

Theoretical Assumptions about Family Firm Radical Innovation

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Abstract

A growing body of research is concerned with radical innovation activities among family firms. During the last decade, the study of family firms and radical innovation has diffused into various research streams driven primarily by aspects of governance. The aim of this paper is to reconcile our understanding of current research findings about radical innovation and family firms by employing a structured literature review technique. After analyzing 39 articles from a cluster of top-ranked journals, we see that investigation of radical innovation and family firms are mainly located under the theoretical lenses of (1) resources, (2) agency theory, (3) behavioral agency theory and socioemotional wealth, and (4) drivers of the ability and willingness to innovate. By viewing radical innovation through these four lenses, we observe that radical innovation activities could be influenced by the level of family involvement in ownership and management, the family capability bundle (resources, knowledge, and experience), and family oriented goals. These matters are potentially inter-related because differences in ways family firms acquire resources, their susceptibility to various institutional factors, levels of ownership and control, and the presence of different family-oriented goals can alter the intentions, motivations, and ability to engage in radical innovation. We present urgent directions for future research, highlighting what key problems and gaps need urgent attention to advance our understanding of radical innovation in family firms.

1. Introduction

What is our current understanding of radical innovation among family firms? What theories have been used (and should be utilised) to predict and explain radical innovation activity in family firms? Between 2003 and 2016, there has been a dramatic growth in research on family firm innovation, led by large numbers of qualitative and quantitative studies, which have formalised a series of different theoretical lenses to investigate the phenomenon. These theoretical lenses have mainly looked at radical innovation under family governance structures, family involvement in ownership and management, family resources and capabilities.

Different from incremental innovation which mainly pursues existing product improvement and line extensions (Chandy & Tellis, 1998), radical innovation is defined as firms (both family firms and nonfamily firms) shifting firms from the current position to a novel position, creating substantial different new products which are largely depart from current technological trajectory (Chandy & Tellis, 1998; Veryzer, 1998). Radical innovation also tends to develop new products or implements new technologies and provides the first-hand experience within a market (Veryzer, 1998; Govindarajan & Praveen, 2006; De Massis et al., 2016). Still, radical innovation contains great uncertainties especially when firms are a lack of experience in engaging new ways of delivering products and services. The benefits that could be brought by radical innovation activities are, most likely, unpredictable. However, radical innovation is still worthwhile conducted, especially in family firms, to search wealth insights and to enhance firms' continuity (Konig et al., 2013).

Unlike traditional firms, family firms have unique forms of governance which affect their behaviour (Carney, 2005; De Massis et al., 2014). Specifically, while traditional firms are distinguished by the separation of ownership and control, family firms are characterised by their unification (Carney & Gedajlovic, 2002). Within family firms, the unification of ownership and control is defined as a generic governance form that generates tendencies towards parsimony, personalism, or particularism that shape their strategic decision-making and investment behaviours (Carney, 2005). Under such a governance form, the incentive alignment between owner and manager is high, which reduces opportunism and lowers the

agency cost associated with monitoring (Shleifer & Vishny, 1997; Carney, 2005). However, unified ownership and control can contribute little in terms of investment in innovative venturing because of the increased concern directed towards wealth preservation (Chandler, 1990; Matzler et al., 2015). This increased concern tends to trigger specific actions by the family firm regarding focusing on the status quo, entrenching the management team by linking the benefits of the family firm to the benefits of family members (Thaler & Shefrin, 1981; Chandler, 1990; Singh & Gaur, 2013), maintaining family ownership and control (or its socioemotional wealth) (Gomez-Mejia et al., 2007) especially during succession periods (Morck et al., 1988; Anderson & Reeb, 2003), and make nepotistic appointments to further solidify family influence (Carney, 2005).

In excess, the tendency of the family firm towards wealth preservation will mitigate the willingness of the family firm to seek out and undertake radical innovation activity, and make a less associated investment in R&D and specialised personnel (De Massis et al., 2014). For instance, family firms would be expected to allocate fewer resources (e.g. money, skilled employees, and technology) towards risk-bearing innovation activity because of the dilution or endangerment of family wealth. Such conservative, control-oriented behaviour typified in this scenario may reduce the organisational incentive to learn, and filter out new knowledge and ideas that might be important for radical innovation. Without a sufficient motivation to innovate, and lack of sufficient supporting resources to do so, organisations can create a failure to build up their internal ability (or capability) for radical innovation (Chandy et al., 2003; De Massis et al., 2014).

This brings us back to the matter of governance. The tendency for wealth preservation and conservative resource allocation can depend on the governance structures at play in the family organisation (Durand & Vargas, 2003; Chrisman et al., 2013). Carney (2005) theorised that there are relationships among ownership and control and the decision-making process that can influence the formation of organisational capabilities that might be critical for innovation. For instance, increasing ownership among family members can generate stronger rights for the family over asset control, which, in turn, will exert stronger family influence on decision-making towards the family's interests and mitigate decision alignment with other investors' interests. As family involvement increases, radical innovation is less likely because the

speed of opportunity recognition, aggressive responsiveness, and flexibility for adaption and adoption are diminished (Konig et al., 2013). However, a change in the composition of family ownership might diversify innovation strategies. To align others' interests into decision-making, family control over the firm's voting stock may need to be diluted by including more non-family shareholders, investors, and other trustees. It is a part of a conscious strategy to change the system of constraints surrounding the family firm's strategic activity (Patel & Chrisman, 2014). Although the involvement of non-family members will reduce family ownership, family firms can still generate effective control by appointing a professional CEO for certain decisions (Carney, 2005). Hence, the governance structures at play can influence the development of internal operational routines, processes, and systems (Lazonick & O'Sullivan, 2002) and further impact on the formation of organisational capabilities for radical innovation. However, reducing the family members' degree of ownership and assigning some control and power to non-family board members and professional managers typically go against the family-centred goals of preserving family ownership and control (Gomez-Mejia et al., 2007; De Massis et al., 2014; Chrisman et al., 2015). Hence, conducting radical innovation by simply reducing family members' ownership and control and increasing power of non-family professionals are not appropriate.

Nonetheless, innovation, especially radical innovation, still 'happens' in the family firms which have high family involvement in ownership and control. Regarding radical innovation, evidence exists to suggest that the family firm has better stamina, faster speed of implementation (Konig et al., 2013), and even better performance in innovation than non-family firms (Anderson & Reeb, 2003). The question then becomes *how* and *why* do family firms appear to be this successful at radical innovation against a rather bleak backdrop? If the risk of the proposed radical innovation activity could be made acceptable and have little negative impact on the pursuit of family-centred goals, radical innovation activity may be considered favourable by the family firm (De Massis et al., 2016; Li & Daspit, 2016; Chrisman et al., 2016). Considering the features of organisational ability and willingness to innovate, the presence and effects of radical innovation activity could be different under various family governance structures, how

resources and capabilities for such innovation activity, and benefit the family firm and the behavioural context of the firm defined by its focus on socioemotional wealth (SEW).

This discussion points to four recurring theoretical debates in the family firm literature, all largely connected under the umbrella of the governance perspective. The first is the matter of governance structures and forms of governance put in place in the family firm, including family control over the board and management (Carney, 2005). Allied to that is matters of the agency and behavioural agency within those governance structures in terms of the relative emphasis placed on SEW and the manner in which family owners, managers, and employees behave while subject to those governance structures. These matters feed into the third area, which is the ability and willingness of the family firm to innovate. Governance structures and the behavioural tendencies of family owners and managers first set the context for whether the firm is willing to innovate in more or less radical ways and what resources may be available to it (Carney, 2005; De Massis et al., 2014). Finally, and as a direct extension of this, because the family firm can tend towards protecting its interests and therefore prevent resource allocation towards projects with higher risk, the firm may then have fewer capabilities in terms of resources and knowledge to innovate radically even when the willingness is there (De Massis et al., 2014).¹

Before proceeding to study the problem of radical innovation in future studies of family firms, it is necessary to pause and reconcile what we currently understand about family firms and radical innovation through a structured literature review to clearly present what important theoretical aspects must underpin these future studies. Hence, this paper will: (1) present the state-of-the-art of knowledge about family firms and radical innovation (ascertaining theory, absences and gaps), and (2) evaluate what the most crucial problems that researchers need to address in their future investigations are. Doing so will reconcile the rapid development in theory seen to date and highlight where our understanding is at its thinnest and in need of the most urgent attention, both theoretically and empirically.

