office, and manufacturing site (Once a week, April 2016 to June 2016, and visits from March 2015 to March 2017)	66 pages of field notes for observations, informal discussions, and meeting attendance	Non-participant observation and meeting attendance provide overall understanding of the operations of the firm and culture
<u>Interviews</u> 16 semi-structured interviews, 12 informants, lasting between 30 minutes to two hours	Engineering House and Head Office (June 2015 - February 2017)	Total of 933 minutes of interview (723 recorded, 210 non-recorded) 183 pages of text (from audio transcript and hand written notes for non-recorded interview)	Interviews provide insights into Alfa Construction as a family firm, growth stages, evolution of R&D phases and process on NPD.

Total: 25,465 pages of data covering time span of 35 years



### **3.5.2 Data Collection**

In March 2015, through the Centre for Family Business at Lancaster University, I began contact with Alfa Construction and made my first visit to the company. The first visit provided an overview of the company and its product innovation landscape. Subsequently, I visited the company again in June 2015 and had a meeting with the R&D director, where I obtained more internal documents. Between April to June 2016, the I spent one day per week at the company, rotating between R&D department, design department, and head office, typically between 10am and 5pm. During this period I was mainly an observer. I was introduced to the employees as a researcher collecting data as part of my research project where I would be going around the company to observe and learn the processes.

For the first two months, I was based in the engineering centre, a location different from the head office with the primary function of dealing with product innovation and front end customer facing. As this study focuses on the topic of innovation, I spent most of my time with the R&D department to have the first-hand and in-depth understanding of product innovation process in the company. During which, I either sat on the desk provided to observe and take note or go around to speak to different people in the company. I also participated in the technical meeting held jointly by the R&D and design department, as well as departmental briefing in the R&D department. Other times, I joined the employees for lunch and tea break to have informal discussions to gain trust and obtain insider insights. In the last month, I then moved to head office to have an overview of the company's operations in relation to accounting, purchasing, logistics, and manufacturing. At the head office, I had the opportunity to participate in an operations meeting held by director levels evaluating company performance against market and discussing short-term goals.

The study at Alfa Construction was conducted openly, with the approval of the owner himself and staffs at all level aware of the nature and purpose of the research.

### **3.5.3 Internal Documents**

The first part of the internal documents provided by Alfa Construction are company profile, R&D time record, R&D procedures, new product and service flowchart, R&D committee meeting minutes, Technical Sub-committee meetings minutes, and product utilization rate. These documents consist of 216 pages in total and span over company's

life span of 35 years. The other part of the internal documents are the R&D archival data that tracks all 305 R&D projects from 2010 to 2016, only accessible on site in the company using company computer with designated username and password. The R&D department keeps detail record of all the products available in Alfa Construction. This includes each product development/modifications, with the initial idea proposed, reason for the request, sketches, budget allocated, product specifications, technical specifications, product descriptions, precise calculations, materials, and subsequent evaluation in different stages. During my visits to Alfa Construction, I was given access to all the archival records by giving me username and password to log in to the computer in the office. The R&D archival consists of more than 5,000 pages of record on new product development and more than 20,000 pages record on product modification and supporting materials. However, given the large quantity of materials, it was used for more in-depth understanding of the innovation process in Alfa Construction over time rather than coding. The internal documents provided important background information and how processes changed over time.

#### **3.5.4 Field Notes**

In order to have an in-depth understanding of the company, I seized every opportunity to observe and interact with the employees during my visits to Alfa Construction. Informal discussions with more than 40 informants were conducted across different departments in Engineering House, Head Office, and manufacturing site. The informants include personal assistant of the owner, design director, engineering director, design manager, purchasing manager, R&D manager, design engineers, R&D engineers, animators, drivers, floor shop workers, health and safety personnel, marketing personnel, and sales. The informal discussions took place during office hour, lunch break, tea break or cigarette break, and the rest during car ride to/from office. The informal approach is time efficient, in oppose to scheduling interview with each and every one of the informants. Moreover, the informal setting with casual and friendly atmosphere leads to more willingness from the informants to share their insights. The informants were more at ease and candid in sharing their thoughts in informal talks in comparison to formal interview.

Whenever possible, I took notes down as the conversation took place, otherwise I would write the notes down soonest possible while the memory was fresh. Furthermore, I kept

a detailed record of the events and observations during the weekly visit to Alfa Construction. The events and observations were mostly recorded at real-time whenever possible and reviewed at the end of the day to ensure nothing was left out. Notes on meetings that I have participated were written down among the field notes. The field notes comprising observations, informal discussions, and meeting attendance entail 66 pages of single-spaced texts.

### **3.5.5 In-depth Semi-structured Interviews**

16 formal interviews with 12 informants were conducted. Informants included engineering director, R&D manager, operations director, design director, fleet director, design manager, R&D personnel, as well as one family member who is the grandson of the owner. Most face-to-face interviews were recorded, each lasting between 30 minutes to 2 hours. At the employee level, they were reluctant to be interviewed formally. In general, the employees were chatty and very willing to share. However, when they were told that it would be a formal interview being recorded, they started to look uneasy and rather hesitant to speak. Therefore, the approach was more of informal talks, taking notes using pen and paper instead of recording, while adhering to the pre-set questions. For example, I would sit by one of the employee's desk and ask: "Could you please tell me what is the purpose of animation made for the product?". When transcribed, recorded and non-recorded interviews yielded 183 pages of single-spaced text.

### **3.5.6 Research Approach and Data Analysis**

The research approach followed the grounded theory approach (Glaser & Strauss, 1973), in line with the feature of grounded theory, the "discovery through direct contact with the social world studied coupled with a rejection of priori theorizing", involving making sense out of the observed events (Locke, 2001). With this approach, I examined the micro level, uncovering the process that involves actions and interactions among human actors, noting the patterns of behaviour and meaning over time. Using Alfa Construction as a single case study setting, I first analysed the case using "time series analysis" (Yin, 2009), to track the historical events and R&D activities starting from the founding year to date, recognized the emerging themes and patterns by giving sense to the multiple sources of data gathered (Boyatzis, 1998). I then "explanation building" (Yin, 2009), using theoretical lens to explain the occurrence of the emerged patterns, taking into account the family firm characteristics.

The data analysis approach followed the common prescription for inductive in-depth qualitative case study analysis (Howard-Grenville, Metzger, & Meyer, 2013; Jacobides, 2005). In the first step, I collated the multiple sources of data from internal documents, field notes, and interviews, linked between the data and cross checked the historical events, in order to create an “event history data base” (Garud & Rappa, 1994; Tracey & Phillips, 2016). The “event history data base” served as a basis to give an overall view of the historical development on all aspects of innovation in Alfa Construction.

Next, I visually mapped out the occurrence of R&D related events over time, including the establishment of the R&D department, the changes in implementation of R&D process and procedures for NPD, changes in R&D personnel, R&D inputs, and R&D outputs. The concept of human actors, the nonfamily members of a family firm, emerged early in my analyses, as innovation didn’t occur overnight with the establishment of R&D department, but evolved over time with continuous adaptation and changes to routines where the human actors played a major part. I went back and forth between the data and literature to assimilate my initial idea on the construct of human assets specifically in the context of family firms. I then returned to the company to gather additional data, as well as archival data to provide more insights on the details of the historical evolvments.

In accordance with family business literature, with the owner’s long-term vision, Alfa Construction has many long-term employees. Along with the owner’s motto in investing in people, whether long-term employees or new comers, employees are all highly loyal to the firm. I noted the role of these highly specified human assets in committing themselves to contributing to achieving innovation in Alfa Construction. They each have very highly specified knowledge in their fields and are put together to bring Alfa Construction to the next level of product innovation. Whereas existing literature on innovation in family firms focus on the role of family members. Following Williamson’s (1981) transaction cost approach, I define these employees as highly specified human assets with specified knowledge, when deployed to another task, would incur transaction costs. Working iteratively between our data, TCE literature, and family business literature provided improved definitions and relationships between constructs. I then converged upon a process model that depicts how these highly specified human assets were deployed to form a R&D committee for evaluating new

ideas for NPD, separated due to disagreements, and integrated again to optimize R&D process for NPD.

## **3.6 Findings**

### **3.6.1 Alfa Construction as a Family Firm and Human Assets**

Alfa Construction was founded by Mr. Harry M, together with his brother. Mr. Harry has always envisioned Alfa Construction to be long-term oriented with more family members being involved over time and to be passed on through generations. Although Alfa Construction operates professionally with Mr. Harry M being the chairman and the management level consists of non-family members, it wasn't like this in the beginning. In the first ten years of the operation, with a scale of thirty headcounts, eleven of which consisted of the M family members. They were mainly Mr. Harry's brother, sister in law, nephews, and nieces. Over time, as the company grows, vision and mission of the company changed, so did the life paths of the family members. Once eleven family members in the operation now reduced to four, one being Mr Harry's grandson and the other three his nephews and niece. Mr. Harry himself sits as the Chairman that oversees the operations, while his two daughters serve as the board members.

Mr. Harry M's grandson, Wesley C, who officially joined Alfa Construction fulltime in May 2015. Prior to working fulltime in Alfa Construction, Wesley C had been working part time in Alfa Construction for 5 years, rotating around different functions, including sales and marketing, equipment maintenance, logistics, R&D, purchasing, and operations. At the time of data collection, Wesley C was working with purchasing and operations, but attends strategic meetings at director level. As a founder-led family firm, Alfa Construction shares the same characteristics of family firms, namely, centralized decision-making, quick decision-making, and long-term orientation.

When asked if they think Alfa Construction is a family firm, the answer from employees were all "yes", as they all know Mr Harry M's family owns the company, his 2 daughters visit the firm occasionally as board members, and just recently has the grandson who joined the firm fulltime. However, employees who have worked for other family firms before commented that although Alfa Construction is a family owned firm, it is not exactly family managed, as the operations of the firm is not operated by family members, albeit key decision-maker is Mr. Harry M.

Having been in the industry for 35 years, together with Mr. Harry M's motto of sustainability, Alfa Construction invests substantially in its people, thus, has many long-term employees, as well as many home grown managers and directors. During the interview, the internal operations director easily named a number of employees from shop floor to office who have worked for Alfa Construction for more than 10 years. As stated by the internal operations director:

*“We are in a niche industry, and you cannot go out and get people who are talented, there are only 3 main players in the UK. To be fair, all are good people in the industry. We don't just snatch our competitor's staffs, because then they start snatching our staffs, which would result in people coming and going. The only real way, is the potential growth and sustainability.”*

In fact, as a family firm, Alfa Construction does develop a unique culture. During the duration of data collection, the atmosphere at the firm was very alive and friendly. Although not mandatory, many employees were seen wearing the jackets or shirts that have Alfa Construction company logo on them. Employees speak of Mr Harry M fondly and express contentment working at Alfa Construction. A remark by an employee about working in Alfa Construction,

*“Here you are treated more like a person, more than just a headcount. They care more here. They can take care of you more as an individual”.*

Another employee also expressed during interview when asked about working in Alfa Construction,

*“This is one of the bigger firm that I have worked for, even though it is family owned. They definitely care about you more, more than the firm that I worked before. I feel I am being looked after for. I think Alfa Construction takes care of us to retain us to prevent high turnover. I think I am given more freedom to email or phone someone in the company, information flows quickly in Alfa Construction. In terms of culture and environment, it is more relaxed here. We are given responsibility and trust, which makes you feel wanted. Working here the experience is much better than where I have worked before”.*

At the director level, directors are given authority for the daily operations within a limit. With this authority, directors are able to proceed with spending within the set amount

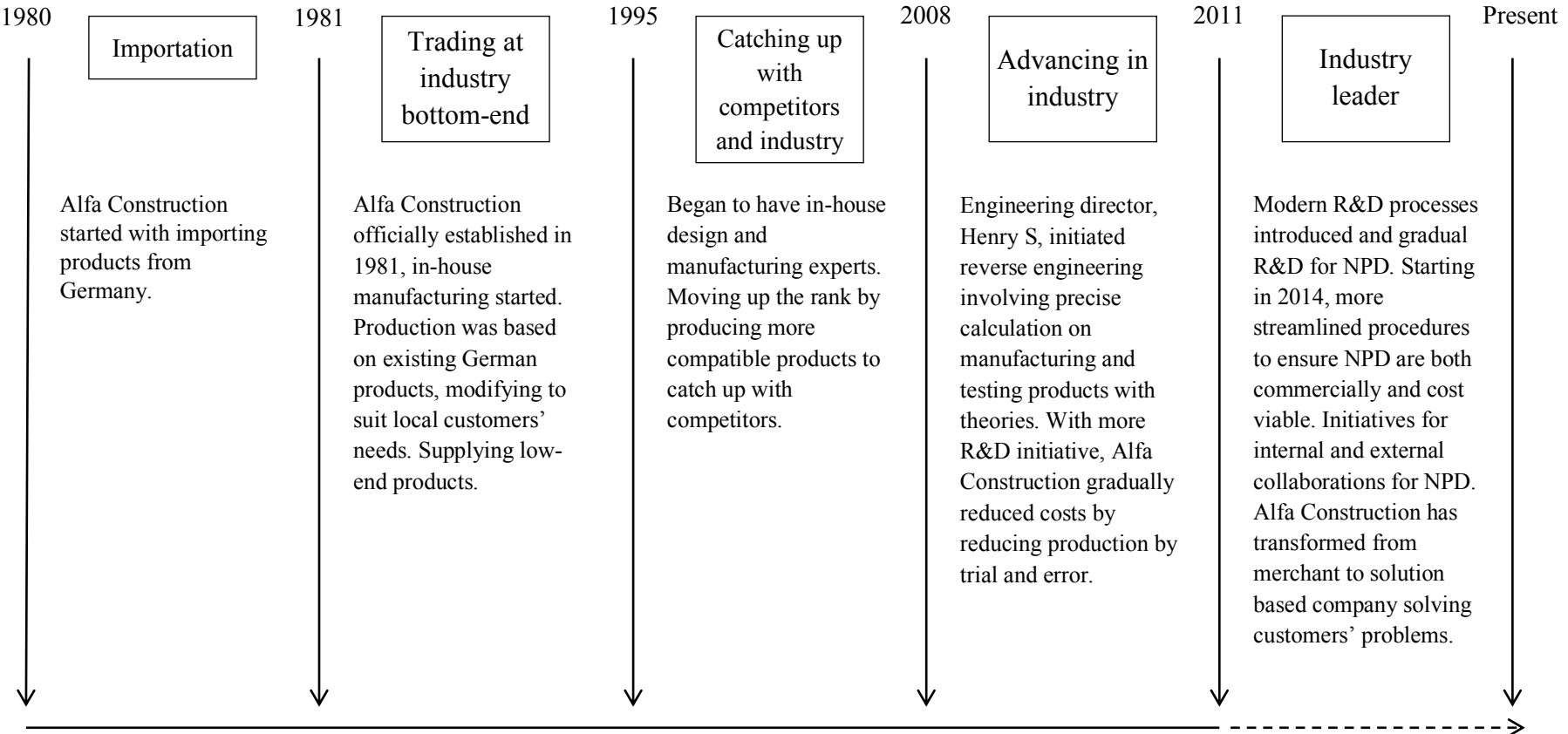
without seeking approval. As noted by the directors, one distinct feature of Alfa Construction is that it has a short line of communication. For spending such as purchases or investment over the limit, any director can just phone Mr. Harry M directly to seek approval. *The external operations director expressed:*

*“We have a very short line of communication to Harry. If we have an idea to do something, it’s very quick for us to get an approval to do it. We don’t have a long-winded approval process. Yes, we do have to do our own homework and make sure the investment is sound, but, once we lay the case out, Harry says ‘yes, get on with it, here’s the money, get it done’. That helps, because it means that, as a business, we are agile, we can respond very very quickly. When we see an opportunity, we can grasp the opportunity very quickly and turn it into business.”*

Since the founding of the firm, Mr Harry M is very much in control of everything. He has been described by the internal operations director as the admiral of the fleet, captain of all ships, and navigator as well. As the firm grows and he ages, starting from 10 years ago, Mr. Harry M delegates the daily operations to the employees while he overlooks the business as the chairman. Nevertheless, Mr Harry M’s influence is deeply rooted in the firm. Most of the employees the author spoke to know Mr Harry’s motto: “Faster, cheaper, and better”, which is almost like a mantra recited by everyone in the firm.

Building on TCE approach of human asset specificity, I argue that human assets retained by family firms are not only highly specified at firm-level, but also highly specified per task. Years of on-the-job learning equip them with highly specified knowledge at what they do. Unlike nonfamily business employees, employees at family firms develop loyalty and commitment over time with their long serving, thus posing less issues in terms of opportunistic behavioural assumption.

