



UNIVERSITÀ POLITECNICA DELLE MARCHE

Theoretical study of open innovation (OI) applied to the industrial sector, implications of applying OI to small and medium-sized enterprises (SMEs) and tools for implementing OI in organisations.

## Abstract

Nowadays, open innovation is a widespread topic among experts and organisations. Open innovation is a strategy in which organisations interact with external partners and ideas, with the aim of improving their technology. However, the term is still relatively new, so new research is continually emerging and there are still certain aspects of the topic that we do not yet know with certainty. These aspects can be how open innovation affects companies, how it affects their environment, how important the organisational culture is for a positive performance with the use of open innovation, among others. This paper will explore this topic, explaining what it is, how it affects SMEs and what tools can be used to take advantage of this phenomenon. While this is a very interesting topic for companies, where every company can benefit to a greater or lesser extent, there are several factors to take into account. It is now expected that this document will provide a better understanding of this phenomenon, explaining both advantages and disadvantages and factors to be taken into account when implementing open innovation.

## Index

1. Introduction.....	5
2. Open Innovation.....	7
2.1. Inbound .....	7
2.2 Outbound.....	11
2.3 Moderating effects of role diversity .....	14
2.4 Disadvantages.....	15
3. Development of Open Innovation in SMEs.....	17
OI1 Protect internal activities .....	21
OI2 External relations management .....	22
OI3 Relationship.....	23
OI4 Business model innovation .....	24
Innovation environment: .....	26
Business environment: .....	28
4. Tools for open innovation.....	30
Crowdsourcing platforms:.....	30
Industrial Clusters.....	31
Social network.....	32
B2B Market .....	33
Incubation and Acceleration programmes.....	34
Hackathons and innovation competitions.....	36
Research bases .....	37
5. Conclusion.....	39
6. Bibliography.....	41

## Index of figures

Figure 1. Strategic use of Outbound OI.....	[14]
Figure 2. OI dimensions.....	[20]

## Abbreviations

<b>APIs:</b> application programming interfaces
<b>OI:</b> open innovation
<b>R&amp;D:</b> Research and development
<b>OOI:</b> outbound open innovation
<b>OSS:</b> (open-source software)
<b>NIH:</b> Not-Invented-Here
<b>OUH:</b> Only-Used-Here
<b>SMEs:</b> small and medium-sized enterprises
<b>IP:</b> intellectual property
<b>BMI:</b> Innovation in Business Models
<b>MEM:</b> the marginal effects at the means
<b>HR:</b> human resource
<b>UAE:</b> United Arab Emirates
<b>ESMEs:</b> emerging market small and medium enterprises
<b>NPD:</b> new product development
<b>ICT:</b> information and communication technology
<b>IT:</b> Information technology
<b>RAC:</b> resource acquisition capabilities

# 1. Introduction

The beginning of the idea of openness is due to the idea that organizations cannot innovate if they are cut off from the outside world. They need to relate and communicate with different partners and different organizations to get a continuous flow of new ideas and resources from an outside circle, otherwise they have no chance of keeping up with the competition (Chesbrough, 2003; Laursen & Salter, 2006).

In defining openness Chesbrough (2003a, p. XXIV) argues that “open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as firms look to advance their technology”.

In addition to the above definition, the literature has presented us with different concepts of openness since its inception, in different ways; (Laursen & Salter, 2006) equate openness with the number of external sources of information, while (J Henkel, 2006) describes openness as a revelation of ideas that were previously hidden within organizations.

The concept is being used more and more for different reasons. Globalization is one of them. It has allowed the scope of the market to expand, therefore increasing the number of jobs. It has increased the use of institutions such as intellectual property rights (IPR), venture capital (VC), and technology standards, which evolve these institutions and make it easier for organizations to exchange ideas. And lastly, the advent of groundbreaking innovations of technological advances offers a multitude of unprecedented opportunities to foster collaboration and facilitate seamless coordination, transcending the barriers imposed by geographic distances. Both individuals and organizations are now empowered to engage in novel modes of interaction, enabling them to seamlessly connect, exchange knowledge, share resources and work cohesively toward shared goals (Dahlander & Gann, 2010).

Some of the disadvantages of openness can be remarkable, although it has not been the principal object of study in the early literature. One problem is the accessibility of resources that competitors or other entities may be able to exploit. The challenges lie in the difficulty of appropriating the advantages of innovation and safeguarding intellectual property.

The arc encompassing openness can be subdivided into two dimensions: (1) inbound and (2) outbound (Dahlander & Gann, 2010) versus (3) pecuniary and (4) non-pecuniary. In this way we can discuss the two forms of inbound innovation-Acquiring and Sourcing; and the two outbound-Selling and Revealing.

In the past decade we have had a great advance in technology and information management. These new technologies have helped the growth of open innovation.

With this work, a clear understanding of the implications of Open Innovation for small and medium enterprises (SMEs) is provided. It aims to highlight the advantages and challenges that these businesses can encounter by implementing open innovation practices. In doing so, it is hoped to add to the repository of knowledge regarding the use of open innovation in the context of SMEs. This study's foundation is a thorough review of the literature relating to open innovation and its

implementation in SMEs. The identification of pertinent works was accomplished through a thorough search in academic data bases like Google Scholar and scientific journal data bases like Elsevier, among others. Additionally, online searches were conducted on websites with a focus on business innovation, and relevant books and research articles were reviewed. The papers were chosen based on their applicability to the subject and their contribution to the analysis of open innovation strategies, using the article (Dahlander & Gann, 2010) as a starting point.

This work is divided into several chapters that address various aspects of open innovation in the context of SMEs. Following is a list of the chapters and a summary of its content:

1. **Open innovation:** It is provided here that you have a thorough understanding of the key terms associated with open innovation. Exploration of open innovation definitions, focuses, and models is done while establishing a strong theoretical foundation.

2. **Development of Open Innovation in SMEs:** This chapter dives into the world of open innovation development in SMEs, exploring how these businesses can take advantage of external collaboration, shared knowledge, and shared resources to encourage innovation and keep themselves competitive in a constantly changing business environment. This document investigates the benefits and unique challenges that SMEs face when adopting open innovation approaches, as well as the best strategies and approaches that may be used to successfully navigate this business environment.

3. **Tools for open innovation:** This chapter focuses on the helpful tools for implementing open innovation, exploring the many platforms, technologies, and approaches available to foster open innovation within organizations. It is being researched how these tools could enhance idea generation, collaboration with external partners, management of innovative projects, and continuous process improvement, hence enhancing business success and sustainability in a dynamic business environment.

4. **Conclusions:** This last chapter summarises the key findings, the problems of implementing OI in small and medium-sized enterprises and explains why the distinction is made between digital and non-digital enterprises. It also focuses on discussing why the lack of adequate competences is a problem for the successful implementation of OI in small and medium-sized enterprises.

With this structure, this document will provide a comprehensive overview of Open Innovation in the context of SMEs, addressing both its advantages and challenges.

## 2. Open Innovation

It can be noted that in the past, the insight of innovation was seen as an internal challenge of a company, to be dealt with by their own departments dedicated to innovation, such as research and innovation departments. However, open innovation not only considers the value of the internal research of the company, but also includes the valuable information which exists outside of the business. Nowadays, companies use open innovation in several aspects depending on the strategic approach of the business.

Now that we have given an introduction to the topic at hand, we will proceed to explain in more detail.

The popularity of open innovation practice is driven by the rapid growth of technology (i.e., Internet, smart devices, etc.), whereby the volume and speed of knowledge diffusion is rapidly increasing (A. Rumanti et al., n.d.)

Open innovation practices allow the organization to utilize and exploit internal and external transfer of knowledge and technologies with the goal of accelerating internal and external innovation, expanding markets (Parida et al., 2012.).

As discussed above, Open Innovation can be divided into two dimensions, inbound and outbound on the one hand and pecuniary and non-pecuniary on the other. In this way, an accurate subdivision can be identified. Therefore, we find two ways of inbound innovation—Acquiring and Sourcing; and two outbound—Selling and Revealing.

When inbound openness is high and the goal is to increase technical performance, high levels of outbound open innovation are advantageous. Combination of strong inbound openness and low outbound openness is ideal if the organization's goal is to enhance its market performance. As a result, the strategies for implementing the Inbound and Outbound branches of open innovation should be taken into account with the specific performance goals to what they showed in the article (A. A. Rumanti et al., 2023).

### 2.1. Inbound

According to (Cheng & Shiu, 2015; Meissner, 2015), the inbound dimension encapsulates deliberate knowledge inputs that enable businesses to investigate and acquire new knowledge and technologies from external sources, such as customers, partners, competitors, governments, consultants, universities, or research organizations. An exploratory learning style known as inbound OI (open innovation) enables a company to look outside of its comfort zone and expand its body of knowledge. In this way, businesses that use inbound methods have access to fresh perspectives, new business prospects, and improved problem-solving skills (Hung et al., 2013; Zahra et al., 2006).

The OI can be positive or negative, as was already mentioned, depending on the desired purpose. In the essay (Tang et al., 2021), they research and substantiate the following claims: open inbound innovation has a negative impact on the project's technical performance and a positive one on its market performance. This is due to the fact that implementing incoming open innovation

presents new project management challenges and makes it difficult to coordinate knowledge transfer and absorption, both of which may impede the technical advancement of project development activities (Du et al., 2014; Fisher & Qualls, 2018).

When maximizing project technical performance is the goal, the coordination costs of open inbound innovation at the project level exceeds the marginal benefits of having access to a variety of knowledge sources and have the opposite effect (slower development). On the project market performance, however, many influences are seen. By expanding access to a variety of knowledge sources, producing new knowledge (Wal et al., Anne, Criscuolo, & Salter, 2017), and producing more innovative products (J. S. Johnson et al., 2019), open inbound innovation improves market performance (Luca et al., n.d.).

Companies can employ a variety of mechanisms, including alliances, OI intermediates, crowdsourcing, and licensing agreements (Janssens et al., 2008; Li-Ying et al., n.d.; Brunswicker et al., n.d.) to access the ideas, talents, and knowledge of their external partners. By enhancing the number, quality, and variety of ideas, skills, and expertise, open inbound innovation increases internal resources and capabilities (Eisenhardt et al., n.d.). This gives businesses the chance to develop their capacity for innovation. In the early literature on this topic, it was believed that this approach could improve and lead to better innovation performance (Faems et al., n.d.; management, 2017; Salge et al., 2013).

Collaboration with outside partners can also assist businesses in quickly obtaining the resources they need, which is crucial when it comes to tacit resources (i.e., knowledge and abilities that are difficult to see) because they take a long time to acquire on their own (Eisenhardt et al., 1996). Anyways, the invention process can be facilitated and encouraged referring to the search for resources, but it does not mean that it would lead to greater innovation performance as the effect it actually has is to slow down the process.

Additionally, it was believed that outside-in OI can strengthen innovation processes by supplying resources from external partners, which can lower the costs and risks associated with innovation (Eisenhardt et al., 1996). This would be ideal for businesses using cost-based strategies to compete in highly competitive marketplaces (Eisenhardt et al., 1996).

The firm's technological skills (i.e., a collection of activities and procedures that combine external and internal knowledge) can also be improved by working with external partners to capture their knowledge. This will enable it to better incorporate external resources into its innovation processes. Businesses can raise the probability that their innovations will succeed by more easily turning both internal and external resources into unique combinations (Helfat et al., 2003).

In a cross-sectional study of Dutch businesses, (Belderbos et al., 2004) discovered that companies are likely to improve their innovation performance in terms of the percentage of total sales attributable to new products or services by engaging in outside-in OI with external partners in R&D projects (i.e., competitors, suppliers, customers, and universities or research institutions). Similar to this, (Faems et al., 2005) demonstrated that manufacturing enterprises' innovation performance improves when they undertake OI from the outside in with external partners as indicated by the total turnover resulting from new product development. Similar findings were made by Knudsen (M.



K.-J. of product innovation management, 2007), who discovered that participating in outside-in OI with private research institutions, universities, and suppliers enhances the share of total revenues attributable to innovation. Similar to this, Hwang and Lee (Hwang et al., n.d.) shown in empirical research of Korean enterprises in the ICT industry that firms can enhance their innovation performance by acquiring knowledge from outside sources, as indicated by the percentage of total sales of new goods in the market. Finally, (Santamaría et al., 2010) offered empirical support for the beneficial impact of outside-in OI mechanisms, such as alliances, on new product development based on a sizable sample of Spanish manufacturing enterprises. All subjects treated and these cases led to think that Outside-in OI is positively related to innovation performance. Nevertheless, this is not empirically supported, as it has been well demonstrated in the (Bagherzadeh et al., n.d.) article.

In light of this, (Janssens et al., 2008) discovered that in a cooperative research and development project, the partner businesses organized technical meetings to promote information exchange and so improve understanding of each other's know-how. These discussions helped both partner organizations evaluate and use external knowledge that was pertinent to their innovation effort. In fact, a study of the partnership between DreamWorks and Hewlett-Packard by (Narsalay et al.) revealed that the companies even encouraged the exchange of private technical and business information to help them gauge one another's knowledge and innovation needs because, as a former director of Open Innovation at HP Labs put it, "without knowledge sharing and open communication between partners, I don't think we could have really gained [valuable knowledge] from the collaboration" (p. 3). And therefore, knowledge sharing and outside-in OI are favourably correlated. This has been verified and corroborated by (Bagherzadeh et al., 2019).

Understanding knowledge demands influences the firm's external knowledge search's scope and direction, assisting it in locating relevant knowledge for its key innovation areas (Todorova et al., n.d.). Additionally, internal procedures are assisted by innovation strategy in identifying external knowledge and evaluating how well it suits the firm's knowledge requirements (Chesbrough et al., 2006; Chiaroni, Chiesa, Management, et al., n.d.; Chiaroni, Chiesa, Technovation, et al., n.d.). In line with this, (Brunswick, business, et al., n.d.-a) research revealed that small and medium-sized businesses that use external knowledge sourcing have an innovation strategy, a formal planning process, and formal control over innovation initiatives. (Chiaroni, Chiesa, Management, et al., n.d.) demonstrated that organizations who implement outside-in OI activities build a formal planning process and a review system to evaluate the success of their innovation initiatives. In a multi-case analysis of Italian firms, they found a similar pattern. Therefore, *OI from the outside in is positively related to innovation strategy. This hypothesis was correlated with the studies in the* (Bagherzadeh et al., 2019) *article in which it is studied and verified.*

In addition to upgrading recognition capabilities (the other two components of absorptive capability), Cohen and Levinthal (W. Cohen et al., 1990) suggested that assimilation and exploitation capabilities (the other two components of absorptive capability) are also crucial during outside-in OI activities. crucial to the performance of businesses and their ability to innovate. Firms must analyse, process, and communicate pertinent external knowledge internally (i.e., have assimilation capability) after identifying it (Zahra et al., 2002). Firms can adapt external knowledge into forms they can use internally with the help of assimilation capabilities (Zahra et al., 2002). Employees typically take external knowledge in a format they cannot interpret or understand (A. Z.-J. of product innovation management, 2017). In this regard, information exchange between businesses and outside partners can assist in giving businesses a better understanding of the features of outside knowledge, making

it easier for employees to comprehend (Zahra et al., 2002). Furthermore, social integration between external partners and company employees is promoted by knowledge sharing between enterprises and external partners (Browning et al., 1995; Janssens et al., 2008). Employee attitudes will likely improve as a result, which is important for better interpreting and comprehending external knowledge (Zahra et al., 2002). Companies should share knowledge internally as well as with external partners to make sure that knowledge they have gathered from outside sources is accessible to relevant business units and departments.

Firms must decide how to use and combine external knowledge with internal knowledge (i.e., exploitative capacity) after assimilation (W. Cohen et al., 1990; Zahra et al., 2002). As the actors involved have a better understanding of the knowledge necessary for innovation processes, knowledge sharing between businesses and outside partners can facilitate the process of alignment between external and internal knowledge (Janssens et al., 2008). Firms can enhance the various combinations of internal and external information as a result of this alignment (A. Z.-J. of product innovation management, 2017). Retrieving previously integrated outside knowledge is also essential for such combinations. Sharing internal knowledge can encourage this process of recovery, resulting in a more effective fusion of internal and external knowledge. Firms can use internal and external information more efficiently and exploit it in new settings and application methods (A. Z.-J. of product innovation management, 2017; Zahra et al., 2002) by enhancing their combination of the two types of knowledge.

In light of this, (Lin, 2007) discovered in a cross-industry study that internal information sharing is favourably correlated with innovation performance. Similar to this, (Foss et al., 2011) demonstrated that information sharing between employees from various departments within a corporation enhances innovation performance as determined by innovativeness and profitability, in comparison to rivals, using a dataset of 169 big Danish enterprises from 29 industries. Similar to this, (Wang et al., 2012) demonstrated that information sharing within organizations has a favourable impact on innovation performance in a survey-based empirical study including high-tech firms in China. Similarly, (Janssens et al., 2008) discovered in a joint research and development project that partners perform better in terms of innovation when they share technological information. Overall, knowledge sharing within organizations and with outside partners can open up opportunities for assimilating and utilizing outside knowledge, which in turn can improve innovation performance. We therefore postulate the following: Overall, knowledge sharing within organizations and with outside partners can open up opportunities for assimilating and utilizing outside knowledge, which in turn can improve innovation performance.

Consequently, innovation strategy is positively related to innovation performance, as a good innovation strategy supports the assimilation of external knowledge, clarifies the characteristics of the knowledge required for innovation and as a result helps firms to understand and interpret external knowledge (Bagherzadeh et al., 2019).

### 2.1.1 Acquiring

This kind of openness entails obtaining feedback on the innovation process from the market. In light of this logic, openness might be interpreted as the process through which businesses acquire outside expertise and license in.

For being able to buy or in-source external ideas to the organization, expertise is required to search for and evaluate them. One of the disadvantages is the fact of acquiring databases that are too close to those that the company already has. If the input is too distant, it is more difficult to combine it with existing practices, and if the databases are too similar, it is difficult to take advantage of them and find new ideas (Sapienza et al., 2004). So, this business model depends on the resources of the partner organization.