Our model builds on 17 articles speaking to radical innovation in family firms and 22 articles which discussed family governance and family decision-making behaviour towards radical innovation published

¹ To a certain extent, this implies a path dependency. Nevertheless, it is also possible that the absence of such capabilities is a conscious decision and a consequence of deliberate strategy-making emphasising a more conservative form of innovating.

between 2003 and 2016 in *Entrepreneurship Theory and Practice*, *Academy of Management Journal*, *Administrative Science Quarterly*, *Journal of Family Business Strategy*, *Journal of Small Business Management*, *Journal of Product Innovation Management*, and *Family Business Review*. Examples of radical innovation include works by Zahra (2005), Cassia et al. (2011), De Massis et al. (2012), Block (2012), Singh and Gaur (2013), Chrisman et al. (2015), and De Massis et al. (2016). While the example of supportive articles includes Sirmon and Hitt (2003), Gomez-Mejia et al. (2007), Chirico and Salvato (2014), and Carney (2005). Since there are thousands of articles in existence more widely in the field, the decision was made to select both radical innovation and supportive articles from top journals that have made important or seminal contributions and reveal the current understanding of radical innovation within family firms developed over the last decade.

This paper offers two contributions. First, it provides an in-depth overview and point of reference for the growing research effort into how family firms generate radical innovation. It helps crystallise why family firms have difficulties innovating in a radical manner and what the origin of those reasons are, our current state of knowledge on those reasons, and where high-priority research gaps exist in this debate. Second, it summarises the current academic investigation of radical innovation within family firms, locating and describing the research advances, problems yet to be solved, and promising areas in which to focus future research endeavour for the greatest contribution and impact.

This research begins by explaining the structured literature review methodology in detail, following by the definition of the key terms and constructs of interest.

2. Structured Literature Review Method

This section explains and justifies the structured literature review method. It explains how journals and articles were searched and selected from various databases (e.g. EBSCO, ScienceDirect, Sage), and why the 39 papers were chosen for the main discussion of radical innovation within family firms. It will begin with a detailed explanation of the process for article searching, navigation and filtering, followed by a general explanation of the aims of these articles.

Mertens (2005) suggested that a structured literature review process and article filtering can be performed through the following steps: (1) read articles and define the key terms; (2) type the 'keywords' into the databases to search and select the articles which are important for the current research theme; (3) determine the connections among the key terms and discover the similarities and conflicts among them; (4) draw a literature map to link the terms that are relevant to each other; and (5) keep updating the literature map and list of articles, and elaborate the overall review.

The databases identified for this study are ScienceDirect, EBSCO, Springer Link, Wiley, and Sage. The both radical innovation and supportive article searching criteria applied to these databases were limited to 'English version', 'peer-review', and 'full text' articles. In order to generate a list of articles relevant to the current topic, a priority searching process was carried out to cover all the keywords and their synonyms referring to radical innovation within family firms. For instance, 'radical innovation', 'disruptive innovation', 'disruptive technological innovation', 'radical innovation', 'radical innovativeness' and 'discontinuous technological innovation' are all similar terms but coded differently in various papers (Jansen et al., 2005; Chrisman et al., 2015). At the same time, wide keyword searching is also a way to prevent important journal articles and scholarly papers being lost, overlooked or omitted. For example, while searching 'family firms', 'governance', and 'radical innovation', supportive articles such as Carney (2005) will not be revealed among the search results. While inputting 'family governance' and 'competitive advantage' into the search, the seminal paper by Carney (2005) reveals itself in the EBSCO database. Through the initial reading of the articles of Cheng and Van de Ven (1996), Konig et al. (2013), Chrisman and Patel (2012), Chrisman et al. (2015) and De Massis et al.(2016), a list of search terms and vocabulary was created, including 'innovation', 'radical innovation', 'technological innovation', 'family governance structures', 'research and development (R&D)', 'radical innovation', 'exploration', 'motivation and ability', 'new product development', 'family influence and firm performance', and 'ownership and control'.

The search engines within the databases tend to use Boolean operators to examine their literature portfolio and ultimate report its results according to the presence of keywords (Hart, 2004:128). The results tend to

include journal articles, essays, magazines, books and newspapers if there are no searching criteria to constrain the auto selection. Therefore, the primary searching criteria were set to limit the results towards English version peer-reviewed articles. The publication timeframe of the chosen articles was restricted to between the year 2000 and year 2016 in order to show recent advances and ascertain the important assumptions for the future investigation of radical innovation and family firms.

The filtering criteria restricted the searching results towards (1) seminal academic contribution that has significantly developed the topic and (2) highly relevant articles in line with the current research theme or providing support for radical innovation (e.g. arguing radical innovation-decision process; connecting family governance and radical innovation). These two criteria were achieved in two ways. First, by reviewing the title of the article, the research concept from the abstract, the contents, introduction and conclusion, the key author or authors, the key argument(s), unstated assumptions, research background, and key examples, the articles deemed most highly relevant were identified. Also, selecting seminal works can not only narrow down the thousands of search results, but also these works can present the key academic findings and evidence, new ideas, and in-depth understanding of the topic (Hart, 2004). Second, to support this endeavour, the further selection was achieved by focusing the choice of journals as the publication outlets to 3- and 4-rated journal 'quality' as indicated by the Association of Business Schools (ABS) in the UK. While carrying a degree of subjectivity and imprecision likely attributable to any such ranking of journal quality, this measure helps provide an additional mechanism to reduce down the plethora of initial search results into a more manageable quantity based on a generally accepted list of journals defined as being of the international or world-leading standard. The journal articles chosen for the main analysis after referring to the ABS Journal Ranking Guide (2015) were sourced from *Entrepreneurship Theory and Practice*, *Academy of Management Journal*, *Administrative Science Quarterly*, *Journal of Family Business Strategy*, *Family Business Review*, *Journal of Business Research*, and *Journal of Small Business Management*.

While initially searching radical innovation and family firms, 70 papers were retrieved from the databases, meeting the criteria of English full-text peer-reviewed articles in line with the topic. After a round of

screening, 31 papers that were not concentrated specifically on radical innovation and family firms were deleted. This screening was determined by examining the title and abstract of each paper. Ultimately, 39 papers published between 2003 and 2016 were selected for the final discussion with 17 articles purely discussing the radical innovation and 22 supportive articles with a section or sections talking about radical innovation and governance, resources, and behaviours (Table 1).

As shown in Table 1, the selected articles and scholarly papers about radical innovation and family firms were mainly located in four areas of discussion: RBV, agency theory, behavioural agency theory and SEW, ability and willingness, all of which were largely under the umbrella of governance. In Table 1, all the articles are listed together with details of their respective lenses. For instance, Chrisman et al. (2015), and Veider and Matzler (2015) discussed how conditions pertaining to the ability and willingness of family firms to act would influence their innovation activities. Accordingly, these two papers were grouped under ‘ability, willingness, and innovation’ theory. Since both papers have explained that family involvement in ownership and management will result in different goal selection and idiosyncratic family decision behaviour associated with innovation (Chrisman et al., 2015; Veider & Matzler, 2015), ability and willingness in this situation belong to the wider theme of governance.

Among the 39 studies, there are 21 quantitative and 18 qualitative studies examining radical innovation and family firms under the umbrella theme of governance. Since 2 studies used several theories at the same time (e.g., Le Breton-Miller et al., 2015, used three theories), and another 6 used two theories at the same time (Zahra, 2005; Chrisman et al., 2005; Kellermanns et al., 2012; Konig et al. 2013; Miller et al., 2015; Kammerlander & Ganter, 2015) to study family firm radical innovation, 17 instances of theory use were identified among the 39 studies.

3. Data Analysis: A Structured Literature Review of Radical innovation and the Family Firm

This section will begin with a general overview of the 39 family firm radical innovation studies in terms of how studies have engaged theoretical lenses in explaining radical innovation within family firms between 2003 and 2016. After the overview, the paper will then provide the definition of radical innovation followed by an assessment of the findings relating to radical innovation and the family firm.

The data analysis attempts to bridge the findings of these papers and (1) demonstrate the state of current understanding, and (2) discover the important directions in which to focus future research endeavours within each theme pertaining to radical innovation within family firms.

Between 2003 and 2016, the dominant theoretical lenses are located in RBV (11), agency theory (10), behavioural agency theory and SEW (8), and ability and willingness (4) comparing to the remainder.

