How open innovation can help entrepreneurs in sensing and seizing entrepreneurial opportunities in SMEs

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How Open Innovation can Help Entrepreneurs in Sensing and Seizing Entrepreneurial Opportunities in SMEs

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Abstract

Purpose
This study explores how open innovation (OI) can be instrumental for entrepreneurs in sensing and seizing entrepreneurial opportunities in SMEs. This study also illustrates how OI can help SMEs overcome the liability of smallness.
Design/methodology/approach
This is exploratory research using an inductive, multiple-case study approach. This study capitalizes on five in-depth case studies of European SMEs to explore a phenomenon using replication logic and provide a robust basis for theory building.
Findings
This study presents a holistic view of the OI process in SMEs and illustrates the crucial role of entrepreneurs. The study provides a better understanding of how OI can help entrepreneurs sense and seize entrepreneurial opportunities by envisioning venture ideas and implementing business model innovation through the management of innovation partners.
Originality
The study emphasizes two critical roles of entrepreneurs in implementing OI in SMEs. First, the entrepreneur can be the instigator of strategic change, and second, he / she can orchestrate the innovation network. The findings emphasize that OI helps avoid knowledge corridors at the venture idea stage, leading to a (re)structuring of the business model and the emergence of a network of innovation partners, which should be managed hands-on. This study discusses in detail the two crucial roles of entrepreneurs.

Keywords: Open Innovation, Entrepreneurship, SMEs, Innovation Network, Business Model Innovation, Case Study, Qualitative research

Introduction:

Open innovation (OI) was launched by Chesbrough (2003) to differentiate between traditional innovation focusing on internal resources and OI, where the innovative power of companies is based on external knowledge and the exchange of ideas and resources across organizational boundaries. OI initially focused on large companies, and it took almost a decade before OI research started to focus on small and medium enterprises (SMEs) (Hossain and Kauranen, 2016; Kraus *et al.*, 2020; Lee *et al.*, 2010; Spithoven *et al.*, 2013; Stefan and Bengtsson, 2017; Suh and Kim, 2012; Theyel, 2013; van de Vrande *et al.*, 2009; Wim *et al.*, 2018). These studies on OI in SMEs showed that SMEs apply OI differently than large companies and that OI may play a crucial role in an SME's process of sensing and seizing business opportunities.

For many SMEs, the business landscape is becoming increasingly competitive due to a lack of necessary resources and complementary assets, mounting commoditization pressure, price battles, increasing globalization, shortening product life cycles, and changing government regulations (Parida *et al.*, 2012; Vanhaverbeke, 2012). To face these challenging business conditions, SMEs must focus on strategic (re)orientation to capitalize on entrepreneurial opportunities (Vanhaverbeke, 2017). Usually, the SME manager or entrepreneur envisions a business idea to overcome the above challenges and develop the identified opportunities into a successful new business. Davidsson (2004) refers to these ideas as "venture ideas" and defines them as the creation of individuals' minds. Venture ideas are unambiguous but changeable ideas that are acted upon. He argues that these venture ideas exploit opportunities, which are an integral part of entrepreneurship (Gartner, 2001; Kirzner, 1973; Morris *et al.*, 1994). The entrepreneur, considering prevailing external conditions and with a good understanding of the market, comes up with the venture idea, which is generated in the entrepreneur's mind based on the perception of market and technology conditions. The venture idea is not formed as a

complete, concrete, and unchangeable entity; it includes (what scholars have referred to as) "idea generation," "opportunity identification," "opportunity formation," and "opportunity refinement" (de Koning, 1999; Gaglio, 1997). Entrepreneurs with prior relevant experience (López-Muñoz et al., 2023) and open mindset (Flamini et al., 2022) are better equipped to identify the opportunities and strategically formulate their business models by leveraging external knowledge resources.

Once an opportunity is sensed by the entrepreneur, SME usually face a new problem: they do not have the in-house knowledge and technological resources required to develop these venture ideas (Brunswicker and Vanhaverbeke, 2014; Woods *et al.*, 2019). Opening the boundaries of their innovation process and systematically using externally generated knowledge is therefore paramount for SMEs to successfully sense and seize entrepreneurial opportunities. Preliminary data and anecdotal evidence suggest that SMEs increasingly use OI to overcome these liabilities (Albats *et al.*, 2021; Bianchi *et al.*, 2010; Meng *et al.*, 2021; Usman *et al.*, 2018; van de Vrande *et al.*, 2009). Through the synergistic integration of external and internal resources, OI facilitates innovation and marketing capabilities (Gimenez-Fernandez et al., 2022), and strengthens the acquisition of sustainable competitive advantage (Malodia et al., 2023).

There is no clear understanding in the current literature on OI in SMEs of the entrepreneur's role in an OI context and how OI can be instrumental for entrepreneurs in sensing and seizing entrepreneurial opportunities (Flamini *et al.*, 2021; Sikandar and Abdul Kohar, 2022). Most of the studies on OI in SMEs are limited to the high-tech SMEs, while the literature on medium-low tech SMEs only accounts for 8% of the articles on OI (Obradović *et al.*, 2021). This study addresses this research question through an exploratory, multiple case study using longitudinal data, which allows us to develop an OI framework that can help scholars and practitioners answer this question. This study contributes to the current research

on the role of entrepreneurs in sensing and seizing entrepreneurial opportunities through OI by examining the key roles of an entrepreneur and how a venture idea, once transformed into a business model, its development and launch with the help of a network of partners. Although research indicates that inter-firm engagement in a firm's network increases its innovation capabilities (Konsti-Laakso et al., 2012; Zardini et al., 2023), setting up and managing this network of partners is a new role for entrepreneurs once they start OI activities. This role is not well understood and is mismanaged in many innovation projects of SMEs, contributing to the high failure rate of open innovation projects initiated by SMEs. Hence, the paper also answers several calls to analyze the role of entrepreneurial leadership in OI implementation (Obradović *et al.*, 2021; Sikandar and Abdul Kohar, 2022; Torchia and Calabrò, 2019) and we will present an OI framework for the SMEs with entrepreneur playing the central role.

The paper is organized as follows. First, we describe the current literature about entrepreneurial opportunities and why sensing and seizing these opportunities is important, especially for SMEs in low- and medium-tech industries. Next, based on literature research, we illustrate how OI can help SMEs sense and seize entrepreneurial opportunities to secure SMEs' growth. The next section develops a theoretical framework to analyze five in-depth case studies. Subsequently, the methodology for the study is explained, followed by the key findings and discussion of the case studies. Finally, we wrap up the major findings, discuss implications for theory and practice, and explore how this line of research on OI in SMEs can be further extended.

2. Literature Review:

The literature review is divided into three broad themes to better understand the key concepts required to develop a theoretical framework that can clarify how OI helps

entrepreneurs improve their SMEs' competitiveness and grow their businesses through innovation. First, it focuses on entrepreneurial opportunities, followed by the entrepreneur's role in securing SME innovation-led growth. It then concludes with a literature review on OI in SMEs.