## 2.1.2 Sourcing

This kind of openness concerns how businesses are able to utilize outside sources of innovation. According to (Chesbrough et al., 2006), businesses conduct an external environment scan before beginning internal R&D activity. The businesses make use of pre-existing concepts and technologies when they are accessible.

According to (Rothwell, 1994, p. 19) "accessing external know-how has long been acknowledged as a significant factor in successful innovation". In keeping with this body of literature, (Laursen)(2004, p. 1204) describe openness as "the variety of external knowledge sources that each firm uses in its innovative activities." According to their reasoning, the firm's search approach will be more open the more external sources of innovation there are.

Companies that are successful in achieving a synergy between their internal processes and externally available ideas may be able to take advantage of the innovative ideas of others to develop successful new goods and services. Firms have to pay close attention to not over-search or come to rely too heavily on external sources of innovation, because then they will experience a problem of lack of attention and possible dependency (Dahlander & Gann, 2010).

## 2.2 Outbound

According to (Hung et al., 2013; Zahra et al., 2006), outbound practices are the exploitation of internal ideas or technological know-how that move outside the company through licenses, patents, or contractual agreements in order to gain financial or non-financial benefits. According to earlier research (Bianchi et al., 2011; Chesbrough et al., 2006), companies are more likely to engage in entry than exit procedures. Nevertheless, these two kinds of activities are not incompatible with one another (Cheng & Shiu, 2015; Tranekjer et al., 2012). According to (Hung et al., 2013; Laursen & Salter, 2006), companies that use entry methods are also more likely to spot fresh chances for innovation. This enhances their capacity to use exit practices successfully. One of the big problems of

implement outbound OI is that people lose desire to put their best effort in an open project when they start to wonder if they will be acknowledged publicly for their contributions. Therefore, a high level of openness may discourage participants from offering the project with high-quality information (Tang et al., 2021).

A high level of outward openness weakens the link between outward open innovation and project market performance by raising contributors' fears of losing credit for their original work. In conclusion, the revelatory approach of outward open innovation encourages team members to contribute quickly to "build momentum behind a technology" to aid the technical advancement of the project, but it also decreases their motivation to contribute critical information and knowledge (Boudreau, 2010, p. 1849), which lowers the quality of product output and harms market performance. As a result, this implies the following moderating connections for initiatives including linked open innovation: Outbound open innovation (a) positively moderates the relationship between inbound open innovation and the technical performance of the project, and (b) negatively moderates the relationship between inbound open innovation and the market performance of the Project (Tang et al., 2021).

(Masucci et al., 2019) propose that a centric firm can profit from outbound open innovation (OOI), a strategy for commercially utilizing internal assets and inventions outside of the firm's boundaries. - to persuade companies that provide related services or goods to accelerate technical development in order to resolve technical limitations. According to earlier research, businesses can use OOI to diversify their revenue sources, access complementary expertise, create new industry standards, and boost the market for their products and services (Alexy et al., 2009; Chesbrough, 2007; Bidault, 2004). When coordination costs are significant, OOI can be used as a tactical tool to bring other businesses together around a focal firm's innovation and promote ecosystem collaboration. According to (Chesbrough et al., 2009; Leten et al., 2013), complementary innovation can assist develop new goods and markets. We advance this and the ecosystem literature by exposing the mechanisms underlying this strategic orchestration process, specifically how the focus firm can strategically leverage OOI to influence other firms in its business ecosystems.

(Masucci et al., 2019) evaluate and contrast the implementation outcomes of various OOI initiatives carried out by a significant oil and gas producer through its internal corporate unit, with an emphasis on the upstream oil and gas sector. These initiatives were started in areas where the producer normally outsourced work in the hopes that the use of cutting-edge technologies would increase the effectiveness of complementary vendor services. By offering their technology for sale or license and generating new revenue streams, the companies can fully profit from their own knowledge (Alexy et al., 2009; Chesbrough, 2007; Bidault, 2004). Cross-licensing agreements are a means of achieving strategic objectives such as creating new standards for the sector, increasing the market for their products and services, and getting access to complementary data (Grindley and Teece, 1997; Lichtenthaler, 2010; West, 2003).

The next image shows us different ways to move ideas outside the organisation, with the respective strategic objectives and mechanisms.

<b>Implementation vehicles</b>	<b>Strategic Objectives</b>	<b>Mechanisms</b>
<b>IP sharing</b>	<ul style="list-style-type: none"> <li>• Develop technologies strategic for core business activity</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure value capture for all innovators to stimulate interfirm cooperation</li> </ul>
<b>Free/Selective revealing</b>	<ul style="list-style-type: none"> <li>• Elicit collaboration from other actors</li> <li>• Grow the overall market</li> </ul>	<ul style="list-style-type: none"> <li>• Reveal internally-developed knowledge to attract third-party contributors and users</li> </ul>
<b>Technology out-licensing</b>	<ul style="list-style-type: none"> <li>• Access complementary assets</li> <li>• Set new industry standards</li> </ul>	<ul style="list-style-type: none"> <li>• Use cross-licensing agreements for knowledge exchange</li> <li>• Promote the large-scale adoption of new technologies</li> </ul>
<b>Open collaboration platforms</b>	<ul style="list-style-type: none"> <li>• Accelerate development and commercialization of complementary innovations</li> </ul>	<ul style="list-style-type: none"> <li>• Engage with external actors (users and firms) to spur ecosystem-related innovation</li> </ul>

**Figure 1** Strategic use of Outbound OI. Source: (Masucci et al., 2019)

## 2.2.1 Selling

This kind of openness refers to how businesses sell or license resources developed to other organizations in order to commercialize their discoveries and technology (Dahlander & Gann, 2010).

Firms can more effectively use their R&D investments by selling or out-licensing, working with partners who are skilled at bringing innovations to market.

Some firms have made it a strategic priority to out-license technologies and inventions (Fosfuri, 2006).

Market failure can also result from innovators' reluctance to disclose their innovations. It is vital to share some details to the potential customer when an inventor is willing to license its information. The 'disclosure dilemma' suggests that the prospective licensee receives the information without paying for it and could, in theory, act opportunistically and steal the concept. According to Arrow's (1962) seminal paper, these issues lead to market failures because they discourage inventors from revealing their technology or knowledge.

Open innovation requires that both the seller and the buyer reach an agreement, so that the seller can disclose information in a secure manner to the buyer. An obstacle that often prevents firms from out-licensing technologies is that they have difficulty anticipating the potential value (Chesbrough et al., 2002).

## 2.2.2 Revealing

This sort of openness refers to how internal resources are made accessible to the outside world. This method focuses on how businesses reveal internal resources while pursuing indirect financial benefits for the target company.

Openness, caused by voluntarily or unintentionally divulging information to outsiders, does not always reduce the probability of being successful (Hippel, 2007; J Henkel, 2006; von Hippel, 2006; Von Hippel & Von Krogh, 2003). For instance, (J Henkel, 2006) proposes that businesses use techniques to selectively share portions of their technology to the public in an effort to inspire collaboration, but without any contractual requirements that guarantees it.

The reality of phenomena like Wikipedia and free and open-source software, where people collaborate to create innovative solutions, serves as evidence for this claim (West and Gallagher, 2006). For instance, it is well recognized in the literature on standards that being open and putting less emphasis on ownership increases the chances of attracting interest from other parties.

The difficulty in reaping gains that occur is a clear drawback of divulging internal resources to keep up with technology advancement in general (Helfat & Quinn, 2006). Competitors may be better positioned to take advantage of the technological advancement if they have complementary resources and production facilities.

## 2.3 Moderating effects of role diversity

Role diversity refers to how many diverse and specialized responsibilities development team members perform in open innovation projects (Daniel et al., 2018).

For open innovation projects that lack formal organizational power to establish tight norms for job performance, the challenges of project coordination resulting from role variety are particularly important (G. Fisher et al., 2018). While the project waits to get the attention of specialized collaborators, role variety can cause delays in the technical progress of the project. This hinders the relationship between open innovation and the technical performance of the project. The coordination

issues brought on by task specialization and role variety, therefore, outweigh the marginal benefits and have an adverse effect when the objective is to maximize the technical performance of the project (Tang et al., 2021). On the other hand, the variety of roles may benefit the project in other ways by encouraging an expansion of the range of perspectives that are employed in it. The project team members contribute a variety of skills that may improve the quality of the project's outcome due to the increased role diversity (Daniel et al., 2017).

The ability of project team members to accomplish NPD (new product development) tasks that add value to the finished product and satisfies better a variety of market needs is therefore increased by more role diversity (Daniel et al., 2017). Therefore, the marginal gains to product quality outweigh the challenges of coordinating knowledge inputs to the project when the purpose of the project is to attain market success. In conclusion, (Tang et al., 2021) forecast that role diversity will have a negative moderating influence on its interaction with open innovation, which will harm technical performance, but a positive moderating influence on this interaction, which will help market performance

(Tang et al., 2021) research suggests that high role diversity negatively modifies the interaction effect of outward and internal open innovation on OSS (open-source software) project technical performance, with combined open innovation strategies used in conjunction with low role diversity resulting in the highest technical project performance. Higher levels of outward openness increase the commitment of OSS team members to push forward the project, overcoming the coordination issues brought on by inward open innovation to enhance the project's technical performance (Tang et al., 2021). When role diversity is minimal, these effects are amplified because team members take on less specialized tasks to make it easier to coordinate and incorporate the contributions of other participants.

(Tang et al., 2021) research demonstrates that the interaction effect of incoming and outgoing open innovation on the market performance of OSS projects is positively moderated by team role diversity. A combined open innovation strategy is not the best for market performance, according to our data, but this adverse effect can be mitigated if the project team contains a wide range of roles. Role diversity improves the range of knowledge inputs and offers various viewpoints that might improve the project's quality of outcome, thereby boosting its market performance. Role diversity therefore significantly reduces the negative moderating effect of outbound open innovation on the market success of OSS initiatives.

## 2.4 Disadvantages

One of the primary barriers to Businesses adopting OI procedures has been highlighted as the Not-Invented-Here (NIH) syndrome (Chesbrough et al., 2006; Lichtenthaler et al., 2009; Spithoven et al., 2013). The NIH syndrome is a reflection of an organization's internal resistance among its employees, particularly among its technical team, which restricts businesses from utilizing outside expertise (Laursen & Salter, 2006). This barrier consists of the behaviours of solid project groups who reject outside knowledge because they believe they have a monopoly on that knowledge. As a result, knowledge inputs are the main focus of the NIH condition. Resistance, however, might also result from

the Only-Used-Here (OUH) syndrome, which creates obstacles to the deliberate movement of knowledge outside of enterprises (Lichtenthaler and Ernst, et al., 2009)

These obstacles highlight how crucial organizational elements like the climate for innovation and employee dedication are for the adoption of OI methods.



### 3. Development of Open Innovation in SMEs

The implementation of Open Innovation (OI) in small and medium-sized enterprises (SMEs) is often based on its positive diagnosis by senior management teams and/or entrepreneurs. Because of the mixed results that can be achieved through SME openness, managers must weigh the beneficial aspects of boundary spanning against the complexities arising from inter-organizational arrangements and knowledge transfer (Marzi et al., 2022). Adopting and implementing open innovation is a strategic tool that builds long-term sustainable competitive advantage and improves an organization's overall performance. Open innovation integration is highlighted as a crucial component that improves and contributes to the performance of small and medium-sized businesses (SMEs).

By utilizing outside resources and promoting cooperation, co-creation, and knowledge sharing, open innovation enhances corporate performance. Due to this, businesses now experience exponential growth, increased agility and a significant competitive advantage in today's marketplace. According to academics and business professionals, networking skills, constant innovation, and knowledge sharing activities appear to be increasingly important for firm growth and survival (Bogers et al., 2017; Chesbrough, 2020; De Marco et al., 2020)(Bogers et al., 2017; Chesbrough, 2020; De Marco et al., 2020).

It is essential that all parties involved in the current business environment, particularly the leader and upper management, adopt an open innovation policy. This will enable them to successfully adapt to changes in digital technology and collaborate on a global scale. By gaining access to talents, knowledge, and resources on a global scale, open innovation gives people the chance to benefit from the advantages of a dynamic and fiercely competitive environment. By encouraging an open innovation culture, organizations are better equipped to take on current challenges and achieve sustainable growth (A. A. Rumanti et al., 2023).

Small and medium-sized businesses (SMEs) typically devote less resources to innovation and research and development (R&D) than larger companies (Teirlinck et al., 2013; Stoji, 2021; Van De Vrande et al., 2009), making the ability to build a successful network of collaborations that foster innovation activity crucial. Greater organizational success is facilitated by greater open innovation deployment, as seen by its more extensive application.

OI represents one of the possible routes for SME development and innovation, as it allows them to gain a competitive advantage by accessing and leveraging a network of resources and knowledge (Bogers et al., 2017; Chesbrough, 2020; Dahlander et al., 2021). The somewhat dangerous adoption of IO forces firms to commit and allocate resources in the present in exchange for deferred benefits in the long term (Bigliardi et al., 2016; Van De Vrande et al., 2009).

In addition, open innovation is expected to accelerate the entry into new markets and shorten the time required to develop new goods or processes (S. Lee et al., 2010). Opening their borders allows businesses to take advantage of the complementary assets of their partners, increase revenue by selling off unused intellectual property (IP), develop innovations more quickly and cheaply, engage potential customers in the production process, and establish new technological standards through partnerships (A. A. Rumanti et al., 2023).

Due to their historical lack of resources—both human and financial—and their need to stay current on innovation advancements in order to maintain their competitive edge, SMEs are more vulnerable when faced with joint innovation projects. Due to their constraints (i.e., the liability of smallness, Spithoven et al., 2013) SMEs are driven to go outside of their immediate surroundings and employ OI techniques to make up for lost assets (Van De Vrande et al., 2009). Previous studies have shown that SMEs turn to OI to address internal asset shortages, whereas large enterprises use OI to better use complementary assets and talents realized by partners (Di Minin et al., 2016; Hossain and Kauranen, 2016; Spithoven et al., 2013).

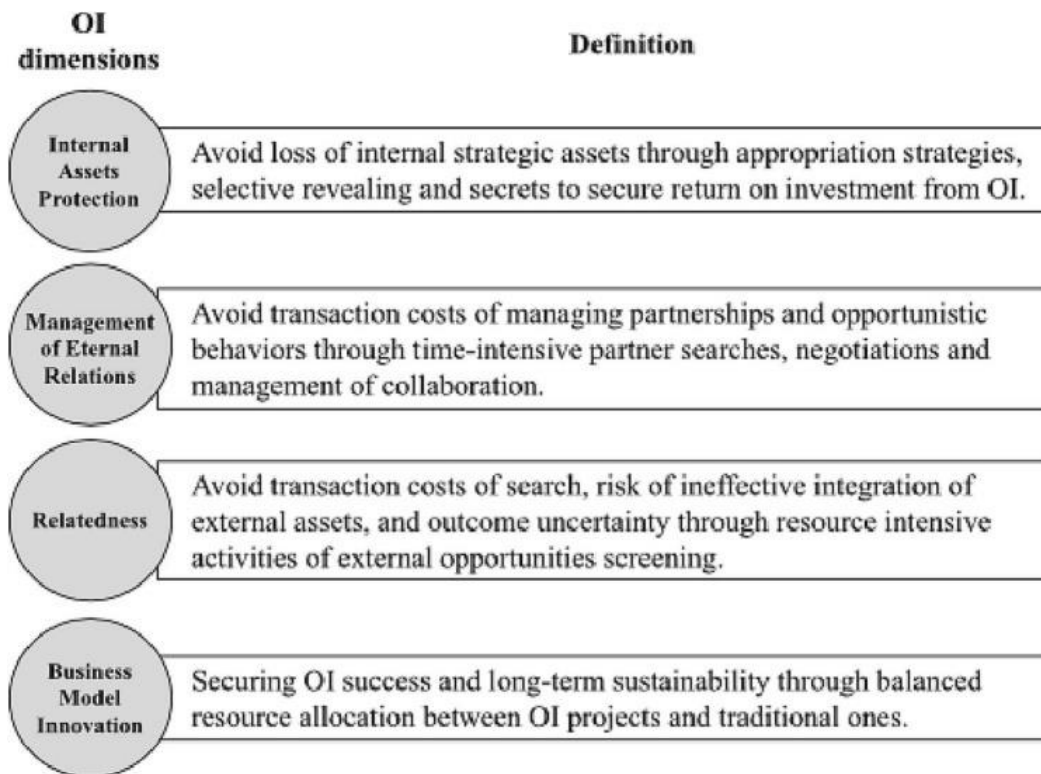
While the maintenance expenses are immediate, the benefits of cooperation in terms of benefits offer a potential gain. Due to their financial limitations, SMEs should take into account the cost of implementing OI in particular (Van De Vrande et al., 2009).

Firms, especially SMEs, experience difficulties implementing OI since they must find and assimilate external knowledge as well as modify organizational structures and tactics. (Marullo et al., 2018) used three distinct theoretical dimensions in their study to shed light on the hidden costs that could impede and alter OI implementation paths: The three factors are: 1) the overlap between OI approaches and the firm's governance mode; 2) the nature of the information communicated; 3) the sectoral innovation system to which the firm belongs.

Additionally, finding appropriate sources of outside knowledge to absorb can be expensive for businesses. They also need to prevent these partners from using such knowledge transfers to their advantage in a way that only benefits them. These expenses include the capacity to enhance internal capacities to scan the external environment, to find appropriate sources of external knowledge, to adopt measures to safeguard internal assets (Costa, Crupi and Marco et al., 2023).

The SMEs are well positioned to deal with potential internal challenges given their agile and flexible internal structures, however they frequently have several resource deficiencies when dealing with external challenges.

De Marco et al. (2020) focused on external challenges, conceived as "representatives of SMEs' unobservable engagement in challenging dimensions of OI strategy realisation". These dimensions, called DeMarkers, are: OI1) Internal Asset Protection, OI2) External Relationship Management, OI3) Relationship and OI4) Business Model Innovation (Fig. 2).



**Figure 2** OI dimensions. Source: (Marco et al., 2020).

With the introductory definition of (Marco et al., 2020), (Costa, Crupi and Marco et al., 2023) further elaborates on each DeMarker, investigating hypotheses with the Demarkers as a basis.