These four theoretical lenses are not only the leading theories to explain family firms and radical innovation in terms of risk-taking behaviours regarding their goals and strategies, but also the foundations on which the remaining other theories are ultimately based upon. For instance, although there were other theoretical lenses used to explain radical innovation within family firms, such as absorptive capacity (Huang et al., 2015) and dynamic capability (Uhlaner et al., 2013), all were focused on dynamically reinforcing family firms' capability towards radical innovation. The basic ideas behind the use of these theoretical lenses are based mainly on the RBV, therefore.

The following sections will analyse radical innovation within family firms under the four theoretical lenses in detail and determine on-going gaps that are yet to be addressed.

3.2 Definitions and Treatment of Radical innovation among Existing Studies

Radical innovation can create a radical shift from the firms' current status to a novel position; its ultimate intention is to introduce new technology combination, new production line, or new products (Anderson & Tushman, 1990). Such innovation is highly uncertain and dynamic, searching for novelty emerges by integrating state-of-the-art techniques with the existing products and services, and combining the contexts of external business environment (e.g. institutional environments including policies, legitimacy, law, and taste of consumers) (Cheng & Van de Ven, 1996; Freeman & Soete, 1997). Many family firm innovation studies believe radical innovation could assist firms to gain a sustained competitive advantage and help family firms walk a big forward step in the current market (Konig et al., 2013; Uhlaner et al., 2013; De Massis et al., 2016). However, it is also difficult to specify radical innovation in a certain activity because radical innovation can have various forms that would cover a broad range of innovative activities.

Family firm radical innovation can be mainly divided into product innovation and process innovation within these studies. From a product perspective, radical innovation can be recognised as a technological innovation, which is different from the former product-development trajectory (Hill & Rothaermel, 2003; De Massis et al., 2012). For instance, the technological radical innovation examples cited in other non-family firm innovation studies are minicomputers (Christensen & Bower, 1996), biopharmaceuticals (Kaplan et al., 2003), and digital photography (Tripsas & Gavetti, 2000). From a process perspective, for instance, radical innovation can be identified as new product development process (NPD) (Cassia et al., 2011; De Massis et al., 2016). The purpose of NPD is to increase family firms' survivability by renewing the product process based on current economic and non-economic goals, social networks, values, and cultures of family firms (Kraiczy et al., 2014). Apart from the two specific radical innovation types above, some studies also investigate radical innovation activities as a whole within family firms (e.g. Patel & Fiet, 2011; Lichtenthaler & Muethel, 2012; Singh & Gaur, 2013). Since the studies have investigated different radical innovation perspectives, the findings could hardly be consistency-applied for all types of family firms. For instance, the studies of radical technological innovation within family firms cannot effectively apply in non-technological family firms.

Either product or radical process innovation can have levels of investment, and time spent in which the implementation of innovation could be highly associated with the unique characteristics of family firms (Carney, 2005; Kammerlander & Ganter., 2015; Miller et al., 2015; De Massis et al., 2016). On the one hand, a certain rate of family firm sizes and resources can determine levels of firms' capabilities in conducting radical innovation (Habbershon & Williams, 1999; Matzler et al., 2015). On the other hand, the intra-family conflicts (Block, 2010), family firm performance (Chrisman & Patel, 2012), and particular preferences and objectives of family members (Anderson & Reeb, 2003) can result in unique business plans, risk-aversion (Gomez-Mejia et al., 2007), and specific investment horizons (Thomsen & Pedersen, 2000; Chrisman & Patel, 2012), and result in varying levels of motivation towards innovation among various family firms (Anderson & Reeb, 2003; Gomez-Mejia et al., 2007). Since family firms are heterogeneous, it is not straightforward to compare the findings with those studies and draw consistent

conclusions about circumstances and conditions for radical innovation and family firms (Kammerlander & Ganter, 2015).

3.3 The RBV and Radical innovation

The RBV holds that the stock of valuable, rare, inimitable, and non-substitutable resources that a firm owns can provide it with a sustainable competitive advantage in its competitive market (Barney, 1991). The family firms' resources, such as strong internal and external social capital, internal financing activities, and highly unified ownership and control, can generate uniqueness in the family firm's resource base and serve as a basis for competitive advantage (Sirmon & Hitt, 2003). In principle, these resources determine the strategic options available for the firm, aligned with the general principle in the RBV that each firm is a unique bundle of these VRIN resources and so are capable to a greater or lesser degree to pursue different opportunities and courses of action (Barney, 1991). Family firms can rely on such uniqueness and further develop competitive advantage from it, one avenue for which may be a radical innovation.

Different from non-family firms, the financial support within family firms comes mostly from family members (Sirmon & Hitt, 2003; Covin et al., 2016). Such limited financing activity would result in limited financial resources that might constrain radical innovation activities which need abundant resources to start (Sirmon & Hitt, 2003; Chrisman et al., 2016). Also, the high altruism family firms' behaviour would associate with strategic decisions which tend to generate benefits (money and shares) and interests of most of the family members (Miller & Le Breton-Miller, 2005). Although such altruism behaviour can strengthen family bonds, and foster loyalty (Miller & Le Breton-Miller, 2005), it can also constrain the innovation activities in which the giving out financial benefits could generate financial resource scarcity, especially in family SMEs (Block, 2012). In the case of lacking financial resources, firms will put greater concern on short-term growth strategy other than jumping out of the box and establishing long-time horizon return (Sharma & Salvato, 2011; Singh & Gaur, 2013).

Social capital includes internal social capital (relationship among employees within the firm), and external capital (between the firm and external entities) (Hoffman et al., 2006; Chirico & Salvato, 2014).

Internally, since family members have shared values and goals, it can create highly cohesive daily operations within the firms regarding intensive and effective communication (Hoffman et al., 2006; Cassia et al., 2011). Such communication style can not only encourage mutual sharing of information, and facilitate flowing of information (Nahapiet & Ghoshal, 1998; Craig & Dibrell, 2006), but also enhance the feeling of trust among employees. Comparing to non-family firms, employees can better handle the problems, and deeper understand the mission and strategy of the firm (Kor, 2006). Hence, the family firm could quickly react to the opportunities with certain actions, and be confident to the risk-taking activities (Zahra, 2003). Externally, family firms can have the ability to search cooperation with stakeholders, develop long-term attachments with key stakeholders, and reinforce such partnerships and alliances with stakeholders through generations. According to Carney (2005) and Dunn (1996), establishing the contacts with stakeholders is not deemed as difficult because stakeholders are willing to connect to the family member who owns and manages a business, and has a certain social reputation. Also, the connected stakeholders prefer to invest in the innovation project that contains benefits from a long-term perspective (Chrisman & Patel, 2012; De Massis et al., 2015). By such support from external social networks, radical innovation activities could be adapted to a large extent (Covin et al., 2016).

However, the attention or emphasis attributed to risk-aversion in the family firm's decision-making will reduce when the family firm's financial resources are strong; specifically, an abundance of financial resources can increase the probability of adopting radical innovation within family firms (Covin et al., 2016). Considering the family firm size, larger firms can have more social, human and financial resources than SMEs (Danes et al., 2009), internally leveraging knowledge and abilities held by employees, and externally tending to have better chance to sense opportunities from a relative stronger social capital (Lichtenchaler & Muethel, 2012; Chirica & Salvato, 2014). These resources can increase family firms' probability in conducting innovation activities; and the negative impact from the radical innovation failure could be eased if firms have 'slack resources' which are more than actually needed (Gibbert et al., 2007).

Comparing to the large family firms, adopting innovation in a radical manner within the small family firms contains less freedom. In the beginning, radical innovation activities would require a high degree of 'sunk costs' (once it has invested, then it could not be moved), injecting into the research and development (R&D) (Singh & Gaur, 2013). After new products had published, the knowledge generated by R&D might be copied or 'invented around' by rival firms (Harabi, 1995). In such a situation, the R&D investment could hardly receive the full return as initially expected (Block, 2012). If family SMEs consumed a lot of resources and energy on innovation activities, which would contain a high degree of failure or long-term payoff, firms might meet resource scarcity and be hard to maintain daily operation (Sorensen & Stuart, 2000; He & Wang, 2004; Singh & Gaur, 2013). Therefore, SMEs firms may drop into a fluctuated market position judged by the degree of success of the innovation activities (De Massis et al., 2014; Chrisman et al., 2015).