2.1. Entrepreneurial Opportunities:

Entrepreneurship research mainly focuses on maximizing the benefits of an entrepreneurial opportunity, commonly known as opportunity exploration and exploitation. Shane and Venkataraman (2000) define the field of entrepreneurship as the study of "how, by whom, and with what effects opportunities to create future goods and services are discovered, evaluated, and exploited' (p. 218). An entrepreneur must sense and seize new business opportunities to initiate strategic (re)orientation or to develop new processes, products, or organizational methods. Most entrepreneurship literature focuses on the entrepreneurial process once an opportunity is identified. In other words, there is a strong focus on the opportunity "exploitation" stage. Many researchers reflected on this bias as they primarily based their analysis on neoclassical economics or psychological theories. Neoclassical economists assume that entrepreneurs identify or sense the same opportunities in a given context, such as a major technology change (Khilstrom and Laffont, 1979). The psychology theorists believe that the entrepreneurial process is based on people's willingness and ability to take action owing to some special personal attributes that some people have, such as risk-taking (Brockhaus and Horwitz, 1986), self-efficacy (Chen *et al.*, 1998), need for accomplishment (McClelland, 1961), and perseverance (Kitchell, 1997). Austrian economists, in contrast, argue that people have different prior knowledge or information and therefore tend to sense the opportunities differently (Kirzner, 1997). According to Shane (2000) and Baron and Ensley (2006) entrepreneurship and prior knowledge are directly correlated. Austrian economists provide an insightful understanding of the opportunity sensing process. Discovering the right

opportunities eventually lead to more interesting business opportunities and, hence, to business growth. Some scholars have weighed this debate from the perspective of opportunity creation and opportunity discovery, while the latter is the dominant perspective (Shane, 2012; Suddaby *et al.*, 2015). Proponents of the opportunity discovery approach argue that entrepreneurs who identify opportunities are significantly different from others in their capability to perceive opportunities or, upon recognition, to capitalize on them (Kirzner, 1997; Shane, 2012), while proponents of opportunity creation theory emphasize the significance of entrepreneurs' cognitive abilities/psychological attributes or charisma as more important than expert leadership, to seize the opportunity expertise, is also of key importance (Alvarez and Barney, 2007; Busenitz and Barney, 1997).

In addition to the above theoretical perspective on the role and characteristics of entrepreneurs in opportunity sensing, some scholars have attributed this characteristic of identifying entrepreneurial opportunity to managerial traits as well. For instance, some scholars have analyzed managerial characteristics from the perspective of managerial factors and the entrepreneur's functional background (Finkelstein *et al.*, 2009; Lazzarotti *et al.*, 2011). Ardichvili *et al.* (2003) argue that high entrepreneurial alertness leads to high levels of opportunity identification, wherein entrepreneur personality traits, social network and prior knowledge of markets, customers and ways to serve market increases entrepreneurial alertness. Entrepreneurs are more likely to seize opportunities with more perceived market-demand knowledge (Choi and Shepherd, 2004). Some scholars have emphasized the importance of inter-organizational networks in which entrepreneurs are embedded for increased opportunity sensing and seizing (Brunswicker and Vanhaverbeke, 2014; Lee *et al.*, 2010). Some have linked it with the entrepreneurial orientation of the entrepreneur (Lumpkin and Dess, 1996; Westerman *et al.*, 2006). Once an entrepreneurial opportunity is sensed, the next imminent role of the entrepreneur is to seize the opportunity for SMEs' growth.

2.2. Role of Entrepreneur in SMEs' Growth:

While analyzing the role of the entrepreneur in an SME's growth, the authors follow Austrian theorists to look at human-side influence on the OI processes. They argue that opportunities are identified based on the entrepreneur's prior knowledge and ability to search for and process information (Baron and Ensley, 2006; Shane and Venkataraman, 2000). Kirzner (1985) argues that possession of prior information appropriate to a specific opportunity leads to opportunity sensing. Kuratko and Audretsch (2009) describe entrepreneurship as a dynamic process of vision, change, and creation. The authors identify entrepreneurship and strategic management as dynamic processes essential for firm performance. Entrepreneurship encourages strategic agility, creativity, flexibility, and continuous innovation throughout the business also referred to as dominant logic (Bettis and Prahalad, 1995).

Ghobadian and Gallear (1997) and Brunninge *et al.* (2007) argue that entrepreneurs are responsible for several facets of business operations and decision-making; therefore, SMEs have no formal planning process. The authors argue that this prompts multifunctional planning in an entrepreneur's mind, stimulating creativity. Entrepreneurs have a strong effect on the strategic direction of SMEs (Eisenhardt and Schoonhoven, 1990; Entrialgo *et al.*, 2000) and in pursuit of the entrepreneurial opportunities (Khanin *et al.*, 2022). The existing literature illustrates the significance of the entrepreneurs' prior experience for opportunity identification and development in the same industry (Ardichvili *et al.*, 2003; Barringer *et al.*, 2005; Finkelstein *et al.*, 2009) and as well as prior experience of the entrepreneur for the same level in the other industries (Eisenhardt and Schoonhoven, 1996). However, the role of entrepreneur at the micro level in low-and medium tech SMEs on the implementation of OI led growth strategies has received negligible attention in the literature (Ahn *et al.*, 2018; Barrett *et al.*, 2021; Santoro *et al.*, 2020). Moreover, while scholars have also analyzed the cognitive aspects of entrepreneurs to analyze personal characteristics suitable for OI adoption in SMEs (Marzi

et al., 2023; Milici *et al.*, 2021), we focus entirely on the implications of OI and the role that entrepreneurs can play when engaging in collaborative innovation processes.

2.3. OI in SMEs:

The SMEs' inherent scarcity of resources prompts entrepreneurs to look for external partners (Bougrain and Haudeville, 2002; Dahlander and Gann, 2010; Edwards *et al.*, 2005; Kraus *et al.*, 2020). These studies indicate that SMEs adopt OI to overcome several challenges, as discussed earlier. These challenges prompt SMEs to explore new ways of innovation, among which OI is being pursued (Barrett *et al.*, 2021; Crema *et al.*, 2013; Flamini *et al.*, 2021; van de Vrande *et al.*, 2009). In particular, the lack of internal R&D capability drives SMEs to search for external sources of technology exploitation (Spithoven *et al.*, 2013). Moreover, SMEs have flexible organizational structures and are more adaptable to change. This flexibility and adaptability give SMEs the potential to benefit more from OI than their larger counterparts in seizing opportunities (Dufour and Son, 2015; Parida *et al.*, 2012). Overall, OI appears to be a useful tool for overcoming the liability of smallness that characterizes SMEs (Albats *et al.*, 2021; Kraus *et al.*, 2020), as research points to the positive effect of OI on SMEs' innovation performance (Minguela-Rata *et al.*, 2014; Suh and Kim, 2012).