OI1 Protect internal activities: Specifically, the protection of internal activities involves the challenge of preserving internal knowledge throughout OI activities and ensuring the returns on OI investments by implementing appropriate risk-reduction strategies to reduce the likelihood of losing important internal activities.

OI2 External Relations Management: This task involves managing the agency and transaction costs associated with managing associations and opportunity-seeking behaviours through time-consuming searches for external investors, negotiations, and collaboration management.

OI3 Relationship: This refers to the relationship between discoveries and your company, which must be seen as moving forward. The article discusses the costs of excessively broad external environment exploration, which can result in ineffective opportunity exploitation and inefficient activity integration processes.

OI4 Business Model Innovation refers to the challenge of ensuring OI success and long-term sustainability through balanced firm resource allocations between the OI projects and the traditional ones, in order to market innovation projects and extract value from them.

Some studies highlight the positive relationship between open innovation (OI) and company rentability, attributing it to the ongoing introduction of new technologies that foster the growth of

profits. Others argue that OI does not necessarily result in a higher level of corporate performance or more profitability (Rosenbusch et al., 2011). These outcomes are highly context-dependent.

Given that both digital and non-digital SMEs rely on different entry and exit strategies to achieve positive, sustainable growth and have unique organizational and human structures, (Costa, Crupi and Marco et al., 2023) argue that even if they could potentially benefit from higher OI than larger businesses (Spithoven et al., 2013), the impact of the opening could be significant. As a result, the SMEs may be more vulnerable to adverse effects that could harm their chances of positive performance.

This is consistent with (Laursen & Salter, 2006), who suggest that businesses are better prepared to manage and transform external knowledge in the early stages of opening. However, when businesses acquire more technology, they must bear higher costs for knowledge integration and transformation processes. This could increase the cost of opening and, as a result, reduce the benefits of OI. Additionally, taking into account the different levels of digital orientation between digital and non-digital SMEs, (Costa, Crupi and Marco et al., 2023) hypothesize that open innovation has a more negative effect on financial performance for digital SMEs due to the greater difficulties they face in utilizing digital-based knowledge as a sustainable competitive advantage in environments that are rapidly evolving.

As a result, (Costa, Crupi and Marco et al., 2023) establishes the initial set of hypotheses as the foundation for further investigation by suggesting that:

**H1:**

The digital SMEs adherence to the opening has a detrimental impact on the likelihood of a profitable financial return.

Particularly, the marginal effect the studies of the article (Costa, Crupi and Marco et al., 2023) has shown suggests that digital platforms with a higher participation in OI practices have 9% fewer chances of having a positive financial return.

Even though it seems like the likelihood of a positive financial return is negatively impacted by the non-digital SMEs commitment to the opening, (Costa, Crupi and Marco et al., 2023) estimates demonstrate that this hypothesis is not supported. More specifically, even while higher levels of opening result in a 1% lower likelihood of having a positive financial outcome, their impact is not statistically significant.

Additionally, in order to better understand how different OI practices affect businesses' financial success, (Costa, Crupi and Marco et al., 2023) use DeMarkers indicators for each of the four dimensions of OI, namely OI1, OI2, OI3, and OI4.

Less digitally oriented SMEs are less likely to embrace behaviours that support the creation and intensive use of technological innovation as well as the openness to new ideas when it comes to OI implementation strategies (Quinton et al., 2018). As a result, while implementing OI strategies, non-digital tactics primarily focus on market-based relationships that are very sensitive to knowledge proximity (Aslesen et al., 2012). This means that non digitals SMEs do prioritize a clear managerial focus on the target market (Brunswick, business, et al., 2015), which results in fewer risks associated with managing external relationships and lower transaction costs related to excessively

extensive external environment exploration (Marco et al., 2020), maintaining the short-term viability of businesses in the process. The results for other variables are mixed.

## OI1 Protect internal activities

Particularly, OI1 reflects the SMEs commitment to safeguarding internal activities. It would be possible to hope that both digital and non-digital businesses committed to this OI challenge would demonstrate effective protection against knowledge loss. However, the protection of assets continues to be a major concern that deters SMEs from taking part in open innovation strategies, particularly those that call for collaboration. Due to the uncertainty surrounding the appropriate application of knowledge, businesses in general and SMEs in particular show lack of confidence in collaborative innovation. (Moser et al., 2005) and (Jaffe & Lerner, 2011) argued that intellectual property protection could hinder innovation processes, particularly in industrial sectors where knowledge is shared among many parties and alternative and complementary business strategies exist. This is especially true when the goals of the policies are to safeguard important internal technical know-how and maintain control over the innovation process. Additionally, because intellectual property protection mechanisms are expensive, SMEs frequently patent their inventions when there is a reasonable likelihood that they would benefit from this protection and achieve commercial success (Van De Vrande et al., 2009). This could be true for non-digital businesses that often devote themselves to intellectual property protection as a measure of security to ensure commercial success. The formal IP mechanisms are preferred tools for managing external collaborations at these businesses since they provide as a way to identify potential customers and investors.

On the other hand, it is more likely that they will experience the paradox of disclosure if the digital SMEs are thought of as businesses with a stronger digital orientation (Arrow, 1972; Dahlander & Gann, 2010). Due to the inherent openness of digitally oriented technologies and activities, which are based on integration and interoperability requirements, these businesses must devote more attention and management effort to protecting intellectual property and choosing how and when to share their knowledge in order to benefit from the benefits of innovation. As a result, even though each business must develop an appropriate appropriation strategy in order to benefit from intellectual property protection, it is reasonable to anticipate that increasing levels of internal activity protection and an excessive emphasis on adequacy will have a negative impact on the external environment. The main risk is that a solid IP strategy could hold back the establishment of certain collaborations, particularly where there is a significant fear of legal infraction (Dahlander & Gann, 2010). Additionally, it is more likely that digital platforms will regard some approaches as alternatives to appropriateness while maintaining their competitive edge, which might translate into a replacement for formal IP rights.

Therefore, even though the final decision about the protection of assets is a commercially strategic one, it is reasonable to anticipate that non-digital businesses will experience a positive impact from IP protection as a guarantee of the successful commercialization of their innovation. On the other hand, a solid intellectual property strategy could easily translate into a negative financial return for digital SMEs. (Costa, Crupi and Marco et al., 2023) test the following hypothesis:

### **H2:**

*The involvement of digital SMEs in internal data protection practices has a detrimental impact on the likelihood of a successful financial outcome.*

The (Costa, Crupi and Marco et al., 2023) studies support the hypothesis, which predicts a negative impact on the financial results of the highest-level SMEs digital's participation in OI1 strategies due

to the effect of dominant negative external signposting that easily could prevent the establishment of productive collaborations. (Dahlander & Gann, 2010)

Participation by non-digital SMEs in internal activity protection procedures has a positive impact on the likelihood of positive financial performance. This hypothesis is incompatible with non-digital SMEs. Therefore, it appears that an increase in internal protection won't necessarily translate into a higher financial return. This refutes the notion that IP protection in non-digital SMEs is an effective way to exploit the fruits of their innovations (González-Álvarez et al., 2007; A. A.-R. policy, 2001) and serves as a deterrent to imitation of the competition (e.g., Graham et al., 2009; MacDonald, 2004). Additionally, (Costa, Crupi and Marco et al., 2023) findings imply that digital SMEs could not participate in OI1 strategies to safeguard inventive activities that are not necessarily integrated into new goods or services but rather aim to safeguard already-established businesses. Last but not least, since many protection mechanisms are expensive, intellectual property protection can easily be transformed into one of the primary financial bottlenecks for businesses; It's possible that businesses with a less advanced digital strategy and who are not at the forefront of technology won't be able to use intellectual property protection as a strategic tool to counteract unfavourable applicability conditions in extremely dynamic industries, instead opting to use more informal protection strategies (Paula et al., 2019).

## OI2 External relations management

Given that SMEs frequently suffer from a lack of financial resources, human capital, managerial skills, and knowledge (Bigliardi et al., 2018; Spithoven et al., 2013), they see the creation of networks as a way to improve their technological competencies. Research suggests that SMEs tend to prefer informal knowledge sharing and the establishment of networks over complex transactions like the acquisition and granting of licenses, taking into account the SMEs resource limitations (Brunswicker, 2015). The SMEs could reduce the costs associated with innovation investments and adapt and reconfigure the innovation processes by utilizing external collaborations. But even if managing external relationships has advantages that are more obvious, there are also significant drawbacks. (S. Lee et al., 2010) identified a potential drawback of external relationships: managing external relationships is expensive and increases the likelihood that central knowledge will be filtered. The diversity and combination of various sources requires a significant effort to benefit from the creation of new value, and the value in each case may differ significantly (Brunswicker, 2015). Additionally, SMEs may exhibit various supply patrons.

Therefore, using and managing more complicated and research-based relationships could negatively impact how well businesses perform. Engaging in a thorough search, choosing the right partners, and managing relationships could all pose significant challenges to the sustainability of businesses' organizational capabilities. Furthermore, (Laursen & Salter, 2006) discovered that, beyond an ideal level, businesses with a greater variety and complexity of external relationships have declining performance in terms of innovation.

When assessing the trade-off between costs and benefits arising from managing multiple external collaborations with different types of partners for digital and non-digital SMEs, the findings are mixed. The benefits derived may outweigh the associated management costs for non-digital SMEs operating in low-intensity R&D sectors because these businesses are more likely to participate in demand-side collaborations and exploitation activities. This is especially true when businesses are looking for downstream to get new knowledge because they are more interested in the commercialization phase of the same thing than their testing phases (Verbano et al., 2015). On the

other hand, digital SMEs tend to strengthen innovative partnerships based on research for exploration-related activities, with partners from the offer side, characterized by higher risks and uncertainty that enable them to be competitive in more complicated and globally oriented environments. The ability to investigate partnerships with universities and research organizations focused on effective knowledge transfer would aid SMEs in seizing opportunities, adopting strategies, and achieving long-term sustainability, even though doing so might result in a worse financial performance and be riskier than long-term planning (Parida, Patel, et al., 2016). As a result, (Costa, Crupi and Marco et al., 2023) proposed the hypothesis that:

**H3:**

*Digital SMEs involvement in managing external relationships has a detrimental impact on the likelihood of a successful financial outcome.*

And this, indeed, is supported. Even though digital SMEs tend to be businesses that invest more heavily in research and technology, they frequently lack the internal capacity to absorb outside knowledge and lack the appropriate infrastructure to benefit from this type of network, which increases the risks associated with it due to the more volatile nature of the exchanged technologies and knowledge.

**H4:**

*Participation of non-digital SMEs in managing external relationships has a positive impact on the likelihood of a successful financial outcome.*

This is partially corroborated, meaning that it has a positive effect even though it is not significant. Results from (Costa, Crupi and Marco et al., 2023) show that their commitment to managing increased demand and market-based collaborations does not translate into a statistically significant improvement in their financial results for non-digital SMEs (Macpherson et al., 2003).

## OI3 Relationship

The third DeMarkers indicator, OI3, is the relationship and it measures how well SMEs can balance external knowledge flows with the company's priorities within the boundaries of their organizational structure (Marco et al., 2020). Traditional literature emphasizes that small and medium-sized enterprise are typically less likely to conduct formal R&D than large corporations, which clearly have an advantage in R&D due to the greater volume of output on which they may focus their R&D expenditures (Ortega-Argilés et al., 2009). In addition, OI3 illustrates an organization's capacity to capitalize on synergies and economies using internal resources by exploring the concept of relation as a theoretically grounded construction based on the resource-based vision (RBV) of diversification (Tanriveldi, 2005). Exploration of new opportunities might be seen as a less desirable alternative to pursue because it is a double-edged sword, which would cause the opposite firm response—an over-commitment to internal resources—instead (Dahlander & Gann, 2010; Minin et al., 2016). As a result, (Costa, Crupi and Marco et al., 2023) claims that the involvement of the SMEs in relation to R&D (OI3) may have a positive impact on their financial performance because it allows them to focus on their core competencies and increase efficiency. As a result, (Costa, Crupi and Marco et al., 2023) tested the following hypotheses:

**H5a**

*Digital SMES involvement in the relationship has a favourable impact on the likelihood of a successful financial outcome.*

The study's findings, which are summarized in the article (Costa, Crupi and Marco et al., 2023), confirm that digital SMEs have a natural tendency toward OI, which is primarily due to the complexity of the architecture of digital solutions and their need for integration and modularity with a variety of different solutions.

#### **H5b**

*The likelihood of a positive financial return is positively impacted by non-digital SME participation in the relationship.*

This hypothesis has not yielded a significant result.

## **OI4 Business model innovation**

Finally, OI4 is linked to Innovation in Business Models (BMI), a source of sustained value creation and competitive advantage (Chesbrough, 2010). The literature demonstrates that many SMEs still fail in the BMI processes because BMI calls for the development of new commercial theories and approaches to capture value (Casadesus-Masanell et al., 2013). The two main factors that hinder the BMI are resource limitations and organizational inertia (Guo et al., 2017). Additionally, the SMEs must balance simultaneously the allocation of resources across various activities and organizational relationships using resources that are neither entirely internal nor entirely external.

The strategic goals of the participating businesses in BMI must deal with the exploration and exploitation of new knowledge as well as the planning of BMI reconfiguration (Clauss et al., 2019). As a result, (Costa, Crupi and Marco et al., 2023) anticipate that efforts related to the SMEs BMI won't produce the desired results given the limited resources (Chesbrough, 2010).

Therefore, (Costa, Crupi and Marco et al., 2023) formulates the following hypotheses:

#### **H6a:**

*The involvement of digital SMEs in business model innovation has a negative impact on the likelihood of a positive financial return.*

#### **H6b:**

*The involvement of non-digital SMEs in business model innovation has a negative impact on the likelihood of a positive financial return.*

None of the two hypotheses has been proven true. Even if digital and non-digital platforms involved in BMI challenges are more likely to experience a loss of viability, the corresponding effects are not statistically significant. The marginal effects show that the negative impact of BMI is greater in magnitude for digital SMEs, whose participation in BMI decreases the likelihood of having a positive financial return. Depending on how each company implements the BMI, the SMEs may have both a sustainable growth and financial difficulties when addressing them (Hartmann et al., 2013). Given that the BMI is frequently closely related to the transformation of the entire organization, a significant shift in organizational culture must come before any successful organizational transformation (Audzeyeva et al., 2016).

Only for digital SMEs does the impact remain significantly negative: its marginal effect, statistically significant at the level of 10%, shows that an increase in patent value results in a decreasing



likelihood of an effective financial performance of 10.9%. This conclusion demonstrates the defensive nature of these companies' patent usage and the effect that patents have on their own innovation capabilities, which are helpful for gaining leverage in the future in dealings with larger and technologically more powerful partners (Costa, Crupi and Marco et al., 2023).

The MEM (the marginal effects at the means) emphasizes that, generally, they have a more detrimental effect on the likelihood that the digital SMEs will have a positive financial outcome, both for Opening and the four key OI practices. In terms of the four different DeMarkers indicators, OI2 participation by digital businesses has the worst effect (32,9%) on the likelihood of financial success, while OI1 has the greatest adverse impact (26,9%) for SMEs that are not digital.

(Costa, Crupi and Marco et al., 2023) findings generally show that short-term OI practices have a significant impact on the financial performance of businesses, and this is true of both digital and non-digital SMEs. However, when the four OI challenges are examined in more detail, the results show intriguing differences between digital and analogue processes. In fact, the costs of OI have less of an immediate impact on non-digital products. In contrast, digital data are more exposed to OI costs in the near future. (Costa, Crupi and Marco et al., 2023) findings are consistent with previous research that shows the risk of immediate financial difficulties businesses face when implementing OI due to the effect of rising costs and growing demand for value absorption (Bogers et al., 2017; Duran et al., 2016; Faems, Visser, et al., 2010). However, they need to better understand how the OI affects the financial performance of businesses, particularly digital SMEs that tend to experiment a lot and use their technological skills and knowledge to take advantage of novel solutions based on technology and knowledge exchange, which increases their exposure to risk.

OI continues to be a crucial option for ensuring that the SMEs can compete in very competitive environments; it is a short-term financial effort. Additionally, our findings suggest that while collaboration is necessary to maintain the pace of technological advancement, it also comes with immediate costs that businesses must be ready to deal with, particularly when it comes to balancing absorption capacity and open innovation (Kim et al., 2015). This supports the concept that the formation of knowledge value and the organization of networks serve as factors that feed the intimidating shadow side of open innovation (Hurmelinna-Laukkanen et al., 2023).

Contrary to large companies, which employ a "single search path" strategy for acquiring external knowledge, SMEs frequently activate multiple search paths, typically one to four at once (Chaochotechuang et al., 2019). As a result, some coordination is necessary, and open innovation frequently involves what has been referred to as orchestration (Hurmelinna-Laukkanen et al., 2023). Due to their involvement in different search routes, SMEs are compelled to seek for far-off external knowledge to include in order to advance the development of their technology (Afuah et al., 2012.; Bogers et al., 2019; Jacobides et al., 2018). Due to the more expensive work necessary to find, integrate, and utilize multiple types of partners at once, these activities typically result in increased costs when increasing the number of partners engaged (Dahlander & Gann, 2010).

(Costa, Crupi and Marco et al., 2023) study alerts the players to carefully balance the knowledge exchange with IP mechanisms in line with (Hurmelinna-Laukkanen et al., 2023). Utilizing a variety of appropriate mechanisms could help businesses in the open innovation context create and capture the value created by their open innovation partners, prevent unintended indirect effects of knowledge, and address risks associated with both inappropriate innovation appropriation and idea imitation. However, the need for additional financial resources as well as the more tangible risk of a negative effect on the external environment (Dahlander & Gann, 2010) may make it difficult for the

SMEs to perform financially. This prevents the establishment of some productive collaborations with outside investors.

In order to reduce inefficient resource allocation, unneeded risks related to the protection of intellectual property, and external knowledge about search, SMEs are called upon to better balance the entry and exit points for knowledge, frequently by limiting the number of potentially committed parties (Molina-Morales et al., 2011).