**Figure 3.1.** Growth Stages of Alfa Construction





### **3.6.2 The Setting: Growth Stages in Alfa Construction in Becoming Innovative – From Scrap Merchant to Industry Leader**

Although currently an industry leader with innovative products, innovation in Alfa Construction wasn't from the start. Going back to the history, Alfa Construction went through different phases to be a truly innovative firm (Figure 3.1). In 1980, founder of Alfa Construction, Mr. Harry M, started importing products from Germany for the local demands in the UK. Importing the products gave Mr. Harry M an overall picture of the product range for the construction industry and at the same time, he investigated the local market needs. In 1981, Alfa Construction was officially established, and in the same year, in-house manufacturing has started. During this period of start-up phase between 1981 to 1995, manufacturing of the products was based on the existing German products, modified according to customer demands to suit to local needs. Although Alfa Construction had in-house manufacturing, it lacked technological expertise, which the production was by trial and error, if things failed, just start and try again. The product range that Alfa Construction had during this phase was of low-end product with poor equipment at the bottom of the industry. Despite trading at the low-end of the industry, in line with Mr. Harry's motto of being people oriented, he invested in grooming employees, employees of Alfa Construction have good working ethics and provided customers with excellent service. Internal operations director, Randy R, who has been with Alfa Construction for more than 25 years noted:

*“When we started we were scrap merchant. Then we had a period of catch up. If you compare that with our competitors out there, we started off more of less a scrap merchant for a number of years, we were the poor end in the industry, of all the companies in this industry, we were the worst. Our equipment was poor, but our work ethic was good.”*

Realising the need for continuous improvement, during the period of 1995 to 2008, Alfa Construction went through a period of catching up with competitors and industry. Consistent with Mr. Harry's long-term vision, to be an innovative and sustainable business, design and manufacturing experts were recruited to bring the productions to the next level: producing more compatible products at better quality that match competitors' product range and industry standard. Manufacturing site was relocated in 2003 to a bigger premise with bigger production capacity to accommodate growth. In

2005, engineering director, Henry S, joined Alfa Construction to help push innovation further. With his engineering background, Henry S initiated the concept of open innovation, pushing for collaborations between departments for NPD, although the concept took years to develop and only came full swing after 2014. Starting 2006, Alfa Construction began introducing new products onto its fleet, although at this stage, R&D was done on a part-time basis where it was only done when there is free time. During this catching up period, Alfa Construction opened new depots in 2 new locations and expanded 2 other existing depots. In terms of external engagement, Alfa Construction started to engage with industry bodies and sits on committees to have a presence and voice in the industry.

Advancing in the industry between 2008 to 2011, engineering director, Henry S, initiated the reverse engineering where it involved calculation to precisions on manufacturing and testing the products with theories. With this move, Alfa Construction was able to reduce manufacture by trial and error, which then helped the company to reduce the cost of production tremendously. More R&D activities were being pushed forward as William A, an engineer joined in 2009. At this point in time, R&D activities was embedded in the design department with only 50% of William's time spent purely on R&D, with the remaining 50% of the time supporting the design department. One major effort by Henry and William during this period was the production of technical file that has detail technical specification of all products in the fleet.

In 2009, Henry pushed R&D forward with the introduction of R&D procedures for NPD and product modification. Knowing that to achieve innovation, continuous R&D efforts are required, which the R&D procedure was revised twice in 2010. In the same year, NPD started to be recorded digitally, all hand written proposals and sketches by hand are to be scanned into digital format. At this point in time, the NPD process consists of four stages: (Stage 1) Specification: detailing reason for product development, sketches if any, back ground research and source of information, materials, and technical specifications; (Stage 2) Prototype Manufacture; (Stage 3) Testing & Evaluation: detailing method and results of testing, compliances, comments, and if any further actions required; (Stage 4) Manufacture: Detail drawings consisting precise calculations and technical specifications with drawings for manufacture. As recalled by internal operations director, Randy R:

*“As the industry change, we got to follow up too with the new things, to have sets of procedures and policies in place. It used to be myself and a couple of others, we just go: Oh that’s a good idea, go make it! No drawings, no calculations, none of that. We just go make it in the oven, not sure about anything, just make and test, and see what comes out. But obviously we have to go away from that and do it properly.”*

Leaning on the existing ties with industrial bodies and committees, along with Henry’s concept of open innovation, Alfa Construction started to explore leveraging the ties with external parties for new ideas on NPD, where it involves more conversations and closely monitor the industry trend for market needs. As Alfa Construction provides safety solutions for the construction industry, it is essential to do what they defined as environmental scan, to look out for any changes in legislations that would have an impact on the service of products that they deliver. With Alfa Construction’s customer service oriented motto, the company not only has built trust from customers but is also actively listening to customers, as stated by the operations director, John I:

*“We are in constant dialogue with our customers, so we often have the opportunities to talk and ask them what their problems are, what their needs are, and from there we can actually start new product development”*

More R&D activities and efforts are continuously being pushed forward with the next phase starting 2011, leading Alfa Construction to being an innovative industry leader. 2011 marks the major milestone for R&D as the R&D department was officially established with William A. made R&D manager. R&D investments gradually increased from less than 0.5% (compared to turnover), to 1% in 2014, 1.5% in 2015, and 2% in 2016. The increased R&D investments are mainly for personnel, materials, testing, equipment, computers, software, and machines. An R&D engineer joined Alfa Construction briefly in 2012 and left. In 2013, principal R&D engineer, Hayden M joined, fully focus on NPD. With the expansion in R&D, Alfa Construction decided to have in-house animation. In the same year, R&D procedure for NPD was revised for the 5th time, subsequently revised for the 6th time in 2014 with flowchart added to evaluate new ideas proposed through stages taking into considerations different aspects in the business. With the revised NPD procedure, the reports now also include detailed costings and 3D images.

R&D committee was formed in 2014, with the main function to evaluate new ideas proposed for NPD, to be considered from different aspects in the firm, including market needs, viability, ease in obtaining materials and production, and costs. In the same year, R&D department pushed for collaborations both internally and externally for NPD. In 2015, another engineer, Woody S, joined. In the same year, Technical Subcommittee was formed alongside R&D committee to look at NPD from technical specifications and solve any technical issues. At the time of data collection, the R&D department consists of one R&D manager, two R&D engineer, and two animators.

Aside from the numerous new products developed and modified over the years, to date, the most innovative and breakthrough product from Alfa Construction would be the lightweight series using glass reinforced plastic (GRP). This product is not only a breakthrough in the industry, but also gained Alfa Construction recognition in the industry for being innovative. To date, among the competitors in the industry, only Alfa Construction has the lightweight system with plastic material reducing hundreds of kilogram of weight. At this stage, Alfa Construction has transformed from merchant to solution-based company solving customers' problems.

### **3.7 Analysis**

#### **3.7.1 In Achieving Continuous Innovation - Product Innovation in Alfa Construction**

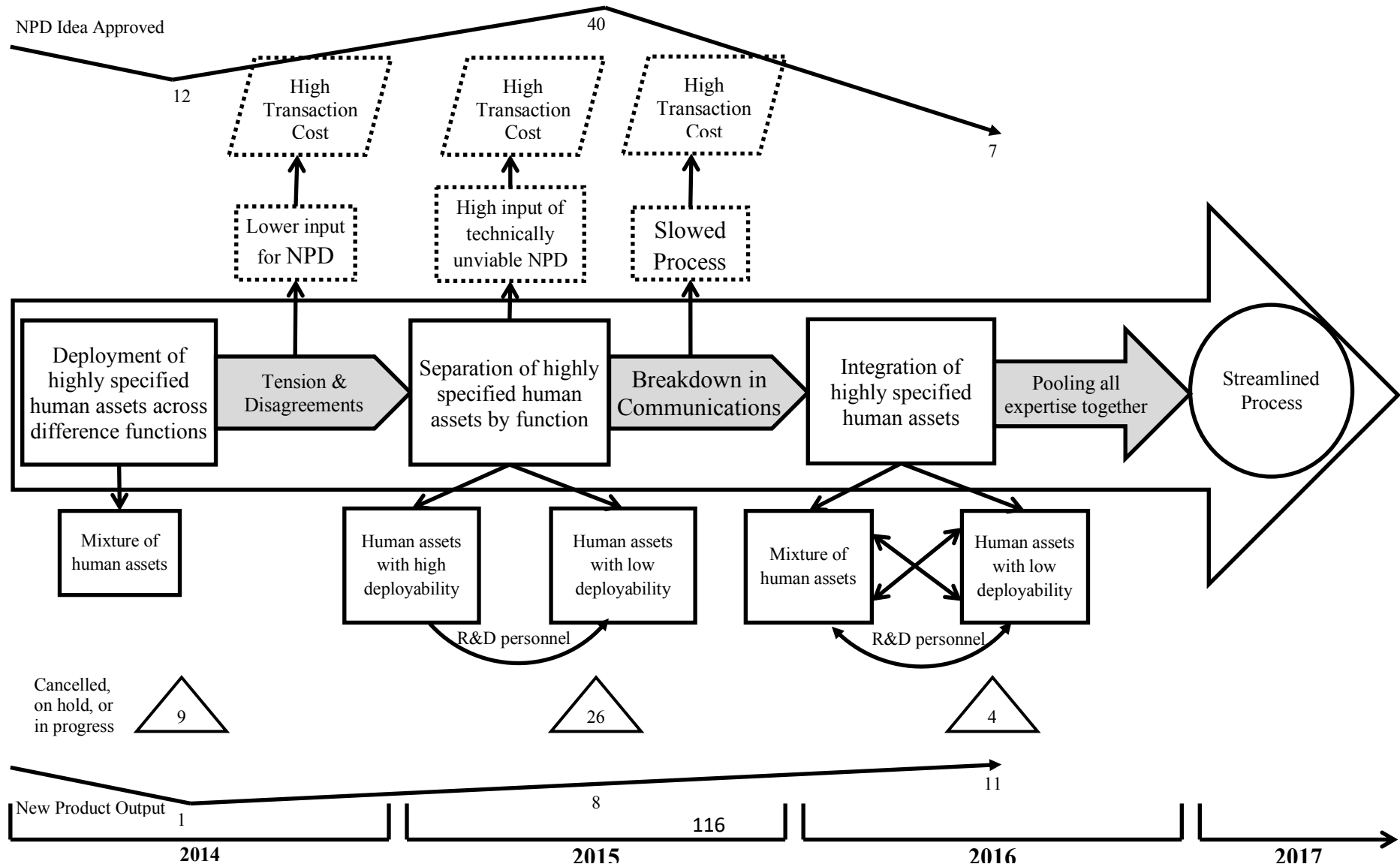
Starting from 2010, Alfa Construction started to record product innovation in digital form instead of paper filing. Product developments are categorized into: new product development; product modifications; and supporting materials. The progress is further tracked using colour coding to differentiate between completed, cancelled, on hold, and in progress. NPD consists of developing a new product from scratch, where it starts with a proposal consists of initial information. Once the proposal approved, the R&D team then moves on to prototyping and when all tests have passed, it then pass on to manufacturing to be manufactured and launched. Product modification involves modifications of existing products in the fleet. The request for modification could stem from customers or employees onsite providing feedbacks on improving the product or modified to suit another purpose. Supporting materials consist of 3D animations and images that provide more precision calculations for technical specifications in the process of NPD, as well as supports for marketing purposes and usual manuals for

customers. With the detailed documentation, I was able to analyse the 305 projects on product innovation, which I went through the input dates, the process, and the dates when it was completed.

Going into the details of changes in R&D efforts in relation to product innovation, as mentioned in the previous section, a dedicated R&D committee was established in 2014 with the main task to evaluate new ideas for product innovation, along with fine-tuned procedures for NPD and product modifications. Aside from assessing new ideas, updates on developments of current R&D projects are to be discussed during R&D committee meeting. Although both NPD and product modifications are considered innovation, they go through slightly different stages in the 6th revision of R&D procedure in 2014, which product modifications go through less steps than NPD. As product modification is less discussed in R&D committee meeting, I decided to focus on the process of NPD and the role of R&D committee over time.

Going back to the history, before the R&D committee was formed, when assessing new ideas for NPD, it was handled between the engineering director and internal operations director, where the engineering director assessed new ideas for new products based on his technical expertise and the internal operations director assessed based on his experience on the utilization rate of existing products in the fleet. With only two people involved in assessing new ideas for NPD, judgement may not be accurate, and when new product developed wasn't what the market really wanted, the company would then had wasted time and resources in developing and producing the unwanted product. Thus, as more R&D efforts were being pushed forward, together with the desire to innovate more, they realise the need to have proper procedures in place to streamline the process of NPD. Therefore, in 2014, R&D committee was formed, with the idea to draw different expertise across the firm to assess new ideas of NPD from different perspectives. The remainder of this section discusses the process model of economizing highly specified human assets in achieving innovation.

**Figure 3.2. Process Model of Economizing Human Assets**



\*NPD ideas approved – NPD projects started

Triangle – include projects that were cancelled, on hold, and in progress

New product output – NPD projects completed all stages and ready for manufacturing

### **3.7.2 A Process Model of Economizing Human Assets**

The process model (Figure 3.2) discloses the process integration of highly specified human assets at Alfa Construction over time in achieving innovation, and the transaction costs incurred along the process of integration. At the core, the model captures the transaction costs that occurred when highly specified human assets were deployed for other tasks when not integrated properly, and how they can slow the process down. In the case of NPD process in Alfa Construction, it was through trial and error to find out the best way to integrate human assets in achieving a streamlined process. As shown in Figure 2, economizing highly specified human assets involves the identification of human asset specificity and their deployability.

### **3.7.3 Deployment of Highly Specified Human Assets**

The NPD procedure consists of three steps. When a new idea is generated, a proposal consists of initial ideas with description of concept, reason(s) for developing, sketch if applicable, background research on commercial viability, initial technical specifications, and assessment for compatibility with existing products, is to be submitted for step 1 approval by the R&D Committee. When the new idea is approved at step 1 by the R&D Committee, the project is then assigned to someone in the firm as the project manager to move the project forward. At this stage, a more in-depth report including more precise technical information with calculations, initial design, costing details, and prototype specifications is to be prepared by the R&D team. This report is to incorporate feedbacks from different functions across the firm, which is utilizing an online platform where everyone in the firm has access to it and provide feedback. This more detailed report is then to be discussed at next R&D Committee meeting for step 2 approval. After step 2 approval, the manufacturing site manufactures the prototypes, while the R&D team test the prototypes and make modifications if needed. When all requirements and standards are met with prototype testing, and ready to be manufactured, the project is then to be submitted for step 3 approval by the R&D

Committee. When the project is approved at step 3, the project is then handed over from the R&D team to the operations board to be decided when to manufacture and when to launch the new product.

With these R&D initiatives in 2014, mainly, the revised NPD procedure, set up of R&D Committee, and online platform for communications, the NPD process is to involve different functions across the firm. The main idea of an R&D Committee is to assess new ideas being submitted for NPD from different sides of the business, utilizing different expertise assessing from different angles throughout the NPD process as proposals go through different steps. In October 2014, when the R&D committee was initially formed, it consisted of regional director, R&D manager, sales managers from different location across the country, depot manager, and workshop manager. The R&D committee meeting was to be held every one to two months. With the combination, new ideas were to be assessed based on multiple perspectives, market feasibility, technical viability, and production practicality. The R&D manager explained,

*“It’s to try and get other people involved and express their opinion. So we are not working on new products that are engineering and innovation wise brilliant but not what the customers want. With depot manager and sales manager, on the R&D Committee, they would be able to tell us what the customers want, coz they interact with customers. So that was the original thinking for the committee.”*

### **3.7.4 Tensions and Disagreements**

Such structure of engaging people across different functions didn’t go so well, as meetings often drag too long with heated debates on which new products to be approved and such situation made it harder to reach consensus. As recalled by the R&D manager:

*“The main issue was that there wasn’t usually approval from everyone”.*

Looking into the structure of the R&D Committee, each member uses his own background knowledge to assess the new idea submitted. On average, each of these employees has been with Alfa Construction for more than 8 years. With years of on the job training, each of them have developed highly specified knowledge in the role they do. The sales managers interact with customers on a daily basis and assess new ideas based on their predictions of what customers want. R&D manager assesses new ideas



based on his knowledge on technical specifications, precise calculation, and design. Workshop manager assesses new idea leaning on his experience on the manufacturing of products, mainly on whether the new idea can be manufactured and what are the possible obstacles. While each hold different opinion, they all have the same goal, to help Alfa Construction introduce innovative new products to the market.