The study also draws on entrepreneurship and organizational learning literature to strengthen our understanding of how an entrepreneur's prior knowledge influences the identification of entrepreneurial opportunities (Baron and Ensley, 2006; Fern *et al.*, 2012; Khanin *et al.*, 2022; Scazziota et al., 2020). This can be a strength, but it may also be an obstacle in identifying entrepreneurial opportunities owing to bias or limitations of entrepreneurs' existing knowledge. Ronstadt (1988) terms this a "knowledge corridor", which enables them to identify certain market opportunities and ignore the rest. Gruber *et al.* (2013) argue that founders' prior knowledge of market opportunities directly impacts opportunity identification

and affects their existing ability to integrate external knowledge. OI can help identify entrepreneurial opportunities beyond entrepreneurs' personal knowledge endowments by sourcing new knowledge from actors across the firm's boundaries. Some scholars have attributed success of open innovation towards effective management of external knowledge sources and the development of internal capabilities (Mostafiz et al., 2022). Few studies have pointed that OI platforms can be useful to find the right resources (Chesbrough, 2012; Kathan *et al.*, 2014; Nambisan *et al.*, 2018; Ndou *et al.*, 2011). However, most of these OI platforms focus on large companies, high-tech SMEs, and collaboration between large and small companies. Very few studies indicate the presence of OI platforms for low- and medium-tech manufacturing SMEs, even though those who offer a platform are mainly regionally focused. The OI platforms with further developments and reach could solve many challenges and open avenues for collaboration for small firms (Kathan *et al.*, 2014; Ndou *et al.*, 2011). This leaves entrepreneurs to leverage their own network for collaborations across organizational boundaries.

Existing literature highlights entrepreneurs have a robust effect on the strategic direction of SMEs (Eisenhardt and Schoonhoven, 1990, (Khanin *et al.*, 2022)) and their influence on organizational routine changes cannot be ignored (Ahn *et al.*, 2018; Marzi *et al.*, 2023). Well-managed coordination is critical when dealing with such challenges. Strong internal support can play a vital role when interacting with external partners from different cultures and at different innovation speeds (Mortara and Minshall, 2011). OI in SMEs is thus closely linked to the entrepreneurial process; therefore, studying how OI helps sense and seize entrepreneurial opportunities is an imminent setting to provide a more general contribution to the integration of OI and entrepreneurial opportunities.

3. Framework Development:

This study aims to analyze and illustrate the OI implementation process in SMEs. Existing research has focused on some aspects of the OI process. In contrast, this study is designed to provide a holistic view of the OI implementation process, which is coupled to the important role of the entrepreneur throughout the OI process.

In SMEs, the planning process is not formalized, implying that multi-functional planning takes place in managers' minds (Ghobadian and Gallear, 1997) while possessing information is critical for effectively explaining the process of opportunity sensing, which is an important aspect of entrepreneurship (Baron and Ensley, 2006; Casprini *et al.*, 2017; Kirzner, 1997)). Mostly, an entrepreneur envisions new venture ideas which are unambiguous but are changeable ideas that would be acted upon (Davidsson, 2004). Venture ideas are internally generated in the entrepreneur's mind based on the perception of technology and market conditions. Individuals with prior knowledge through education and work experience are more likely to sense particular entrepreneurial opportunities in a changing business environment (Alvarez and Barney, 2007; Baron and Ensley, 2006; Khanin *et al.*, 2022; Venkataraman *et al.*, 1997)). The entrepreneur senses an opportunity for a venture idea based on prior experience and perceived information and decides on a strategic (re)orientation or business model innovation. This change is challenging for entrepreneurs because of SMEs' limited internal resources (Albats *et al.*, 2021; Chesbrough and Crowther, 2006; McGrath, 2010) calling for resources inflow across the organizational boundaries.

In this study, we attempt to encapsulate the OI process in SMEs and the role that SME entrepreneurs play in this process. The authors posit that the OI process can be summarized into three phases: the venture idea generation stage, which results from new opportunity sensing. The new venture idea leads to a strategic re(orientation) or business model innovation, which is followed by the development and management of a network of partners due to SMEs' limited internal resources. The later phases focus more on the opportunity-seizing activities.

OI also holds significant implications for the idea generation stage: OI can help sense opportunities outside the entrepreneur's "knowledge corridor". The entrepreneur envisions a venture idea to exploit a business opportunity based on their sourced knowledge of the industry, hence broadening their knowledge corridor. Once the venture idea is clear, the firm starts with business model innovation. A business model is an organization-level illustration of OI's ability to bolster opportunity sensing and seizing. It connects value creation and value capture, which may be located across organizational boundaries (Eftekhari and Bogers, 2015; Osterwalder *et al.*, 2020; Zott *et al.*, 2011). The current study does not highlight how entrepreneurs use OI to sense entrepreneurial opportunities. However, our research does point out that in search of the most suitable business model, the entrepreneur embarks on a "discovery-driven" journey (McGrath and MacMillan, 2009). From a discovery-driven point of view, entrepreneurs face many uncertainties when taking innovative measures and do not usually possess all the requisite information to make the right decisions. The innovative SMEs evolve their business models through experiments as they re-evaluate their progress against various checkpoints and redirect their efforts, eventually articulating the most suitable business model (McGrath, 2010; Osterwalder *et al.*, 2020).

Moreover, several studies examine the impact of OI networking on SMEs' performance. Few have indicated that it is crucial to ensure valuable network positions among these OI partners and to build skills for the effective orchestration of OI partners and relationships (Brunswicker and Vanhaverbeke, 2014; Lee *et al.*, 2010; Woods *et al.*, 2019). Owing to the liability of smallness (Acs and Audretsch, 1990), SMEs lack the necessary financial and technical resources and knowledge and have to seek these resources outside their organizational boundaries (Brunswicker and Vanhaverbeke, 2014). To acquire the required resources, entrepreneurs must work with and manage a network of innovation partners, which is critical for the success of OI (Kraus *et al.*, 2020; Nambisan *et al.*, 2018; Woods *et al.*, 2019).

Moreover, existing research struggles to present the mechanisms of how entrepreneurs can organize and manage OI to identify and seize entrepreneurial opportunities.

In summary, the literature shows that prior knowledge leads to the identification of entrepreneurial opportunities and that to seize those opportunities, entrepreneurs engage in a strategic (re)orientation of their business, followed by the articulation of the new business model to implement the intended strategic change. Though the literature highlights the importance of network management in OI, it does not explain how SMEs can organize and manage OI to sense and seize entrepreneurial opportunity. Therefore, to develop a holistic view of how the entire OI process can help entrepreneurs sense and seize entrepreneurial opportunities, this study uses multiple case studies to explore and analyze the role of OI in three stages: the development of the venture idea, the articulation of the business model, and the development and management of the innovation partners' network. The theoretical framework is summarized in Figure (1) below:

[Insert updated Figure (1) here)

4. Methodology:

This study analyzes the factors and mechanisms by which entrepreneurs identify and seize entrepreneurial opportunities through OI practices. The objective is to address the research gaps identified by identified by several scholars. For instance, Brunswicker and Vanhaverbeke (2014) points to the need to investigate the mechanisms and processes involved in managing OI in SMEs. Hossain and Kauranen (2016), in their systematic literature review of OI in SMEs, further call for qualitative studies to investigate OI processes, and Livieratos

et al. (2022) suggested to further explore OI journeys in SMEs. Few scholars have called for further research to explore the role of top manager in OI process in the SMEs (Ahn *et al.*, 2018; Marzi *et al.*, 2023) while the use of longitudinal studies in this domain is virtually inexistent (Sikandar and Abdul Kohar, 2022). The authors argue that the topics under study can be best understood by obtaining information from SME managers and entrepreneurs. Therefore, to fully understand the mechanisms to manage OI in SMEs effectively, a qualitative methodology is used, as it can produce detailed and illustrative information on several dimensions of the underlying analysis (Yin, 2009).