Now that it has been talked about the DeMarkers and studied both digital and non-digital SMEs cases, we will talk now about how important it is to empower the employee. Empirical proof of the beneficial impact of employee empowerment on the inventiveness of SMEs is provided by (Çakar et al., 2010), letting now that indeed, the organisations have to encourage the empowerment. Nevertheless, a lack of employee participation in decision-making may impede openness and internal commitment. Thus, it is anticipated that the development of an organizational culture for innovation will be limited by the centralization of decision-making.

Due to their higher flexibility and responsiveness to market needs, SMEs are more likely than their larger counterparts to benefit from OI practices, according to recent study (Spithoven et al., 2013).

OI efficacy may lead to reduced costs, a quicker time to market, increased sales, a stronger technological position, and access to new markets (Lichtenthaler, 2007; Huizingh, 2011).

## Innovation environment:

"Innovation environment" refers to organizational environments that encourage employees' inventiveness, creativity, risk-taking, and personal development (Menzel et al., 2007). According to prior research, engagement-based human resource (HR) practices can foster a favourable social climate that motivates workers to act in accordance with the company's goals by acting as facilitators of a favourable social climate for innovation (Soto-Acosta et al., 2017). This is consistent with the Social Exchange Theory. According to (Collins et al., 2006), engagement-based HR strategies promote flexibility, teamwork, cooperation, and knowledge sharing over the long term. Therefore, it is anticipated that commitment-based HR strategies will aid in creating an innovative environment.

The climate for innovation is anticipated to depend on interdepartmental connectivity. Nevertheless, new study (Prakash et al., 2008) contends that open communication, decentralization, and high job autonomy are crucial elements in fostering creativity.

The following theories are put forth:

### Hypothesis 1

*Engagement-based HR practices have a positive effect on the innovation climate.*

Hypothesis 2

*Interdepartmental connectedness has a positive effect on innovation climate.*

Hypothesis 3

*Centralisation of decision-making has a negative effect on innovation climate.*

Previous studies suggest that a high level of involvement is more likely to occur in firms that have a strong internal innovation climate (Carayannis et al., 2017; Oke et al., 2013).

Hypothesis 4

*Innovation climate has a positive effect on OI.*

Hypothesis 5.

*Environmental dynamism strengthens the positive effect of innovation climate on OI.*

Hypothesis 6

*Environmental competitiveness strengthens the positive effect of the innovation climate in OI.*

Hypothesis 7

*OI practices have a positive impact on SME business performance.*

After (Popa et al., 2017) studied the different hypotheses, the following results were reached:

-Hypothesis 1 was confirmed. These results show that HR practices based on commitment are an important factor for the development of an innovation climate.

-Hypothesis 2, Hypothesis 3 found no support, indicating a non-significant relationship between interdepartmental connectedness and innovation climate and a non-significant relationship between centralisation of decision-making and innovation climate.

-Hypothesis 4 was confirmed. The results show that innovation climate contributes positively to both incoming OI and outgoing OI.

-Hypothesis 5 found moderate support. Environmental dynamism strengthens the positive effect of innovation climate on outgoing OI, while it does not moderate the relationship between innovation climate and incoming OI.

-Hypothesis 6 found no support, suggesting that environmental competitiveness does not moderate the relationship between innovation climate and OI.

-Furthermore, the results show that outgoing OI and incoming OI contribute positively to firm performance. Therefore, Hypothesis 7 found support.

The innovation climate is positively impacted by commitment-based HR strategies, and development and incentive HR practices have a higher impact than selection HR policies.

While prior research has shown that interdepartmental connectedness and centralization do matter in the role of innovation development and exploration in large firms (Jansen et al., 2006; journal, 2003; Lantos, 2006), the effects of these factors on innovation climate were not found to be significant. SMEs, on the other hand, are less bureaucratic and more adaptive, as a result it is less important to them.

The findings imply that both incoming and outgoing OI are positively impacted by the innovation climate. These results corroborate earlier research that, while not focusing on OI, found that an environment that encourages innovation increases the inventiveness of SMEs (Kmieciak et al., 2012). Strong internal innovation cultures encourage risk-taking and lateral thinking in businesses (Oke et al., 2013), which encourages them to use outside knowledge (Carayannis et al., 2017; Laursen & Salter, 2006).

SMEs have significantly fewer resources than their larger competitors to sort through the outside world for useful information (Dahlander & Gann, 2010; Van De Vrande et al., 2009). Because they can perceive a clear financial gain from commercializing domestically produced innovations, SMEs can only take environmental dynamism into account while producing outbound OI.

According to recent studies, SMEs have an advantage over large companies in that they are more likely to gain expertise from outside sources since they are less bureaucratic, more receptive to customer needs, and more adaptable (Spithoven et al., 2013). This argument contends that both inbound and outbound OI can help SMEs increase the performance of their businesses.

## Business environment:

Let's talk about the business environment. According to earlier research (Gulati et al., 1998; Sutcliffe et al., 1998), many external collaborations fail because they are unable to adapt to environmental dynamism. According to (Krishnan et al., 2016, p. 57), "Environmental dynamism, the difficulty of predicting external changes outside the control of the partnership, is a key factor underlying coordination difficulties that are innocent and non-strategic".

(1) "How much do organizational learning culture and environmental dynamic influence OI? likewise, how does the relationship between organizational learning culture and OI get moderated by relational capital?". The article (Zahoor et al., 2023) gathered survey information from 209 emerging market SMEs operating in the United Arab Emirates (UAE), a developing market in the Middle East, to answer these questions.

According to (Heyden et al., 2013), environmental dynamism describes the rapidity and unpredictable nature of changes occurring in the external environment. The OI operations of emerging market small and medium enterprises (ESMEs) suffer whenever environmental dynamism in emerging economies increases. ESMEs can concentrate on matching their collaborative innovation activities with known requirements when operating in predictable contexts (Cruz-González et al., 2015; Huang et al., 2023).

Additionally, SMEs can obtain and process more accurate information and knowledge to support OI because the rate of environmental change in emerging markets is modest or predictable (McKelvie et al., n.d.). Additionally, these predictable environmental factors suggest that ESMEs can easily coordinate partnership work and communicate in order to develop a thorough understanding of operational concerns, acquire tacit knowledge, and possibly increase efficiency through OI activities (Schilke et al., 2014). But as the environment becomes more dynamic, it calls for quick and flexible decision-making based on an abundance of precise data supplied by alliance partners (Hao et al., 2020). Information overload issues result from this, which might impede joint OI efforts and lead to bottlenecks (Ringov, 2017). High levels of environmental dynamism also cause variability and call for mutual adjustment, which makes coordination extremely difficult (McKelvie et al., n.d.; Zheng et al., 2015). Emerging markets confront considerable adjustment issues with alliance partners due to the comparatively low levels of standardization present in these markets, especially in environments of strong interdependence (Dyer et al., 2018). According to (Kwok et al., 2019, p. 5), "any changes by one partner affecting the other in an unplanned way and mistakes by the partners would lead to a more immediate and severe adverse impact on each other" in such situations. Alliance partners are more likely to break the terms of their agreements and pursue personal gain in dynamic circumstances (Zhang et al., 2010), which can have a major financial impact on the parties involved. the creation of innovative products.

In the context of the UAE (United Arab Emirates), there are three unfavourable relationships. Starting with environmental instability. It can be challenging for organizations to participate in open innovation activities in the UAE due to the country's heavily regulated economic environment (Zarrouk et al., 2021). Regulatory restrictions and bureaucracy may make it more difficult for organizations to work with outside partners and may make it more difficult for new competitors to enter the market. Third, the UAE market is also very competitive, with an emphasis on innovation and rapid growth (Nuseir et al., n.d.; Pervan et al., n.d.). Organizations may find it challenging to engage in open innovation in this competitive environment because they may be reluctant to share their discoveries and ideas with potential rivals.

Environmental dynamic poses OI challenges for ESMEs, including knowledge gaps, challenges with information verification and contract enforcement, and a higher risk of partner opportunism (Dyer et al., 2018; Marino et al., 2008).

Hypothesis 1:

*Open innovation is adversely correlated with environmental dynamism.*

A sample of technological ESMEs functioning in the United Arab Emirates, a nation in the middle east, were used by the authors of the paper (Zahoor et al., n.d.) to examine this idea. The UAE is a relatively developing market in the Middle East that has undergone political interventions as well as economic transformations (Donbesuur et al., 2021; Nakos et al., 2018). The findings show that it does, in fact, have a detrimental effect on environmental dynamism.

## 4. Tools for open innovation

Open innovation tools play a critical role in facilitating communication, collaboration and co-creation among these participants. From online platforms that foster the exchange of ideas to open challenges that convene innovative solutions, these tools drive synergy between different perspectives, accelerating the generation and application of disruptive ideas. Below, we explore some of the key open innovation tools that are transforming the way companies innovate today.

### Crowdsourcing platforms:

The term "crowdsourcing" is a combination of two English words, "crowd" (for multitude) and "outsourcing" (for external assistance). The term first appears in a 2006 article by Howe for the magazine *Wired*, in which crowdsourcing initiatives were described as a cutting-edge business model based on the use of "collective creativity" through online networks (Howe, 2006).

The study (Schenk & Guittard, 2009) contributes one of the first approaches that effectively conduct a theoretical analysis by examining the origins, potential applications, and relationships of the tool with other practices, and by proposing a classification based on a practical and conceptual analysis: Crowdsourcing is a method of assigning tasks to the masses through an open call for submissions on an online platform, rather than to other businesses. This invitation should not be restricted to professionals or preselected candidates. The benefit to the companies is substantial, as they are able to externalize the risk of failure and only pay for goods or services that meet their expectations.

(Geiger et al., 2011) carried out the following categorization of processes:

1. Candidate selection procedures, including limitations on who is eligible to participate in a call for candidates.
2. Access to peer contributions: the extent to which participants may access one another's contributions.
3. Usefulness of Participations: Explain how the Online Mass Contributions to Multitudinous Processes might be used by the Process Organising Organization to achieve the Desired Results.
4. Participant compensation: decide how to pay participants for their contributions.

(Hosseini et al., 2014) provide a typology that is quite detailed with regard to the fundamental components (pillars) of the process, which are:

- The online mass should have the following qualities: diversity, a large number of participants, anonymity, aptness, and borderless action.
- The process's organizer should have rewards and incentives, an open nomination process, and confidentiality.
- The task that needs to be finished must include a traditional process, outsourcing, modularity, complexity, solvability, animate characteristics, be user-driven, and specify the kind of contribution that is desired.
- The technological platform needs to be connected to the masses, interact with the process organizer, and be structured appropriately.

The quality and quantity of user-submitted ideas are a major factor in the success of crowdsourcing communities. More ideas will increase the likelihood of discovering novel ideas, but more poor ideas will raise the expense of doing so.

In the past ten years, businesses have been more and more interested in using crowdsourcing platforms as a way to involve consumers in the process of developing new products (NPD) (Prpić et al., n.d.). In these communities, businesses involve customers in the creative process by inviting them to submit suggestions for new products (Dahlander & Gann, 2010; Huang, Singh, et al., n.d.) or ways to improve existing ones (Mahr et al., n.d.; Yang et al., 2021).

More ideas will increase the likelihood of discovering novel ideas (Boudreau et al., 2011). However, only few people are able to contribute novel or highly potential ideas (Huang, Singh, et al., n.d.; B. B.-M. science, 2013). Therefore, receiving a lot of low-potential ideas when there are more ideas increases the cost of finding novel ideas for organizations (Piezunka & Dahlander, 2014). In the context of NPD, there is frequently a general description of the issue that invites users to come up with ideas (e.g., Lego game design ideas), whereas in the context of product improvement, ideas are typically the result of a consumer identifying a problem or error with the company's software (B. B.-M. science, 2013). Users are recognized by the community and/or the company on platforms for crowdsourcing ideas for NPD if their concepts attract the community's attention because they are novel and distinctive. On the other hand, because ideas tend to be incremental improvements to existing products, creators of ideas on platforms for product improvement like Idea Exchange may not receive the same recognition or reputation (Information et al., n.d.).

## Industrial Clusters

A possible interpretation of the meaning of industrial clusters is: concentrations of economic agents in close geographic proximity with the aim of establishing relationships with one another to carry out specific economic activities more effectively (development, 2004).

Having an active industrial membership during the second half of the 20th century provided one of the best opportunities for small and medium-sized businesses to survive and continue to be competitive on a regional, international, and even global scale. The risk of losing the entirety of the value chain in key competitive areas like product manufacturing, product design, and research and development (I+D) was also present for major international, multinational, and global corporations in the face of powerful and agile rivals, firmly grouped in particular geographical locations (development, 2004). Some of these large corporations were also able to take advantage of the enormous potential and capabilities that the industrial clusters have to offer. In general, this was accomplished by placing the company's key operations in carefully chosen industrial groups around the world.

It is possible to understand a cluster's potential for knowledge creation and innovation by looking at the nature and quality of its surrounding social web.

The concept of scale economies located in geographic agglomerations has a long history in economics, dating back to Adam Smith's initial observations on occupational specialization and (Marshall, 2009) findings. Explanations as to why businesses keep locating in the same areas. Marshall highlighted three crucial explanations. First, businesses are located close together geographically because this enables them to develop a specialized workforce that is highly qualified for a certain industry's unique needs and is relatively simple for businesses that require these skills to access. Second, these businesses are capable of supplying non-marketable inputs unique to a particular industry. To put it another way, by situating themselves close to one another

geographically, these businesses are able to experience scale economies through the development and application of common technologies or specialized capital infrastructure. Thirdly, geographically unified businesses can produce the most information and idea flow. In other words, a product. This final point, in particular, is intriguing for open innovation because it is enabling easier in the exchange of information.

Global logistics make it possible for everyone to have access to basic production factors like capital and unskilled labour, but flows of specialized knowledge and rich knowledge interactions that result in beneficial innovations are still stronger between agents in the same spatial group than among firms that are geographically dispersed.

An industrial cluster is a socioeconomic entity that consists of a social community of people and a dense population of economic agents that are both located in the same general geographic area. Within an industrial conglomerate, a sizeable portion of the social and economic agents collaborate on economically related tasks, sharing and fostering a stock of products, organizational knowledge, and technological know-how to produce goods and services that are superior in the marketplace (development, 2004).

## Social network

Everything about this social network concept is very fascinating to SMEs.

Each person's knowledge is their own personal capital, and because of it, many of them earn an income, meaning that their knowledge has a definite market value. Given the dynamic of change in the modern world, knowledge must be updated frequently in order to be obtained, maintained, and make it appealing to the market. People use a variety of methods to accomplish this, including: Life experience; reading books, texts, and specialized journals; use and repetition of information and communication technology (ICT, with the internet being the most frequently used resource for knowledge seeking); attending formal training courses (face-to-face or not); and speaking with and exchanging ideas with others who are experts in the subject(s) on which a person wishes to obtain knowledge or increase or update the knowledge he or she already has. Meetings, conferences, congresses, events, expositions, etc. are some examples of this final method (Vergara, 2006).

Social networks in its various forms have established a background for entrepreneurship and new firms in this digital era by offering areas for knowledge and information sharing as well as chances to boost creativity and economic growth (Ebrahimi et al., n.d.). A business has the chance to strategically utilize social media to strengthen its capacity to increase innovation performance (Muninger et al., 2018). Additionally, social networks offer a platform for closer client engagement and innovation (Carlson et al., 2018). The impact of social networks on innovation is supported by empirical data from earlier studies (Research, 2018; A. P.-M. R. Review, 2018; Scuotto et al., 2017). Constant engagement with the environment leads to the development of innovative ideas. Social networks therefore enable businesses to share information, obtain problem-solving ideas, discover new opportunities, and locate new markets (Udimal et al., n.d.).

As information technology advances, businesses have more options to innovate, one of which is through social networks. Companies can create reciprocal connections through social networking in order to develop norms, networks, and partnerships (A. P.-M. R. Review, 2018). Open-source social networking websites rely on close connections between businesses. As a result, businesses can engage many users in knowledge transfer without regard to organizational or geographic boundaries (Scuotto et al., 2017).



According to a study's findings, social networks have a positive impact on the process of value creation, which will drive the innovation process. Another study (Scuotto et al., 2017) that focuses more on social networks comes to the conclusion that SMEs that use social networks can increase innovation and the production of new products. Previous studies also demonstrate the significant impact that social networks have on open innovation (Hitchen et al., n.d.; Loukis et al., 2016). As a result, the next hypothesis is the following:

**H1:**

*Social media networks have a positive impact on innovation.*

This study's (Latifah et al., n.d.) key finding is the confirmation that social networks play a minor mediating role in the relationship between human capital and innovation. This indicates that businesses use social networking sites to exchange information on a variety of topics, including commercial interests. More specifically, social networks can be used to build relationships with external parties like customers, business partners, and consumers so that they can learn new information. High-level human capital will be intelligent when using social networks to stimulate innovation through socialization, externalization, and the process of combination (S. H.-T. Q. Management & 2007, n.d.).

It's crucial to take into account using social media to assist the company in achieving better results. The option is available for businesses to provide social media platforms to foster closer relationships with their customers. A company's ability to innovate is impacted by the role that knowledge exchange plays in the organization.

## B2B Market

B2B are "open electronic platforms that facilitate activities related to transactions and interactions between numerous businesses" (Holzmüller et al., n.d.). According to (Rohm et al., n.d.), the digital B2B platform is "an interorganizational information system through which numerous buyers and vendors interact electronically to identify potential business partners, choose them, and carry out transactions."

A B2B market is where commercial customers and commercial suppliers can exchange goods and services. Third parties that coordinate all required activities for the exchange may be able to assist in making intercompany coordination between businesses more effective and efficient. We'll start calling these B2B markets (Holzmüller et al., n.d.).

The conditions for corporate coordination have changed as a result of the growth of the Internet, giving B2B electronic markets a new role.

Utilizing the internet reduces specificity and makes product descriptions easier. As an illustration, with the help of the Internet and information technology (IT), it is possible to easily describe even complex products or conduct a global search for the necessary information, which reduces the significance of location (Holzmüller et al., n.d.).

Businesses might benefit from additional services provided by B2B electronic markets to help them combat information overload.

Information will play a significant role in future intercompany coordination. It appears the question of how information will be coordinated between companies and what channels should be used to communicate information to market participants most effectively.