As the tension and disagreements arisen from the deployment of human actors of different background to assess new ideas submitted for NPD, we noticed the emergence of “deployability” of highly specified human assets and how transaction costs occurred when human assets were being deployed for another task. Which we will discuss deployability and how it is applied in the discussion section. In the case of NPD process in Alfa Construction, the deployment of human assets with mixture between specificity and deployability to assess new idea of NPD resulted in tension and disagreements. The lack of consensus in approving new ideas resulted in lower input of NPD projects to 12, compared to 24 in the previous year. Moreover, the output of new product decreased from 12 in the previous year to only 1 in 2014.

### **3.7.5 Separation of Human Assets**

The R&D Committee went on for one year with the structure set up initially. During which, six meetings were conducted. The on-going frictions in the R&D Committee meetings resulting unproductive outcome wasn't expected by the engineering director and the internal operations director. To resolve the issue, engineering director and internal operations director seek opinions from across the firm. As recalled by the R&D manager:

*“Randy and Henry had been doing various interviews and trying to get a bit more opinion and understand the best way to do a committee. They've been told by a few people that the main committee should not be technical based, should just be like sales and operations to ensure commercial viability.”*

In October 2015, R&D committee was restructured. The core idea of restructuring was to separate the task of assessing new ideas for NPD by function, separating it from business point of view and technical point of view. As remarked by grandson of the founder, Wesley C, who works on operations,

*“The R&D guys are very clever, so they can work out lots of clever stuffs with loads of calculations, but then when it come to this side of the business, how to make it, they’ve not got a clue. They come up with brilliant designs that are innovative but would cost too much to manufacture and will not make profit. Because they don’t do the manufacturing and the purchasing so they don’t understand that.”*

Thus, a Technical sub-committee was formed to assess the technical specifications and solve technical issues that arise from the main R&D Committee meetings. Under the new structure, the two committees hold meetings separately. Technical Sub-committee meeting is to be held after R&D Committee meeting, where they would discuss the items from minutes of meeting of the R&D Committee, prepare briefs containing updates to be discussed in the subsequent R&D Committee meeting. With this change, R&D manager and workshop manager were moved to Technical sub-committee while other members in the firm were added to the R&D committee. The new structure of the R&D committee consisted regional director, regional sales director, financial director, external operations director, business development director, sales managers, operations and purchasing, and new managing director joined in June 2016 as he joined Alfa Construction.

The R&D committee now assessed new ideas of NPD from the business point of view, including budget, market viability, costs and ease of obtaining material, and demands from customers. Problems to be solved are then assigned to Technical Sub-committee. The Technical sub-committee consisted of engineering director, design director (resigned in Oct 2016), R&D manager, design manager, workshop manager, and design engineers, focusing on technical specifications and technical viability with precise measurement. Health and safety manager attended the technical subcommittee when health and safety issues arose. As remarked by the R&D manager,

*“So the technical people were removed from the main R&D Committee to set up Technical Sub-committee, so that the main R&D Committee is sales and operations focused, and we at Technical Sub-committee work on the problems to be solved /fixed that are assigned by the R&D Committee. It’s putting people to do what they do.”*

With separation by function into R&D Committee and Technical Sub-committee, process was smoother, and the number of approved NPD projects jumped from 12 in 2014 to 40 in 2015 (Figure 2). Another reason for the increase in NPD input was the R&D team's efforts in pushing for more idea submission across firm. However, as shown in figure 2, while the number of inputs has increased, the number of NPD projects that were cancelled, on hold or in progress also surged from 9 to 26 in 2015. As the R&D committee assessed new ideas purely from business point of view, without the R&D team assessing the technical viability, many approved NPD inputs were later on deemed technically not feasible by the R&D team. These NPD projects then were put on hold, cancelled, or progressing with longer time, resulting in redundancy work for R&D team. As shown in Figure 2, the high inputs of technically unviable NPD projects resulted in high transaction costs.

### **3.7.6 Breakdown in Communications**

The restructured model of separating highly specified human assets by function between R&D committee and Technical sub-committee solved the problem of disagreements on new ideas for NPD, yet, another problem arose – the missing link between the two functions was slowing down the NPD process. Without the R&D personnel present at the R&D committee meeting, there was no immediate update on the R&D activities, progress on on-going NPD projects, and latest R&D developments. The lack of real-time update and problem solving on the spot, lead to slowed process in NPD and thus incurred high transaction cost.

The Technical Sub-committee held meeting after the R&D Committee meeting. Discussions at Technical Sub-committee meetings were based on minutes of meeting of the previous R&D Committee meeting, which weeks could have lapsed. The items discussed at Technical Sub-committee were usually the problems arose from R&D Committee, in relation to technical specifications. The brief prepared by Technical Sub-committee, containing answers to queries from previous R&D Committee meeting, updates on R&D activities and NPD development would then be discussed at the next R&D Committee meeting. Also, if there were any queries from Technical Sub-committee, they would be included in the brief to be discussed in the next R&D Committee meeting. The R&D team only got to work further on the NPD project once the queries were being answered in the subsequent R&D committee meeting. The time

lag between R&D Committee meeting and Technical Sub-committee was between 4 to 8 weeks, which was when each committee got the answer on queries from previous meeting. For product innovation and NPD, this time lag is detrimental to NPD process. Principal R&D engineer, Hayden M recalled:

*“The fact that we were not on the main R&D committee just slows things down as the only source of update we had was from minutes of meeting, which is of fragmented information. We were not able to grasp the point and it doesn’t answer our queries. Thus, any further question would wait for the next R&D committee meeting, which would be another 1 or 2 months.”*

Also, reflected by R&D manager:

*“So they did 3 or 4 R&D Committee meetings without R&D and workshop people, then they fed back to us what to work on. But this structure didn’t work so well because there was some bit of information missing, in terms of the work that we’ve been doing on our projects. We couldn’t really be there at the R&D committee meeting to help explain the current state of the projects being handed over, they might not be able to interpret properly, and there was still some slight confusions.”*

The breakdown in communication, due to the separation of human assets by function results in high transaction costs, the slowed process for NPD.

### **3.7.7 Integration of Human Assets and Achieving Streamlined Process**

The new MD who joined Alfa Construction in June 2016 attended R&D committee meeting that was held in July 2016. With his 20 years’ experience in the industry, he immediately saw this shortcoming of the slowed process. As commented by John,

*“The process is right, but we need to streamline the process. We need to take the ideas from the business, put them through the R&D process and push them through quicker. It was getting lost and it was getting stuck in the process. That was the problem. The process was good but it’s not quick enough.”*

Although newly joined the firm, the new MD was determined to push innovation forward in Alfa Construction. He suggested that the R&D committee to include R&D personnel as they are vital to NPD in providing opinions from technical point of view. As noted by the MD:

*“When I first came to the business, the R&D team weren’t in the R&D committee, which was a problem. So I suggested that we moved the R&D team back into the R&D committee, they are the people that own the process.”*

Starting September 2016, R&D manager was back on the R&D committee. As noted by the R&D manager:

*“It started with me sitting on the main R&D committee again. Then another maybe 2 or 3 meetings, then we get Hayden and Woody into the meeting as well. So then we can discuss the projects in depth, understand where we were and what we were doing, as well as seeing how they work. It seems to work better now, having us involved as well, but not overly technical in looking at the new proposals.”*

Starting October 2016, the two R&D engineers began to engage in R&D committee meetings. To date (February 2017), the R&D committee remain similar to the structure that was restructured in October 2015, with the exception that the external operations director withdrew due to other commitment on other projects, and with the addition of R&D managers and two R&D engineers. Technical Sub-committee remained with the same members, except the addition of two R&D engineers and workshop manager joins meeting only when needed. As reflected by the MD:

*“The R&D team are the people that after the meeting take things forward. So, by bringing them in, it’s taking the process forward a lot. In the last 6 months, it’s improved massively.”*

With the integration, the R&D personnel are now able to address any technical issues on the spot during the R&D Committee meeting. Thus, the R&D Committee is able to assess new ideas based on commercial viability and get feedback directly if the new idea isn’t technically viable or to agree on the solution during the meeting to take the project forward immediately after meeting. Any further detailed technical specifications are then to be discussed in the Technical Sub-committee. With the integration, the process is more streamlined and the R&D team spend less time on redundancy going back and forth figuring out the fragmented information from minutes of meeting and preparing the briefs. As reflected by the R&D manager:

*“It took a while to find the right balance. The amount of time we spend working on redundant or projects that get cancelled is vastly reduced now. We are able to focus more on new products and not jumping between different things which we have done in the past.”*

Referring to Figure 3.2, although the R&D input was 7 projects, the output of new product was 11 products. The lower number of R&D input has to do with the new initiative of focusing on new products that are sure to be developed, rather than having many inputs but ended up having efforts putting into it only to get cancelled. The more streamlined process allows the R&D personnel to focus on R&D activities and reduce redundancy, to work on the products that the company wants instead of developing unwanted products. Besides the development of new projects, the more effective allocation of time also allows R&D personnel to go back to work on the projects that were of potential but being put on hold due to lack of available time and resources to work on them. The R&D hours spend by the R&D team into product innovation has drastically increased from 4,270 (year 2015) to 5,079.50 (year 2016). As stated by the R&D manager:

*“It’s much easier for us. There’s obviously lots of work assigned, but, we know what we are working on. So yes, I think it is much better. It’s getting more people involved, and more high-level people involved, as well as getting everybody in the company involved in terms of putting forward ideas. Definitely it’s easier, it’s better process, and which means we are getting a better output.”*

### **3.8 Discussions**

Beginning with the puzzle of how family firms can innovate more with less, I uncover the process of economizing human assets in achieving innovation, by integrating human assets. The case of Alfa Construction supports my claim on extending human asset specificity, the study exemplifies that the long-term employees of a family firm are not only highly specified at firm-level, but also highly specified per task. This is due to their long serving in the family firm with years of on the job experience, equipping them with the highly specified knowledge. Through the process of integrating human assets, I noticed the emergence of “deployability”. As seen during the process of economizing human assets, the deployment of highly specified human assets across different function without understanding the deployability has led to high transaction costs, impeding

innovativeness. I note that, merely mixing human assets without considering their specificity and deployability would result in occurrence of transaction costs.

The study also uncovered another class of asset that family firms possess, long-term employees as the loyal workforce. Although evidence shows that family firms are better able in retaining employees in comparison to nonfamily firms (Kachaner, Stalk, & Bloch, 2012), academic research focuses on the loyal and committed family members as one of the unique resources that family firms possess (Gedajlovic & Carney, 2010; Sirmon & Hitt, 2003; Verbeke & Kano, 2012). Existing research overlooks the fact that the long-term orientation of family firms grants them the possession of long-term employees. Family management and family influence induces unique culture within a family firm, the familiness culture that nonfamily employees feel and appreciate (Barnett & Kellermanns, 2006). Therefore, the loyalty and commitment of long-term employees are second to none.

### **3.9 Future Research**

The emergence of deployability fills a significant gap in operationalization of transaction cost in family firms in the process of achieving innovation, by providing further measurement of human asset specificity. Extending human asset specificity, this study adopts a micro view in describing human assets: (1) the degree to which their knowledge are function specific and (2) the ease with which the knowledge can be deployed for another task in the firm.

Thus, I propose a framework combining specificity and deployability to better measure human assets for the purpose of innovation. Referring to Figure 3.3, in the context of achieving innovation, we propose: (1) Human assets that have low specificity and low deployability. For example, workshop workers who are highly knowledgeable in operating machineries for manufacturing products are less deployable to assess new ideas for NPD; (2) Human assets that have high specificity and low deployability. For example, engineers are highly specified in technical knowledge are less deployable for assessing new ideas for NPD; (3) Human assets that have low specificity and high deployability. For example, operations as the backbone of a firm, know bits and pieces of everything are highly deployable for assessing new ideas of NPD; and (4) Human assets that have high specificity and high deployability. For example, sales have highly

specified knowledge on the products and are in frequent contact with customers, are thus highly deployable for assessing new idea for NPD.

My framework provides further measurement for nonfamily employees as human assets in family firms, specificity and deployability. This study suggests that by just classifying nonfamily employees as generic human assets is not enough. Mixing employees without identifying their specificity and deployability causes high transaction costs in the process of innovation. Existing research points out that deploying employees across different functions to work together contributes positively to innovation but at the same time incurs costs such as delays and cancellations of NPD projects (De Luca & Atuahene-Gima, 2007; Hansen, 2009; Mishra & Shah, 2009; Olson, Walker, Ruekerf & Bonnerd, 2001; Swink & Song, 2007; Troy, Hirunyawipada & Paswan, 2008). While these studies measures innovation performance by wide variety of different criteria covering assessments on internal capabilities and market response, my study focuses on the human aspect of internal collaborations. Moreover, these studies overlook the effects of family influence and the special workforce consists of long-term employees. Although these studies have pointed out the costs cause by internal collaborative innovation, they do not provide solutions on how these costs can be overcome.

My study provides further evidence in the family firm setting, focusing on the knowledge specificity of long-term nonfamily employees as loyal and committed workforce. As I have found, many long serving nonfamily employees of Alfa Construction are committed and loyal workforce who strive to work on pushing the company in becoming an innovative firm. Nevertheless, tensions between employees resulting in delays and high number of project cancellation occurred when they were put to work collaboratively on assessing NPD. It was through trial and error that Alfa Construction finally found a way to integrate the human assets to become an innovative firm. Thus, this study helps scholar to understand how transaction costs are incurred in the process of innovation when employees across different functions work collaboratively. Furthermore, it provides operationalization of transaction cost in the process of innovation in family firms, to economize its human assets in achieving innovation.



**Figure 3.3.** Human Assets Specificity and Deployability

	Low Specificity	High Specificity
Low Deployability	1	2
High Deployability	3	4

### 3.10 Limitations

This research has several limitations. This is a study of a particular industry, construction industry. Thus, it may not be generalized to other industries. Also, it is a single case study base on a family firm in the UK. Though one might argue the applicability of findings from one family firm to other family firms, Alfa Construction exhibits many of the unique traits of family firms. Similar to other process research (Howard-Grenville, Metzger & Meyer, 2013; Jacobides, 2005), it focuses on understanding the causal relationship and patterns in a particular setting, as opposed to providing findings that are generalizable to other settings. The family firm in the construction industry was chosen because the niche industry facing constant regulatory changes by the government forces the family firm to be innovative. This industry setting, coupled with Alfa Construction being a Family SME facing resource constraints provides a setting that enables the process view. Such process study help better understand how transaction costs incurred in the process of collaborative innovation and how human assets can be economized to achieve innovation.

### **3.11 Conclusion**

Existing research emphasized the occurrence of transaction costs when innovation is left to the market, overlooking the unique traits of family firms that make them take innovation within firm to have total control. This research focuses on the process of NPD in a family firm - the first empirical study focused on the role of nonfamily employees in the process of innovation - demonstrates how transaction costs occurred during the process of internal collaboration through integration of human assets. This study also provides further measurement for the operationalization of human asset specificity, deployability, the degree to which human assets can be deployed for accessing ideas for NPD taking into account their knowledge specificity. The process view advance understanding of how family firm can do more with less through economizing human assets by internal collaborations. Moreover, the proposed framework of human asset specificity and deployability provides better understanding of how human assets can be economized to reduce transaction cost, when innovation is to be done within firm.

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## **Chapter 4**

### **Forming International Collaborative Innovation and Government Funding as a Double-Edged Sword**

#### **4.1 Introduction to Chapter 4**

The fourth chapter of this dissertation examines the role of government funding at the formative stage of international collaborative innovation for small ventures and family firms. Sampling on the Lancaster China Catalyst Programme, this paper is in collaboration with the programme manager, Dr. Simone Corsi.

#### **4.2 Abstract**

Prior research has indicated that small ventures are more inclined to pursue collaborative innovation to overcome lack of resources and access to new market with government support. But how government support can facilitate the formation of collaborative innovation by small ventures is less known. Small ventures, many of which are founder led or owned and managed by families, have different goals and less inertia in forming collaborations compared to large corporations. However, less is known about small ventures' readiness in forming collaborative innovation. Using comparative case study method with polar sampling, we sampled four UK firms forming international collaborative innovation with Chinese organizations under Lancaster China Catalyst Programme, a matrix comprising differences in ownership and collaboration status. The inductive analysis unveils the evolvement of collaborative innovation with a process view from the early formative stage throughout the process and the dark side of government support. Thus, this study contributes to the existing literature by providing understanding on the role of government funding at the formative stage of international collaborative innovation and propositions for future research avenues.