Still, radical innovation activities cannot fully depend on the size of the firm. Although the larger family firm normally has stronger social capital, in which it can have better chance to recognize the opportunities from social networks (Lichtenthaler & Muethel, 2012; Kraiczy et al., 2014;), the strong social capital will constrain the radical innovation paradigm, because family members would favour the dense social capital and might tend to heavily rely on, instead of searching for enhancing the creativity of their own (Chirico & Salvato, 2014). In such the case, large family firms would not have an absolute higher chance in adopting radical innovation than that within SMEs (Craig et al., 2014). In addition, family SMEs can react to opportunities faster than large firms, because large firms have relative highly formalised bureaucratic system in which the decision-making should be made in a systematic way in order to meet the policy and legitimacy (Gudmundson et al., 2003; Patel & Fiet, 2011). At the same time, an innovation activity, especially a radical version, would force some parts of the firm to experience intensive change, which might raise family members' fear of losing job control latitudes (Craig & Moores, 2006; De Massis et al., 2016).

Considering the heterogeneity of different family firms, the adoption of radical innovation is associated with how many degrees of risks can trigger firms to conduct radical innovation (Singh & Gaur, 2013;

Sciascia et al., 2015). Family firms would like to engage in the innovation activities which can generate reliable performance other than high-performance innovation activities (Patel & Chrisman, 2014). Covin et al. (2016) found innovation activities are highly related to the 'resource bundle', including a certain market demand from customers, financial resources which can support an overall innovation project, a strong social capital which firms could rely on, and firms' knowledge which can help exploit the products and later gain competitive advantage. However, there is no causal relationship between each one of them within the resource bundle and radical innovation. That is, family firms should have developed their unique resource bundle as the basic condition for conducting radical innovation. Family firms having abundant resources could adopt radical innovation with fewer uncertainties than rival firms lacking in well-developed resources and resource bundle.

However, after we summarised studies through the lens of RBV (Table 1), the investigation of family firm firms is limited by bringing all possible resources held by a family firm and radical innovation activities together. It is beneficial to make a contribution to family heterogeneity and radical innovation in resource perspective. Thus, an unresolved gap, however, is what those resource stocks and bundles should consist of and whether specific resource histories and trajectories create lock-ins that may only further hinder the family firms.

Knowledge resources could not only be viewed as an important aspect in conducting radical innovation (Sirmon & Hitt, 2003; De Massis et al., 2012; Kotlar et al., 2013), but also help firms establish strong tacit knowledge in order to maintain the market position, and prevent competitors fully imitating (Lichtenthaler & Muethel, 2012; Chirico & Salvato, 2014). A question lies in how family firms acquire and utilise knowledge resources for radical innovation. For this, absorptive capacity is needed.

The process of increasing absorptive capacity could be different comparing to non-family firms. The separation of 'outsider' (non-family employee) and 'insider' (family member) mindset is rooted in many family firms (especially during first and second generations) (Zahra, 2012). Normally, founders would favour the development of their children, take extra care with other family members, and eventually undermine the non-family employees (Chua et al., 1999; Zahra, 2005). In this case of unequal treatment,

family firms can hardly retain the non-family talents (especially those who hold contradicted opinions with owners) (Zahra, 2012), and, over time, firms would be lacking in diversification of professional knowledge support, generating 'strategic simplicity' (highly routinized operational process) (Cohen & Levinthal, 1990; Miller, 1993). Although family firms are able to generate effective socialisation and shape the employee's idea towards a common goal, the firms would also narrow the innovation paradigm of employees and routinize the operation (Zahra, 2016; De Massis et al., 2015). Family firms would more and more prefer the status quo other than pursuing radical innovation, learning from the experience, and utilizing 'ready-made' planning in dealing with problems in the ongoing renewal business environment (Sharma & Salvato, 2011; Gomez-mejia et al., 2007; Zahra, 2016). As the non-family employees' knowledge has been less effectively utilised, the knowledge resource for adopting innovation activities would depend on the knowledge of founders and other family members (Miller, 1993; Block, 2012).

Family firms' founders, who act as the CEOs, have the power to integrate various resources around them and align such resources and their interests into strategic actions (Block, 2012). During development of firms, founders are equipped with vast of business experience both in business operation and innovative venturing (McConaughy et al., 1998; Li & Daspit, 2016). Li & Daspit (2016) contended that founders are more innovative than the managers within a family organisation. However, the investment behaviour of the founders will not stay constant in a long-term. That is, radical innovation activities would act in decreasing manner (Miller, 1993; Zahra, 2005). In other words, firms are active in risk-taking at the business start-up stage and becoming less incentive to consider radical innovation in mature stage (Zahra, 2005; Hannan & Freeman, 1984; Craig & Moores, 2006). The concern of founders will heavily put on how to protect family legacy and reputation through generations, and preserve family wealth for the next generations (Schulze et al., 2001; Chrisman & Patel, 2012). Also, the low innovation incentive and conservation decision behaviour of family founders can influence employees to act less motivated in adopting a radical innovation (Kellerman et al., 2008; Zahra, 2005; Lumpkin et al., 2015). Indeed, family firms have the ability to learn, but the narrowed information searching can impede the inflow of knowledge (Patel & Fiet, 2011; De Massis et al., 2016). Over time, the ability to conduct innovation

would be reduced and eventually undermined (Zahra, 2005) and committed to the family tradition (De Massis et al., 2016). The decision-making mindset might be caged regarding protecting family tradition and legacy for at least two generations in terms of first and second generation leaders would act conservatively in decision-making, and the third generation could manage more democratically in integrating ideas from both family members and non-family employees (Cruz & Nordqvist, 2012). Still, until the third generation, the only democratically decision behaviour can hardly to push firms to engage with the radical innovation because long-term low innovative orientation has created a rigid mental model of employees, which would constrain the innovative thinking (Huang et al., 2015).

The purpose of providing learning for founder-CEOs is to broad their mind to against the narrowed information searching (Hannan & Freeman, 1984; Sorensen & Stuart, 2000; Bassant et al., 2010; Zahra, 2012), to increase the founder-CEOs' sensitivity in seeking opportunities, and to lengthen founders' investment horizons (Miller, 1998; Kotlar et al., 2013; Lumpkin et al., 2015). Learning, in this case, is mainly practical oriented in providing risk project to founders to try on (Cucculelli et al., 2016). Through such learning, over time, family founder-CEOs could act less conservatively and would like to consider how to access wider resources, as well as how to utilise the resources effectively into innovation (Zahra, 2012; Cucculelli et al, 2016). It could result in higher chance in adopting a radical innovation.

To foster the ability of successors, family founders can provide on-the-job training (e.g. junior management interns) for next-generation leaders at their early age (Learning from relatives and other non-family employees) (Carnes & Ireland, 2013; Cruz & Nordqvist, 2012). Sending the next family organisation leader to train in other firms can not only differentiate their business experience but also can strengthen the trust and reinforce the contacts between firms (Carne & Ireland, 2013; Zahra, 2012). Also, it can develop family business affiliation and create chances to access financial resource towards radical innovation (Singh & Gaur, 2013). Kraiczy et al. (2014) found that a large number of generations within a family can bring fresh insights from different aspects that would stimulate the chance of adopting a radical innovation.

However, as we are viewing the findings from Table 1, the contextual difference might influence difficulties in implementation of the resource acquisition mentioned above. The learning process of founders and next-generation leaders can meet failure in adopting a radical innovation if they have the low individual absorptive capacity (Huang et al., 2015). That is, the process of receiving knowledge to utilising it into radical innovation could not be identified as effective. At the same time, knowledge accumulation is a slow and costly process in which firms should continuously inject time and money before witnessing the radical innovation adoption (Patel & Fiet, 2011). Also, family firms can hardly engage radical innovation if the external environment is changing dramatically (Block, 2012). For instance, radical innovation can hardly generate long-term benefits if the taste of the customers is changing quickly (Le Mens et al., 2015). There is little research conducting in what kind and degree of knowledge should founders, owner-managers or second generation leaders own that can help family firms conduct radical innovation.

In order to conduct radical innovation, the resources or resource bundles which family firms have or intangible resources which the firms tend to accumulate and acquire should fit the requirements of radical innovation adoption. Considering the uniqueness of family firms resources, family firms could establish resource stocks or bundle to create a basic condition for radical innovation adoption. The further radical innovation investigation within family firms can find the composition of the resource bundle.

Research gap 1: What resource bundles should family firms, possess or develop to facilitate a high degree of radical innovation? Are there specific resource histories and trajectories that create facilitate or hinder the family firm in terms of radical innovation activities?