By grouping participants together in the middle, a B2B electronic market has the potential to significantly reduce participant connections. The outcome is a decrease in information costs and an improvement in information quality (H. Lee et al., n.d.)

An electronic B2B market's goal is to maximize corporate coordination. Every service provided has to help achieve that goal, whether directly or indirectly.

The B2B electronic markets will provide standard functions during the information phase, such as tools for searching and comparing products, buyers, and suppliers, as well as more sophisticated functions like product configuration and evaluation tools. (Holzmüller et al., n.d.) anticipate seeing standard functions used more frequently in the future given that they are shared by all market participants and significantly improve the efficiency of the information flow.

The majority of B2B digital platforms are Internet-based aggregators that serve as virtual spaces where buyers and sellers can reach agreements (De Reuver et al., 2018). As a result, one of the key characteristics is the role of an intermediary, which acts to promote transactions among the platform's actors. Another consistent prerequisite for defining a digital B2B platform is the shared value. In other words, the platform should not only support the network between parties that would otherwise lack a space to meet, but should also encourage the exchange of value along with the information (Peruchi et al., 2022). The perspective of (Peruchi et al., 2022) improves understanding of the topic of B2B platforms. The authors specifically state that each business network, whether digital or not, has a B2B characteristic that is based on collaboration and innovation among participants who speak to multiple individuals and businesses.

In fact, commercial organizations that are primarily interested in enhancing their own performance participate in digital B2B platforms. The B2B digital platforms enable the actors to take advantage of numerous benefits. According to (Rodríguez et al., 2011), the variety of benefits is made up of: professional experience, knowledge exchange, chances for innovation, sales availability, and supplier information.

The goal of the actors on the digital B2B platform is to exploit infrastructure connections. However, in order to achieve greater economic value, one must think beyond financial considerations and instead consider their ability to generate greater value in terms of innovation, problem-solving skills, and market sensitivity (Cusumano et al., 2019).

## Incubation and Acceleration programmes

As they provide access to mentors and information, the development of skills, connections and networks with existing and new businesses, all of which increase the likelihood of business success, acceleration programs may have an impact on possibilities for professional advancement (Giourka et al., 2021).

Through initiatives of business support that also include procedures for entrepreneurship acceleration and incubation (Fini et al., n.d.), public policy initiatives are attempting to facilitate business-to-business networks of communication and foster ties between business and scientific actors (Partanen et al., n.d.).

The modern business acceleration benchmarks have developed gradually over time. Programs of multifactorial acceleration have replaced simple informational tools that contain general information on how to support a business. A business accelerator's design pattern typically includes programs for participant training and mentoring led by a wide range of mentors who may be former business owners, venture capitalists, business managers, or executives. Corporate acceleration is primarily a growth-hacking strategy that helps organizations connect with startups, collaborate with them, and use open innovation. The corporate acceleration programs are intended to speed up current business operations and enhance an organization's capacity for innovation, fostering "ambidexterity at the level of the enterprise" (Basu et al., 2009). Existing businesses' objective in accelerating into corporate accelerations is to absorb innovations or gain quick access to businesses that could be disruptive. As the economy grows, business acceleration programs become more specialized and focused on the industry, with a variety of property types, complex financial structures, and an evolution toward franchise models (Ismail, n.d.).

The accelerators support the establishment of businesses through the provision of specialized services adapted to the unique characteristics of either existing or new businesses, the industry they operate in, market trends and competitive pressures, technological leadership, general marketing, human resource management, and sustainable business practices. They focus on development over the course, that usually lasts a few months (S. L. Cohen et al., 2014).

In their study on corporate accelerators, Shankar and Shepherd (Shankar et al., n.d.) state that corporate acceleration results in a "corporate nutrition", whether by increasing the absorption of innovations or by gaining access to new businesses that enhance competitiveness and capacity for responding to market developments using open innovation principles. As a result of access to information about novel perspectives that may help to reduce cost structures or improve relationships between customers and suppliers, the outcomes of corporate acceleration programs may also involve investing in incremental changes that keep businesses updated.

It has been discovered that mentoring helps accelerated businesses focus on rationalizing their concepts rather than creating entirely new goods or services (Bone et al., 2019). A higher likelihood of progressing in the outcome of innovation is linked to assistance with team formation.

It has been discovered that business support mechanisms, such as acceleration programs, are positively associated with business survival and have positive indirect effects on the larger business ecosystem (Bone et al., 2019).

Since the 1960s, there have been incubator-style support systems for businesses (Dempwolf et al., n.d.). Their main goal is to support a business so that it can thrive and develop during the early stages of the venture by providing affordable office space, services in financial and legal matters, and mentorship to help with business development or fund raising (S. L. Cohen et al., 2014). When resources like specialized technical experience are lacking, incubators focus on fostering commercial connections with other businesses, government agencies, and other parties with commercially relevant interests outside of the incubator (Hausberg & Korreck, 2020). However, incubators sometimes do not impose tight time limits on how long a company can participate in an incubator

program. Therefore, if this period is prolonged, it may lead to incubators holding onto businesses so they don't fail quickly, which is contrary to the idea of quick failure put out by agile thinking and lean start-up principles. After stating this, academics acknowledge the contribution of local incubators to employment and monetary earnings (Ratinho et al., n.d.).

On the other hand, the accelerators that have grown significantly since the launch of Y-Combinator in 2005 (Dempwolf et al., n.d.) are fast-paced, typically lasting three months, and are commercial support programs that aim to assist both new and existing businesses. working online, improving their knowledge and competitiveness through business-related training, and looking for funding opportunities while receiving intensive guidance and training, with the overall goal of growing relatively quickly or failing quickly and safely (Giourka et al., 2021). Corporate acceleration programs are a relatively new phenomenon that began in 2011. The corporate accelerators provide information on changes in the commercial environment, how to boost sales and switch to a more innovative marketing strategy, and how to attract cooperation and associations to foster a more entrepreneurial culture. The corporate accelerators offer the services provided by other acceleration programs, but they also aim to assist corporate employees in starting new businesses (Hausberg & Korreck, 2020). The goal of the services of acceleration is to help emerging and established businesses move quickly from one stage to the next, whereas the goal of the services of incubation is to help entrepreneurs advance toward more mature and self-sufficient businesses (Dempwolf et al., n.d.).

## Hackathons and innovation competitions

The growth of open innovation and the development of the digital economy are improved through digital innovation competitions and hackathons (Alves et al., n.d.).

Periodically, "technological events" are held to promote innovation, the entrepreneurial spirit, and social enterprise. The hackathons typically last for a week and are made up of coders, creators, domain experts, businesspeople, and other interested parties that collaborate to produce early versions of solutions to a collection of "challenges" (Perng et al., 2018).

Developers generate concepts and turn them into applications during short-lived events called hackathons. The hackathons are being used to band together and encourage the development of services using open data that will increase the value added for the government and the people. The goal of the hackathons is for citizens and developers to work together to create open-source applications that are released to the market through competitions (Adamczyk et al., n.d.; Alba et al., n.d.; Chan et al., n.d.; Juell-Skielse et al., 2014).

Although the academic community has given the innovation contests and hackathons a lot of attention, very few conclusions have been drawn about the roles and responsibilities of the various participants or how they may affect the development of new digital services (Hjalmarsson et al., 2012; P. Johnson et al., 2014; Juell-Skielse et al., 2014; Strategies, 2014). This is due to the fact that it is still unclear who the actors are (Juell-Skielse et al., 2014), as well as the protocols for coordinating hackathons and how they affect the establishment of innovative services.

The public institutions frequently provide open data to programmers and others in order to encourage participation in innovation challenges and open data usage. These hackathons have two goals: to encourage developers to use open data in novel ways and to inform the public at large about the value and potential of this data through public presentations and debates. This kind of innovation competitions are frequently used to promote information exchange and the development of new goods and services that benefit society (P. Johnson et al., 2014; M. Lee et al., 2016).

In terms of the more digital part, and specifically the development of software, the dissemination of information by governmental agencies is a driving force behind the development of new software. The governments must ensure that open data is easily accessible and cost-free in order to encourage the development of digital services and applications (P. Johnson et al., 2014). The possibility of training, collaboration with other developers, acquisition of new skills, and perceived equity in the evaluation system are only a few of the reasons why developers find hackathons appealing (Adamczyk et al., n.d.; Hernández-Dionis et al., n.d.; Kitsios et al., 2018; Komssi et al., n.d.; Leemet et al., n.d.). Developers are encouraged to participate in hackathons for a variety of reasons, such as the chance to test out new concepts, develop cutting-edge digital services, and gain experience in the face of fierce competition and technical uncertainty. Prior digital innovation competitions gave participants access to open data to aid in the development of novel applications and the acquisition of new skills (P. Johnson et al., 2014).

## Research bases

The introduction of Google Scholar (GS) in November 2004 revolutionized how academic researchers and the general public searched for, found, and accessed scholarly information by bringing the simplicity of Google searches to the academic world.

The majority of the physical barriers to accessing scientific information were removed with the general adoption of web technologies (Nature, 2001). Since then, academic community members of all stripes—researchers, editors, funding organizations, librarians, and political decision-makers—have engaged in heated debate over the issue of open access (or OA) to academic literature. Many of these discussions focused on how the academic communication system should be changed, taking advantage of this new virtual environment to become more effective and efficient and, hopefully, finding solutions to issues like the disparity and accessibility of scientific information that plague many research institutions.

Due to how quickly users have started sharing their work on academic social networks (ASN), in particular, they have drawn a lot of attention (Publishing & 2016, n.d.). Researchers from 13 Spanish universities found that ResearchGate was used considerably more frequently than the institutional repositories for storing and sharing their research, according to (Jamali et al., 2015; Martín-Martín et al., 2014; publishing & 2017, 2017) investigated the free accessibility to a collection of Google Scholar-restricted documents.

In order to find scientific information, researchers increasingly turn to Google Scholar (Mussell et al., 2013; news & 2014, n.d.; Nicholas et al., 2017). The Google Scholar coverage is substantially wider because it analyses the entire academic web automatically rather than only indexing a few specific sources.

Information technology (IT) plays a significant role in the development of OI implementation as an important organizational resource with significant penetration (Cui et al., 2015; Gómez et al., n.d.; Trantopoulos et al., n.d.). For instance, organizations rely on IT tools and applications to acquire external knowledge and quickly share it with employees, and IT offers a virtual environment that is effective at knowledge transfer and integration. The existing literature oversimplifies the role that IT played in OI due to OI's complex nature. As a result, in order to enable the OI, it is necessary to open the black box of the IT's role (Cui, Ye, et al., n.d.).

Information technology (IT) is a key enabler for organizational initiatives, serving as the organization's exclusive resource and aiding in the discovery, dissemination, and utilization of both internal and external resources for innovation (Tippins et al., 2003). We refer to this use of IT as an organization of IT-assigned resources.

RAC (resource acquisition capabilities) refers to the extent to which an organization uses IT to identify and select potential external resources for external business environment innovation.

The RAC helps organizations explore their external environment and utilize various sources outside of their established boundaries (Chi et al., n.d.; Dodgson et al., n.d.).

The ability for organizations to search across billions of web pages, scientific literature, and patent databases is made possible by sophisticated data extraction technologies and Internet-related IT, which facilitates the discovery and acquisition of new, valuable knowledge (Cui, Tong, et al., n.d.). As a result, RAC expands the organizational resource base and may potentially open up new opportunities for the integration of high-quality, innovative knowledge.

In particular, IT can assist in expanding the search's scope and obtaining knowledge to produce goods or services of greater value (Cui, Wu, et al., n.d.; Katila et al., 2002; Roberts et al., 2012). For instance, the IT enables organizations to search for radical innovations in distant fields (Jeppesen et al., 2009), which will yield greater returns than incremental innovations (Jansen et al., 2006). Additionally, the IT encourages organizations to broaden their search scope in order to develop numerous innovative solutions (Joshi et al., 2010) that have high profitability.

## 5. Conclusion

This document has focused on compiling the current literature on the topic of Open Innovation, helping to better understand this topic, shedding light on its benefits and challenges, and also helping companies and managers who have in mind to apply this interesting strategy.

We have seen how OI has both positive and negative effects. Implementing OI gives you the opportunity to increase technological growth, the main objectives being to accelerate internal and external innovation.

Depending on what the objective is, i.e., depending on whether the goal is to increase technical performance, both a strong implementation of outbound OI and a strong implementation of inbound open innovation will be used. On the other hand, if the objective is to improve market performance, a strong inbound OI and a low outbound OI will be used.

It is important to take into account possible problems that may arise and that should be taken into account before using this strategy, in order to foresee and focus in an adequate way the way to implement OI. One of the problems is the resistance of employees to the idea of implementing OI to achieve innovation and also to outsourcing innovations. One should always pay attention and be careful that intellectual property is not stolen, as using OI can make one more exposed.

Some of the aspects that companies and managers have to take into account are the protection of intellectual property, the relationship of discoveries to the company, the innovative environment within the company and also to be aware of the environment in which the company is located.

We have also studied how OI affects SMEs, we have seen how it affects digital and non-digital SMEs differently. We made this difference when researching SMEs for a number of reasons. The nature of innovation projects is one of them because digital businesses tend to focus more on projects involving digital technologies, whereas non-digital businesses tend to focus more on traditional products and services that don't require a digital foundation. This distinction affects how open innovation is implemented and which collaborations are more important. The technological requirement plays a significant role in second place since digital SMEs frequently have significant technological infrastructure and greater familiarity with industrial technologies, which enables them to participate in open innovation projects more easily. Finally, the strategy employed by each type of business is different because digital businesses may be more willing to collaborate online, use digital platforms, and access external technological resources, whereas conventional businesses may be more dependent on traditional approaches to innovation.

For digital SMEs OI has a negative effect on the performance of a profitable financial activity. It also has a negative effect on engaging in strategies to protect internal assets. However, there are certain strategies that help digital SMEs to succeed, such as the involvement of the company in the pursuit of business-related innovation.

On the other hand, non-digital SMEs have a slight positive impact when it comes to managing external relationships, although this is not significant, while the implementation of intellectual

property protection can have a very negative impact, as the cost of these protections is often the main financial obstacle for SMEs.

For many SMEs, the lack of appropriate skills to manage open innovation (OI) processes and interactions with outside investors is a significant challenge. Managing collaborations with external investors requires specialized skills in the identification of suitable investors, the establishment of agreements, negotiation skills to get fair and advantageous terms, management of intellectual property, and project management. The SMEs can lack experience in certain fields. Additionally, they frequently lack the systems and processes needed to successfully combine internal and external knowledge of the company.

The development of specialized skills and capacities is a priority for SMEs, as is the establishment of an organizational culture that promotes open innovation as an intrinsic part of its business strategy.



## 6. Bibliography

- Adamczyk, S., ... A. B.-C. and I., & 2012, undefined. (n.d.). Innovation contests: A review, classification and outlook. *Wiley Online Library* S Adamczyk, AC Bullinger, KM Möslin *Creativity and Innovation Management*, 2012•Wiley Online Library. Retrieved August 16, 2023, from <https://onlinelibrary.wiley.com/doi/abs/10.1111/caim.12003>
- Afuah, A., review, C. T.-A. of M., & 2012, undefined. (n.d.). Crowdsourcing as a solution to distant search. *Journals.Aom.Org* A Afuah, CL Tucci *Academy of Management Review*, 2012•journals.Aom.Org. Retrieved August 16, 2023, from <https://journals.aom.org/doi/abs/10.5465/amr.2010.0146>
- Alba, M., Avalos, M., ... C. G.-2016 I. international, & 2016, undefined. (n.d.). Synergy between smart cities' hackathons and living labs as a vehicle for accelerating tangible innovations on cities. *Ieeexplore.Ieee.Org* M Alba, M Avalos, C Guzmán, VM Larios *2016 IEEE International Smart Cities Conference (ISC2)*, 2016•ieeexplore.Ieee.Org. Retrieved August 16, 2023, from <https://ieeexplore.ieee.org/abstract/document/7580877/>
- Alexy, O., Criscuolo, P., review, A. S.-M. S. management, & 2009, undefined. (n.d.). Does IP strategy have to cripple open innovation? *Sloanreview.Mit.Edu* O Alexy, P Criscuolo, A Salter *MIT Sloan Management Review*, 2009•sloanreview.Mit.Edu. Retrieved August 15, 2023, from <https://sloanreview.mit.edu/article/does-ip-strategy-have-to-cripple-open-innovation/>
- Alves, J., Technology, W. Y.-J. of O. I., Market, undefined, and, undefined, & 2022, undefined. (n.d.). Cognitive mechanisms in entrepreneurship competence: Its implication for open innovation. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S2199853122000063>
- Arrow, K. J. (1972). *Economic welfare and the allocation of resources for invention*. [https://link.springer.com/chapter/10.1007/978-1-349-15486-9\\_13](https://link.springer.com/chapter/10.1007/978-1-349-15486-9_13)
- Aslesen, H., Innovation, M. F.-I. and, & 2012, undefined. (n.d.). Industrial knowledge bases as drivers of open innovation? *Taylor & Francis* HW Aslesen, M Freell *Industry and Innovation*, 2012•Taylor & Francis. Retrieved August 16, 2023, from <https://www.tandfonline.com/doi/abs/10.1080/13662716.2012.726807>
- Audzeyeva, A., Systems, R. H.-E. J. of I., & 2016, undefined. (n.d.). How to get the most from a business intelligence application during the post implementation phase? Deep structure transformation at a UK retail bank. *Springer* A Audzeyeva, R Hudson *European Journal of Information Systems*, 2016•Springer. Retrieved August 16, 2023, from <https://link.springer.com/article/10.1057/ejis.2014.44>
- Bagherzadeh, M., Markovic, S., ... J. C.-I. T., & 2019, undefined. (n.d.). How does outside-in open innovation influence innovation performance? Analyzing the mediating roles of knowledge sharing and innovation strategy. *Ieeexplore.Ieee.Org* M Bagherzadeh, S Markovic, J Cheng, W Vanhaverbeke *IEEE Transactions on Engineering Management*, 2019•ieeexplore.Ieee.Org. <https://doi.org/10.1109/TEM.2018.2889538>
- Banerjee, P., Friedrich, R., Computer, L. M.-, & 2010, undefined. (n.d.). Open innovation at HP labs. *Ieeexplore.Ieee.Org*. Retrieved August 6, 2023, from <https://ieeexplore.ieee.org/abstract/document/5632044/>
- Basu, S., Phelps, C., Venturing, S. K.-J. of B., & 2011, undefined. (2009). Towards understanding who makes corporate venture capital investments and why. *Elsevier*. <https://doi.org/10.1016/j.jbusvent.2009.07.001>