This study adopts an inductive approach using multiple case studies as a research method (De Massis and Kotlar, 2014; Eisenhardt and Graebner, 2007; Yin, 2003). In this methodology, case studies function as sets of experiments that serve to confirm or challenge an emergent theory that is not well developed through consistent patterns of data replication logic, which facilitates the development of an explanatory theory (Eisenhardt, 1989; Eisenhardt and Graebner, 2007; Yin, 2017). Therefore, a multiple-case study design is selected to explore a phenomenon using replication logic and provides a robust basis for theory building.

To illustrate and examine the OI process in SMEs, we used a longitudinal approach (Berends *et al.*, 2014; Van de Ven, 2007). The data collection and analysis methods effectively served to the exploratory nature of the present study and provided corroborated findings. For the replication strategy, the authors compare and contrast the findings from one case study with those of other case studies. Replication adds external validation to the case study findings, as case studies depend on analytical rather than statistical generalization (Yin, 2009).

Initially, 13 SMEs were identified using a purposeful criterion sampling strategy (Eisenhardt, 1989). The SMEs were contacted through personal references and interviews with experts working with the SMEs involved in OI. The authors contacted each firm and conducted initial interviews with SME managers to collect information on business types and OI

activities. The selected SMEs share similarities in terms of industry (low- and medium-tech and original equipment manufacturers) and we excluded high-tech SMEs and SMEs in the service industry, resulting in a set of homogenous SMEs with own OI trajectories. The final sample comprises five SMEs working with OI practices: Curana (a small bicycle parts manufacturer), Jaga (a radiator manufacturer), Quilts of Denmark (a functional quilt manufacturer), DNA Interactif Fashion (a virtual shopping solution), and PRoF (a user-centric consortium of suppliers to the healthcare sector). The sample size falls within the Eisenhardt (1989) suggestion of including 4-10 cases to ensure the replication and saturation in analysis.

Table (i). summarizes the selected SMEs for this study.

[Insert Table 1 here]

This study focuses on these SMEs because prior research struggles to examine good examples of such contexts in low- and medium-tech SMEs (Ahn *et al.*, 2018; Obradović *et al.*, 2021). These cases are based on extensive research developed by (Vanhaverbeke, 2012) to understand the nature of OI activities in low- and medium-tech SMEs. Since, this is a longitudinal study, primary and secondary data from two time periods were collected, synthesized and analyzed. For each case study, several interviews with stakeholders were conducted at two intervals. The first set of interviews were conducted in 2010. The authors approached these SMEs again between 2016 and 2018 for new interviews based on an underlying analytical framework. Detailed information is extracted through interviews and follow-up e-mails. Semi-structured interviews were conducted with entrepreneurs or SME managers, innovation network members, and key customers, as needed to gather information for in-depth case exploration. This also provided an opportunity for longitudinal analysis of the data, allowing authors to check their success levels and the claims interviewees made about the success of their firms and OI over time. Several authors employed this strategy (Heaton, 2008;

James and Sørensen, 2000). Heaton (2004) describes the reworking and reuse of qualitative data to investigate new or additional research questions as useful and increasingly common, especially when the original data collector is involved in the reuse.

Extensive desk research was carried out before and after each interview, leading to substantial secondary data; for example, data were also collected using archival data from websites of the companies' and their partners' websites, brochures, and news articles. This secondary data not only guided the interview questions to elucidate pertinent issues but also enabled triangulation of the data, thereby enhancing its reliability and validity. The interviews were transcribed, and the authors frequently exchanged notes and drafts to re-validate the conclusions drawn and ensure that nothing was misconstrued. Relevant excerpts of the cases after the write-up were also shared with the entrepreneurs to cross-examine the synthesized version of the case if any detail was misunderstood or a pertinent piece of information was left out.

Consistent with the research theme described above, case selection aims to investigate the role of entrepreneurs in sensing and seizing entrepreneurial opportunities. Therefore, shortlisted SMEs reflect the set of OI practices adopted with a varying degree but adequately to seize an opportunity sensed via entrepreneurs' experience and subsequently shaped into a venture idea.

This study used within-case and cross-case examination methods to analyze the collected data (Eisenhardt and Graebner, 2007). Firstly, authors built individual case studies from transcripts and supplementary data and followed up with the interviewees to clarify certain events and/or request further details. Subsequently, authors cross-examine case studies to identify consistent patterns of relationships between all cases and discuss insights to rule out alternative explanations (Eisenhardt, 1989; Eisenhardt and Graebner, 2007).

While undertaking cross-case analysis, the authors iteratively analyze the qualitative data by moving back and forth between theory, data, and literature to adjust to emerging theoretical relationships.

5. Case Findings:

The section below illustrates how entrepreneurs use OI to sense and seize entrepreneurial opportunities using these five in-depth case studies. The findings are organized around three key phases of OI use: opportunity sensing, business model innovations, and developing and managing OI networks.

5.1. Opportunity Sensing:

In these small firms, the entrepreneur identifies an entrepreneurial opportunity and seize it through OI activities as a direct consequence of a strategic change or business model innovation. This helps not only in benefiting from the new entrepreneurial opportunities but also to cope with increasingly competitive business conditions. The business landscape of many SMEs is becoming increasingly competitive due to mounting commoditization pressure, price battles, increasing globalization, shortening product life cycles, and changing governmental regulations (Vanhaverbeke, 2012). To face these challenging business conditions, entrepreneurs actively seek to discover opportunities guided by their prior expertise in a particular industry. The discovery of these opportunities was motivated by a strong desire for strategic (re)orientation. That is, the entrepreneur, in light of prevailing external conditions and with market insight, produces the venture idea, which this study refer to as “opportunity sensing”. This section discusses the critical role of the entrepreneur in sensing entrepreneurial opportunity and subsequently opting for OI practices to carry on with the venture idea with the help of the case studies mentioned before.

Curana is a small family-owned Belgian company established in 1940 as an original equipment manufacturer (OEM) of bicycle accessories. The Curana case elegantly illustrates the deep relationship between OI and strategic reorientation. Dirk Vens and his brother inherited the company in the 1990s, as third-generation owners, at a time when the bicycle-parts industry was becoming increasingly competitive. The business landscape was going through some drastic changes with the introduction of fashionable mountain bikes and sports bikes with bicycle parts that were imported from low-cost countries. In combination with the growing internationalization of the bicycle market, this resulted in a continuous decline of Curana's profitability.

Curana's CEO, Dirk Vens, decided in 1999 to change strategic direction from an OEM to an ODM (original design manufacturing) business model. The idea was to offer innovative and fascinatingly designed bicycle parts to bicycle manufacturers. He sensed that Curana could escape the fierce, price-based competition and charge a premium price to customers with its innovative designs. Curana had at that time only a good understanding of the bicycle market and production skills "to bend steel". It had no in-house design competencies or knowledge about polymer extrusion to make plastic mudguards. Vens started a new product project to develop a unique mudguard with a sleek design combining aluminum and plastic parts. From day one, this was an OI project: As Curana had no expertise in design and polymer extrusion, Vens started a strategic partnership with a local design office and a polymer extruder to accomplish his vision. The efforts finally paid off in 2002, with the introduction of the B"Lite mudguard. It was Curana's first major success and the result of intensive collaboration with a limited set of external innovation partners, including a polymer extruder, a design house, and two bike manufacturers as lead customers. In other words, Curana's OI journey started as the result of Vens' decision to change the business model from an OEM into an ODM. The

company lacked competences in design and plastics and therefore initiated a network of innovation partners.