Research gap 2: What kind and degree of knowledge should the family founder(s), owner-manager(s), or next-generation leader(s) possess, acquire or seek to build within the family firm to change the system of constraints in favour of radical innovation?

3.4 Agency theory and Radical innovation

A favourable agent, a manager or a management team, can represent some owner/owners to make a strategic decision by following the owner's best interest, and maximising the value (e.g. profits and market share) (Jensen & Meckling, 1976). In non-family firms, in order to reach such perspective, owners can assess the potential of the strategic decision which was made by agent managers, and then provide relevance resources as support; at the same time, monitor and confirm agent managers who would not make a decision by following the best interest of their own.

However, in non-family firms, agency problems can derive from the conflicts between the owner and agent managers in which agent managers tend to increase their utility during a project, but, at the same time, create a negative impact on organisational value (Block, 2012). For instance, agent managers have incentives to pursue the most advantages for themselves when a firm has acquired benefits from a venturing investment, but they would also lead shareholders to undertake the main losses when the investment of a project met failure (Leland & Pyle, 1977). In such the case of manager and owner conflict, and agent moral problem, firms would incur high costs on monitoring (e.g. issuing financial statements), or spend money on bonding managers with the firm (stimulating the managers' incentive) after utilizing constructed principles, which tend to constrain the agent manager's decision latitude (Chen & Hsu, 2016).

The unification of management and control within the family organisation could create close alignment between agent manager and owner, and further reduce the agent cost related to conflicts between owner and lenders (Block, 2012; Le Breton-Miller et al., 2015). Different from non-family firms, the family owner normally has great power to control the firm and make a dominant decision, and the high family involvement in management can generate effective monitoring and minimise the agency cost (Chen & Hsu, 2016). Carney (2005) found the family involvement will generate three main governance propensities, parsimony, personalism, and particularism. Parsimony entails that family firm tends to preserve the resources and to allocate them carefully. Firms, in this case, would reduce the risk-taking activities and pool the resources for current survival and future development. Personalism refers to the family firm has concentrated management and ownership, generating great power for family members.

Hence, strategic decision-making and problem solution could jump over the bureaucratic control within firms. Based on the premise of personalism, particularism entails strategic decisions may be influenced by non-economic family goals (Carney, 2005). For instance, family owner-managers should consider non-financial benefits (e.g. ownership) of others while making a strategic decision (altruism) (Chrisman et al., 2005; Chrisman et al., 2012).

In terms of firm survival, Carney (2005) found that the three governance propensities could bring distinctive ways in gaining competitive advantage. Parsimony propensity can help pool the resources (i.e. financial resources, and human resources), and outcompete other rivals in scarce environment (Sirmon & Hitt, 2003); while the combination of personalism and particularism can accumulate social capital (e.g. kinship, ethnicity group, community and political affiliation) for long-term development (Granovetter, 1994; Miller & Le Breton-Miller, 2003), and can have the power to make quick decisions in reacting to the opportunities.

However, the propensity of parsimony, personalism, and particularism can also influence the radical innovation in different ways. Under parsimony, family firms will primarily concentrate on wealth preservation and cost-saving instead of innovation venturing while dealing with the risk of market resource scarcity (De Massis et al., 2015; Sirmon & Hitt, 2003). Since radical innovation would require various resources, the generated huge sunk costs can hardly persuade the owner to take the investment if the coming innovation activities would also include great uncertainties (Singh & Gaur, 2013). In order to shift the owner's willingness towards innovation projects, agent managers, in such the case of parsimonious propensity, would like to make investments in low-uncertain innovation activities which can increase the sales in a fast speed with a short return period, instead of conducting the project which contains short-term losses but long time horizon for returns even it seems promising (Sharma & Salvato, 2011; Singh & Gaur, 2013).

Under personalism and particularism, although the high involvement of family members can provide owner-managers great power, the decision-making should be highly limited to altruism behaviour in which the only innovation activity, which can benefit most of the family members (both current

generation and next generations), will most likely be chosen (Lichtenthaler & Muethel, 2012; Berrone et al., 2012; De Massis et al., 2015). That is, the selected innovation activities tend to assist firms to lengthen the horizon for payoff and benefits for other family members (Chrisman & Patel, 2012; Singh & Gaur, 2013). Although family involvement can reduce agency cost on monitoring, the strong altruism behaviour (e.g. nepotistic appointments) and management entrenchment can lead family free-riders (who have high dividends but are not engaging the business) and provide power for family members to pursue self-interests (Chrisman et al., 2005; Block, 2012), which might cause misuse of funds in radical innovation projects, and eventually cause agency problems again (Chen & Hsu, 2016). Sometimes, high family involvement can render severe conflicts, which could generate an adverse impact on firm performance (Faccio et al., 2001).

After we have summarised the arguments through the lens of agency theory in Table 1, the degree of risk-aversion is highly related to the different degree of family involvement in ownership and management, and styles of governance (Fernandez & Nieto, 2006; Chrisman et al., 2015). Within high degree of the family ownership and parsimonious propensity, firms would less likely to adopt radical innovation because high ownership could create a tight organizational control by following the goal of wealth preservation, which can highly shape employees' idea and behaviour into conservative trajectory and block the innovative thinking over time (Chin et al., 2009; Cheng & Van de Ven, 1996; Munari et al., 2010). Under personalism and particularism and high family ownership context, although altruism thinking limits the behaviour of family firms, opportunistic investment decisions are encouraged if the proposed investment could be in line with the interests of family members (e.g. long-term profitable, and survival) (Zahra, 2003; Anderson & Reeb, 2003; Zahra, 2005). The family firm would, most likely, engage with radical innovation which contains great long-term benefits in line with goals and strategies even the coming radical innovation would put the short-term wealth at risk (Chrisman & Patel, 2012). In this case, the risk-aversion behaviour might be reduced when family firms tend to focus on long-term potential. However, there is little research classifying levels of family involvement in ownership and

management would generate different levels of risk-taking behaviour within family firms under personalism and particularism.

Research gap 3: Under what conditions does a family unit treat a radical innovation project as being in line with the interests of family members? What family properties encourage radical innovation as opposed to more conservative courses of actions?

3.5 Behavioural Agency, SEW and Radical innovation

Behaviour agency theory entails that the risk-bearing decision attitudes can be dependent on different contexts (Kahneman & Tversky, 1979). For instance, by combining resources, agency theory and radical innovation, family owners would pay great attention to avoid risk-taking, or at the very least calculating the risks of an innovation project in order to prevent the loss of wealth (Sciascia et al., 2015; Le Breton-Miller et al., 2015). This loss of wealth includes financial wealth and socioemotional wealth (SEW) (Gomez-Mejia et al., 2007). To this end, the decision-making of family firms is typically more loss-aversion than risk-aversion in terms of avoiding losses than with obtaining gains. For example, Gomez-Mejia et al. (2007) argued that when faced with a risk to financial and on-financial wealth (SEW), the family firm is willing to tolerate an economic loss (or hazard) to protect its SEW.

According to Gomez-Mejia et al. (2007), SEW endowment represents the non-financial wealth of the family and includes the preservation of family reputation and social identity, social capital, the degree of family influence (control), and the longevity of business through generations. On the one hand, family firms tend to protect family legacy and avoid pursuing the type of innovation which has strong tendencies to harm such legacy (De Massis et al., 2016); on the other hand, family firms would engage innovation for the sake of gaining long-term benefits without losing family control (Miller & Le Breton-Miller, 2005). Comparing to financial wealth, family firms typically place stronger attention on and attach greater importance to SEW endowment. Doing so results in two decision behaviours with regard to risk-taking.

First, according to Berrone et al. (2010), family firms have strong intention to preserve SEW endowment, even if such conservation intention will miss financial opportunities, which can further decrease sales

growth. In this regard, family firms would seldom conduct radical innovation because it might create changes and endanger the SEW endowment (e.g. social identity, ownership and control, and continuity of business) (Morck & Yeung, 2003; Berrone et al., 2012; Le Breton-Miller et al., 2015). Second, the preference of family firms could attach to risk-taking when the performance is showing a decreasing trend and in turn harm the SEW (Gomez-Mejia et al., 2007; Berrone et al., 2012). In order to rescue the SEW endowment losses caused by poor firms' performance, family firms can act more innovatively than before. In this case, innovation activities would be considered to a large extent for the purpose of saving SEW. However, theoretically, it implicates that risk-taking strategy will not be primarily pursued when the performance has not reached a point where SEW has witnessed a decreasing trend.