#### **4.3 Introduction**

Collaborative innovation fills an important gap of resource constraints for small ventures, such as the lack of adequate knowledge and technology, in achieving innovation like new/modified products/services. Through collaborative innovation,

small ventures are able to access resources they otherwise do not possess, as well as tapping into new markets, such as developing a new/modified product/service for a foreign market (Fernhaber & Li, 2013; Lu & Beamish, 2001). Drawing on existing research on collaborations with the goal to innovate, we define collaborative innovation as an innovation-driven inter-firm relationship based on an agreement to exchange and share resources that include financial capital, information, knowledge, and technology in a specific timeframe in order to develop new/modified product/service (Das & Teng, 2000; R. Gulati, 1995; Kale & Singh, 2009; Un, Cuervo-Cazurra, & Asakawa, 2010)

Institutional theory posits that organizations not only look alike due to institutional factors, but firms also form collaborations to attain legitimacy (R. N. Osborn & Hagedoorn, 1997). In particular, smaller firms benefit from collaborative innovation with larger firms in gaining resources not available internally, endorsement to gain trust from public/consumers, as well as profile raising (Stuart, 2000). More efforts have also been seen from governments to support smaller ventures to achieve innovation by means of government funding as incentive to form collaborative innovation and facilitate the progression of collaborative project (Feldman & Kelley, 2006; Kang & Park, 2012).

The importance of collaborative innovation can be seen from the vast amount of study by researchers in the last three decades (Schilling, 2009). Resource Dependency Theory (RDT) points out that firms do not possess all resources required for innovation, thus firms seek resources externally as inputs to achieve innovation (Pfeffer & Salancik, 1978). The earliest research on inter-firm collaborations started back in the 60's, focusing on social and economic impacts, without much theoretical background (Richard N Osborn & Hagedoorn, 1997; Warren & Warren, 1967). Strategy scholars started more theoretical sound research on collaborations involving research and development (R&D) element and innovation started from the resource based view (RBV) (Penrose, 1995; Wernerfelt, 1984), how lack of resources drive firms to look externally for resources needed to achieve innovation, in order to stay competitive in the fierce market (K. M. Eisenhardt & Schoonhoven, 1996). With valuable, rare, inimitable, and non-substitutable resources being one of the factors of sustained competitive advantage (Barney, 1991), researchers recognized the need for firms to govern the collaborative innovation relationship in order to prevent opportunism (Oxley, 1997; Parkhe, 1993). At the same time, researchers started to examine the role



of network and familiarity as collaborative innovation relationship continues with repeated transactions between collaborating firms (R. Gulati, 1995; Ranjay Gulati, 1998). Starting in 2000's, scholars have called for more attention on the "open innovation" approach (Chesbrough, 2006). With globalization, more and more firms internationalize through collaborative innovation, as firms move past simple import/export but develop products/services adapted to the foreign market (Lu & Beamish, 2006).

In the past decade, scholars studying collaborative innovation have started to examine the institutional factor, mainly, the effects of government support. In particular, research has shown that government support through financial means of funding acts as an incentive for firms to form collaborative innovation (Czarnitzki, Ebersberger, & Fier, 2007). Other researchers have found the positive impact of government funding on collaborative innovation, which can be seen from more R&D efforts and patent filing (Feldman & Kelley, 2006; Ryu & Choi, 2016). Despite the evidence on the positive effects of government support on the outcome of collaborative innovation, to what extent government support can be positive is questionable, especially for the small ventures. For example, a scholar has found that firms with more existing R&D efforts received more government funding (Wallsten, 2000). This is in line with the study by Romijn and Albaladejo (2002), showing that firms with existing track record of innovation and experience in funding applications were more successful in receiving government grants.

Therefore, firms with existing track record of innovation and prior experience in funding application would be more ready in forming collaboration and apply for government funding to facilitate the collaborative projects. However, smaller firms, in comparison to larger firms, have less existing R&D activities and track record of innovation, as well as fewer resources in regards to funding application. Moreover, many small ventures are young ventures led by founders with different goals or owned and managed by family with distinct governance, goals, and risk attitude due to family influence. Thus, it brings the question: "How ready are small ventures and family firms in forming collaborative innovation when presented with government funding?"

Nevertheless, most of the existing research on collaborative innovation are based on large secondary database, which are criticized for the lack of consistency in various

aspects, such as constructs used, measurement, geographic coverage, and applicability to firms of various sizes (Schilling, 2009). Furthermore, findings from dataset or surveys do not provide us with insights into the “how” question (Yin, 2011). In particular, research on the positive impact of government funding on the outcome of collaborative innovation are sampled on firms that have been granted the funds. Thus, we know less about how government funding assumed to be an incentive helps facilitate the formation of collaborative innovation at the early stage. Hence, the understanding of collaborative innovation might be hindered. The purpose of this article, therefore, is to examine the role of government funding at the formative stage of collaborative innovation.

“How” questions are well suited to qualitative research (Yin, 2011). Therefore, we chose qualitative techniques to study a set of four UK small ventures forming international collaborative innovation with Chinese organizations. The setting is a unique programme: the Lancaster China Catalyst Programme (LCCP). LCCP is a two-year stage-based programme run by Lancaster University that aims at facilitating UK SMEs to set up and develop collaborative innovation with Chinese organisations. Using the programme as a research setting, we have chosen four UK firms for comparative case study with polar sampling to gain more insights on collaborative innovation.

While existing research mostly focus on firm, collaboration, or industry level using secondary data (Schilling, 2009), this paper looks into the formation of collaborative innovation between UK and Chinese organizations from multi-level perspective: firm, LCCP programme, and institutional. Thus, providing first hand insights with the temporal effect, looking into the evolvement of collaboration between the collaborators and ideas development over time from multiple levels. This research focuses on the “pre” effect, tracing back to the very primitive stage of searching and selecting potential Chinese collaborator, exploring potential R&D collaboration project by matching each other’s capability and resources, developing the project ideas over time, and progressing with the project ideas, while uncovering the role of government funding throughout these phases. Interestingly, our finding shows that, while government funding can facilitate the formation and development of collaborative innovation, it can act as hindrance throughout different stages of collaborative innovation and ultimately affect the outcome, in oppose to only positive effects found by existing research.

Our study makes three contributions. The first contribution is the identification of formative stages of collaborative innovation with a process view. Looking beyond innovation performance of collaborative innovation, the process view of the formative stages provides insights into the success/failure factors of collaborative innovation. The “pre” effect, from as early as screening stage, may have a profound effect in the outcome of a collaborative innovation. Second, we uncover the role of government funding at each of the formative stages and the mechanisms at work. Specifically, we show how each mechanisms of government funding can act as facilitation or hindrance at each stage, affecting the subsequent stage. Finally, we propose a theoretical framework and propositions for future research. Our study supports existing findings that government funding have positive effects on collaborative innovation, but also extends the evidence that it can have adverse effect from the early stages and ultimately affect the outcome.

This paper is structured as follows. Following the introduction, we review briefly the literature for the theoretical background. The next section shows the research design and empirical setting, followed by data collection and case firms. We discuss results and findings, propose theoretical framework and propositions, followed by discussions on research, policy, and managerial implications. We then end the paper with a conclusion.

## **4.4 Theoretical Background**

### **4.4.1 Institutionalization and Legitimacy**

Neo institutional theory explains why organizations look alike, with similar organizational structures, to seek legitimacy in the socially constructed system of forms, values, beliefs, and definitions (DiMaggio & Powell, 1983; Meyer & Rowan, 1977; Suchman, 1995). Family firms behave differently owing to distinct governance structure with the unification of ownership and management, are also found to conform to garner legitimacy (Miller, Breton-Miller, & Lester, 2013). Extending institutional theory from the view of organization structure, researchers started to investigate the formation of collaborations by organizations to gain legitimacy (Dacin, Oliver, & Roy, 2007; Khoury, Junkunc, & Deeds, 2013; Kishna, Niesten, Negro, & Hekkert, 2017). In fact, using semiconductor industry as sample, a study has found support that forming collaborative innovation grants young or small organizations endorsement, which builds public confidence in the organization’s products and services (Stuart, 2000).

Although collaborative innovation management capability is seen as an important aspect in forming and building collaborative innovation relationship, inertias in large firms may actually be a hindrance. In contrast, smaller firms have less structural barriers in forming and managing collaborative innovation relationships (Rothaermel, 2005). Especially in the case of small ventures and family firms with centralized decision-making, they are able to react faster without the structural barrier. While firms of all sizes seek to form collaborative innovation for the same reason, access to resources, they have different goals owing to difference in ownership status. For example, while larger firms may be after novel innovation, small ventures may be after growth and survival (Miller, Le Breton-Miller, & Lester, 2011).

#### **4.4.2 Collaborative Innovation in International Context, China**

Globalization has led to a rapid increase in the formation of collaborative innovation across continents in the past few decades (Deeds & Rothaermel, 2003; R. Gulati, 1995; Harrigan, 1987; Sampson, 2005). Collaborative innovation can stem from the need for complementary assets, knowledge, and resources by firms in order to build competitive advantage to sustain in the competitive market (Barney, 1991). Existing research has also shown that collaborative innovation leads to speedier new product development (Harrigan, 1987). Eyeing on the great opportunities and capabilities the emerging markets present, foreign firms turn to countries like China to form collaborative innovation with the purpose of developing new/modified products, processes and services specifically targeting the Chinese market (von Zedtwitz, Ikeda, Gong, Carpenter, & Hämäläinen, 2007). However, finding the right collaborator and developing strong collaborative relationship can be very challenging (Geum, Lee, Yoon, & Park, 2013), especially with geographically distant collaborators like Chinese firms. Among the emerging economies, China presents great opportunities, as well as challenges.

Collaborating with Chinese firms, where the institutional context of China, as well as business practices, varied differently from western countries, can be perceived as more risky compared to collaborators from other countries for foreign firms (Hoskisson, Eden, Lau, & Wright, 2000). Distant collaborators like Chinese organisations can bring issues such as cultural differences, difficulties in communications and coordination, different perceptions, uncertainties and trust, just to name a few (Kelly, Schaan, &

Joncas, 2002; Zedtwitz, 2004). Most of these can be very difficult, if not impossible, to overcome for small ventures (Lu & Beamish, 2006).

#### **4.4.3 Institutional and Government Support**

While large firms particularly rely on their superior availability of resources and capital to invest in China for setting up their own market presence, smaller firms face major challenges in accessing the Chinese market (Mattos, Burgess, & Shaw, 2013). In comparison to large firms, small ventures face three liabilities due to resource constraints in forming international alliances: foreignness, newness, and smallness (Lu & Beamish, 2001). For this reason, institutional and government supports for small ventures through various mechanisms and programmes are highly beneficial for small ventures in fostering international collaborative innovation and achieving innovation (Radas, Anic, Tafro, & Wagner, 2015).

Government support, in the form of tax breaks, subsidies, and funding, is seen as an incentive for small ventures to establish international collaborative innovation, acting as a source of financial support for R&D efforts (Czarnitzki, Ebersberger, & Fier, 2007; Feldman & Kelley, 2006; Wallsten, 2000). On the one hand, small ventures seek international collaborative innovation to overcome lack of resources. On the other hand, they may be hesitant in forming international collaborations due to lack of financial capital for R&D spending on the collaborative project. Thus, government funding acts as an incentive for small ventures to form international collaborative innovation, as the funding would ease their financial burden, as well as the easing the risk of failure. Existing research have found positive effect of government funding on the innovation performance of collaborative innovation (Czarnitzki & Kraft, 2009; Kang & Park, 2012).

Thus, existing research point out that: (1) firms of all sizes and ownership status seek legitimacy, and collaborative innovation is one of the ways in gaining legitimacy, (2) smaller ventures are more inclined to collaborative innovation in comparison to larger firms due to lack of resources, (3) with globalization, more firms form international collaborative innovation with foreign collaborators, and (4) government funding is deemed as an incentive for small ventures to form collaborative innovation and has shown positive effect on innovation performance. But how government funding actually facilitates the formation of collaborative innovation is less known, and it is this

failure to fully understand the role of government funding in collaborative innovation that is the basis for the question guiding this research: How do government funding affects the formation of collaborative innovation?

## **4.5 Methods**

### **4.5.1 Research Design**

With the limited literature on the role of government support in the formation of international collaborative innovation by small ventures, we adopt multiple a case study design approach (K. Eisenhardt, 1989; Yin, 2009) as a basis for inductive theory development, an approach particularly appropriate to understand partnership evolvement in international collaborative innovation. Our case selection process generated a matrix of four cases: polar sampling to compare between family and nonfamily firms, firms with and without a Chinese collaborator (Table 4.1. Comparative Case Study Design). This research setting of longitudinal comparative case study took a multimethod approach that enabled us to capture the evolvement of the international collaborative innovation over the span of two years (Bresman, 2013; Brown & Eisenhardt, 1997; Cardinal, Turner, Fern, & Burton, 2011). This study includes both real-time observations with two of the authors being participant observers and retrospective data uniformly collated and stored in the archive. The multi-level approach generated insights from institutional level, programme level, collaboration project level, and firm level. Following the inductive method, the theory we proposed is emergent, it is “situated in and developed by recognizing patterns of relationships among constructs within and across cases and their logical arguments” (Eisenhardt & Graebner, 2007). We started with observing general patterns and constructs, similarities and differences, then we develop the theory based on identified causal relationships.

**Table 4.1.** Comparative Case Study Design

Family Firm	eBusiness	Lune Valley
	Lanhai Career Management	The Reach Centre
Nonfamily Firm	With Chinese Collaborator	Without Chinese Collaborator

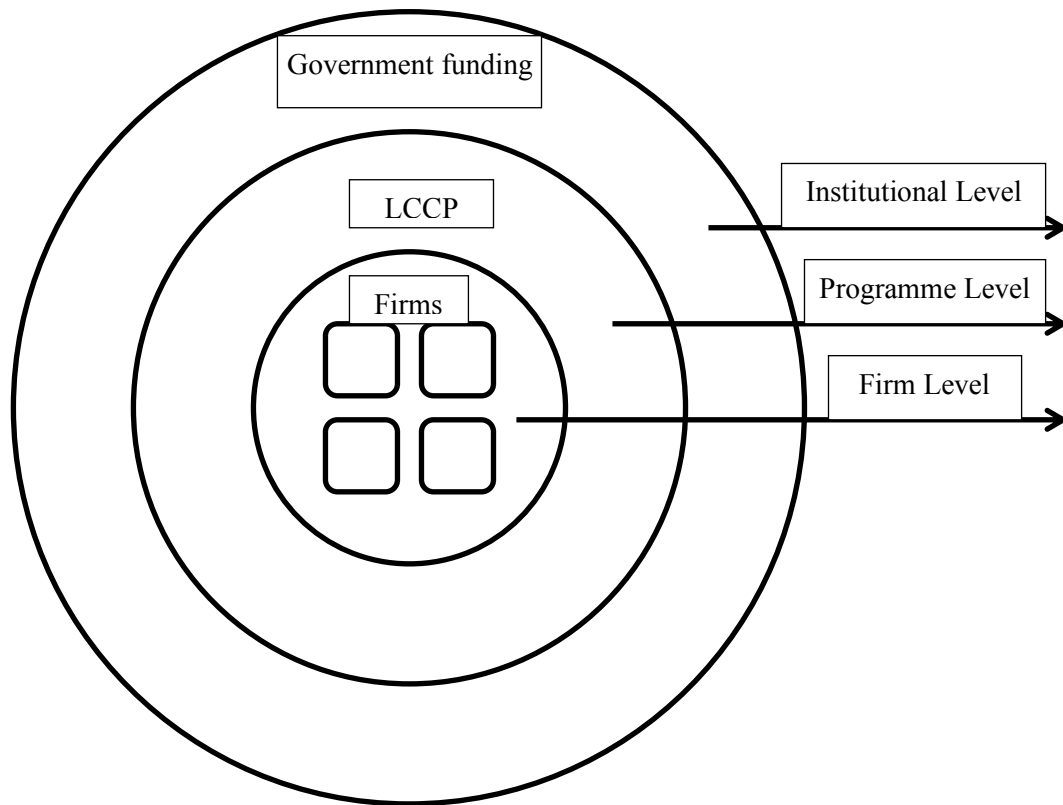
### **4.5.2 Empirical Setting**

LCCP is a programme ideated and run by Lancaster University, in cooperation with Guangdong Department of Science and Technology (GDST), and financially supported by the Higher Education Funding Council for England (HEFCE), Lancashire County Council and Lancaster University on the UK side. LCCP has teams both in the UK (Lancaster) and China (Guangdong). The programme supports the creation and development of international R&D collaborations between UK firms and Chinese organisations for the purpose of developing new products/services, specifically in the region of Guangdong Province in China. Once agreed on a collaborative project idea between the UK and Chinese organizations, Chinese organisations have the opportunity to apply, backed by their UK partners, for GDST funding to support these cooperative projects. Funding for each project can reach up to 1 million RMB (approx. 113,000 pound sterling). Alongside the LCCP, a new MSc in International Innovation has been set up by Lancaster University with the main purpose of producing cohorts of graduates that undertake the projects of the UK-China collaborations as graduate consultant. The journey includes a minimum of three trips to China for UK firms to meet potential Chinese collaborators, network, and market survey. The programme also includes a potential inbound visit to UK for the collaborating Chinese organizations.