- Belderbos, R., Carree, M., policy, B. L.-R., & 2004, undefined. (2004). Cooperative R&D and firm performance. *Elsevier*, 33, 1477–1492. <https://doi.org/10.1016/j.respol.2004.07.003>
- Bianchi, M., Cavaliere, A., Chiaroni, D., Frattini, F., Technovation, V. C.-, & 2011, undefined. (n.d.). Organisational modes for Open Innovation in the bio-pharmaceutical industry: An exploratory analysis. *Elsevier*. Retrieved August 15, 2023, from <https://www.sciencedirect.com/science/article/pii/S0166497210000337>
- Bigliardi, B., Management, F. G.-T. A. & S., & 2016, undefined. (2016). Which factors hinder the adoption of open innovation in SMEs? *Taylor & FrancisB Bigliardi, F GalatiTechnology Analysis & Strategic Management*, 2016•Taylor & Francis, 28(8), 869–885. <https://doi.org/10.1080/09537325.2016.1180353>
- Bigliardi, B., SMEs, F. G.-R. open innovation in, & 2018, undefined. (2018). An open innovation model for SMEs. *World ScientificB Bigliardi, F GalatiResearching Open Innovation in SMEs*, 2018•World Scientific, 71–113. [https://doi.org/10.1142/9789813230972\\_0003](https://doi.org/10.1142/9789813230972_0003)
- Bogers, M., Chesbrough, H., ... S. H.-C., & 2019, undefined. (2019). Strategic management of open innovation: A dynamic capabilities perspective. *Journals.Sagepub.ComM Bogers, H Chesbrough, S Heaton, DJ TeeceCalifornia Management Review*, 2019•journals.Sagepub.Com, 62(1), 77–94. <https://doi.org/10.1177/0008125619885150>
- Bogers, M., Zobel, A.-K., Afuah, A., Almirall, E., Brunswicker, S., Dahlander, L., Frederiksen, L., Gawer, A., Gruber, M., Haefliger, S., Hagedoorn, J., Hilgers, D., Laursen, K., Magnusson, M. G., Majchrzak, A., Mccarthy, I. P., Moeslein, K. M., Nambisan, S., Piller, F. T., ... Wal, A. L. J. Ter. (2017). The open innovation research landscape: Established perspectives and emerging themes across different levels of analysis. *Taylor & FrancisM Bogers, AK Zobel, A Afuah, E Almirall, S Brunswicker, L Dahlander, L FrederiksenIndustry and Innovation*, 2017•Taylor & Francis, 24(1), 8–40. <https://doi.org/10.1080/13662716.2016.1240068>
- Bone, J. ;, Gonzalez-Uribe, J. ;, Haley, C., Lahr, H., Bone, J., & Gonzalez-Uribe, J. (2019). *The impact of business accelerators and incubators in the UK*. <https://oro.open.ac.uk/67380/>
- Boudreau, K., ... N. L.-M., & 2011, undefined. (2011). Incentives and problem uncertainty in innovation contests: An empirical analysis. *Pubsonline.Informs.OrgKJ Boudreau, N Lacetera, KR LakhaniManagement Science*, 2011•pubsonline.Informs.Org, 57(5), 843–863. <https://doi.org/10.1287/mnsc.1110.1322>
- Browning, L., Beyer, J., Management, J. S.-A. of, & 1995, undefined. (1995). Building cooperation in a competitive industry: SEMATECH and the semiconductor industry. *Journals.Aom.OrgLD Browning, JM Beyer, JC ShetlerAcademy of Management Journal*, 1995•journals.Aom.Org. <https://doi.org/10.2307/256730>
- Brunswicker, S., business, W. V.-J. of small, & 2015, undefined. (n.d.-a). Open innovation in small and medium-sized enterprises (SMEs): External knowledge sourcing strategies and internal organizational facilitators. *Taylor & FrancisS Brunswicker, W VanhaverbekeJournal of Small Business Management*, 2015•Taylor & Francis. Retrieved August 6, 2023, from <https://www.tandfonline.com/doi/abs/10.1111/jsbm.12120>
- Brunswicker, S., business, W. V.-J. of small, & 2015, undefined. (n.d.-b). Open innovation in small and medium-sized enterprises (SMEs): External knowledge sourcing strategies and internal organizational facilitators. *Taylor & FrancisS Brunswicker, W VanhaverbekeJournal of Small Business Management*, 2015•Taylor & Francis.

- Retrieved August 16, 2023, from  
<https://www.tandfonline.com/doi/abs/10.1111/jsbm.12120>
- Brunswick, S., Research-Technology, H. C., & 2018, undefined. (n.d.). The Adoption of Open Innovation in Large Firms: Practices, Measures, and Risks A survey of large firms examines how firms approach open innovation strategically. *Taylor & FrancisS Brunswick, H ChesbroughResearch-Technology Management, 2018•Taylor & Francis*. Retrieved August 1, 2023, from  
<https://www.tandfonline.com/doi/abs/10.1080/08956308.2018.1399022>
- Çakar, N., management, A. E.-J. of small business, & 2010, undefined. (n.d.). Comparing innovation capability of small and medium-sized enterprises: examining the effects of organizational culture and empowerment. *Taylor & FrancisND Çakar, A ErtürkJournal of Small Business Management, 2010•Taylor & Francis*. Retrieved August 16, 2023, from  
<https://www.tandfonline.com/doi/abs/10.1111/j.1540-627X.2010.00297.x>
- Carayannis, E., Meissner, D., Technology, A. E.-T. J. of, & 2017, undefined. (2017). Targeted innovation policy and practice intelligence (TIP2E): concepts and implications for theory, policy and practice. *SpringerEG Carayannis, D Meissner, A EdelkinaThe Journal of Technology Transfer, 2017•Springer, 42(3), 460–484*.  
<https://doi.org/10.1007/s10961-015-9433-8>
- Carlson, J., Rahman, M. M., Voola, R., & De Vries, N. (2018). Customer engagement behaviours in social media: capturing innovation opportunities. *Emerald.ComJ Carlson, M Rahman, R Voola, N De VriesJournal of Services Marketing, 2018•emerald.Com*.  
<https://doi.org/10.1108/JSM-02-2017-0059>
- Casadesus-Masanell, R., journal, F. Z.-S. management, & 2013, undefined. (2013). Business model innovation and competitive imitation: The case of sponsor-based business models. *Wiley Online LibraryR Casadesus-Masanell, F ZhuStrategic Management Journal, 2013•Wiley Online Library, 34(4), 464–482*.  
<https://doi.org/10.1002/smj.2022>
- Chan, J., management, K. H.-C. and innovation, & 2010, undefined. (n.d.). Dual allegiance and knowledge sharing in open source software firms. *Wiley Online LibraryJ Chan, K HustedCreativity and Innovation Management, 2010•Wiley Online Library*. Retrieved August 16, 2023, from <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-8691.2010.00566.x>
- Chaochotechuang, P., ... F. D.-E. J. of, & 2019, undefined. (n.d.). External knowledge search paths in open innovation processes of small and medium enterprises. *Emerald.ComP Chaochotechuang, F Daneshgar, S MarianoEuropean Journal of Innovation Management, 2019•emerald.Com, 23(3), 524–550*.  
<https://doi.org/10.1108/EJIM-01-2019-0013/full/html>
- Cheng, C. C. J., & Shiu, E. C. (2015). The inconvenient truth of the relationship between open innovation activities and innovation performance. *Management Decision, 53(3), 625–647*. <https://doi.org/10.1108/MD-03-2014-0163/FULL/HTML>
- Chesbrough, H. (2003). *Open innovation: The new imperative for creating and profiting from technology*.  
[https://books.google.com/books?hl=es&lr=&id=4hTRWStFhVgC&oi=fnd&pg=PR9&ots=XuZxZLr6xB&sig=Z\\_3k75zmVXXd2bbhPaLL43h8sZE](https://books.google.com/books?hl=es&lr=&id=4hTRWStFhVgC&oi=fnd&pg=PR9&ots=XuZxZLr6xB&sig=Z_3k75zmVXXd2bbhPaLL43h8sZE)
- Chesbrough, H., corporate, R. R.-I. and, & 2002, undefined. (2002). The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies. *Academic.Oup.ComH Chesbrough, RS*

- Rosenbloom *Industrial and Corporate Change*, 2002•academic.Oup.Com.  
<https://academic.oup.com/icc/article-abstract/11/3/529/1044102>
- Chesbrough, H., Management, A. C.-R., & 2006, undefined. (2006). Beyond high tech: early adopters of open innovation in other industries. *Wiley Online LibraryH Chesbrough, AK CrowtherR&d Management*, 2006•Wiley Online Library, 36(3), 229–236.  
<https://doi.org/10.1111/j.1467-9310.2006.00428.x>
- Chesbrough, H., review, A. G.-H. business, & 2009, undefined. (n.d.). How open innovation can help you cope in lean times. *Europepmc.OrgHW Chesbrough, AR GarmanHarvard Business Review*, 2009•europepmc.Org. Retrieved August 15, 2023, from  
<https://europepmc.org/article/med/19968058>
- Chi, L., ... T. R.-I. systems, & 2010, undefined. (n.d.). Information technology, network structure, and competitive action. *Pubsonline.Informs.OrgL Chi, T Ravichandran, G AndrevskilInformation Systems Research*, 2010•pubsonline.Informs.Org. Retrieved August 16, 2023, from <https://pubsonline.informs.org/doi/abs/10.1287/isre.1100.0296>
- Chiaroni, D., Chiesa, V., Management, F. F.-R., & 2010, undefined. (n.d.). Unravelling the process from Closed to Open Innovation: evidence from mature, asset-intensive industries. *Wiley Online LibraryD Chiaroni, V Chiesa, F FrattiniR&d Management*, 2010•Wiley Online Library. Retrieved August 6, 2023, from  
<https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-9310.2010.00589.x>
- Chiaroni, D., Chiesa, V., Technovation, F. F.-, & 2011, undefined. (n.d.). The Open Innovation Journey: How firms dynamically implement the emerging innovation management paradigm. *Elsevier*. Retrieved August 6, 2023, from  
<https://www.sciencedirect.com/science/article/pii/S0166497209001400>
- Clauss, T., Abebe, M. A., Abebe, M., Tangpong, C., & Hock, M. (2019). Strategic agility, business model innovation, and firm performance: an empirical investigation. *Ieeexplore.Ieee.OrgT Clauss, M Abebe, C Tangpong, M HockIEEE Transactions on Engineering Management*, 2019•ieeexplore.Ieee.Org.  
<https://doi.org/10.1109/TEM.2019.2910381>
- Cohen, S. L., Cohen, S. G., & Hochberg, Y. V. ". (2014). Accelerating startups: The seed accelerator phenomenon. *SSRN Journal*, 1–16. <https://doi.org/10.2139/ssrn.2418000>
- Cohen, W., quarterly, D. L.-A. science, & 1990, undefined. (1990). Absorptive capacity: A new perspective on learning and innovation. *JSTORWM Cohen, DA LevinthalAdministrative Science Quarterly*, 1990•JSTOR, 35(1), 128–152.  
<https://www.jstor.org/stable/2393553>
- Collins, C., journal, K. S.-A. of management, & 2006, undefined. (2006). Knowledge exchange and combination: The role of human resource practices in the performance of high-technology firms. *Journals.Aom.OrgCJ Collins, KG SmithAcademy of Management Journal*, 2006•journals.Aom.Org, 49(3), 544–560.  
<https://journals.aom.org/doi/abs/10.5465/AMJ.2006.21794671>
- Costa, A., Crupi, A., Marco, C. De, and, A. D. M.-T. F., & 2023. (n.d.). SMEs and open innovation: Challenges and costs of engagement. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S004016252300416X>
- Cruz-González, J., López-Sáez, P., Technovation, J. N.-L.-, & 2015, undefined. (n.d.). Open search strategies and firm performance: The different moderating role of technological environmental dynamism. *Elsevier*. Retrieved August 16, 2023, from  
<https://www.sciencedirect.com/science/article/pii/S0166497214001230>
- Cui, T., Tong, Y., Teo, H., Information, J. L.-J. of M., & 2020, undefined. (n.d.). Managing knowledge distance: IT-enabled inter-firm knowledge capabilities in collaborative

- innovation. *Taylor & Francis* T Cui, Y Tong, HH Teo, J Li *Journal of Management Information Systems*, 2020•Taylor & Francis. Retrieved August 16, 2023, from <https://www.tandfonline.com/doi/abs/10.1080/07421222.2019.1705504>
- Cui, T., Wu, Y., management, Y. T.-I. & 2018, undefined. (n.d.). Exploring ideation and implementation openness in open innovation projects: IT-enabled absorptive capacity perspective. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S0378720617310625>
- Cui, T., Ye, H., Teo, H., Management, J. L.-I. & 2015, undefined. (2015). Information technology and open innovation: A strategic alignment perspective. *Elsevier*. <https://doi.org/10.1016/j.im.2014.12.005>
- Cui, T., Ye, J., Management, C. T.-I. & 2022, undefined. (n.d.). Information technology in open innovation: a resource orchestration perspective. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S0378720622001082>
- Cusumano, M. A., Gawer, A., & Yoffie, D. B. (2019). *The business of platforms: Strategy in the age of digital competition, innovation, and power*. [https://antonzitz.com/wp-content/uploads/2020/07/The-Business-of-Platforms\\_f.pdf](https://antonzitz.com/wp-content/uploads/2020/07/The-Business-of-Platforms_f.pdf)
- Dahlander, L., & Gann, D. M. (2010). How open is innovation? *Research Policy*, 39(6), 699–709. <https://doi.org/10.1016/j.respol.2010.01.013>
- Dahlander, L., Gann, D. M., & Wallin, M. W. (2021). *How open is innovation? A retrospective and ideas forward*. <https://doi.org/10.1016/j.respol.2021.104218>
- Daniel, S. L., Katz, J. M., Agarwal, R., Stewart, K. J., & Smith, R. H. (2017). The effects of diversity in global, distributed collectives: A study of open source project success. *Pubsonline.Informs.OrgS Daniel, R Agarwal, KJ Stewart* *Information Systems Research*, 2013•pubsonline.Informs.Org, 24(2), 312–333. <https://doi.org/10.1287/isre.1120.0435>
- Daniel, S., Midha, V., ... A. B.-T. J. of S., & 2018, undefined. (n.d.). Sourcing knowledge in open source software projects: The impacts of internal and external social capital on project success. *Elsevier*. Retrieved August 15, 2023, from <https://www.sciencedirect.com/science/article/pii/S0963868716301251>
- De Reuver, M., Sørensen, C., & Basole, R. C. (2018). The digital platform: A research agenda. *Journal of Information Technology*, 33(2), 124–135. <https://doi.org/10.1057/S41265-016-0033-3>
- Dempwolf, C., Auer, J., Administration, M. D.-S. B., & 2014, undefined. (n.d.). Innovation accelerators: Defining characteristics among startup assistance organizations. *Academia.EduCS Dempwolf, J Auer, M D'ippolito* *Small Business Administration*, 2014•academia.Edu. Retrieved August 16, 2023, from <https://www.academia.edu/download/63818493/rs425-Innovation-Accelerators-Report-FINAL20200703-84782-1qyfnur.pdf>
- development, P. M.-W., & 2004, undefined. (n.d.). Industrial clusters, knowledge integration and performance. *Elsevier*. <https://doi.org/10.1016/j.worlddev.2002.12.001>
- Dodgson, M., Gann, D., Management, A. S.-R., & 2006, undefined. (n.d.). The role of technology in the shift towards open innovation: the case of Procter & Gamble. *Wiley Online LibraryM Dodgson, D Gann, A Salter* *R&d Management*, 2006•Wiley Online Library. Retrieved August 16, 2023, from <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-9310.2006.00429.x>
- Donbesuur, F. ;, Zahoor, N. ;, & Adomako, S. (2021). Postformation alliance capabilities and environmental innovation. *Business Strategy and the Environment*, 30(7), 3330–3343. <https://doi.org/10.1002/bse.2805>