Quilts of Denmark (QOD) is another case in point. QOD is a Danish SME that produces quilts and pillows. Søren Løgstrup and Erik Schmidt, two entrepreneurs with 20 years' experience in the quilt business, founded QOD in 2000 with a vision to reform the conventional quilt and pillow industry. At that time, the quilt industry was facing many challenges due to high commoditization pressure, retailer consolidation, rapidly increasing globalization of the industry, and low profitability. The founders of QOD knew from their extensive business experience that sleep was becoming a problem in contemporary societies.

Both entrepreneurs realized that, in order to be successful in this competitive industry, they had to come up with a radically new venture idea. They were convinced that customers would pay a premium price for a good and healthy night's sleep. Therefore, they envisioned QOD as a "*provider of a healthy sleep*". Neither entrepreneur, however, had any idea what healthy sleep entailed. Therefore, they reached out to sleep institutes in Denmark for advice as a first step. During their meetings with several sleep experts, they discovered that the most influential factor on quality of sleep was the temperature variation under the quilt. Quilts are used to keep a person warm in bed but also tend to trap heat, leading to considerable temperature variations and reduced sleep quality. The company had no in-house competencies to tackle this problem. This prompted the two entrepreneurs to look outside the company and work with external partners. They finally found the PCM technology used by NASA in their space suits to control temperature variations. QOD introduced "Temprakon"—the brand name of the product that included the PCM technology—in 2003 after several intensive years of collaboration with Outlast, the company responsible for the commercialization of PCM technology in civil applications on behalf of NASA. Temprakon was the first functional quilt to shake up the quilt industry. It was the result of a new strategic orientation that forced the two

entrepreneurs to start a bewildering cross-industry and cross-disciplinary learning process that brought together knowledge from sleep experts and PCM technology, that is used in expensive settings such as the space industry, and microencapsulation technology. Collaboration, first with sleep scientists and later with NASA and Outlast, led to one of the most successful innovations in the quilt industry. In short, QOD started its OI process as a direct consequence of its ambition to follow its vision "to provide a healthy sleep", guided by the entrepreneurs' prior experience in the same industry.

In sum, OI was never an explicit objective of Curana's or QOD's entrepreneurs. They envisioned a strategic change for their companies to follow the discovered opportunities in their respective industries. Once an SME starts to work on the business model innovation, due to a lack of internal resources and skills, it must collaborate with external partners to seize new business opportunities. In other words, OI is a direct consequence of SMEs' business model innovation; the requirement to use new skills and competences drives them towards collaboration with external partners. Curana and QoD cases illustrate how an entrepreneur instigated strategic change with the basic venture idea and realized the benefits of identified opportunity ascertained by prior knowledge.

iStyling, a virtual fashion store introduced by *DNA Interactif Fashion*, is another example. It illustrates that entrepreneur's experience and industry knowledge help discover market opportunities and to capitalize on them, entrepreneur comes up with a venture idea. It was Dirk Ghekiere, founder of Dzine, a leading digital signage company in Belgium, who envisioned in 2006 the idea of a virtual store, i.e., a digital system where customers could virtually try on fashion goods and then buy what they liked. Dirk, did not have the resources to follow through his vision. In quest of his vision, he began to look for external resources. In 2008, he met Huub Fijen, who transformed this vision into a business model. Huub insisted on

developing a 3D body scanner that could create a consumer's virtual avatar in a few seconds. Consumers could then use their avatar to try on dresses virtually, to select for purchase.

Both entrepreneurs were convinced to continue looking for external solutions and resources to make sense of the identified opportunity. After several failed attempts, they could finally secure a deal with an American nonprofit organization for the exclusive distribution of body scanners that could make consumers' avatars. The business plan for a 3D body scanner was then rolled out and the whole business concept, labeled as "iStyling," was introduced with some features as a first way to facilitate the purchase process for fashion goods, such as clothing, glasses, hairstyles, and jewelry. Retailers and consumers alike appreciated the concept; it saved retailers' expensive store space, and consumers could reduce the number of outfits that they ultimately never wore.

In this case of DNA Interactif Fashion, the entrepreneurs also started the process with a venture idea which they transformed into business model innovation that finally led to the collaboration with several partners to implement the entire business model. At the start, there were just the basic insight based on the prior knowledge that the current way of purchasing fashion goods was quite inefficient for producers and retailers as well as for consumers and that the virtualization of the process could be beneficial for each of these stakeholders. Turning a basic venture idea into a reliable business model may take time: at the start, the business model is not well articulated, and a lot of untested "hypotheses" must be explored through rapid experimentation (Blank, 2005). This basic insight, however, works as an igniter for initiating the business model innovation and setting the direction for an SME's strategic innovation.

The basic idea in QOD was to "provide healthy sleep" and in the case of iStyling to offer a virtual and more effective shopping solution. Those ideas were not just opinions, but the entrepreneurs were deeply convinced that their ideas were right based on years of

experience in the business and the information they absorbed about business trends and new technologies.

5.2. Business Model Innovations

Seizing entrepreneurial opportunity is a crucial twofold job for entrepreneurs: On the one hand, they have to focus on the strategic (re)orientation of their business and the corresponding business model innovation, and on the other hand, they have to engage into network management to manage the OI with their partners. The venture idea based on entrepreneurial insight is just a conceptual idea not a fully structured business model of how to create and capture the value. In some cases, it can be realized in a short time window while in other cases it can take years. New business models may be challenging to articulate due to their innovative nature, as was for QOD and iStyling.

The Curana case illustrates that the articulation of a business model innovation is a stepwise discovery-driven process that depends on the entrepreneurial vision and abilities to implement. Curana started from an OEM business model and went on to become an ODM. Entrepreneur's vision was to offer innovative and fascinatingly designed bicycle parts to bicycle manufacturers and to be a product-driven rather than customer-driven company. For taking up his vision further, however, he anchored strategic reorientation into a single new product development project and searched for resources outside the organizational boundaries to accomplish it; important partners were Pilipili, the design house, and Anziplast, the polymer extruder along with two bicycle manufacturers as key customers. The joint efforts finally paid off in 2002 when the B"Lite mudguard was launched after a time-consuming and agonizing joint innovation process. B"Lite turned out to be the Curana's first major success and was the result of intense collaboration with several external partners.