LCCP is well suited to select cases in building theory on international collaborative innovation because it is similar to a laboratory setting with all participating firms going through identical process within a specific timeline under the programme, yet, each firm signed up with different goals and project ideas in mind. Sampling on LCCP allowed us to provide a nuanced process view, uncovering the similarities and differences, from multi-levels: institutional level, programme level, and firm level (Figure 4.1. Empirical setting: Multi-level).



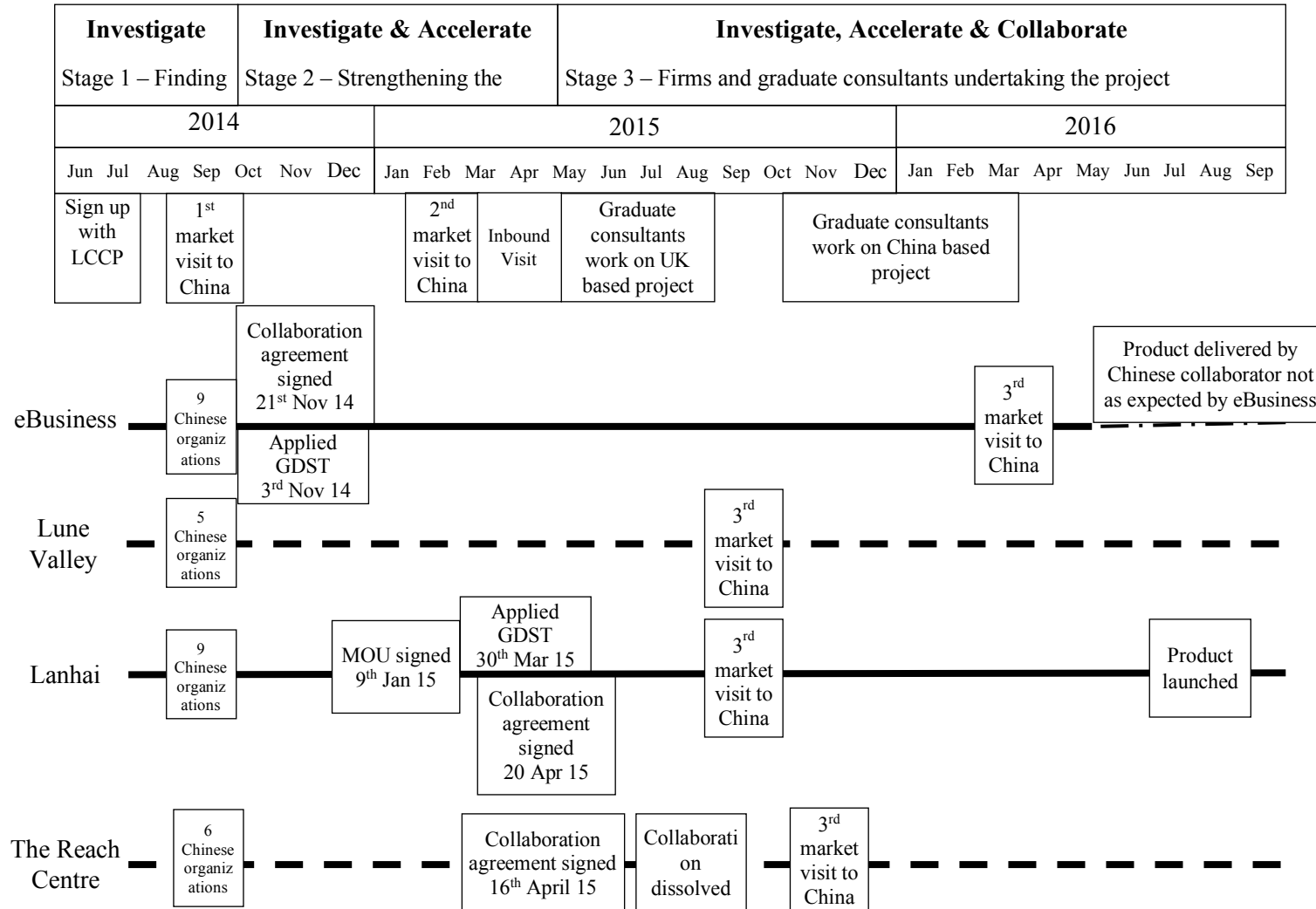
**Figure 4.1.** Research Setting: Multi-level



Each cycle of the programme is a progressive, stage-based, 2 year journey where UK companies are introduced to Chinese potential collaborators, including firms and research entities on the basis of their profile (Stage 1). The UK firms conduct the first market visit to China during this stage together with the LCCP team. Prior to the trip, the programme provides the UK firms with a pre-trip briefing. The programme then supports the development of an agreement between the engaging parties on a collaborative R&D project (Stage 2) and provides UK firms training on topics such as Chinese laws and IP issues in China. During this stage, UK firms would conduct their second market visit to China, either to strengthen the collaborations in place or explore further on possible collaborations. As the programme is supported by the Guangdong provincial government, a collaboration project formed by a UK firm and a Chinese organization have a chance to apply for the GDST funding when the call for funding application opens. The GDST funding application is to be submitted by the Chinese organization with the support of the UK firm. Firms can either wait for the call to be opened to form a collaboration or form a collaboration first then wait for the opportunity

to submit their funding applications. The last stage (stage 3), the programme provides each collaboration project with a multidisciplinary team of graduate consultants to undertake the agreed project. The graduate consultants first work with the UK firms in UK for the duration of four months then with the Chinese collaborators in China for another five months. In this stage, the UK firms then conduct their third Chinese visit either with the LCCP team or go on their own schedule according to the progression of the collaboration project (Figure 4.2. Overview of Lancaster China Catalyst Programme).

**Figure 4.2.** Overview of Lancaster China Catalyst Programme



Sampling on cycle 1 of the three cycles of LCCP, we designed the research as a longitudinal comparative case study, comparing between four UK firms during the duration of 2014 to 2016. Of the three cycles, cycle 1 was selected based on completeness of the data, as the firms have fully participated throughout the cycle for the duration of two years, with the cycle officially ended in September 2016. The four firms chosen from cycle 1 for comparative case studies are a good representative of the thirteen participating firms, as they each represents different scenarios for the purpose of comparison (Table 4.2 Case Firms).

**Table 4.2** Case Firms

	<b>eBusiness</b>	<b>Lune Valley</b>	<b>Lanhai</b>	<b>The Reach Centre</b>
<b>Status</b>	First generation family firm between brothers	Third generation family firm - Father, mother, and 2 sons	Founder led	Founder led
<b>Year of Establishment</b>	1998	1960's	2010	2007
<b>Industry</b>	IT (product oriented)	Dairy (product oriented)	Career Management (service oriented)	Chemical Assessment (service oriented)
<b>Project/Aim</b>	To research and develop a new surveillance video analysing and decision making system framework to be marketed to the EU and other global markets. The system includes intelligent video analysis, object detection, abnormal event analysis and decision making algorithms.	To develop a dairy brand locally produced on Lune Valley's farm to be sold to the Chinese market, emphasizing quality with the innovative traceability techniques, allowing consumer to trace back the origin of the dairy.	The research and development of a project involving the development of a UK based Chinese language on-line career development learning system – This will involve language, cultural, IT data mining and interface adaptation for global markets including China called ‘The Songshan Project’. The intended purchasers of this service include university/college careers services, career/recruitment companies and business HR departments.	Mainly to explore the Chinese market, the possibilities of selling the chemical risk assessment service to Chinese customer wishing to export their chemicals.
<b>GDST Funded</b>	Yes	No	Yes	No

- eBusiness, managing director and family member, Kam Kothia: a family-owned and managed firm between three brothers, specialising in e-commerce solutions development, search engine optimisation and online marketing, bespoke web software applications and strategic e-business consultancy. The company also manages its own highly successful online retail division that supplies a range of smart devices and accessories in UK, Europe and other global markets. Their project with a major Chinese research organization, Institute of Software Application Technology, Guangzhou & Chinese Academy of Sciences (GZIS), was the development of a new smart home intelligent video surveillance service. At the time of signing up to LCCP, eBusiness consisted of 9 full-time employees and 2 part-time employees.
- Lune Valley, manager and 3<sup>rd</sup> generation family member, Joe Towers: a 3<sup>rd</sup> generation family-owned and managed firm specialized in the production and marketing of dairy milk. Though officially count as 3<sup>rd</sup> generation with two generations currently involved in the business, the family has been in the dairy business for the last 9 generations, which can be traced back to the 1800's. At the time of signing up to LCCP, Lune Valley consisted of 5 full-time employees and 3 part-time employees.
- Lanhai, CEO and founder, Peter Sewell: a founder-led career consultancy service firm providing advice, guidance and training in leadership, personal development, employability and essential business skills. In order to enter the Chinese market, they were cooperating with a local Chinese firm, Xuanyuan, for the development of an online e-learning system, which provides career development learning tools and business skills resources for Chinese universities and businesses. At the time of signing up to LCCP, Lanhai consisted of 2 part-time employees.
- The Reach Centre (TRC)<sup>1</sup>, CEO and one of the founders, Jonathan Lutwyche: a founder-led firm, providing regulatory guidance, scientific and analytical services, and training to industry in the field of chemicals management and risk assessment. TRC also provides an on-line platform, allowing companies to track, monitor and

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<sup>1</sup> The Reach Centre has been rebranded to Yordas Group as of October 2017. However, we refer the firm to its former name TRC as it was the name being used during Cycle 1.

manage compliance and business risk of chemicals. At the time of signing up to LCCP, TRC consisted of 10 full-time employees and 4 part-time employees.

Two of the authors were directly involved in the programme as participant observant. One author is the programme manager who was in direct contact with the firms, including email exchanges, meetings, presentations, trainings, briefing, and market visits to China. The other author as a researcher participating in LCCP events and trainings for the firms. We gathered archival data consists of internal documents for analysis. Additional primary data includes in-depth semi-structured interviews with the participating UK firms and informal conversations with graduate consultants who worked on the projects. Multiple data sources enabled “triangulation” of our observations, and to eliminate any possible bias from the two participant observers. Data sources and uses are summarized in Table 4.2.

**Table 4.3** Data Sources and Use in Analysis

<b>Data Sources</b>	<b>No. of pages</b>	<b>Minutes</b>	<b>Use in Analysis</b>
<b><u>Institutional Level</u></b>			
Chinese funding sources	1		Funding sources, procedures and evaluation criteria of Guangdong Provincial government, to understand the role of government funding in collaborative innovation.
Chinese legislation - IP protection	27		
GDST funding evaluation criteria	1		
GDST funding evaluation process	1		
R&D indicators for funding application	15		
Innovate Guangdong	30		
Science and Technology Management in Guangdong Province	10		
<b><u>Programme Level</u></b>			
<b>Direct Observation (Direct Contact)</b>			
Email exchange		2686	The process under LCCP where all participating firms went through identical process.
Meetings (calls, face to face meetings, graduate consultant presentations, company visits)			
Trips to China			
Events (pre-trip briefing, training, company presentations, end of cycle celebration, and seminar)			
<b>Internal Documents</b>			
Partnership Progress - all firms			
Participating Firm Master List			
<b><u>Firm Level</u></b>			
<b>Internal Documents</b>			
ICF, Beneficiary Proposal, Expression of Interest	197		Understanding of each firm's needs and goals, and individual involvement of partnership and project ideas along the process.
Documentations on Project Evolvement, Graduate Consultant Participations, and Reports	1495		
Interviews - UK Firms	118	348	
Interviews - Graduate Consultants		175	
<b>Total</b>	<b>1895</b>	<b>3209</b>	



### **4.5.3 Data Collection**

#### **4.5.3.1 Participant Observation**

Two of the authors were closely engaged with LCCP, with the first author a PhD student researching on the programme since its early stage and second author as the programme manager since the beginning of the program in 2014. Thus, both authors closely monitored the evolvement of the sample firms' participation in the programme throughout the duration of the cycle lasting over two years. As the researcher of the programme, the first author participated in events, briefings, and trainings organized by LCCP for the participating firms. The first author also worked as the programme assistant since September 2017, thus providing insights from both internal and external point of view, being both an independent researcher as well as a participant observant. As the programme manager, the second author designed the process of LCCP cycles and followed through each stages, lived through the process on a daily basis and collected feedbacks regularly through meetings. He directly observed and engaged with the evolvement of the sample firms throughout the cycle, with email exchanges, meeting attendance, accompanying market visits to China, and attendance of firm/graduate consultant presentations, events, briefings, and training. These engagement let us directly observe the firms' attitude and confidence level in forming collaboration with Chinese organizations, and observe the interactions between sample firms, potential Chinese collaborators, Chinese collaborator where applicable, and graduate consultants working on the collaboration project in developing new product/service.

#### **4.5.3.2 Internal Documents**

We obtained extensive internal documents from archival data uniformly maintained by the LCCP team. The forms that participating firms signed up at the initial stage provided us with firm background information and the initial idea for entering the Chinese market through the collaboration with a Chinese organization. Firms are required to develop project briefs for their graduate consultants for both UK and China projects. Each project brief is to specify the background/context, overall aim and objective, constraints, and technical elements of the project. These project briefs developed by the firms showed their intent in forming partnership with Chinese organizations. Reports, proposals, and presentations by graduate consultants on UK and China projects showed

the progress of the projects. The feedback forms from the participating companies evaluating graduate consultants on both UK and China projects provided us with an idea on the progress of the projects from another point of view. Other internal documents include documentation for application of the GDST funding, partnership progress, and various records, provided further insights into the evolvement throughout the cycle.

#### **4.5.3.3 Interviews**

With the participation and direct observation of the first two authors, there was no imminent need for interviews as the authors have the immediate first-hand knowledge of the program and the companies. However, eight semi-structure interviews with the companies were conducted: four interviews to gain insights on their prior/existing international presence, view on innovation in China, and challenges faced in the international R&D collaborations; and four interviews post project to assess their two year journey with LCCP. Other conversations took place with companies and graduate consultants during various events, briefings, trainings, presentations, and market visits to China.

#### **4.5.4 Data Analysis**

In line with the inductive research approach, we started with first building individual case story of the four chosen cases. We relied on the direct observations, internal documents, and interviews to write each case story. Once each case story is completed, the first two authors then cross checked with the LCCP team to ensure the authors have crafted the case stories accurately for the purpose of data triangulation. After the individual case stories have been developed, the other authors who were not involved in the programme then reviewed them with an independent view. Specifically, the case stories were used for both within-case and cross-case analysis. Within-case analysis centred on the different background of each case, existing network possessed, how the initial intent for joining the programme changed throughout the cycle, how each case approach the development of the project, and the challenges faced.

We began the cross-case analysis after sufficient and clear understanding of the individual cases was established. Next, we constructed a rich descriptive process view of the four case firms' participation in LCCP chronologically, noting key historical events, to compare the cases and examine emerging pattern, looking for similarities and

differences. The within-case and cross-case analysis provided us with conceptual insights, which then we followed an iterative process of revisiting the various data as each insights emerged. Though we followed the inductive research method with no priori hypotheses, we compared our findings with existing literature to give sense to the constructs and causal relationships, to provide sound definitions, to highlight the similarities and differences, and to develop the emergent theory's generalizability. The iteration between theoretical insights and findings provided improved conceptual understanding.

## **4.6 Findings**

### **4.6.1 Embarking on the Journey of International Collaborative Innovation – The Two Years Process with LCCP**

As the participating firms of cycle 1 in LCCP, these four firms embarked on the journey of finding a Chinese collaborator for international collaborative innovation exerts similarities and yet differences. In the following section, we will examine first the same process the case firms have gone through along with other firms under LCCP and then what each of them have done differently throughout this process.