Although Chrisman and Patel (2012) argued that family firms could emphasise entrepreneurial behaviour particularly when much concerned about passing the business on to next-generation family members because renewal of the family business can provide career opportunities for next generations (Chrisman & Patel, 2012; Miller & Le Breton-Miller, 2005), considering such renewal process would be conducted under the premise of identity and reputation protection (Berrone et al., 2010), incremental innovation is more likely to be adopted as renewal strategy than radical innovation (Sharma & Salvato, 2011).

Chrisman & Patel (2012) and Le Breton-Miller et al. (2015) both argued that the risk-taking and risk-averse behaviour within family firms should be dependent on the weighting placed on pursuing either short-term or long-term goal. Short-term goals are specific, certain and practical and tend to deal with improving the current business (Carney, 2005; Sorensen & Stuart, 2000). When family firms put a heavier weight on pursuing short-term goals than long-term goals, family members would prefer to take short-term investment in order to maintain/enhance current SEW endowment and receive a quick return such as short-term sales growth (Chrisman & Patel, 2012; Miller et al., 2015). In this case, incremental innovation would be mainly considered in daily operation (Sharma & Salvato, 2011; Kraiczy et al., 2014). On the other hand, in general, long-term goals are generated from the combination of the firm's current performance, capability, business environment and business aims of the future (Porter, 1980). Compared to short-term goals, long-term goals are fuzzy and uncertain, containing not only risks but the potential

for firm's long-term development and survival. Since long-term goals are distant from the current business aim, if family members have the intention to pursue long-term goals instead of short-term goals, family firms need to act radically in strategic decision making and choose radical innovation as an option to assist family firms to achieve the goals. In such a case, family firms are willing to take short-term losses of both economic and non-economic wealth (SEW endowment), less emphasis on altruism behaviour, and tend to hire non-family talents (Chrisman & Patel., 2012; Sciascia et al., 2015), in contrast to what we might expect from a pure SEW perspective (e.g., Berrone et al.,2010; Gomez-Mejia et al., 2007).

By conducting an investigation into family manufacturing firms, Chrisman and Patel (2012) suggested that the investment horizon can be shifted from short-term to long-term within family firms. Family CEOs would like to calculate the potential losses and gains of wealth before investing in R&D and to assess the R&D performance frequently after the investment. For example, when uncertainties of conducting the innovation have exceeded family CEOs' perception of acceptable risks, family CEOs would hesitate to make a risky decision in responding to the innovation (Kammerlander & Ganter, 2015). Then the risky decision in such innovation activities would be diminished. However, if the R&D performance has met the perception of family owners in terms of increasing economic performance and, at the same time, maintaining or enhancing the SEW endowment, family owners would become more risk-willing to adopt fuzzier and longer-term investment which contains more uncertainties (Chrisman et al., 2012; Li & Daspit, 2016). In this case, innovation activities start from the incremental ones including a low degree of risks and uncertainties and move towards radical innovation (Kraiczy et al., 2014; Li & Daspit, 2016). Meanwhile, the investment horizon is also more and more concentrating on the longer term. If family firms have engaged in the long-term investment, and the actual R&D performance at current stage is lower than the performance aspirations regarding economic and non-economic wealth acquisition, family firms would suspect the current R&D might cause the further losses of financial and SEW wealth, and tend to invest more in the R&D in order to receive better R&D performance in the future (Chrisman & Patel, 2012). Through such a mechanism of investing in R&D, in the long-term, family firms would

have high chance to conduct radical innovation through the accumulation of learning and experiencing R&D. Juxtaposing above the arguments, family firms would conduct the radical innovation which has strong alignment with goals of family firms and can show a great potential for the future development of the firms.

Through the lens of behavioural agency theory and SEW, we summarised that family firms can engage with radical innovation if, first, family firms have a long-term investment horizon and intention to conduct radical innovation activities by investing in R&D, second, radical innovation is potentially associated with acquiring economic and non-economic wealth of family firms (Chrisman & Patel, 2012; Le Breton-Miller et al., 2015). When family firms started to conduct innovation activities, family firms can act conservatively in terms of tackling high certain innovation activities and willing to generate short-term benefits. This type of family firms would gradually release conservative tension and engage more uncertain innovation activities when firms have received a constant R&D performance which has met the perception of family owners (Patel & Chrisman, 2014). Family firms would conduct more risky innovation than before and eventually reach the condition to adopt a radical innovation.

Does maintaining SEW always conflict with the decision to take risks? Family firms would gradually take hold of SEW endowment while the family involvement is increasing (Gomez-Mejia et al., 2007; Berrone et al., 2012). In such case of family involvement, family firms would act progressively risk-averse. However, studies have found there is a positive relationship between family involvement and entrepreneurship behaviour (Konig et al., 2012; De Massis et al., 2014). Family involvement can enhance the family members' power in allocating human capital, social capital and financial capital towards R&D investment (De Massis et al., 2012). At the same time, the increase of family members, especially involving numbers of multiple generations, can broaden the firms' knowledge in sensing business opportunities (Lichtenthaler & Muethel, 2012; Kraiczy et al., 2014). In this case of family involvement, family firms would increasingly take hold of SEW endowment but at the same time enhance risk-taking behaviour.

Gomez-Mejia et al. (2007) suggested the risk-taking or risk-willing decision behaviour should depend on the maintaining of SEW endowment and rescuing the loss of SEW endowment respectively. SEW entails five dimensions (family control and influence, identification of family members with the firm, binding social ties, emotional attachment of family members, and the renewal of family bonds to the firm through dynamic succession) (Berrone et al., 2012). Which dimension could be identified as the current priority in fitting in current strategies of family firms? Are these SEW dimensions all tend to block family firms' risk-taking behaviour, and, in turn, impede radical innovation at all? Kammerlander and Ganter (2015) found that there are different aspects of noneconomic goals which can lead different decision behaviours within family firms.

The decision behaviour might be different referring to the dimensions of family identity and transgenerational value (Chrisman & Patel, 2012; Kammerlander & Ganter, 2015). Family firms are less willing to conduct radical innovation because radical innovation might result in changing in family members' control latitudes and diluting their ownership, or ruining the identity of family firms (Chen & Hsu, 2016). However, according to Chrisman et al. (2015), family firms would shift the risk-averse towards risk-willing when the family is currently concentrating on maintaining transgenerational value in the future. Family firms would strive for intrafamily succession and conduct radical changing in order to increase transgenerational control (Berrone et al., 2012; Chrisman et al., 2015). Therefore, we identified the current research gap of family firms could be a contingent factor which can drive family firms to either place more weight on maintaining transgenerational control than maintaining the identity of family firms or vice-versa. In this case, family firms are risk-averse or risk willing even firms have the same purposes of maintaining SEW endowment.

Research gap 4: Is SEW a multi-dimensional concept that can both support and dilute radical innovation?

3.6 Ability and Willingness, and Radical innovation

Ability entails the discretion of family members to manage family firms' resources towards a strategic direction, and the capability (combination of financial resources, human resources, social capital, and firms' knowledge and experience) of family firms allows family firms to pursue the strategic direction in

question (De Massis et al., 2014). Willingness, however, is related to family owners' goals, intentions and motivation, which can drive family firms to behave in a particular way (Chrisman et al., 2015).

Miller et al. (2015) contended SEW dimensions could impact on innovative goals construction and identified two extremes of SEW objectives in line with the decision behaviour of family firms. The first extreme is 'feeding parochial family desires (FPFD)'. Under this specific SEW objective, family firms act conservatively focusing on parochial family interests, and in turn, create a risk-averse organisational culture in decision-making. Such risk-averse behaviour can decrease the investment in radical innovation activities and in turn block family firms' ability to innovate through generations. Second, the other extreme of SEW is 'creating an evergreen organisation (CAEO)' in which family firms act proactively in innovation by continuously investing in stakeholders, human capital, and social capital. The vision of this evergreen family firm type is to establish a robust business.

SEW dimensions may shift across conservative behaviour and innovative behaviour. If SEW dimension can drive family firms' willingness to start acquiring resources to innovate (Chrisman et al., 2015), family firms may pursue radical innovation more when SEW has reached the CAEO extreme. The research gap here is what factors drive SEW to shift towards CAEO extreme and in turn increase willingness to pursue radical innovation and construct relevant, innovative goals.

Research gap 5: What factors can drive family SEW towards CAEO dimension, increasing willingness to pursue radical innovation and construct relevant innovative goals?