At the outset, Vens didn't know how his vision about premium-priced bicycle parts with a sleek design would finally result in a product like the B"Lite (the sequence of the different prototypes shows major changes in the conceptualization and development of the B"Lite). He followed an effective learning process: the end result could not be anticipated or even conceived of at the start, and, during the entire development process, partners had to deal with numerous challenges by making decisive adjustments. The switch from an OEM to an ODM strategy paid off very well for Curana. Most SME managers would stick to the new ODM strategy, but Vens moved on and changed the business model again. In fact, he changed to a new business model three times in 15 years, each time capitalizing on the competencies that had been built in the previous process. Orchestrating a new business model is a path-dependent, stepwise process in which the adoption of each new model paves the way for the adoption of another. In 2006, Curana switched to so-called original strategic management (OSM) and established an in-house design office to conceive and develop innovative ideas continuously without waiting for client requests as in the ODM model. Not surprisingly, Curana earned many esteemed innovation and design awards in that period. This in turn moved Vens to shift Curana's business model again in 2008. The new model is called original brand management (OBM); the awards gave high visibility to Curana's products and consumers wanted the "by Curana" logo on their bikes. Curana established itself as a trendsetter in the industry. It changed its business model toward more openness in response to the discovered opportunities in the marketplace. Entrepreneur's continuous search to reinvent the firm's business model was a major driving force behind these strategic changes. The innovative solutions were neither planned nor developed in a linear way. This discovery-driven approach led to innovative solutions based on experimentation and the resulting pivoting of projects.

Jaga is a medium-sized Belgian radiator company with a focus on values such as reducing the ecological footprint and the aesthetics of radiators. It is another illustration of a

stepwise change of the business model in an innovative SME. Jaga products combine design and technical expertise wrapped up in a cradle-to-cradle philosophy. The company was not aiming for this when it was founded in the 1960s; its strategy focus emerged as the result of a discovery-driven, stepwise evolution of its business model orchestrated by Jan Kriekels, a visionary entrepreneur.

Initially, Kriekels started to change the company's innovative culture by taking some simple initiatives in the 1990s when he took over his father's company. He started with the solution strategy: that is, to cater to customers' demands by offering various unique products with the help of local partners. The solution strategy was a success for Jaga, which offered customers an alternative when oil prices were high. In response to the extreme swings in oil process in the nineties, Kriekels decided to switch to a "customer experience" strategy in 2002 and established an Experience Department as a first step toward implementing it. This department established the "experience labs" in 2005 as its first major accomplishment. The Jaga experience labs are a test facility where all weather conditions can be simulated to calculate heating time and cost. Jaga opened the lab for scientists to conduct their personal research. This helped Jaga to stay connected with world-leading technologies and gain early access to promising technologies in order to beat the competition.

Jaga's entrepreneur also organized Jaga product days in 2007. In preparation for the product days, Kriekels invited employees, external partners, and suppliers, encouraging them to propose creative ideas for heating solutions. An external jury evaluated the ideas in various aspects, such as design, innovativeness, and commercialization potential, and the winning projects were placed into production. This resulted into several unique product ideas developed by Jaga that were commercially remarkably successful.

The cases illustrate that entrepreneurs do not work with a grand design or plan that surpass a long period of time. They simply start with a vision to offer a new value proposition to their customers and develop a first innovation project. Once the innovation project is successful, company looks for new business opportunities leveraging its newly developed competencies.

5.3. Managing OI Networks:

SMEs, in general, cannot mobilize sufficient internal resources to implement a venture idea (Lee *et al.*, 2010, van de Vrande *et al.*, 2009). When these SMEs developed new products, services, or business models, they jointly created value with their innovation partners, as a part of their business model. These case studies provide notable lessons about SME innovation networks; First, most SMEs collaborate with value chain partners, less so with technology partners. SMEs in low- and medium-tech industries start cooperating with partners when they sense new business opportunities, usually based on market insights. Developing technology can be critical in realizing the business model but in most cases remains a supporting activity. Second, the entrepreneur plays a vital role in changing the business model and combining knowledge from unrelated fields. He or she pulls in expertise from other industries and disciplines unrelated to the small firm's industry. QOD and iStyling are examples of how the entrepreneur's visionary approach leads to the development of an innovation ecosystem with unexpected partners from different industries. Third, success of such an OI approach depends largely on the quality of the innovation network management. Creating joint value with partners implies that a company organizes itself internally so that it can learn from its partners. In many cases, this can be done using simple and inexpensive tools, such as Jaga's Experience Labs or Products Days.

Establishing an innovation ecosystem can lead to substantial benefits for SMEs. The management of that ecosystem is critical to its success and SME entrepreneurs must assume a new role as network orchestrator to guarantee the success of the strategic change. When entrepreneurs innovate with partners in the value chain, they usually build strong personal ties with the main partners. Managing the innovation network is the key process of OI in SMEs, as the whole network is based on trust and transparency about the objectives of the partners and the time and money that must be invested.

Curana showcases the scenario where entrepreneur successfully leveraged close relationships with the partners in its network. Combining internal and external knowledge is a key competency of the Curana's entrepreneur, which enhances the creativity and speed of producing new bicycle parts but also assists in attaining market leadership. Vens realized that Curana could not develop the B"Lite itself and needed a variety of expertise from different partners to bridge the gap. Curana's success built upon the extended knowledge and expertise of its partners, produced prototypes more quickly, and developed highly innovative products as it integrated different types of expertise. Vens established strong bonds with suppliers, the designer community, knowledge centers, and customers. Working with external partners over the value chain (from design to production to sales) leveraged the business to new opportunities that could not have been seized without the innovation network. Moreover, the network gave Vens access to an extensive pool of knowledge and expertise, which jointly transformed into extraordinary solutions for its customers. In this respect, the orchestration of the network by Curana's entrepreneur is a good example of how collaboration with innovation partners defines the competitive strength of a small firm and how the network becomes the locus of Innovation.

Likewise, QOD's success was the result of years of close cooperation with a network of sleep scientists and physiotherapists. The entrepreneurs used their network of medical contacts extensively to acquire knowledge about who could define "what is a healthy sleep?"

and how to translate these insights into technical specs for a functional quilt. In the case of QOD, developing a functional quilt required a combination of different types of knowledge from disparate scientific disciplines made accessible through effective orchestration of innovation network.

Another example is PRoF *(Patient Room of the Future)*, where 30 suppliers to the healthcare industry jointly create value for customers by establishing a broad network with 30 manufacturers (the small consortium) and a user group of 300 partners from the healthcare sector (the large consortium). ProF led by Jan Van Hecke, envisions bringing in innovative ideas regarding what a patient room or a residence for elderly people could look like in the future. Van Hecke is Managing Director of Boone International, a Belgian furniture manufacturing company since the 1980s. He realized he had to diversify to stay competitive. As the government was investing increasingly in hospitals and health care, he recognized that the hospital furniture market would be an interesting business opportunity. Although hospitals are a protected contract market, Van Hecke succeeded in entering the market and Boone International has since evolved to hold the third largest contract in Belgium to furnish hospitals and retirement homes. Working with various hospital suppliers, Van Hecke noticed that every player in the supply chain was innovating on its own. These isolated innovation efforts were not successful as everyone was facing the same innovation-killing regulations and restrictions in this highly regulated sector. To overcome these constraints, Jan set out to establish a consortium of manufacturers, architects, user groups, universities, nurses, caregivers, and patient associations. He created a group of innovative and complementary suppliers to the healthcare sector with the common goal of developing one innovative project every year.