#### **4.6.1.1 The Identical Process**

Following the two year programme during the duration of 2014 to 2016 (Figure 4.2. Overview of Lancaster China Catalyst Programme), these four firms signed up with LCCP between June to July 2014. Subsequently, the firms went to Guangzhou, Guangdong province of China for the first market visit together with the LCCP team between 8 to 12 September 2014. The purpose of the first market visit was to provide the case firms with first-hand experience in China and the insights on the Chinese market. Prior to the first market visit, the China LCCP team provided the case firms with a list of potential Chinese collaborators with due diligence, based on the case firms' background, industry, and initial project ideas for the new product/service. The case firms then went on to 2nd market visit to China with the LCCP team in February 2015, except Lanhai, where Peter Swell went on his own in January 2015. The purpose of the 2nd market visit was to either facilitate strengthening of the collaborations and project ideas already in place, or to meet more potential Chinese collaborators.

All case firms were assigned graduate consultants from the Master of International Innovation of different study paths, namely, Computer Science, Design, Entrepreneurship, Environmental Science, and Engineering. The graduate consultants work with the case firms between April to August 2015 to learn about the case firms, such as the core business, technologies, and market, as well as doing market research on both UK and Chinese markets to help the case firms further refine their project ideas. Next, the graduate consultants then work with the Chinese collaborators in China between October 2015 to March 2016, to facilitate the progression of the collaborative project between case firms and Chinese collaborators. Entrepreneurship background graduate consultants usually would be doing the market research and market entry strategy, Computer Science, Environmental Science, and Engineering background graduate consultants would work on technical issues or product testing, and the Design background graduate consultants worked on designs related issues such as user interface and packaging.

Each of the case firms were assigned following graduate consultants:

- eBusiness

UK project: 1 computer science, 1 design, and 2 entrepreneurship

China project: 1 design and 2 entrepreneurship

- Lanhai

UK project: 1 design and 2 entrepreneurship

China project: 1 design and 2 entrepreneurship

- Lune Valley

UK project: 1 design, 2 entrepreneurship, and 1 environmental science

China project: 1 design, 2 entrepreneurship, and 1 environmental science

- TRC

UK project: 1 design, 1 entrepreneurship, and 2 environmental science

China project: 1 design, 1 entrepreneurship, and 2 environmental science

#### **4.6.1.2 Different Outcomes with Different Approaches under the Identical Process**

Following the timeline of the programme, what went differently between the four case firms then was that eBusiness and Lanhai each formed collaboration with a Chinese organization, and applied for the GDST funding. eBusiness' collaboration project applied for and granted 500,000 RMB (approx. 57,000 pound sterling) and Lanhai's collaboration project applied for and granted 1 million RMB (approx. 114,000 pound sterling) for R&D purpose. In both cases, the GDST funding was received by the Chinese organizations and 100% used by the Chinese side. TRC signed a collaboration agreement in April 2015 with Zuhai Energy. However, the collaboration quickly dissolved soon after the signing of agreement. Nevertheless, TRC stayed on the programme and instead, have the graduate consultants work on strengthening the existing collaborations with the two Chinese collaborators that were formed prior to joining LCCP, as well as more market research and strategies for entering the Chinese market. Lune Valley was close to signing collaboration agreement with a Chinese organization, NateIOT, to develop product traceability. The idea was that it enables product traceability of Lune Valley's milk to Lune Valle's farm as a selling point in the Chinese dairy market, encountering the food safety concern there. Nonetheless, due to the time constraint for the GDST funding application and hesitance from Joe Towers, general manager and third generation of Lune Valley, the potential collaboration didn't proceed.

Although LCCP included third market visit to China, participating firms could choose to go with the LCCP team during the scheduled date or go on their own schedule depending on the progress of the project in China. Among the case firms, only Lune Valley went with LCCP team for the third market visit, while eBusiness, Lanhai, and TRC went on their own schedules according to their own progress and arranged individual meet up with graduate consultants in China.

Of the four firms, Kam Kothia, one of the founders among three brothers from eBusiness, Joe Towers, general manager and third generation of Lune Valley, and Peter Swell from Lanhai all went personally throughout all three market visits to China. TRC adopted a different approach, with marketing manager, Judith Friesl, attending the first market visit to China to screen the potential collaborators, reported back to CEO, Jonathan Lutwyche, one of the founders of TRC. Jonathan then narrowed down the

potential collaborators, went on to second market visit by himself to meet and discuss further with the potential collaborators. The third market visit to China, Jonathan went again himself, together with Alex Paul, senior regulatory consultant, to meet with the graduate consultants and visited their two existing collaborators formed prior to LCCP: CIRS and CMA.

#### **4.6.2 Evolving Project Ideas and the Changing Goals**

In this section, we show how each case firm went through the same process of refining project ideas with the support of LCCP team and graduate consultants along the cycle, and yet varied in progress (Table 4.3).

Starting from the initial reasons for signing up, both eBusiness and Lune Valley were driven by the market. While eBusiness was aiming to overcome the fierce competition in the UK market and to achieve growth, Lune Valley was eyeing at the perceived demand on imported dairy product due to the food safety scandal in China that broke in 2008 leading to collapse of consumer trust on local dairy products. With prior projects and working relationships in China, Peter from Lanhai had already a clear idea on the online career development platform that he wanted to develop with a Chinese collaborator. TRC is of an interesting firm to observe, where they have actually looked at the Chinese market right from the start-up phase of the business but decided not to pursue further due to price competition and other Chinese government regulatory complications. Since then, TRC has developed their international stance mainly in North America, Europe, and particularly Japan in Asia. TRC then came across LCCP as their office is situated in the Lancaster University campus. Thus, Jonathan decided to explore the Chinese market further with the support of the LCCP team.

The process starts with case firms submitting Initial Contact Form (ICF), providing basic background information of the firm, including information like ownership status, finance and employment data, and other external funding. The case firms were then required to provide outline of the initial project idea, the supports needed, and the anticipated outcomes in two other documents to LCCP team.

**Table 4.4** Evolving Project Ideas

Company	Initial reason(s) signing up with LCCP	Initial Project Idea	→	Project Idea for UK Project	→	Project Idea for China Project	→	Outcome from LCCP
eBusiness	Facing fierce competition and to achieve own growth ambition, to develop a product that is of good quality at lower price to market in the UK successfully and at a good margin.	"The specific product area that we have chosen to develop is smart devices for the home. Products can range from home surveillance cameras to smart devices that can control your lighting or heating – all from anywhere in the world using your smartphone or tablet pc."	Briefing, 1st & 2nd China Market Visit, training, application for GDST funding	Outlined science component: develop software platform and app, business component: market research, and design component: design of branding, logo, website, and user interface of the new product to be developed.	Reports and presentations on UK project and proposals on China project by graduate consultants	Outlined science component: research and understanding of the hardware component, business component: market research, and design component: analyze competitors' branding, logo, website, and user interface.	Reports and presentation on China project by graduate consultants	The outcome delivered by the Chinese partner was not as expected by eBusiness, as the software and camera hardware could not work together. The main takeaways from the whole journey are learning, market knowledge, and some networking.
Lune Valley	Demand for milk in China was soaring in 2013 due to food safety scandal, thus Lune Valley wanted to develop a product for the Chinese market.	"The company aims to develop a niche dairy brand aimed at high end Chinese consumers. Fundamentally consumer led as opposed to production led, this project aims to start with consumer demands and work backwards through the supply chain to the farm where the company aims to produce a product that meets the values demanded by consumers."		Outlined science component: environmental performance of UK farming business as unique selling point to the Chinese market, business component: market research, and design component: packaging design.		Similar to UK project but more Chinese market focused, specifically more research on Chinese legal trade barriers and importation regulations, competitions.		No partnership formed or product developed through LCCP, but gained benefits such as network, profile raising in the dairy and food retail industry in the UK, knowledge exchange, market insights, and other business opportunities.
Lanhai	Had an idea in mind for an online career development platform for fresh graduates. Been looking for Chinese partner for 6 months but unsuccessful. Came across LCCP and thus signed up in hope to find a Chinese partner to take the idea forward.	"LanHai (Mandarin for Blue Ocean) Career Management (LHCML) with its partner Abintegro is spearheading the development of high quality on-line career development and professional skills training resources for use in universities and businesses in China."		Outlined science component: to overcome IT challenges, business component: market research, and design component: user interface design across different platforms.		"Support the directors in the delivery of services to clients. Assist staff of the LanHai and Xuanyuan Network Technology Ltd. Partnership in the production and testing of the career and professional development web portal (The Songshan Project)."		Partnership with Chinese organization, Xuanyuan, continues. A new product and service for the Chinese market has been developed, an employment and entrepreneurship portal for the Chinese college and university market. Furthermore, gained network, knowledge exchange, profile raising, learning, and further business opportunities.
The Reach Centre	Didn't really have the need towards the Chinese market but was persuaded to join LCCP, as TRC is based on Lancaster University campus.	"The REACH Centre Ltd aims to secure long-term strategic alliance or JV with a Chinese organisation to accelerate business development between China and rest of world clients through the collaboration, which would both support customers wishing to sell products into China and also support Chinese companies wishing to export their products."		Outlined science component: to learn and understand global regulatory framework in relation to chemical, business component: to develop strategic business plan, and design component: explore local adaptation of existing software service.		Similar to UK project but in addition, interns were expected to attend meetings with potential partners in China, and to discuss and define potential partner strategy.		No partnership formed or product/service developed during cycle 1, but the participation of LCCP helped strengthened the relationship with existing contacts in China, CIRS in Hangzhou and CMA in Hong Kong, leading to more business sales. In addition, TRC gained valuable market knowledge: more holistic understanding of the Chinese market.

After the first and second market visit to China, and GDST funding application where applicable, the case firms then develop project ideas for the graduate consultants to work with them on the projects in the UK, to outline the different elements according to graduate consultants' study paths. These project briefs were to be completed by the case firms and submit to LCCP team. Upon completion of the UK project, the graduate consultants would each submit a report on the project undertaken, according to prior communication and expectation. The graduate consultants also had to each present their work to the case firms, mid-project review and end-project review presentations, which were also attended by the programme manager.

As they participated in the project and gained more understanding of the firm, market, and technology, along with their own research, the graduate consultants then submit proposals to case firms on the work to be undertaken onsite in China. The case firms then submit the second project brief, containing the project ideas for the graduate consultants to work in China. Upon return from China, graduate consultants again submit reports and present the work done to the case firms.

During the process of refining the project ideas, we notice the differences between the case firms with and without a Chinese collaborator. Both eBusiness and Lanhai had a Chinese collaborator on the programme to work on the collaborative project. Referring to table 3, it can be seen that both eBusiness and Lanhai's project ideas evolved along the process, incorporating more specifications on various components. In the case of Lune Valley, by the time the graduate consultants were setting off to China, Joe had already switched focus to the domestic market, nevertheless, stayed on the programme to give another try on exploring the possibility of exporting dairy product to China. TRC stayed on the programme, but switched strategy to use the opportunity to strengthen the relationship with the existing collaborators in China to develop more business sales.

Though the case firms underwent identical process and received the same support from LCCP, their goals changed along the process and completed the process with varied outcomes. Among the four case firms, Lanhai was the only one that had the intended product completed and launched in July 2016. The online platform has since been commercialized and to date, Lanhai is still in collaboration with Xuanyuan. The face recognition software delivered by the Chinese collaborator, GZIS, was deemed a failure by eBusiness as it does not work with eBusiness' camera hardware. No product



delivered or collaboration formed from LCCP for both Lune Valley and TRC, but TRC benefitted from strengthening the relationship with existing collaborators in China. All case firms have takeaways including market knowledge, market insights, network, knowledge exchange, learning, and further business opportunities.

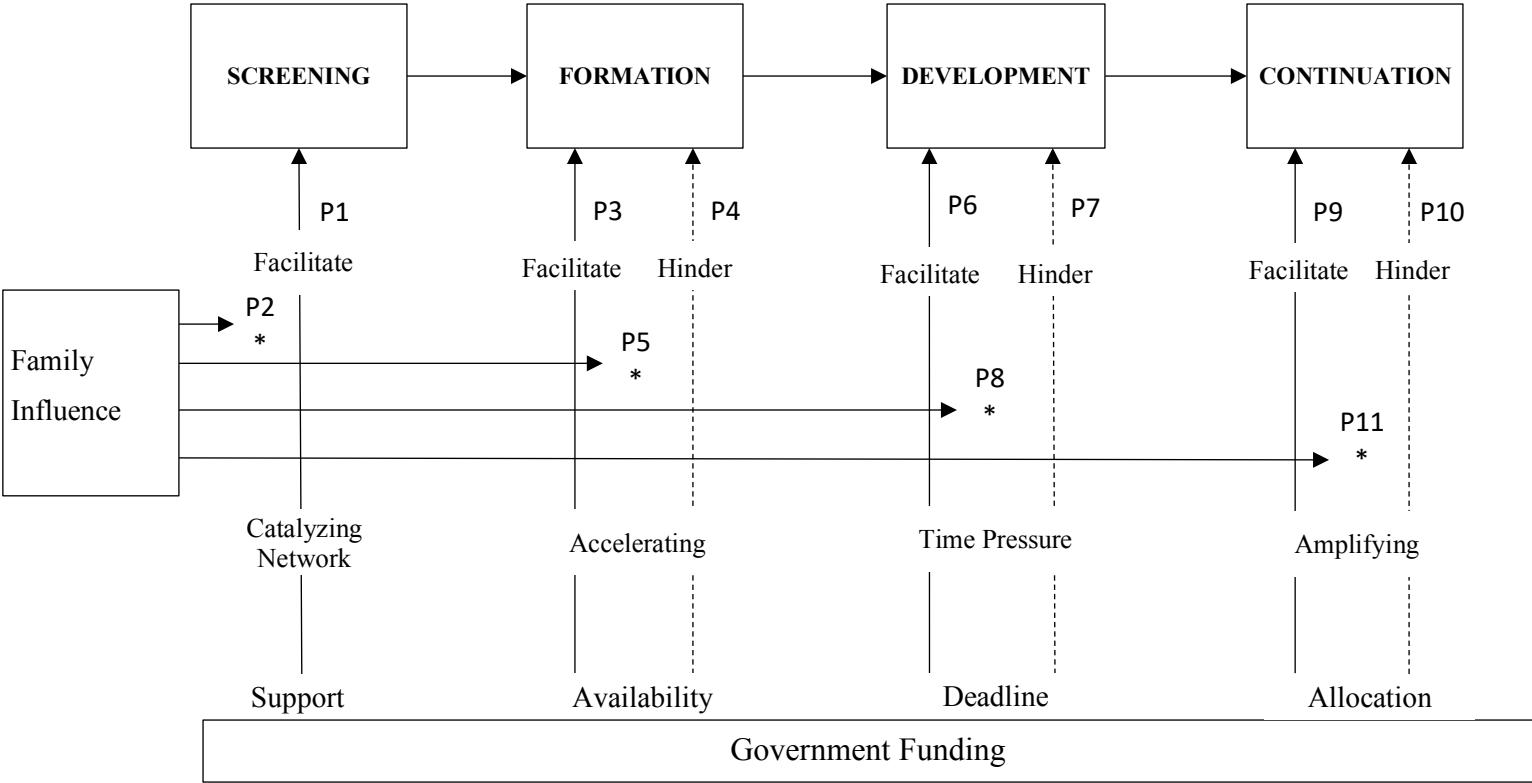
## **4.7 Analysis**

### **4.7.1 Government Funding as a Double-edged Sword**

From these rich data, the role of government funding throughout the process of collaborative innovation emerged. Our research method of polar sampling allowed us to see the different views and effects of GDST funding on each case firm and collaboration. As it turned out, the effects of the GDST funding started as early as the formation stage and continues to have effect throughout the process, which we will discuss further the role of government funding in the sections to follow.

The effects of government funding is captured by a model with four stages of early formative stage of collaborative innovation labelled screening, formation, development, and continuation. In each stage, we show how government funding can act as a mechanism that either facilitates or hinders the process, namely, catalysing network, accelerating, time pressure, and amplifying. We chose the labels in view of the patterns emerged from the field data and the existing literature, in accordance with the process of collaborative innovation. Figure 4 presents the role of government funding, acting as both push and pull factor in the early formative stages of collaborative innovation, from collaborator screening, formation of collaboration, development of collaborative project idea, to continuation of the collaborative project.