- Du, J., Leten, B., Policy, W. V.-R., & 2014, undefined. (2014). Managing open innovation projects with science-based and market-based partners. *Elsevier*, 43, 828–840. <https://doi.org/10.1016/j.respol.2013.12.008>
- Duran, P., Kammerlander, N., Van Essen, M., & Zellweger, T. (2016). Doing more with less: Innovation input and output in family firms. *Journals.Aom.OrgP Duran, N Kammerlander, M Van Essen, T ZellwegerAcademy of Management Journal*, 2016•*Journals.Aom.Org*, 59(4), 1224–1264. <https://doi.org/10.5465/amj.2014.0424>
- Dyer, J., Singh, H., journal, W. H.-S. management, & 2018, undefined. (n.d.). The relational view revisited: A dynamic perspective on value creation and value capture. *Wiley Online LibraryJH Dyer, H Singh, WS HesterlyStrategic Management Journal*, 2018•*Wiley Online Library*. Retrieved August 16, 2023, from <https://onlinelibrary.wiley.com/doi/abs/10.1002/smj.2785>
- Ebrahimi, P., Ahmadi, M., ... A. G.-I. J. of, & 2021, undefined. (n.d.). CRM performance and development of media entrepreneurship in digital, social media and mobile commerce. *Emerald.ComP Ebrahimi, M Ahmadi, A Gholampour, H AlipourInternational Journal of Emerging Markets*, 2021•*emerald.Com*. Retrieved August 16, 2023, from <https://www.emerald.com/insight/content/doi/10.1108/IJOEM-11-2018-0588/full/html>
- Economy, D. M.-J. of the K., & 2019, undefined. (2019). Public-private partnership models for science, technology, and innovation cooperation. *SpringerD MeissnerJournal of the Knowledge Economy*, 2019•*Springer*, 10(4), 1341–1361. <https://doi.org/10.1007/s13132-015-0310-3>
- Eisenhardt, K., Science, C. S., & 1996, undefined. (n.d.-a). Resource-based view of strategic alliance formation: Strategic and social effects in entrepreneurial firms. *Pubsonline.Informs.OrgKM Eisenhardt, CB Schoonhovenorganization Science*, 1996•*pubsonline.Informs.Org*. Retrieved August 1, 2023, from <https://pubsonline.informs.org/doi/abs/10.1287/orsc.7.2.136>
- Eisenhardt, K., Science, C. S., & 1996, undefined. (n.d.-b). Resource-based view of strategic alliance formation: Strategic and social effects in entrepreneurial firms. *Pubsonline.Informs.OrgKM Eisenhardt, CB Schoonhovenorganization Science*, 1996•*pubsonline.Informs.Org*. Retrieved August 15, 2023, from <https://pubsonline.informs.org/doi/abs/10.1287/orsc.7.2.136>
- Faems, D., ... B. V. L.-J. of product, & 2005, undefined. (n.d.). Interorganizational Collaboration and Innovation: Toward a Portfolio Approach\*. *Wiley Online LibraryD Faems, B Van Looy, K DebackereJournal of Product Innovation Management*, 2005•*Wiley Online Library*. Retrieved August 15, 2023, from <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.0737-6782.2005.00120.x>
- Faems, D., Visser, M. De, ... P. A.-J. of P., & 2010, undefined. (n.d.). Technology Alliance Portfolios and Financial Performance: Value-Enhancing and Cost-Increasing Effects of Open Innovation\*. *Wiley Online LibraryD Faems, M De Visser, P Andries, B Van LooyJournal of Product Innovation Management*, 2010•*Wiley Online Library*. Retrieved August 16, 2023, from <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1540-5885.2010.00752.x>
- Fini, R., Grimaldi, R., Santoni, S., of, M. S.-F., & 2010, undefined. (n.d.). Complements Or Substitutes? The Role Of Universities And Local Context In Supporting The Growth Of Academic Spin-offs. *Cris.Unibo.It*. Retrieved August 16, 2023, from <https://cris.unibo.it/handle/11585/93859>

- Fisher, G. J., & Qualls, W. J. (2018). A framework of interfirm open innovation: relationship and knowledge based perspectives. *Journal of Business and Industrial Marketing*, 33(2), 240–250. <https://doi.org/10.1108/JBIM-11-2016-0276/FULL/HTML>
- Fisher, G., product, E. F.-H. of research on new, & 2018, undefined. (n.d.). Customer-driven innovation: A conceptual typology, review of theoretical perspectives, and future research directions. *Books.Google.ComGJ Fisher, EE FangHandbook of Research on New Product Development, 2018•books.Google.Com*. Retrieved August 15, 2023, from <https://books.google.com/books?hl=es&lr=&id=Q1RMDwAAQBAJ&oi=fnd&pg=PA60&ots=8Galv9ARJQ&sig=2oxSefKsIYJe7JP-OAW1p2zIZ1M>
- Foss, N., Laursen, K., science, T. P.-O., & 2011, undefined. (2011). Linking customer interaction and innovation: The mediating role of new organizational practices. *Pubsonline.Informs.OrgNJ Foss, K Laursen, T PedersenOrganization Science, 2011•pubsonline.Informs.Org, 22(4)*, 980–999. <https://doi.org/10.1287/orsc.1100.0584>
- Geiger, D., Seedorf, S., Schulze, T., Nickerson, R. C., & Schader, M. (2011). *Managing the crowd: towards a taxonomy of crowdsourcing processes*. 430. [https://aisel.aisnet.org/amcis2011\\_submissions/430/?utm\\_sourc](https://aisel.aisnet.org/amcis2011_submissions/430/?utm_sourc)
- Giourka, P., Kilintzis, P., Samara, E., Avlogiaris, G., Farmaki, P., & Bakouros, Y. (2021). A business acceleration program supporting cross-border enterprises: A comparative study. *Mdpi.Com*. <https://doi.org/10.3390/joitmc7020152>
- Gómez, J., Salazar, I., Systems, P. V.-I., & 2017, undefined. (n.d.). Does information technology improve open innovation performance? An examination of manufacturers in Spain. *Pubsonline.Informs.OrgJ Gómez, I Salazar, P VargasInformation Systems Research, 2017•pubsonline.Informs.Org*. Retrieved August 16, 2023, from <https://pubsonline.informs.org/doi/abs/10.1287/isre.2017.0705>
- González-Álvarez, N., Technovation, M. N.-A.-, & 2007, undefined. (n.d.). Appropriability of innovation results: An empirical study in Spanish manufacturing firms. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S0166497206001222>
- Graham, S. J., Merges, R. P., Samuelson, P., Sichelman, T., Graham, J., & Professor, A. (2009). High technology entrepreneurs and the patent system: Results of the 2008 Berkeley patent survey. *JSTORSJH Graham, RP Merges, P Samuelson, T SichelmanBerkeley Technology Law Journal, 2009•JSTOR, 24, 4*. <https://www.jstor.org/stable/24120583>
- Grindley, P., review, D. T.-C. management, & 1997, undefined. (n.d.). Managing intellectual capital: licensing and cross-licensing in semiconductors and electronics. *Journals.Sagepub.ComPC Grindley, DJ TeeceCalifornia Management Review, 1997•journals.Sagepub.Com*. Retrieved August 15, 2023, from <https://journals.sagepub.com/doi/abs/10.2307/41165885>
- Gulati, R., quarterly, H. S.-A. science, & 1998, undefined. (n.d.). The architecture of cooperation: Managing coordination costs and appropriation concerns in strategic alliances. *JSTORR Gulati, H SinghAdministrative Science Quarterly, 1998•JSTOR*. Retrieved August 16, 2023, from <https://www.jstor.org/stable/2393616>
- Guo, H., Tang, J., Su, Z., Management, J. K.-R., & 2017, undefined. (n.d.). Opportunity recognition and SME performance: The mediating effect of business model innovation. *Wiley Online LibraryH Guo, J Tang, Z Su, JA KatzR&D Management, 2017•Wiley Online Library*. Retrieved August 16, 2023, from <https://onlinelibrary.wiley.com/doi/abs/10.1111/radm.12219>

- Hao, B., Ye, J., Feng, Y., Management, Z. C.-R., & 2020, undefined. (2020). Explicit and tacit synergies between alliance firms and radical innovation: The moderating roles of interfirm technological diversity and environmental technological. *Wiley Online LibraryB Hao, J Ye, Y Feng, Z CaiR&D Management, 2020•Wiley Online Library, 50(4)*, 432–446. <https://doi.org/10.1111/radm.12390>
- Hartmann, M., Oriani, R., Management, H. B.-A. of, & 2013, undefined. (n.d.). Exploring the antecedents to business model innovation: an empirical analysis of pension funds. *Journals.Aom.OrgM Hartmann, R Oriani, H BatemanAcademy of Management Proceedings, 2013•journals.Aom.Org*. Retrieved August 16, 2023, from <https://journals.aom.org/doi/abs/10.5465/ambpp.2013.10986abstract>
- Hausberg, J. P., & Korreck, S. (2020). Business incubators and accelerators: a co-citation analysis-based, systematic literature review. *Journal of Technology Transfer, 45(1)*, 151–176. <https://doi.org/10.1007/S10961-018-9651-Y>
- Helfat, C., journal, M. P.-S. management, & 2003, undefined. (2003). The dynamic resource-based view: Capability lifecycles. *Wiley Online LibraryCE Helfat, MA PeterafStrategic Management Journal, 2003•Wiley Online Library, 24(10 SPEC ISS.)*, 997–1010. <https://doi.org/10.1002/smj.332>
- Helfat, C., & Quinn, J. (2006). *Open innovation: The new imperative for creating and profiting from technology*. <https://journals.aom.org/doi/full/10.5465/AMP.2006.20591014>
- Hernández-Dionis, P., ... D. P.-J.-J. of O., & 2022, undefined. (n.d.). The coordinator of information and communication technologies: Its implication for open innovation. *Mdpi.ComP Hernández-Dionis, D Pérez-Jorge, O Curbelo-González, OM Alegre de La RosaJournal of Open Innovation: Technology, Market, and Complexity, 2022•mdpi.Com*. Retrieved August 16, 2023, from <https://www.mdpi.com/2199-8531/8/1/42>
- Heyden, M. L. M., Doorn, S. Van, Reimer, M., & Volberda, H. W. (2013). Perceived environmental dynamism, relative competitive performance, and top management team heterogeneity: Examining correlates of upper echelons' advice. *Journals.Sagepub.ComMLM Heyden, S Van Doorn, M Reimer, FAJ Van Den Bosch, HW VolberdaOrganization Studies, 2013•journals.Sagepub.Com, 34(9)*, 1327–1356. <https://doi.org/10.1177/0170840612470229>
- Hippel, E. Von. (2007). *The sources of innovation*. [https://link.springer.com/chapter/10.1007/978-3-8349-9320-5\\_10](https://link.springer.com/chapter/10.1007/978-3-8349-9320-5_10)
- Hitchen, E., Nylund, P., ... X. F.-J. of B., & 2017, undefined. (n.d.). Social media: Open innovation in SMEs finds new support. *Emerald.ComEL Hitchen, PA Nylund, X Ferràs, S MussonsJournal of Business Strategy, 2017•emerald.Com*. Retrieved August 16, 2023, from <https://www.emerald.com/insight/content/doi/10.1108/jbs-02-2016-0015/full/html>
- Hjalmarsson, A., ... D. R. I. Systems. A. in T., & 2012, undefined. (2012). Designing digital innovation contests. *SpringerA Hjalmarsson, D RudmarkDesign Science Research in Information Systems. Advances in Theory and, 2012•Springer*. [https://doi.org/10.1007/978-3-642-29863-9\\_21](https://doi.org/10.1007/978-3-642-29863-9_21)
- Holz Müller, H., and, J. S.-E. commerce R., & 2002, undefined. (n.d.). Delphi study about the future of B2B marketplaces in Germany. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S1567422302000030>
- Hossain, M., management, I. K.-J. of S. and, & 2016, undefined. (n.d.). Open innovation in SMEs: a systematic literature review. *Emerald.ComM Hossain, I KauranenJournal of*



- Strategy and Management*, 2016•emerald.Com. Retrieved August 16, 2023, from <https://www.emerald.com/insight/content/doi/10.1108/JSMA-08-2014-0072/full/html>
- Hosseini, M., Phalp, K., ... J. T.-... I. C., & 2014, undefined. (n.d.). The four pillars of crowdsourcing: A reference model. *leeeexplore.leeeg.OrgM Hosseini, K Phalp, J Taylor, R Ali*2014 *IEEE Eighth International Conference on Research Challenges, 2014•ieeexplore.leeeg.Org*. Retrieved August 16, 2023, from <https://ieeexplore.ieee.org/abstract/document/6861072/>
- Huang, Y., Lin, H., Social, H. L.-T. F. and, & 2023, undefined. (n.d.). Innovation in manufacturing SMEs during the COVID-19 pandemic: How does environmental dynamism reinforce employee proactive behavior? *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S0040162522007685>
- Huang, Y., Singh, P. V., science, K. S.-M., & 2014, undefined. (n.d.). Crowdsourcing new product ideas under consumer learning. *Pubsonline.Informs.OrgY Huang, P Vir Singh, K SrinivasanManagement Science, 2014•pubsonline.Informs.Org*. Retrieved August 16, 2023, from <https://pubsonline.informs.org/doi/abs/10.1287/mnsc.2013.1879>
- Hung, K., Technovation, C. C.-, & 2013, undefined. (n.d.). The impact of open innovation on firm performance: The moderating effects of internal R&D and environmental turbulence. *Elsevier*. Retrieved August 1, 2023, from <https://www.sciencedirect.com/science/article/pii/S0166497213000680>
- Hurmelinna-Laukkanen, P., Stefan, I., ... J. Y.-I. P. and, & 2023, undefined. (n.d.). What Could Possibly Go Wrong? Reflections on Potential Challenges of Open Innovation. *SpringerP Hurmelinna-Laukkanen, I Stefan, J YangDebating Innovation: Perspectives and Paradoxes of an Idealized Concept, 2023•Springer*. Retrieved August 16, 2023, from [https://link.springer.com/chapter/10.1007/978-3-031-16666-2\\_13](https://link.springer.com/chapter/10.1007/978-3-031-16666-2_13)
- Hwang, J., Policy, Y. L.-T., & 2010, undefined. (n.d.). External knowledge search, innovative performance and productivity in the Korean ICT sector. *Elsevier*. Retrieved August 15, 2023, from <https://www.sciencedirect.com/science/article/pii/S0308596110000431>
- Information, D. B.-, Society, C. &, & 2010, undefined. (n.d.). Moving the crowd at Threadless: Motivations for participation in a crowdsourcing application. *Taylor & FrancisDC BrabhamInformation, Communication & Society, 2010•Taylor & Francis*. Retrieved August 16, 2023, from <https://www.tandfonline.com/doi/abs/10.1080/13691181003624090>
- Ismail: A Framework for Designing Business-Acceleration... - Google Académico*. (n.d.). Retrieved August 16, 2023, from [https://scholar.google.com/scholar\\_lookup?title=A%20Framework%20for%20Designing%20Business-Acceleration%20Programs%3A%20A%20Case%20Study%20from%20Egypt&publication\\_year=2020&author=A.%20Ismail](https://scholar.google.com/scholar_lookup?title=A%20Framework%20for%20Designing%20Business-Acceleration%20Programs%3A%20A%20Case%20Study%20from%20Egypt&publication_year=2020&author=A.%20Ismail)
- J Henkel, & 2006. (2006). Selective revealing in open innovation processes: The case of embedded Linux. *Elsevier*. <https://doi.org/10.5465/AMBPP.2006.22898660>
- Jacobides, M. G., Cennamo, C., Gawer, | Annabelle, & Mgmt, S. (2018). Towards a theory of ecosystems. *Wiley Online LibraryMG Jacobides, C Cennamo, A GawerStrategic Management Journal, 2018•Wiley Online Library, 39(8), 2255–2276*. <https://doi.org/10.1002/smj.2904>
- Jaffe, A., & Lerner, J. (2011). *Innovation and its discontents: How our broken patent system is endangering innovation and progress, and what to do about it*. <https://books.google.com/books?hl=es&lr=&id=rQBsx-vw-mUC&oi=fnd&pg=PP1&ots=4ZQRXJ7nOe&sig=eZ67SyWlgHMb4pK0XEIMCs1kU2o>

- Jamali, H., Scientometrics, M. N.-, & 2015, undefined. (2015). Open access and sources of full-text articles in Google Scholar in different subject fields. *SpringerHR Jamali, M NabaviScientometrics, 2015•Springer, 105(3)*, 1635–1651. <https://doi.org/10.1007/s11192-015-1642-2>
- Jansen, J., ... F. V. D. B.-M., & 2006, undefined. (2006). Exploratory innovation, exploitative innovation, and performance: Effects of organizational antecedents and environmental moderators. *Pubsonline.Informs.OrgJJP Jansen, FAJ Van Den Bosch, HW VolberdaManagement Science, 2006•pubsonline.Informs.Org*. <https://pubsonline.informs.org/doi/abs/10.1287/mnsc.1060.0576>
- Janssens, M., Leuven, K. U., Madhok, A., Van, B., & Ku Leuven, L. (2008). Toward an integrative perspective on alliance governance: Connecting contract design, trust dynamics, and contract application. *Journals.Aom.OrgD Faems, M Janssens, A Madhok, BV LooyAcademy of Management Journal, 2008•journals.Aom.Org, 51(6)*, 1053–1078. <https://doi.org/10.5465/AMJ.2008.35732527>
- Jeppesen, L., science, K. L.-O., & 2010, undefined. (2009). Marginality and problem-solving effectiveness in broadcast search. *Pubsonline.Informs.OrgLB Jeppesen, KR LakhaniOrganization Science, 2010•pubsonline.Informs.Org*. <https://pubsonline.informs.org/doi/abs/10.1287/orsc.1090.0491>
- Johnson, J. S., Fisher, G. J., & Friend, S. B. (2019). Crowdsourcing Service Innovation Creativity: Environmental Influences and Contingencies. *Journal of Marketing Theory and Practice, 27(3)*, 251–268. <https://doi.org/10.1080/10696679.2019.1615842>
- Johnson, P., research, P. R.-R. of policy, & 2014, undefined. (2014). Civic hackathons: Innovation, procurement, or civic engagement? *Wiley Online LibraryP Johnson, P RobinsonReview of Policy Research, 2014•Wiley Online Library, 31(4)*, 349–357. <https://doi.org/10.1111/ropr.12074>
- Joshi, K., Chi, L., Datta, A., Systems, S. H.-I., & 2010, undefined. (2010). Changing the competitive landscape: Continuous innovation through IT-enabled knowledge capabilities. *Pubsonline.Informs.OrgKD Joshi, L Chi, A Datta, S HanInformation Systems Research, 2010•pubsonline.Informs.Org, 21(3)*, 472–495. <https://doi.org/10.1287/isre.1100.0298>
- Journal, A. F.-S. M., & 2006, undefined. (2006). The licensing dilemma: understanding the determinants of the rate of technology licensing. *Wiley Online LibraryA FosfuriStrategic Management Journal, 2006•Wiley Online Library, 27(12)*, 1141–1158. <https://doi.org/10.1002/smj.562>
- journal, K. A.-G.-A. of management, & 2003, undefined. (n.d.). The effects of centrifugal and centripetal forces on product development speed and quality: how does problem solving matter? *Journals.Aom.OrgK Atuahene-GimaAcademy of Management Journal, 2003•journals.Aom.Org*. Retrieved August 16, 2023, from <https://journals.aom.org/doi/abs/10.5465/30040629>
- journal, O. S.-S. management, & 2014, undefined. (2014). On the contingent value of dynamic capabilities for competitive advantage: The nonlinear moderating effect of environmental dynamism. *Wiley Online LibraryO SchilkeStrategic Management Journal, 2014•Wiley Online Library, 35(2)*, 179–203. <https://doi.org/10.1002/smj.2099>
- Juell-Skielse, G., Hjalmarsson, A., Johannesson, P., & Rudmark, D. (2014). Is the public motivated to engage in open data innovation? *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 8653 LNCS, 277–288*. [https://doi.org/10.1007/978-3-662-44426-9\\_23](https://doi.org/10.1007/978-3-662-44426-9_23)