The business environment can play an important role in the strategic decision-making. Strategic goals are set after analysing the environment regarding demand, market competition and taste of consumers (Le Mens et al., 2015). Sometimes, the volatile environment including unstable demand, strong market competition and frequently change the taste of consumers can put pressure on family CEOs to rethink the current strategic goals as well as the long-term ones. Such volatile environment can twist long-term strategic goals which were set at the beginning (Venkatraman & Camillus, 1984; Prajogo, 2016).

Both family firms and non-family firms have two aspects in firms' adaptive behaviour: firms create a strategy to match with the current business environment and at the same time diversify firms' capabilities to fit the environmental changes (Andrani, 2001; Venkatraman & Camillus, 1984). In the low dynamic business environment, the future will be more or less like the present (Hamel, 1996; Hannan & Freeman, 1978). The taste of consumers is predictable and changed slowly. In such context, a competitive advantage could be acquired by diversifying products and services and try to act differently from other rivals (Porter, 1990; Sharma & Salvato, 2011). Family firms can implement incremental innovation to maintain survivability and the fitness of the environment. Theoretically, as long as firms are constantly creating strategic fitness, family firms can prevent entering the age of obsolescence (new products will replace the existing products and lead the existing products obsolesced in a business market) (Venkatraman & Camillus, 1984; Hannan & Freeman, 1977). In such a low dynamic environmental context, radical innovation is not urgently needed during business development. When radical product innovation is conducted, consumers might have little knowledge and experience while facing to new products (Le Mens et al., 2015). It will take a longer period for consumers to understand the new products than those within the highly dynamic environment (Prajogo, 2016). Since radical product innovation can ruin the social identity (one of the SEW dimensions) within consumers' mind, the consumers will question the reliability and capability of family firms regarding how the products can compete with the top performers with the similar price level (Sorenson & Stuart, 2000). The consumer can hesitate to choose the new products and lead the sales growth down the bottom (Le Men et al., 2015). Although radical innovation might be promising in the future, family firms need to stand for a long period low or no sales profits until when consumers have realised the new products are much better than the current ones and decided to switch their mind towards the new products (Prajogo, 2016). Therefore, the low environmental dynamism would decrease CAEO intensity and increase FPF intensity and family firms are less willing to allocate resources towards radical innovation.

When family firms are operating in a highly dynamic environment with high turbulent and uncertainties, and the taste of consumers is changing quickly, the continuous improvement within family firms can have

difficulties in tracking environmental changes (Allen, 2001). Because of the taste of consumers is frequently changing, this situation would create numbers of niches within the market (Prajogo, 2016). The niches can provide family firms opportunities to implement radical innovation (Porter, 1980). Family firms, in this case, can act radically and keep generating new products to attract consumers' attention and adopt the environment (Craig & Moore, 2006; Prajogo, 2016; Venkatraman & Camillus, 1984). CAEO can be increasingly taken hold and drive family firms to invest more intensively by investing more in R&D. Because of the taste of consumers is frequently changing that results in old fashion products outdated, it is difficult for family firms which have little intention to pursue radical innovation to survive. In order to increase the survivability and create strategic fit, family firms would decrease the FPF intensity and engage more radical innovation.

Research Gap 6: How does environmental dynamism moderate the relationship between CAEO intensity and degree to pursue radical innovation and the relationship between FPF intensity and degree to pursue radical innovation within family firms?

4: Conclusions

After examining radical innovation within family firms by systematically reviewing 39 papers published between 2003 and 2016, we found the main investigations fall under the theoretical lenses of RBV, agency theory, behavioural agency theory and SEW, and ability and willingness. Within these four theoretical lenses, RBV and agency theory were leading theories in the last decade; while behavioural agency theory and SEW, and ability and willingness paradox have grown substantively in use from the year 2007 and 2012 respectively. The main argument of radical innovation among the four lenses could lie in the alignment among family involvement in ownership and management, resources, governance and goal settings. That is, if family firms have long-term investment horizon and the proposed radical innovation is in line with the goals and strategies, family firms could have strong willingness to devote into the radical innovation by conducting internal financing activities (e.g. acquiring financial support from family members), investment for R&D, and knowledge acquisition for specific knowledge renewal

(Sirmon & Hitt, 2003; Chrisman & Patel, 2012; Covin et al., 2016; Cucculelli & Daspit, 2016). By having strong motivation, family firms can have high chance to adopt radical innovation by the time when resources have been accumulated to a certain degree (Cohen & Levinthal, 1990; Chandy et al., 2003; De Massis et al., 2014).

A key question lies in what the key factors which can drive family firms towards risk-taking. By analysing RBV, agency theory, behavioural agency theory and SEW, and ability and willingness debates separately, the radical innovation adoption could depend on if family firms have resource bundle to support radical innovation activities, what the level of family involvement in ownership and management is, and what the style of governance is. However, these mentioned criteria can hardly be specified because family firms are highly heterogeneous that can result in various combinations of resources, levels of family involvement in ownership and management, and types of governance structures. For instance, two family firms have the same level of family involvement in ownership and management, and hold the same resources could result in different goals, strategies, and risk-taking behaviour.

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Table 1 Article Overview

No.	Articles	Paper type	Theories	Sample	Data type	Finding	Arguments from the supported papers	Talking radical innovation
1	Chrisman et al. (2012)	Qualitative	Agency theory, ability and willingness	Structural literature review	Secondary data	Different agency types will generate different agency costs, which will influence future firm strategies in nonfamily management buy-in or buy-out.	Unified family governance structure constrains family firms' risk-taking behaviour and willingness to innovate	Supportive
2	Chrisman et al. (2015)	Qualitative	Ability and willingness	Structural literature review	Secondary data	Although increasing family involvement is positively associated with family owner-managers' discretion to allocate resources to innovate, family involvement is not necessarily related to the willingness to pursue radical innovation.		Yes
3	Veider and Matzler (2015)	Qualitative	Ability and willingness	Structural literature review	Secondary data	Ability and willingness paradox is not a general rule in every family firm. Innovative behaviour depends on the goals of family firms.	Family firms' willingness to innovate is based upon how family firms face the challenges	Supportive
4	De Massis et al. (2014)	Qualitative	Ability and willingness	Structural literature review	Secondary data	Family-oriented behaviour is generated by combining ability and willingness together.	Innovation activities of family firms is influenced by ability and willingness	Supportive
5	Zahra et al. (2004)	Quantitative	RBV	536 manufacturing companies. U.S	Secondary data	1 Individual orientation family firms' culture is positively associated with entrepreneurship behaviour, but this relationship will be then negatively related in the later stage. 2 the diversification of employees' ability is positively related to entrepreneurship behaviour. 3 Decentralised control is positively associated with entrepreneurship behaviour.	1 Family firms are innovative at the beginning of organisational life-cycle. 2 Knowledge resources are crucial for family firms' innovation.	Supportive
6	Cassia et al. (2011)	Qualitative	RBV	Case study of Four family firms, Italy	Secondary data	High 'closure' attitudes of family firms are negatively related to NPD process. NPD process needs the high motivation of family firms.		Yes
7	Chrisman et al. (2005)	Qualitative	RBV and Agency theory	Structural literature	Secondary data	Family involvement will influence family firms' performance.	Family involvement can increase altruism and	Supportive

				review		entrenchment, which will nullify the value of existing capabilities and slow down the development of new capabilities.	
8	De Massis et al. (2012)	Qualitative	Agency theory	Structural literature review	Secondary data	Demonstrating current knowledge in family involvement and R&D expenditure and future questioned the relationships among innovation input, output, and activities as the fundamental thinking of family firms and technologic innovation studies.	Yes
9	Singh and Gaur (2013)	Quantitative	Agency theory	4946 firms in Bombay Stock Exchange, India.	Secondary data	1 Family ownership has a positive relationship with R&D intensity in a new market. 2 R&D investment is positively associated with family ownership in a new market.	Yes
10	Zahra (2005)	Quantitative	Agency theory, entrepreneurship	497 responses from 209, U.S manufacturing firms	Primary data	1 Family ownership and involvement have positive relationship with technological innovation 2 Long CEO tenure has negative relationship with technological innovation	Yes
11	Chen and Hsu (2009)	Quantitative	Family ownership and R&D investment	124 responses from 76 firms, Taiwan	Secondary data	Family ownership is negatively associated with R&D expenditure	Supportive
12	Block (2012)	Qualitative	Agency theory	154 firms listed in S&P 500, U.S	Secondary data	Founder involvement has a positive relationship with innovative activities in a later stage in organisational life-cycle within family firms.	Yes
13	De Massis et al. (2016)	Qualitative	Governance structure (Ownership and management)	Structural literature review	Secondary data	Creating an agenda to demonstrate how family firms innovate through tradition.	Yes
14	Kellermanns et al. (2012)	Quantitative	Agency theory and stewardship theory	126 responses from 70 firms, U.S.	Primary data	1 Innovativeness in family firms is positively associated with family firm performance. 2 generational ownership dispersion is positively related to innovativeness.	Yes