**Figure 4.3.** The double-edged sword effects of government funding – early formation stages of collaborative innovation



#### 4.7.1.1 Screening

Collaborative innovation starts with the process of finding a potential collaborator who has similar vision and complimentary resources to undertake the collaborative development of a new/modified product/service. From the resource point of view, a firm would seek for a collaborator with specific knowledge or technology that they themselves do not possess in developing the intended new/modified product/service. Thus, firms seek out for and meet potential collaborators through various channels, such as existing network, trade shows, exhibitions, associations, or government supported programme like LCCP. Government supported organizations like trade associations and programmes like LCCP provide another type of network that has an extra layer of protection as the member organizations have gone through initial screening. At the screening stage, government funding as a support facilitates by catalysing network, where potential collaborators have been initially screened, thus shortening the time and efforts if a firm is to do such screening on its own. Peter from Lanhai recalled his experience with LCCP prior to departing to China for first market visit:

*“The thing really impressed me was not only I was given a list of 9 companies, but it had the initial due diligence on them all. To list down 9 potential companies by myself would take a long time as I would need to meet and visit them, and in no way I would be able to get the due diligent like LCCP did. You know, to be handed these sheets, with all these information about the companies. So, I was blown away, and then after that first visit over there, I think it narrowed down to about 4 possible companies. And they were all perfectly viable companies.”*

It is interesting to observe that, among the four case firms, three firms had prior network with China. In particular, Peter Sewell, founder of Lanhai, has more than 10 years of working relationship in China with wide range of network. Prior to joining LCCP, Peter had been trying to find a collaborator in China for about two and a half years to take his idea forward, and travelling to China intensively for the previous six months, but without much progress. Peter recalled,

*“I suddenly found out there is this thing called Lancaster China Catalyst Programme and I thought maybe this could be part of the solution because I’ve been going to China trying to find a good collaborator, having found how difficult it was to do business in China if you are a small UK company.”*

Continuing on the prior network that the case firms possessed, eBusiness and TRC both have existing buyer/seller relationship with China. In the digital agency side of business, eBusiness outsources their work to India and Bulgaria. The e-commerce side of the business, eBusiness sources consumer electronic products from China, thus has existing network in China in the IT sector. Eyeing at the huge opportunities in China, as China has been a massive manufacturing country producing and trading lots of chemicals, TRC has already started looking at the Chinese market since the start of the business in 2007. Prior to signing up LCCP, TRC has working relationship with two partners in China, CMA in Shenzhen and CIRS in Hangzhou. Despite the prior network these firms possess, they joined LCCP to seek for potential collaborators.

*Proposition 1:* The support of government funding facilitates the screening stage of international collaborative innovation by catalysing network and thus shortening the time for screening of potential collaborators.

Comparing between the nonfamily and family firms in our sample, both nonfamily firms have prior connection and network in China, while only one of the family firms have them. As shown in the prior section, in spite of the wide reach network the two nonfamily firms have, those network are categorized as arm's length network by both Jonathan and Peter as these network did not provide them with more opportunities in forming collaborative innovation in China.

In the case of family firms in our sample, unlike eBusiness, Lune Valley did not have any connection or network in China prior to joining LCCP. Nevertheless, Lune Valley has very strong local network. Being in a niche industry of dairy farm, the business is tied to the land, thus, generations of farmers on the farm are mostly related, forming a unique familiar network. In fact, Lune Valley itself, Joe's grandparents were son and daughter of two different farms who married each other, and then their children, Joe's father and two uncles all have their own farms in the area. Joe explained:

*“In farming, or, in my industry, particularly farming, milk processing, everybody knows everybody. Particularly in farming, when you look at the generations, tracing all the farmers back, they all married each other, everybody knows everybody. It is a very different industry, in farming you are tied to a land that doesn't move, so, everybody knows who everybody is.”*

Lune Valley illustrates a form of familiar network that family firms have, a closely-knit network that all actors are strongly connected to one another with family ties. Such network is invaluable as it is rooted with deep trust among the actors in the network and sharing of information amongst themselves. Although such strong ties allows the flow of information among actors in the network without hesitation, the downside is that actors are then bounded in this closely-knit network and not generating new or novel information.

At the time eBusiness participated in LCCP, Kam expressed that they were undergoing a phase where they were aggressively hiring managers, so that the family members can move away from daily operations and focus more on the strategic moves. The family members were also hoping that the new externals would bring in new knowledge and connections that the family members lack of.

Compared to nonfamily firms, family firms tend to be more risk adverse. The other family firm, eBusiness, chose to participate in LCCP to reduce risk, despite having his own network and working relationship with suppliers in China. By participating in LCCP, the programme reduces the risk for the family firms by providing an extra layer of screening of potential collaborators and at the same time provide network outside family ties. As noted by Kam from eBusiness:

*“Only because, at that time, LCCP came along. For me, do I do it by myself? Or do I work with LCCP with their knowledge and understanding of what’s required to develop products, have Chinese partners and alliances? For me it’s quite simple, doing on my own, high risk; doing it with LCCP, with the supports that go with it, minimises my risk, have much better opportunities to develop links and networks, and that’s exactly how it happened. Would I have met GZIS have I not participated in LCCP? Of course not.”*

Analysing the client report prepared by the graduate consultants, we noticed the difference between nonfamily and family firms. While reports for both nonfamily and family firms include product specifications/designs/interface for the intended product and market research, the family firms have more elements in the report. Both family firms have more elaborated market research. eBusiness had their graduate consultants look into the competitors, mainly, the products that the competitors were offering and competitor analysis in the market. Lune Valley had their graduate consultants do more

elaborated market research on the Chinese market, such as competitor analysis, consumer preference, and marketing strategies for selling to China. The more elaborated report shows that the family firms in our sample intended to reduce the risk as much as possible.

*Proposition 2:* The facilitating effects of government funding in catalysing network is stronger in family firms.

#### **4.7.1.2 Formation**

Often times, even if a firm has already met potential partners and has the project idea in mind, does not see the need to form a partnership hastily as the firm keeps an eye on the market development and at the same time calculates the risks involved. Another reason for delaying the formation of a collaboration would be the lack of financial support and resources to form a collaboration to further develop the project idea. Thus, there exists a time lapse between having potential collaborators with complimentary background and actually form the collaboration by signing an agreement.

The four case firms seek collaborative innovation with various different motivations, including as market driven, idea driven, and exploration. Though the case firms came with different motivations and different ownership status, among other benefits, one of the biggest attracting points of LCCP was the possibility of getting government funding, specifically, the GDST funding provided by the Guangdong province government of China. The GDST funding opportunity calls for collaborative innovation between UK firms and Chinese organizations, involving R&D with the goal to achieve innovation. The possibility of obtaining government funding is especially integral for small ventures as it helps to ease their financial constraints to actually form a collaboration in order to pursue the idea at hand. With this, we label the availability of government funding as a mechanism affecting formative stage as accelerating because the availability of the government funding accelerates a firm's decision in forming a collaboration.

Among the case firms, three have formed collaborations within seven months after meeting the potential collaborators. eBusiness was the first to form collaboration, two months after first meeting with the Chinese organization, GZIS. Lanhai signed MOU with Xuanyuan four months later, and TRC signed collaborations agreement with Zuhai seven months later, though TRC opted for two-step screening prior to making decision

by CEO Jonathan. In the case of Lanhai, Peter had been trying to form collaboration with a Chinese organization to take his idea forward for two and a half years prior to joining LCCP. He had both the idea and network in China, as he has working relationship with China for more than ten years. Having had tried so long to form a collaboration with a Chinese organization, he was even sceptical about how fast he can form a collaboration under LCCP. Turned out, Lanhai managed to form a collaboration with Xuanyuan within 4 months. Thus, the funding opportunity acts as a push factor that speeds up the decision on partner selection and collaborations formation, pushing the firms to form a partnership in time to be eligible for the funding application.

*Proposition 3:* The availability of government funding facilitates the formation stage of collaborative innovation by accelerating decision-making.

We previously discussed how the availability of government funding facilitates the formation of collaborative innovation by accelerating, which we can see that three out of four firms formed collaborations with Chinese collaborators by signing either collaboration agreement or MOU. However, the positive effect of the availability of government funding was not applicable to all case firms. In particular, it did not exert positive effect on Lune Valley, but in fact, a negative effect. Also, the negative effect on TRC emerged later on. The data shows that, the availability of funding can work as a hindrance at the formative stage, as it might attract the wrong collaborator, who have a different goal in mind in forming collaboration. For example, in the case of TRC, after one round of screening of the potential collaborators, Zuhai Energy was among the three potential collaborators chosen to form collaboration with. Zuhai Energy in the oil and gas sector was chosen for their focus and link to the industry. The collaboration was looking positive and Zuhai Energy's representative travelled to UK for the inbound visit and signed MOU with TRC to work on a collaborative project during the signing ceremony held on 16th April 2015. However, the collaboration dissolved soon after the signing of MOU. Jonathan recalled:

*“After signing the MOU, we started to work on the GDST funding application. I think when the realization of the complexity of the application procedure and the limited amount of money that it would bring, that's when the interest started to disappear, from their end. We then found it increasingly hard to get hold of them, with all communications unanswered.”*

Adding the example of Lune Valley where the availability of government funding acts as hindrance, Joe was also suspicious of the potential Chinese collaborator's motivation for the push to sign collaboration agreement quickly. Referring to figure 5, Lune Valley was the only firm that did not sign any collaboration agreement. With the hesitation, Joe agreed to continue working on the project with NateIOT under LCCP, with the graduate consultants, to explore the possibility of the product traceability on Lune Valley's milk as a selling point to the Chinese market and its potential. He recalled:

*“The Chinese company could be just looking to get the money from GDST, as they have the obligation to have a signed partnership with a UK firm to get the funding. So, they were quite happy to just sign the agreement and get the money.”*

*Proposition 4:* The availability of government funding hinders the formation stage of collaborative innovation by increasing the chance of attracting collaborators with misaligned goals.

Both nonfamily firms are founder led firms led by entrepreneurial founders. Both Lanhai and TRC seek for collaborators purely from business point of view, to find a collaborator with compatible background and resources to develop the intended product. Peter from Lanhai recalled that the first potential collaborator the he had chosen, was because the representatives speak fluent English. Nevertheless, the LCCP China team nudged him to look beyond language ability for ease of communication. Of course, language could ease communication, but the development of intended product requires more complex ability other than language. Taking the advice in mind, Peter then reconsidered his options, taken into account the technical background of the potential collaborators, before choosing the existing collaborator, Xuanyuan.

The two family firms here in our sample are a good illustration on how government funding can have diverse effect on family firms with generation effect in place. As discussed previously in this section, we have seen that the availability of government funding acted as a facilitating mechanism for eBusiness in accelerating the formation of a collaboration while it acted as a hindering mechanism for Lune Valley. eBusiness, although a family business, that is assumed to be more risk adverse, was the fastest in forming partnership among the other 3 case firms who formed partnership. On the other hand, Lune Valley, with much suspicion, consideration, and precaution, exhibits the typical family firm traits, risk adverse. This could contribute to the difference between



the two firms: eBusiness being founder-led family firm adopting entrepreneurial logic and Lune Valley being a third generation family firm adopting familiar logic. The entrepreneurial logic, coupled with the drive to growth, lead eBusiness to grab the opportunity of government funding and formed collaborative innovation. Lune Valley, being a third generation family firm, has more long-term view in preserving the family business.

*Proposition 5: Both facilitating and hindering effects of availability of government funding at formation stage will be stronger in family firms.*

#### **4.7.1.3 Development**

After collaborators have agreed to work on a collaborative project, the next step then is to jointly discuss and agree on the specifications of the product/service to be worked on. GDST funding has several rounds a year and calls for application with a deadline each round of opening. This is especially an integral step for the funding application, as the GDST funding needed a sound project proposal with a clear title outlining the intended end product/service, technical specifications, and resource allocation. In the case of GDST application, since the funding is provided by the Chinese government, the applications were to be made in Chinese language and to be submitted by the Chinese collaborator.

During the development stage, the deadline imposed for government funding can act as a mechanism of time pressure in facilitating the development of the collaboration, because collaborating firms are ‘pressured’ to develop the project proposal in time before the application deadline and move forward to work on the project. Small ventures, compared to bigger corporations, would have less inertia and quicker decision-making process to react to faster pace of project development phase. Within the specified timeframe, supported by LCCP team, both eBusiness and Lanhai worked with their Chinese collaborators in developing the project proposal, overcome various challenges, and submitted their application to GDST funding in time and were both granted the funding. Noted by Peter from Lanhai:

*“It is not entirely about the money, it’s a mixture of support and pressure that the GDST involvement creates. That’s sort of the subtle pressure to keep things moving and to make the project work.”*

*Proposition 6:* The deadline of government funding facilitates the development stage of collaboration by creating time pressure to develop project proposal.

Even with the government funding readily available, the procedures and selection process can be daunting for small ventures, as the procedure often require extensive paperwork. This adds extra burden to small ventures in the international context, where foreign language is involved and translations needed. Joe from Lune Valley recalled:

*“The GDST funding call for application opened one week before the deadline, such short timeframe did not give me enough time to prepare. We didn’t have enough time to prepare, and have it checked by lawyers and things like that.”*

This points to another form of resource constraint that small ventures face. Another point to note here is the readiness of small ventures for funding application. If Lune Valley were a bigger organization, they might have the documentations readily available or have more resources to prepare for the funding application. Thus, from another side, government funding with complex procedure and pressing deadline can be hindrance for small ventures in the development stage of collaborative innovation.

*Proposition 7:* The time pressure created by short notice of deadline hinders the development stage of collaborative by increasing the chance of misspecification of project proposal.

The two family firms, although with family wealth at stake, were willing to take the risk of forming collaborative innovation by joining LCCP. Although family firms often take pride in being family firms with family value, they recognise the need for survival and public recognition. Joe from Lune Valley expressed:

*“The world is changing, you are seeing a lot more movement from independence to interdependence. In today’s world, it’s very difficult to do everything yourself and survive being independent. I think it is better to try and be a bit more fluid and build relationships. You sacrifice independence, but, independence is really impossible, you will always depend on somebody.”*

One of the ways for family firms to gain public recognition would be to form collaborations. Another way would be obtaining government funding. These two ways help family firms to gain legitimacy in the eyes of the public, as these shows the family

firms have passed the due diligence and are as competent as nonfamily firms although with family governance. This can be seen in the case of eBusiness, where the collaboration along with the funding is seen as an endorsement, gaining legitimacy in the eye of the public, as well as reaching out to bigger corporations. Kam from eBusiness expressed that:

*“When I go talk to Samsung or other big important people for example, they are talking about us working in partnership with a Chinese organization under a programme lead by Lancaster University and the project is being funded by the GDST by Chinese government. Those kind of things are very important, having the badges as a marketing tool.”*

Nevertheless, decision-making process in family firms is not as straightforward as nonfamily firms, even if smaller firms supposedly have less inertia compared to large corporations. Family involvement and emotional attachment play big roles in family firms. In the development stage of collaborative innovation, preparing paperwork can exert extra challenge to family firms due to their difference in governance structure. This is due to family involvement, where emotions are involved, leading to more complications in reaching consensus among family members. Joe from Lune Valley expressed the complications with the family governance:

*“I take pride in being a family firm, but it can be very horrible at times. The challenge can be very big because you have personal relationships that are complex with your family. In business it should be no emotion. But it is impossible when it is your mom, to not have emotions, or with your dad or brother. We take pride in it and it’s a strength because family members are bonded together, but it’s so difficult at times. Don’t underestimate it, when you say family business, people won’t tell you the truth, it’s very difficult, the dynamic.”*

The emotional attachment and the long-term view make family firms especially cautious in making decision, the time pressure with short notice of deadline does not give enough time for a family firm to gain consensus from different family members.

*Proposition 8:* The negative effect of deadline that hinders the development stage of collaborative innovation will be stronger in family firms.

#### 4.7.1.4 Continuation

Going past the formative stage and development stage, collaborating firms continue on the agreed projects with the fund granted from government. In this stage, collaborators put words into action, pouring in the agreed resources to the project, whether the expertise, knowledge, technology, or extra financial capital where needed. In principle, government funding is extra cash where collaborating firms still have to contribute financially, as collaborative innovation would require costly items like equipment, samples, and testing, where it is not possible to rely entirely on government funding. In the context of international collaborative innovation, shipments might be involved, incurring extra cost. Thus, government funding cannot fully cover the cost of a collaborative project, but acts as incentive to carry out the project.