It is a customer-centric consortium that starts from the patients' experience to come up with an overall concept of a novel patient room that can deliver value to patients, nurses, doctors, patients' families, etc. Van Hecke developed the network in two consortiums, small

and large. The small one consists of a well-selected group of architects, interior decorators, and several manufacturers of beds, nurse call systems, lighting, etc. All these members develop specific products or services necessary to develop a concept room. This group had commercial interests and invested money in the project. The large consortium included user groups, such as nurses, hospital management, surgeons, etc. Van Hecke would also invited engineering offices and architects to diffuse the idea of the Patient Room of the Future among decision-makers in building hospitals. The small consortium started with a set of 20 keywords that were derived from large brainstorming sessions in the large consortium. The small consortium used the keywords to develop a new concept of the patient room that was subsequently translated into several products and systems to implement the concept, which was checked and monitored regularly in meetings with the large consortium. Companies learned from the user groups' feedback and adapted products accordingly. The manufacturers in the small consortium created value for patients and user groups in a way that they could not have achieved as individual producers.

Van Hecke developed the PRoF network in a way that manufacturers got several benefits from participating in the network. First, they gained direct access to potential customers and valuable information about the needs of nurses and hospital management. Second, the consortium allowed them to develop a radically new patient room in a way that would have been impossible if they were acting as single companies. Partners in the small consortium can achieve extraordinary results because of the synergy among the different partners in the network, input from the user groups, and by combining skills of partners and members of the consortia. Third, the PRoF consortium gives manufacturers greater visibility in the healthcare community. In addition, a concept room is accessible for potential customers in a showroom all year. Fourth, the delicate and successful management of innovation network

affected the producers' bottom line and helped them internationalize through participation in trade fairs under the PRoF brand name.

This section highlighted how network management is essential for SMEs to successfully implement OI and illustrated the importance of role of entrepreneurs in developing and managing OI. This is a continuous process as new challenges come forward with the realization of different aspects of the venture idea.

6. Discussion

This study examines the OI process in five European low- and medium- tech SMEs using an inductive, multiple-case study approach. Upon describing and explaining the use of OI, from envisioning the venture idea and implementing business model innovation to the management of innovation partners and provide a better understanding of how OI can help entrepreneurs in sensing and seizing entrepreneurial opportunities. Once an entrepreneur senses an entrepreneurial opportunity and comes up with a venture idea, he or she starts articulating the business model to seize that opportunity. The next step is to seek key resources to realize that business model. These key resources are usually unavailable in SMEs, compelling entrepreneurs to collaborate with external partners to explore and seize new business opportunities. Figure (2) illustrates a framework of the whole process.

[Insert Figure 2 here]

The entrepreneur's experience and industry insights empower him to identify entrepreneurial opportunities and, ultimately, the conception of a new venture idea. However, the entrepreneur's knowledge of a specific industry can also blinder him in realizing the

potential of a venture idea in other industries and validating the benefits of incorporating ideas and inputs from other industries into his venture idea, i.e., it may create 'knowledge corridor'. OI can benefit entrepreneurs already at the venture idea conception stage by helping them overcome the knowledge corridor by using the flow of ideas and knowledge across organizational boundaries. Moreover, working with a network of partners can also spark further creativity.

Once the opportunity is sensed and the venture idea is finalized, the next step for the entrepreneur is to formulate a strategic (re)orientation to seize the opportunity. This aligns with an effectuation strategy, which describes how SMEs set goals and gather resources to achieve those goals (Sarasvathy, 2001). This is where OI becomes particularly relevant: SMEs' lack of resources and knowledge compels them to look outside organizational boundaries (Albats *et al.*, 2021; Kraus *et al.*, 2020). To acquire the resources they need, entrepreneurs must look for partners and manage the network of partners, which is critical for the success of OI (Eftekhari and Bogers, 2015; Lee *et al.*, 2010). These processes continue to improve, and entrepreneurs' sense new opportunities and ideas through collaboration with innovation partners leading to the redevelopment of business models over time, following a "discovery-driven approach" (McGrath and MacMillan, 2009).

The case findings illustrate that another crucial role of entrepreneurs in the OI process is the network development and management. The entrepreneurs emphasized during the interviews that selecting the right partner is one of the most crucial aspects of developing an innovation network. The alignment of goals is crucial, and the output yield of partners' combined efforts should be greater than that of working alone. Moreover, SMEs must secure and maintain a favorable position in the innovation network, a contention supported by researchers who analyze the role of networks in OI in SMEs (Heger and Boman, 2015; Mitze

et al., 2015). A favorable position aids small firms by enhancing knowledge flows to enable them to optimally access the networks' common knowledge base.

Although some studies on OI in SMEs have highlighted the importance of innovation networks, they have rarely discussed the role of entrepreneurs. While analyzing the interviews, developing the case studies, and vetting the cases with the entrepreneurs, the authors found that entrepreneurs searched for partners through their personal relationships, and such collaborations are mostly informal and trust-based. This inference supplements earlier studies that trust increases SMEs' ability to identify business opportunities and enable collaborations (Brunetto and Farr-Wharton, 2007; Sherer, 2003), suggesting that this holds true for innovation-related collaborations as well. Keeping the network activity through open communication came up as one of the key success factors for effective OI network management. The exchange of knowledge and interactions with innovation partners also sparks further creativity and leads to the identification of entrepreneurial opportunities beyond the entrepreneurs' knowledge corridor. Entrepreneurs continuously appraise changes in the business landscape, which guide them toward the creation of new venture ideas or the identification of new opportunities and the evolution of the business model, hence, the strengthening of the innovation network.

By documenting the process of OI implementation in SMEs and examining how SMEs can identify entrepreneurial opportunities, this study adds to the work of (Ahn *et al.*, 2018; Barrett *et al.*, 2021; Brunswicker and Vanhaverbeke, 2014; Wynarczyk *et al.*, 2013). They repeatedly called for advancing knowledge on the process of OI implementation in SMEs and examining the role of the entrepreneur/CEOs in this process. (Chesbrough and Bogers, 2014) also point towards lack of studies on OI in SMEs in the context of entrepreneurship. This study adds to the emerging literature in this regard. Additionally, this research compliments the research of Shane (2000) on the significance of entrepreneurs' experience and knowledge in

identifying and seizing entrepreneurial opportunities; however, this study uniquely addresses these factors in the context of OI. The entrepreneurship literature pays considerable attention to opportunity identification and its limited scope due to entrepreneurs' limited knowledge (Ronstadt, 1988; Shane and Venkataraman, 2000). This study enhances understanding by illustrating how entrepreneurs could increase their pool of opportunities by using OI and escape the "knowledge corridor" by scouting and refining venture ideas and strategic (re)orientation, the opportunity identification phase.

One key aspect that differentiates OI management in SMEs from that in large firms is the entrepreneur's role. Thus, this study supplements existing research on the role of entrepreneurs in OI for SMEs by providing evidence of entrepreneurs' profound influence on various OI practices at different process levels (Ahn *et al.*, 2018) and how entrepreneurs' open mindset can foster OI practices in SMEs (Eftekhari and Bogers, 2015; Flamini *et al.*, 2021) and entrepreneurial success (Chen *et al.*, 2022). This study elaborates that OI in SMEs can be understood appropriately only when integrated into the firm's strategy and is considered part of the entrepreneurship activities in SMEs.