15	Konig et al. (2013).	Qualitative	Family influence, 4C (command, continuity, community, and connections)	Structural literature review	Secondary data	Family firms have high speed and stamina of implementing radical innovation strategies when family firms have made the decision to pursue the innovation strategies.		Yes
16	Chrisman et al. (2015)	Qualitative	4C (command, continuity, community, and connections)	Structural literature review	Secondary data	Ability and willingness paradox plagues family firms to innovate. However, how will family firms be surviving without conducting any innovation activities?		Yes
17	Le Breton-Miller et al. (2015)	Qualitative	Agency theory, Behavioural agency theory, RBV	Structural literature review	Secondary data	It has found out positive and negative side of agency theory and behavioural agency theory, generating future propositions for the future	1 High levels of tenure is negatively related to firms' entrepreneurship behaviour 2 the number of family member board directors' presence is positively related to entrepreneurship behaviour 3 family involvement in management is positively related to entrepreneurship behaviour.	Supportive
18	Sciascia et al. (2015)	Quantitative	Behavioural agency theory and SEW	240 firms, Italy	Primary data	1 Family ownership is negatively related to R&D intensity 2 Less family wealth invested in family firms, the higher R&D intensity.	SEW endowment is negatively related to R&D intensity.	Supportive
19	Kraiczy et al. (2014)	Quantitative	Upper echelon theory	63 firms with 127 TMT members, Germany	Primary data	1 new product development is positively related to multiple generations involving in TMT. 2 new product portfolio performance and experience are negatively associated with the ratio of family members involving in TMT.		Yes
20	Patel and Fiet (2011)	Qualitative	RBV	Structural literature review	secondary data	Family firms have advantages in enduring knowledge structures, shorter responding opportunities, combining diversified sets and creating economies of scope	When family survivability is threatened, firms will search for alternatives.	Supportive
21	Ingram et al. (2014)	Qualitative	Paradox theory	178 executive responses	Primary data	CEO with paradoxical thinking can increase innovative behaviour	Family employees'' knowledge and ability	Supportive

				from 125 firms			matter for pursuing innovation activities.	
22	Sirmon and Hitt (2003)	Qualitative	RBV	Structural literature review	Secondary data	Family firms have five idiosyncratic resources which bring competitive advantages. They are family human capital, family social capital, family patient capital, survivability capital, governance structure & costs.	Comparing to nonfamily firms, family firms have advantages in pursuing innovation activities by relying on these resources.	Supportive
23	Chirico and Salvato (2014)	Quantitative	RBV (Knowledge internalization) and product development (PD)	592 firms, Switzerland.	Primary data	1 Dense social capital will can innovation inability within family firms because family members will strongly rely on the social capital. 2 social capital enhances product development outcome.	Social capital has an invert U-shaped relationship with the pursuit of conducting PD processing.	Supportive
24	Matzler et al. (2015)	Quantitative	Agency theory	829 firms, Europe	Secondary data	1 There is a negative relationship between family ownership and R&D intensity. 2 Family involvement is positively related to innovation outcomes.		Yes
25	Carney (2005)	Qualitative	Agency Theory, RBV	Structural literature review	Secondary data	There are three types of family firm governance, parsimonious, particularism and personalism.	Innovation activities are more likely conducted in the combination of particularism and personalism governance type.	Supportive
26	Sharma and Salvato (2011)	Qualitative	Ambidexterity	Structural literature review	Secondary data	Incremental innovation is largely helpful when family firms are at the grown-up stage. Radical innovation is needed when the market is highly saturated.	In order to achieve highest firm performance, family firms need to combine the incremental and radical innovation together.	Supportive
27	Covin et al. (2016).	Quantitative	RBV (resource bundle)	1749 responses, Germany, Austria, Switzerland, Liechtenstein.	Primary data	The combination of customer responses, social network and innovation motivation is positively related to radical innovativeness in family firms. Adding financial resources will maximise this relationship.		Yes
28	Lichtenthaler and Muethel (2012)	Quantitative	Dynamic capabilities	165 medium-sized firms, Germany.	Primary data	Family involvement is positively related to the sensing capacity of innovation.		Yes
29	Cucculelli & Daspit	Quantitative	RBV,	3200	Secondary	1 Radical innovation activities are highly		Yes

	(2016)		Governance structure	companies, Italy.	data	dependent on founders' risk-taking behaviour. 2 Poor firm performance is positively related to risk-taking behaviour; good firm performance has a negative relationship with risk-taking.		
30	Craig and Moores (2006)	Quantitative	Four-stage life-cycle	67 companies longitudinal studies, Australia.	Primary data	The relationship between technoeconomic uncertainty and innovation is weaker at a later stage than that in the early stage of organisational life-cycle.	Innovation activities are conducted more in established firms than those within young firms.	Supportive
31	Kammerlander and Ganter (2015)	Quantitative	SEW, Attention-based view	Case study of 8 firms, Germany	Primary data	1 Economic and noneconomic goals are mutually reinforcing when family firms are experiencing an intensity development. 2 different noneconomic goals lead different firm radical innovation behaviours		Yes
32	Gomez-Mejia et al. (2007)	Quantitative	Behavioural Agent theory, SEW	1237 firms, Spain.	Primary data	Family firms will largely avoid risk-taking for the sake of preserving SEW endowment. However, family firms can be highly innovative when SEW endowment witnessed a significant loss.	The behaviour of preserving SEW will gradually block innovation activities during development.	Supportive
33	Chrisman and Patel (2012)	Quantitative	Behavioural Agency theory, SEW	964 firms, U.S	Secondary data	1 When results are below the aspirations, family firms will shift to lose mode and then increase the R&D expenditure. 2 Increasing in investment-time horizon can ease the risk-averse behaviour and increase the R&D expenditure.	SEW dimensions can direct family firms' attention towards either conservative or highly innovative.	Supportive
34	Berrone et al. (2012).	Quantitative	Behavioural Agency theory, SEW	43 family firms, and 43 nonfamily firms, U.S.	N/A	SEW consists FIBER dimensions.	SEW can be shifted at any point in time and generate different innovative behaviour.	Supportive
35	Miller et al. (2015)	Qualitative	RBV, SEW	A case study of 4 firms, UK.	Primary data	SEW can generate two extreme behaviours which are rooted in family firms and influence decision to pursue innovation. One is 'feeding parochial family desires' (FPFD), and the other is 'creating an evergreen organizations' (CAEO). CAEO directs family firms are making the	SEW dimensions are the key factors to influence innovative goals creation.	Supportive

						innovative decision to pursuing firms' development; while FPF type firms prefer to maintain status quo by acting conservatively and voiding risk-taking.		
36	Kraicz et al. (2014)	Quantitative	SEW	63 nonfamily firms and 114 small and medium family firms, Germany	Primary data	CEO's risk propensity is positively associated with new product portfolio innovativeness. This relationship is stronger in the early stage than in later stage in organisational life-cycle.		Yes
37	Huang et al. (2015)	Quantitative	absorptive capacity	165 firms, Taiwan.	Primary data	1 R&D spending is positively related to innovation. the investment in R&D employees can increase the skills and knowledge held by employees and in turn increase organisational absorptive capacity. 2 absorptive capacity moderates the relationship between R&D expenditure and innovation.	Absorptive capacity can help facilitate innovation.	Supportive
38	Uhlener et al. (2013)	Quantitative	Dynamic capability	229 firms, Netherlands.	Secondary data	1 Process innovation has more effects on sales growth than product innovation in SMEs. 2 external sources is positively related to sales growth 3 employee involvement in renewing activities is negative related to sales growth.	Resources are important for family firms pursuing innovation.	Supportive
39	Craig et al. (2014).	Quantitative	Entrepreneurial orientation	127 food industry firms, 246 media firms, 159 shipbuilding firms, Finland	Primary data	Risk-taking does not impact on innovation output.	There is no relationship between risk-taking behaviour and innovation outputs.	Supportive