In the case of eBusiness, prior to applying for funding, it was agreed that the project was going ahead even if they did not get the funding, but a matter of how much more that they would have to contribute through their own pocket and the distribution of the costs between the partners. Still, having the government funding is an extra benefit to continue on the project. Kam expressed:

*“When you have got some extra allowance to spend, it allows you to do more as oppose to what you plan to do originally.”*

In the case of Lanhai, the GDST funding acts as a safety net, in which the extra money would allow them to take risk and try more. Peter noted:

*“The GDST funding covers the costs if things work terribly bad.”*

Thus, both eBusiness and Lanhai were ready to continue on the collaborative project with their Chinese collaborators even without the GDST funding. The allocation of the government funding at this stage then amplifies the continuation of the collaboration project as it provides a safety net for collaborators to do more experiments.

*Proposition 9:* Allocation of government funding facilitates the continuation of a collaborative innovation by providing a safety net do more experiments.

On the other hand, just as collaborations are hard to govern with risk of appropriability, it can be equally difficult to decide on the distribution of the government fund between

the collaborators. Collaborative innovation in the international context would add another layer of complexity as to where the project would be carried out and the resource allocation with the geographic proximity. Moreover, with the geographic proximity, it is even more difficult to govern on the use of the resources. In other words, it would be hard for a firm to verify that the resources allocated to the collaborating firm is entirely being used on the project.

In the case of GDST funding, the fund went entirely to the Chinese partner, as specified by the funding body, the Guangdong provincial government in China. Examining closer on the two case firms with partnership in place and funded by GDST, while Lanhai had the end product delivered and launched, eBusiness was not the case. As the distribution of the fund went entirely to the Chinese collaborator, GZIS, it was entirely being used by the Chinese collaborator in development of the intended face recognition software to be used with eBusiness' camera hardware. At the end of the programme, the Chinese collaborator claimed that they have delivered the intended product as specified in the project proposal. However, it was deemed as a failure by eBusiness as the software was not compatible with eBusiness' hardware, thus an end product that couldn't be used. In this sense, the Chinese collaborator had fulfilled the requirements outlined by the GDST funding per se, but not meeting the need of eBusiness, that is to get the software to work with eBusiness' camera hardware.

*Proposition 10:* Allocation of government funding hinders the continuation stage of collaborative innovation by amplifying the misalignment of goals between collaborators.

Referring to figure 4.3, although Lune Valley chose not to sign any formal agreement with NateIOT, the family firm stayed on the programme and had the graduate consultants to continue further explore the possibility of dairy product traceability technology. However, it was just for the purpose of exploring Chinese market as the graduate consultants conduct market research to assess the feasibility. Without any allocation of resources from Lune Valley, the graduate consultants had to be creative in conducting the market research. The graduate consultants conducted market research by methods like focus group, surveys on customers' willingness to purchase Lune Valley's dairy product that can be traced back to the farm in the UK, and surveying other imported dairy products. Had Lune Valley formed the collaboration with NateIOT

and granted the GDST funding, Lune Valley and NateIOT would then be able to actually do some ground work in testing out the actual willingness of the consumer in buying dairy product that traces back to Lune Valley's dairy farm in the UK. Coupled with family firms' risk adverse attitude, we propose that the allocation of government funding would have a more profound effect for family firms to continue on collaborative project with their collaborators.

One of the reasons why Lune Valley wasn't willing to form a formal collaboration with NateIOT was due to Joe sensing the possibility of misalignment of goals from the start. While both being family firms, eBusiness adopted the entrepreneurial logic in forming a formal collaboration, Lune Valley adopted the more conservative familiar logic to stay put and just explore without any binding of legal agreement or resources. Comparing to the nonfamily firms, eBusiness and Lune Valley behave differently as they have the family value, family involvement, and family influence. The goals of eBusiness and Lune Valley in forming the collaborative innovation has an extra layer of family influence in comparison to the nonfamily firms. Therefore, the effect of allocation of government funding in amplifying the misalignment of goals would be even greater in family firms.

*Proposition 11:* Both facilitating and hindering effects of allocation of government funding at continuation stage will be stronger in family firms.

## **4.8 Discussions**

Starting from the premise that understanding how collaborative innovation evolves is central to understanding the role of government support, this research is an attempt to advance theories about how government funding affects collaborative innovation at the early formation stages by tracking the evolvement throughout the process of international collaborative innovation. Although prior research has shown that government support in the form of financial funding acts as an incentive for firms to form collaborative innovation and has positive effect on the innovation performance (Czarnitzki, Ebersberger, & Fier, 2007; Feldman & Kelley, 2006; Kang & Park, 2012; Ryu & Choi, 2016), it has not investigated the question of how government support actually affect collaborative innovation in each stages, particularly the formative stage. Existing research based on large quantitative dataset examine the effect of government funding on government funded collaborative projects, but does not provide insights on

whether government funding actually contribute to the formation of collaborative innovation if researchers claim that government funding acts as an incentive to form collaborative innovation. Moreover, existing research has pointed out that firms with existing track record of innovation and experience in funding application were more successful in obtaining government funding (Romijn & Albaladejo, 2002; Wallsten, 2000), thus leading to the question of readiness of small ventures for international collaborative innovation. In seeking to fulfil these gaps, we have examined how four UK small ventures went through identical process under LCCP with institutional supports have varied progress through different stages. The emergent model uncovers a process that provides a more refined understanding of the role of government funding than it has previously been understood to be. This model contributes to the existing research by revealing the dark side of government funding towards international collaborative innovation. Specifically, the process view that emerges from the study has important implications for understanding of how government funding can be both positive and negative effect at different stages of the early formative stage. It also sheds light on the challenges faced by founder-led and family owned and managed small ventures in seeking to form collaborative innovation due to the lack of resources yet constrained by the lack of resources in doing so. This study further contributes to the collaborative innovation literature by providing new insights on the role of government funding being either push factor or hindrance at the early formative stage, thus uncover the overlooked factors in the past findings. Although the study was conducted in the international context, the formation of international collaborative innovation, the model is also applicable to collaborative innovation with domestic collaborators.

#### **4.8.1 Future Research - A Process View of the Effects of Government Funding**

The process model comprises four key sub-process at the early formative stage that helps explain how government funding can either facilitate or hinder the progress of international collaborative innovation at each early formation stage. First, *screening* – the process by which a firm seeks and screens potential partners with complimentary resources to form collaboration with – will be positively facilitated by government funding as it provides extra layer of protection by providing the first screening. Existing research shows that, compared to meeting strangers at trade shows and exhibitions, acquaintances from existing network like suppliers or customers pose more familiarity from prior contacts and thus increase the likelihood to form collaboration with (Ahuja

2000, Reuer&Lahiri, Vanhaverbeke 2002). However, it is not the case in our study. As shown in our data, three out of the four firms have prior connection and network with China through various working relationship, yet, these firms chose to participate in LCCP to seek for a collaborator for collaborative innovation.

Family firms are known for having a unique class of asset, social capital that consists of family ties, providing extra business ties at low or no extra costs ((Anderson, Jack, & Dodd, 2005)). However, embeddedness in a network, especially in closely knit family network, may not bring novel or new information (Uzzi, 1997). At the same time, small family firms may not possess the resources to obtain a pool of potential partners to choose from. Moreover, due to their long-term vision and risk adverse nature, coupled with the unwillingness to collaborate, family firms tend to have lower search breadth, unless incentivised (Alberti et al. 2014). This positive effect would be stronger for family firms as it helps family firms to expand the network beyond familial network, as well as reducing the perceived risk on forming international collaborative innovation.

Second, *formation* – the process by which a firm forms a partnership with an external organization in developing new/modified product/service - can be either positively facilitated by government funding as a push factor to speed up the process and form collaboration, or negatively hindered by government funding as the possibility of funding may attract the wrong collaborator. Certainly, extra financial support from the government is a lucrative incentive to form collaboration, especially for small ventures with limited resources and family firms who are known to be risk adverse. However, it might attract organizations with different goals and priorities in forming such collaboration. When two organizations form collaboration with unaligned goals and priorities, it sets out a path with different pace ahead, which could ultimately lead to failure in delivering the end product. In the case of family firm, taking family influence into considerations, both effects of government funding at this stage will have more profound effect. Depending on the generational stage of the family firm, whether they take the entrepreneurial or familiar logic, will lead to a diverse outcome.

Third, the *development* stage, a process by which the partnering firms develop project proposal jointly for funding application. On one hand, the opportunity of government funding pushes partnering firms to move forward with the project and develop proposal in time for application. On the other hand, short notice of deadline hinders small



ventures for preparations of the paperwork involved, especially if translation and legal advices are needed. This stage emerged as critical, especially for small ventures, because small ventures seek to form collaborations due to lack of resources, and yet constrained in the process of formation due to lack of resources, thus not able to move forward even if a potential partner is in place.

Family firms, owing to their unique characteristics and risk adverse attitude, tend to be less willing to collaborate (cassia et al 2012, Nieto 2015). Although, other research has found that the willingness to collaborate is related to economic prospects and social emotional wealth (SEW) (Gomez-Mejia 2007). Nevertheless, institutional factor has been overlooked in the existing research on collaborative innovation in family firms. The need for legitimacy leads family firms to adopt conformity strategy, thus forming collaborative innovation to garner public confidence that is much needed by the smaller family firms (Miller, Breton-Miller, & Lester, 2013). The time pressure will have a more profound negative impact on family firms because family firms tend to be more cautious and need more time to coordinate among family members in gaining consensus.

Fourth, *continuation* – the process by which the collaborating firms work together on the proposed project idea with the government fund awarded - has mostly been assumed to have positive innovation outcome resulting in patent and commercial output with government funding. Prior research that studies governance issue of collaborative innovation focuses on the opportunism and appropriability hazard, but overlooks the issue on the allocation of funds between partners. Although having the extra financial support from government adds as an incentive to carry on the project and a safety net for more testing and trials, the question is how the fund is being distributed. Specifically, in the context of international collaborations, is the government funding from either of the partner's home country or third country? Is the collaboration project being carried out in either/both of partners' home country or third country? This raised the question of how the awarded fund is allocated and governed. And again, if the goals of the collaborating partners are not aligned from the start, it adds another layer of difficulty in governing the use of the awarded fund. The impact of the allocation of government funds would be even greater on family firms with family firms behaving differently from nonfamily firms.

In sum, this study identifies the early formative stages of collaborative innovation and how government funding can affect each stages. Specifically, we uncovered the negative effects of government funding that can impede the formation of collaborative innovation and ultimately affect the end result. We specify the mechanisms at work at each of the stages to show how government funding affects each stages.

## **4.9 Practical Implications**

### **4.9.1 Policy Implications**

The study carried out in this paper puts in evidence some of the main challenges UK small ventures face when seeking internationalization and access to the Chinese market through R&D collaborations in China. If the availability of funding to support this process in either China and/or the UK facilitates the formation of R&D collaboration (or at least creates the appetite for it), it is by no means ensured that the supports provided to these collaborations will lead to the creation of new products/services, economic wealth, development and jobs that are hoped for.

As we have seen in the paper, while government funding can have a positive effect on the delivery of the intended outcome of the funded project, it is clear that additional supports for collaborators are needed to ensure the outcome delivered do not devalue to a simple box ticking exercise like the case of eBusiness and GZIS collaboration.

Most of the supports available through UK or China government schemes primarily focus on one stage of the UK-China collaboration development. In the most cases, support is available for finding a collaborator through, for example, sectoral trading missions or, alternatively, on commercialization of technology. These schemes, developed and delivered by organizations such as the Foreign and Commonwealth Office and the Department for International Trade with the support of the China Britain Business Council, are vital for the economy but still inadequate to fill the resource and skill gaps faced by UK small ventures. Even in the case of match funding provided by the Chinese Government<sup>2</sup>, collaborators still face major difficulties during the delivery of their projects while the applicability and commerciality of outcome are doubtful.

In order to avoid such an uncertain outcome, funding and support schemes should adopt a more ‘holistic’ approach, providing assistance in the different stages of collaboration

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<sup>2</sup> For example in the case of the Newton Fund China-UK Research and Innovation Bridges.

formation and development. Furthermore, the assistance currently provided is very often in the form of basic support that helps meeting a pool of potential collaborators but doesn't help in the follow up activities unless a big project is at stake. This is most probably due to limited resources available from government organizations, thus unable to thoroughly support high number of small ventures but rationally prioritize larger opportunities. Further support should be made available in the form of tutoring for small ventures that undertake collaborative innovation projects with Chinese collaborators. A company tutor provided by UK government organizations would then be able to advise a small venture on a number of issues arising during their collaborations and addressing knowledge and resource gaps by leveraging on an established network of additional support schemes or specialized tutors (ex. intellectual property protection, international trade tax and customs) provided by government organizations. The tutor would in effect be an advisor to the small venture and a broker of available government support schemes, filling the knowledge gap that UK small ventures often have with regards to availability of support.

The LCCP is a good example of support programs that have tried to fill those gaps but, despite the positive outcomes, it presents at least two challenges: (1) the cost of support per company is quite high if compared to the expected outcome; (2) the network of support, and therefore multiplying the benefits, that a UK university can unlock is rather limited in comparison to what can be reached by a UK government organization both within and outside the country.

At the same time, the role of universities is crucial in these collaborations as it offers small ventures with a concrete cutting edge research basis that they would hardly have on their own. The UK Government has recognized this and has then promoted several funding schemes that require forming a collaboration between a small venture and a university research department in order to be eligible for application.

An interesting, potentially very beneficial, further step would be to create collaborations between UK government organizations such as Innovate UK, FCO or DIT and UK universities. These government departments are already managing funding schemes that aim at supporting UK small ventures in their China endeavors. Collaborating with universities could mean not only unlocking additional research capability in the form of faculty already active in the relevant fields (Banal-Estanol, Jofre-Bonet & Lawson,

2015), but also accessing a pool of skilled students that could help delivering the projects, as well as widening access to a Chinese research base through establishing contact with Chinese Universities and research centers.

This type of engagement requires reciprocity of funding between Chinese and UK governments. Although this is an already established funding mechanism (ex. Newton Fund), it still lacks the tutoring element that organizations involved would require in order to make sure that collaborations smoothly deliver their projects and reach a commercialization success that repay the investment.

#### **4.9.2 Managerial Implications**

Facing resource constraints in achieving innovation, coupled with the need for legitimacy in the eyes of the public, small ventures seek aids from government funding to form and develop collaborative innovation. This study uncovers the formative stages of collaborative innovation, and how each mechanisms of government funding plays an integral part in the formative and development stages of collaborative innovation. Using the four sample case firms from LCCP, we found that the role of government funding not only affects the formative and development stages, but also ultimately affect the outcome. Of the four sample firms, only one firm delivered a tangible end product as intended for the collaboration, despite having gone through identical process and received equal supports from the program. This brings the question on how small ventures and family firm owners can better leverage the government support.

Existing research has shown that most of the firms that have been granted government funds to form collaborative innovation have existing track record of innovation activities, such as patent filing and R&D investments. Moreover, funding applications often time requires paperwork that can be daunting to small ventures due to lack of resources in preparing them. These result in a recursive relationship between small ventures and institutional support. On one hand, small ventures seek institutional support due to resource constraints. On the other hand, due to resource constraints, small ventures are not able to obtain institutional support. While funding bodies want to ensure the success rate of the funded project, small ventures find it hard to demonstrate their capabilities in the form of documentations required.

Thus, our proposed framework help small venture and family firm owners identify the mechanisms of government support at different stages and how they can leverage it.

Small ventures and family firm owners should have a clear idea in mind what they wish to achieve in forming collaborative innovation. This would then help them to identify potential collaborators and take advantage of the institutional support when they have to opportunities to meet a wider pool of potential collaborators. With the clear idea in mind, small venture and family firm owners should then set aside some resources for paperwork, in order to demonstrate their capabilities in delivering the intended outcome in forming collaborative innovation.

Resources needed in terms of time and staff are often misinterpreted and underestimated by decision makers when engaging with China. This is very often due to the number and size of opportunities that executives and business owners are often presented to when visiting China. The reality is that in order to realize at least one of those opportunities, small ventures need to overcome a series of uncommon challenges. This usually requires more time and effort than the average foreign market they are used to. It is then advisable to make sure that the senior leadership of the business is fully supportive of a China-related initiative as well as aware of the risks and resource consumption associated with the project.

#### **4.10 Conclusion**

Starting on the premises of the role of government funding, we have examined the effects of government funding at the formative stage of collaborative innovation and the interaction effect on family firms. By identifying the role of government funding as a mechanism at each stage: screening, formation, development, and continuation, our analysis shows how each mechanism of government funding at each stage can be either facilitating or hindering. Therefore, our findings extend the existing literature on the negative effects of government funding. Furthermore, by comparing between family and nonfamily firms, our analysis show the interaction effect of government funding on family firms. Our proposed framework and propositions is guide the future research.

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