7. Conclusion:

This study is one of the first to analyze how SMEs entrepreneurs systematically sense and seize entrepreneurial opportunities using OI practices. in small firms systematically and holds several theoretical and practical implications. It attempts to specify the role of SME entrepreneurs when they began to implement OI to sense and seize entrepreneurial opportunities. The study is also unique in a way since it is a longitudinal study while most of the studies on the subject matter are conducted using cross-sectional data. Hence, this study holds several theoretical and practical implications. It attempts to specify the role of SME entrepreneurs when they initiated OI practices through its implementation. It points out that

entrepreneurs with prior experience in the same industry are better equipped to sense and eventually seize entrepreneurial opportunities using the OI approach. This extends the conclusions drawn by (Ahn *et al.*, 2018; Barrett *et al.*, 2021) regarding the role of entrepreneurs in OI adoption. Entrepreneurs play two major roles. First, they are instigators of new business ideas, leading to the (re)orientation of the firm's strategy. This is a classical theme in entrepreneurship literature (Davidsson, 2004). However, the OI aspect is a novel addition to this research, especially its role in the articulation of business model innovation. Second, the entrepreneur's task is to establish a network with partners to develop new products or implement their strategy. To our knowledge, this topic is fairly new in entrepreneurship and OI literature. However, it is essential to understand how SMEs can seize new business opportunities only when they collaborate with a set of innovation and market partners. The implementation of OI practices in SMEs calls for a shift in entrepreneurship and entrepreneurial skills and includes networking skills as crucial skills for the successful adoption of OI practices. This also strengthens research concluding that SMEs that manage a network of innovation partners could seize new business opportunities, become key players in growth industries, and turn themselves into highly profitable companies (Brunetto and Farr-Wharton, 2007; Konsti-Laakso *et al.*, 2012; Woods *et al.*, 2019).

An SME will engage in OI practices depending on its need for new technology, value chain positions, and competencies to realize a new product. Moreover, locus of innovation is shifting from being largely confined to operations within the four walls of SMEs to a distributed, inter-organizational innovative value network (Pop *et al.*, 2018; Vanhaverbeke and Cloodt, 2006). Although the network was initially developed based on the entrepreneur's social network (Hite and Hesterly, 2001; Holm *et al.*, 1999), it later became a strategic network.

The creation and management of networks require special skills. While networking has been emphasized in the literature in the initial growth phase of a venture, its role in innovation

in SMEs and the skills required for networking remain underemphasized. The authors emphasize the role of entrepreneurs in developing and managing innovation networks and the skills required to connect partners and retain them in a value network. Clear leadership is needed to organize and manage an innovation network, as seen in the cases of PRoF and Curana. The basic rule is that each partner should be better off joining and staying in the network than leaving. OI networks are therefore only sustainable when the jointly created value is several times larger than what partners can realize on their own. The analysis of the case studies reveal that this choice is crucial because partners must share the same ambition, be trustworthy, and be loyal during difficult times. SMEs tend to partner within their value chain (Konsti-Laakso *et al.*, 2012) or choose partners based on their personal networks (Aldrich *et al.*, 1986; Hoang and Young, 2000). Such partnerships are typically based on trust. This is also in line with Larson (1992), who reiterates that trust is often cited as the most critical factor in a network for enhancing resource flow.

Studies show that in a network, partners are interconnected, and an SME's success depends greatly on the success of the entire network (Kothandaraman and Wilson, 2001). However, the entrepreneur of the central firm should operate as a strong leader in the network (Nambisan and Sawhney, 2011). Open communication with partners is also a key success factor in these case studies. Conversely, it minimizes misunderstandings and conflicts; in contrast, open communication with partners increases the possibility of novel discoveries (Pittaway *et al.*, 2004). Clear leadership is needed to organize and manage an innovation network, as seen in the cases of PRoF and Curana. Studies show that in a network, partners are interconnected, and an SME's success depends greatly on the success of the entire network (Kothandaraman and Wilson, 2001). The cases also shows that effective collaboration enables innovation by facilitating shared activities and mutual material arrangements, albeit with distinct objectives for the participating partners (Hydle and Billington, 2021).

This study is valuable to anyone seeking to better understand OI in the SME context. The multiple case analysis revealed linkages between entrepreneurial vision, business model development, and network management, followed by SMEs. Subsequently, this study highlights the importance of entrepreneurs' role in SMEs in building and sustaining external networks for continual innovation. It ascertains the role of entrepreneurs who, with their networking skills, establish a network of partners based on their personal networks.

7.1. Managerial Implications:

This study offers several managerial implications. To begin with, it establishes the importance of integrating the business model perspective when envisioning OI. The results show that business model innovation is an important step before moving on to the development of technology and resources. The business model innovation (usually conceptualized by the entrepreneur) is the main driver for entrepreneurs to set up a network of partners to get access to the required technologies, resources or market positions.

The findings also show that OI can be instrumental in SMEs growth and success in several ways. For instance, idea inflows and external collaborations can spark creativity, leading to the discovery of new business opportunities. Managing innovation networks can be new and challenging for many entrepreneurs. The Discussion and Conclusion sections present some key success factors for the orchestration of innovation, such as open communication and goal alignment among partners to maintain trust and synergies. Furthermore, the locus of innovation transitioned from being primarily restricted to SMEs' internal R&D to an inter-organizational innovation network. Entrepreneurs need to strategically position their SMEs in the innovation network to leverage the maximum value.

7.2.Limitations and Future Research

This study attempts to combine insights from entrepreneurship and OI literature and illustrate the need to do so through several case studies. Entrepreneurship and OI scholars can create integrated frameworks to help SME managers develop better OI strategies. It would also be interesting to see detailed studies on partners' roles, innovation networks' management, and associated benefits and risks for SMEs.

This study is based on exploratory case studies on European SMEs. While this enabled us for better analysis and comparison with the extant studies, future research in emerging or developing countries is needed to see if the findings will be replicated. Moreover, some of the case studies in this study are family firms. It may also be pertinent to analyze family and non-family firms separately to examine the role of entrepreneurs (Lambrechts *et al.*, 2017). Moreover, we focused entirely on the role of an entrepreneur in the successful development and management of OI networks, but we lack the data to connect these roles to personality traits of an entrepreneur. This also joins the recent call for further research on the human-side of the OI focusing on cognitive and psychological characteristics of entrepreneurs, employees and decision makers on the successful adoption of OI (Ahn *et al.*, 2017; Marzi *et al.*, 2023; Milici *et al.*, 2021). Combining personality traits with the entrepreneurs' role in OI networks - what kind of personality can lead OI networks? - is obviously an interesting topic for future research. Gaining a better understanding of how entrepreneurs in small firms adopt OI and overcome their size-related competitive challenges is important because it can help firms gain a competitive advantage and become economically more prosperous. Future research is also needed to improve the current understanding of other aspects of OI in SMEs because this study restricts the focus to entrepreneurs in orchestrating innovation networks. Finally, some recent studies have pointed out that digital capabilities increase SMEs innovation performance (Benhayoun-Sadafiyine *et al.*, 2015) and that digital technological capabilities significantly influence OI practices in SMEs (Urbinati *et al.*, 2020; Valdez-Juárez and Castillo-Vergara,

2021). However, such studies mainly focus on high-tech firms, while our study focuses on low- and medium-tech firms. It would be interesting to see how the use of digital technologies and capabilities can affect the OI process in such firms, especially with respect to opportunity-seizing activities.

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