- Katila, R., journal, G. A.-A. of management, & 2002, undefined. (2002). Something old, something new: A longitudinal study of search behavior and new product introduction. *Journals.Aom.Org R Katila, G Ahuja Academy of Management Journal*, 2002•*Journals.Aom.Org*, 45(6), 1183–1194.  
<https://journals.aom.org/doi/abs/10.5465/3069433>
- Kim, B., Kim, E., Journal, N. F.-E. M., & 2016, undefined. (2015). Balancing absorptive capacity and inbound open innovation for sustained innovative performance: An attention-based view. *Elsevier*. <https://doi.org/10.1016/j.emj.2015.10.002>
- Kitsios, F., Science, M. K.-I. J. of I., & 2018, undefined. (2018). Open data hackathons: an innovative strategy to enhance entrepreneurial intention. *Emerald.Com F Kitsios, M Kamariotoul International Journal of Innovation Science*, 2018•*emerald.Com*, 10(4), 519.  
<https://doi.org/10.1108/IJIS-06-2017-0055/full/html>
- Kmieciak, R., Michna, A., Data, A. M.-I. M. &, & 2012, undefined. (n.d.). Innovativeness, empowerment and IT capability: evidence from SMEs. *Emerald.Com R Kmieciak, A Michna, A Meczynska Industrial Management & Data Systems*, 2012•*emerald.Com*. Retrieved August 16, 2023, from  
<https://www.emerald.com/insight/content/doi/10.1108/02635571211232280/full/html>
- Komssi, M., Pichlis, D., ... M. R.-I., & 2014, undefined. (n.d.). What are hackathons for? *Ieeexplore.Ieee.Org*. Retrieved August 16, 2023, from  
<https://ieeexplore.ieee.org/abstract/document/6809711/>
- Krishnan, R., ... I. G.-S. M., & 2016, undefined. (2016). The effectiveness of contractual and trust-based governance in strategic alliances under behavioral and environmental uncertainty. *Wiley Online Library R Krishnan, I Geyskens, JBEM Steenkamp Strategic Management Journal*, 2016•*Wiley Online Library*, 37(12), 2521–2542.  
<https://doi.org/10.1002/smj.2469>
- Kwok, F., Sharma, P., Gaur, S., Review, A. U.-I. B., & 2019, undefined. (n.d.). Interactive effects of information exchange, relationship capital and environmental uncertainty on international joint venture (IJV) performance: An emerging markets. *Elsevier*. Retrieved August 16, 2023, from  
<https://www.sciencedirect.com/science/article/pii/S096959311730166X>
- Lantos, G. P. (2006). Resolving the Capability-Rigidity Paradox in New Product Innovation. *Journal of Product Innovation Management*, 23(3), 289–291.  
<https://doi.org/10.1111/J.1540-5885.2006.00200.X>
- Latifah, L., Setiawan, D., Aryani, Y., ... I. S.-... of O. I., & 2022, undefined. (n.d.). Human Capital and Open Innovation: Do Social Media Networking and Knowledge Sharing Matter? *Elsevier*. Retrieved August 16, 2023, from  
<https://www.sciencedirect.com/science/article/pii/S219985312200717X>
- Laursen, K., policy, A. S.-R., & 2004, undefined. (n.d.). Searching high and low: what types of firms use universities as a source of innovation? *Elsevier*. Retrieved August 15, 2023, from <https://www.sciencedirect.com/science/article/pii/S0048733304001003>
- Laursen, K., & Salter, A. (2006). Open for innovation: The role of openness in explaining innovation performance among U.K. manufacturing firms. *Strategic Management Journal*, 27(2), 131–150. <https://doi.org/10.1002/smj.507>
- Lee, H., commerce, T. C.-I. journal of electronic, & 1996, undefined. (n.d.). Impacts of the electronic marketplace on transaction cost and market structure. *Taylor & Francis HG Lee, TH Clark International Journal of Electronic Commerce*, 1996•*Taylor & Francis*. Retrieved August 16, 2023, from  
<https://www.tandfonline.com/doi/abs/10.1080/10864415.1996.11518279>

- Lee, M., Almirall, E., & Wareham, J. (2016). Open data and civic apps: First-generation failures, second-generation improvements. *Communications of the ACM*, 59(1), 82–89. <https://doi.org/10.1145/2756542>
- Lee, S., Park, G., Yoon, B., policy, J. P.-R., & 2010, undefined. (2010). Open innovation in SMEs—An intermediated network model. *Elsevier*, 39, 290–300. <https://doi.org/10.1016/j.respol.2009.12.009>
- Leemet, A., Milani, F., 13th, A. N.-2021 I., & 2021, undefined. (n.d.). Utilizing hackathons to foster sustainable product innovation—the case of a corporate hackathon series. *leeeexplore.lee.org*. *OrgA Leemet, F Milani, A Nolte2021 IEEE/ACM 13th International Workshop on Cooperative and Human, 2021•ieeexplore.lee.org*. <https://doi.org/10.1109/CHASE52884.2021.00014>
- Leten, B., ... W. V.-C., & 2013, undefined. (2013). IP models to orchestrate innovation ecosystems: IMEC, a public research institute in nano-electronics. *Journals.Sagepub.ComB Leten, W Vanhaverbeke, N Roijackers, A Clerix, J Van HelleputteCalifornia Management Review, 2013•journals.Sagepub.Com, 55(4), 51–64*. <https://doi.org/10.1525/cmr.2013.55.4.51>
- Lichtenthaler, U., management, E. L.-J. of, & 2009, undefined. (n.d.). A capability-based framework for open innovation: Complementing absorptive capacity. *Wiley Online LibraryU Lichtenthaler, E LichtenthalerJournal of Management Studies, 2009•Wiley Online Library*. Retrieved August 15, 2023, from <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-6486.2009.00854.x>
- Lichtenthaler, U., Management, H. E.-R., & 2009, undefined. (n.d.). Opening up the innovation process: the role of technology aggressiveness. *Wiley Online LibraryU Lichtenthaler, H ErnstR&D Management, 2009•Wiley Online Library*. Retrieved August 15, 2023, from <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-9310.2008.00522.x>
- Li-Ying, J., Planning, Y. W.-L. R., & 2015, undefined. (n.d.). Find them home or abroad? The relative contribution of international technology in-licensing to “indigenous innovation” in China. *Elsevier*. Retrieved August 1, 2023, from <https://www.sciencedirect.com/science/article/pii/S0024630114000211>
- Loukis, E., Charalabidis, Y., information, A. A.-G., & 2017, undefined. (2016). Promoting open innovation in the public sector through social media monitoring. *Elsevier*. <https://doi.org/10.1016/j.giq.2016.09.004>
- Luca, L. De, marketing, K. A.-G.-J. of, & 2007, undefined. (n.d.). Market knowledge dimensions and cross-functional collaboration: Examining the different routes to product innovation performance. *Journals.Sagepub.ComLM De Luca, K Atuahene-GimaJournal of Marketing, 2007•journals.Sagepub.Com*. Retrieved August 1, 2023, from <https://journals.sagepub.com/doi/abs/10.1509/jmkg.71.1.095>
- Macpherson, A., Enterprise, A. W.-J. of S. B. and, & 2003, undefined. (2003). Enhancing SMEs’ capability: opportunities in supply chain relationships? *Emerald.ComA Macpherson, A WilsonJournal of Small Business and Enterprise Development, 2003•emerald.Com*. <https://doi.org/10.1108/14626000310473193>
- magazine, J. H.-W., & 2006, undefined. (2006). The rise of crowdsourcing. *Sistemas-Humano-Computacionais ....* [https://sistemas-humano-computacionais.wdfiles.com/local--files/capitulo%3Aredes-sociais/Howe\\_The\\_Rise\\_of\\_Crowdsourcing.pdf](https://sistemas-humano-computacionais.wdfiles.com/local--files/capitulo%3Aredes-sociais/Howe_The_Rise_of_Crowdsourcing.pdf)

Mahr, D., policy, A. L.-R., & 2012, undefined. (n.d.). Virtual lead user communities: Drivers of knowledge creation for innovation. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S0048733311001636>

management, A. Z.-J. of product innovation, & 2017, undefined. (n.d.). Benefiting from open innovation: A multidimensional model of absorptive capacity. *Wiley Online LibraryAK ZobelJournal of Product Innovation Management, 2017•Wiley Online Library*. Retrieved August 15, 2023, from <https://onlinelibrary.wiley.com/doi/abs/10.1111/jpim.12361>

Management, H. C.-I. M., & 2020, undefined. (n.d.-a). To recover faster from Covid-19, open up: Managerial implications from an open innovation perspective. *Elsevier*. Retrieved August 15, 2023, from <https://www.sciencedirect.com/science/article/pii/S001985012030300X>

Management, H. C.-I. M., & 2020, undefined. (n.d.-b). To recover faster from Covid-19, open up: Managerial implications from an open innovation perspective. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S001985012030300X>

management, M. K.-J. of product innovation, & 2007, undefined. (n.d.). The Relative Importance of Interfirm Relationships and Knowledge Transfer for New Product Development Success\*. *Wiley Online LibraryMP KnudsenJournal of Product Innovation Management, 2007•Wiley Online Library*. Retrieved August 15, 2023, from <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1540-5885.2007.00238.x>

Management, S. H.-T. Q., & 2007, undefined. (n.d.). Human capital, organizational learning, network resources and organizational innovativeness. *Taylor & FrancisSH HsuTotal Quality Management, 2007•Taylor & Francis*. Retrieved August 16, 2023, from <https://www.tandfonline.com/doi/abs/10.1080/14783360701592208>

manpower, H. L.-I. J. of, & 2007, undefined. (n.d.). Knowledge sharing and firm innovation capability: an empirical study. *Emerald.ComHF LinInternational Journal of Manpower, 2007•emerald.Com*. <https://doi.org/10.1108/01437720710755272>

Marco, C. De, Martelli, I., Social, A. D. M.-T. F. and, & 2020, undefined. (n.d.-a). European SMEs' engagement in open innovation When the important thing is to win and not just to participate, what should innovation policy do? *Elsevier*. Retrieved August 15, 2023, from <https://www.sciencedirect.com/science/article/pii/S0040162518315476>

Marco, C. De, Martelli, I., Social, A. D. M.-T. F. and, & 2020, undefined. (n.d.-b). European SMEs' engagement in open innovation When the important thing is to win and not just to participate, what should innovation policy do? *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S0040162518315476>

Marino, L. D., Lohrke, F. T., Hill, J. S., Weaver, K. M., & Tambunan, T. (2008). Environmental shocks and SME alliance formation intentions in an emerging economy: Evidence from the asian financial crisis in Indonesia. *Entrepreneurship: Theory and Practice, 32*(1), 157–183. <https://doi.org/10.1111/J.1540-6520.2007.00220.X>

Marshall, A. (2009). *Principles of economics: unabridged eighth edition*. [https://books.google.com/books?hl=es&lr=&id=lyZJXc\\_v-TAC&oi=fnd&pg=PR30&ots=aY30t6Mu4t&sig=vgqX3ZuhxtAiZNip4\\_Pawal3fO0](https://books.google.com/books?hl=es&lr=&id=lyZJXc_v-TAC&oi=fnd&pg=PR30&ots=aY30t6Mu4t&sig=vgqX3ZuhxtAiZNip4_Pawal3fO0)

Martín-Martín, A., Orduña-Malea, E., Ayllón, J. M., & López-Cózar, E. D. (2014). *Does Google Scholar contain all highly cited documents (1950-2013)?* <http://arxiv.org/abs/1410.8464>

Marullo Politecnico di Torino, C., Di Minin Scuola Superiore Sant, A., Eleonora De Marco, C., & Piccaluga, A. (2018). The “hidden costs” of open innovation in SMEs: From theory to practice. *World ScientificC Marullo, A Di Minin, CE De Marco, A*

- Piccaluga Researching Open Innovation in SMEs, 2018*•World Scientific, 37–68.  
[https://doi.org/10.1142/9789813230972\\_0002](https://doi.org/10.1142/9789813230972_0002)
- Marzi, G., Manesh, M., Caputo, A., Pellegrini, M., Technovation, B. V.-, & 2023, undefined. (2022). Do or do not. Cognitive configurations affecting open innovation adoption in SMEs. *Elsevier*. <https://doi.org/10.1016/j.technovation.2022.102585>
- Masucci, M., Brusoni, S., Policy, C. C.-R., & 2020, undefined. (2019). Removing bottlenecks in business ecosystems: The strategic role of outbound open innovation. *Elsevier*. <https://doi.org/10.1016/j.respol.2019.103823>
- McKelvie, A., Practice, J. W.-... T. and, & 2018, undefined. (n.d.). Externally acquired or internally generated? Knowledge development and perceived environmental dynamism in new venture innovation. *Journals.Sagepub.Com A McKelvie, J Wiklund, A Brattström Entrepreneurship Theory and Practice, 2018*•journals.Sagepub.Com. Retrieved August 16, 2023, from <https://journals.sagepub.com/doi/abs/10.1177/1042258717747056>
- Menzel, H., Aaltio, I., Technovation, J. U.-, & 2007, undefined. (n.d.). On the way to creativity: Engineers as intrapreneurs in organizations. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S0166497207000648>
- Minin, A. Di, Marco, C. De, & Karaulova, M. (2016). *SME Instrument—so far so good? Expectations, reality and lessons to learn*. <https://research.manchester.ac.uk/en/publications/sme-instrument-so-far-so-good-expectations-reality-and-lessons-to>
- Molina-Morales, F., Planning, M. M.-F.-L. R., & 2011, undefined. (n.d.). The dark side of trust: The benefits, costs and optimal levels of trust for innovation performance. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S0024630111000033>
- Muninger, M., Hammedi, W., Research, D. M.-J. of B., & 2019, undefined. (2018). The value of social media for innovation: A capability perspective. *Elsevier*. <https://doi.org/10.1016/j.jbusres.2018.10.012>
- Mussell, J., in, R. C.-J. of library & information services, & 2013, undefined. (2013). Discovery layers and the distance student: Online search habits of students. *Taylor & Francis J Mussell, R Croft Journal of Library & Information Services in Distance Learning, 2013*•Taylor & Francis, 7(1–2), 18–39. <https://doi.org/10.1080/1533290X.2012.705561>
- Nakos, G., Dimitratos, P., Review, S. E.-I. B., & 2019, undefined. (2018). The mediating role of alliances in the international market orientation-performance relationship of SMEs. *Elsevier*. <https://doi.org/10.1016/j.ibusrev.2018.12.005>
- Nature, S. H.-, & 2001, undefined. (n.d.). The self-archiving initiative. *Nature.Com S Harnad Nature, 2001*•nature.Com. Retrieved August 16, 2023, from <https://www.nature.com/articles/35074210>
- news, R. V. N.-N., & 2014, undefined. (n.d.). Online collaboration: Scientists and the social network. *Nature.Com R Van Noorden Nature News, 2014*•nature.Com. Retrieved August 16, 2023, from <https://www.nature.com/articles/512126a>
- Nicholas, D., Boukacem-Zeghmouri, C., Rodríguez-Bravo, B., Xu, J., Watkinson, A., Abrizah, A., Herman, E., & Świgo, M. (2017). Where and how early career researchers find scholarly information. *Wiley Online Library D Nicholas, C Boukacem-Zeghmouri, B Rodríguez-Bravo, J Xu, A Watkinson, A Abrizah Learned Publishing, 2017*•Wiley Online Library, 30(1), 19–29. <https://doi.org/10.1002/leap.1087>

- Nuseir, M., Innovation, A. A.-I. J. of, & 2020, undefined. (n.d.). The role of digital marketing in business performance with the moderating effect of environment factors among SMEs of UAE. *Researchgate.NetMT Nuseir, A AljumahlInternational Journal of Innovation, Creativity and Change, 2020*•researchgate.Net. Retrieved August 16, 2023, from [https://www.researchgate.net/profile/Mohammed-Nuseir/publication/340874998\\_The\\_role\\_of\\_digital\\_marketing\\_in\\_business\\_performance\\_with\\_the\\_moderating\\_effect\\_of\\_environmental\\_factors\\_among\\_SMEs\\_of\\_UAE\\_International\\_Journal\\_of\\_Innovation\\_Creativity\\_and\\_Change\\_wwwijccnet\\_Volume/links/5eb4716c299bf1287f750cf0/The-role-of-digital-marketing-in-business-performance-with-the-moderating-effect-of-environmental-factors-among-SMEs-of-UAE-International-Journal-of-Innovation-Creativity-and-Change-wwwijccnet-Volum.pdf](https://www.researchgate.net/profile/Mohammed-Nuseir/publication/340874998_The_role_of_digital_marketing_in_business_performance_with_the_moderating_effect_of_environmental_factors_among_SMEs_of_UAE_International_Journal_of_Innovation_Creativity_and_Change_wwwijccnet_Volume/links/5eb4716c299bf1287f750cf0/The-role-of-digital-marketing-in-business-performance-with-the-moderating-effect-of-environmental-factors-among-SMEs-of-UAE-International-Journal-of-Innovation-Creativity-and-Change-wwwijccnet-Volum.pdf)
- Oke, A., Prajogo, D., Chain, J. J.-J. of S., & 2013, undefined. (n.d.). Strengthening the innovation chain: The role of internal innovation climate and strategic relationships with supply chain partners. *Wiley Online LibraryA Oke, DI Prajogo, J JayaramJournal of Supply Chain Management, 2013*•Wiley Online Library. Retrieved August 16, 2023, from <https://onlinelibrary.wiley.com/doi/abs/10.1111/jscm.12031>
- Ortega-Argilés, R., Vivarelli, M., & Voigt, P. (2009). R&D in SMEs: A paradox? *Small Business Economics, 33*(1), 3–11. <https://doi.org/10.1007/S11187-009-9187-5>
- Parida, V., ... M. W.-J. of small business, & 2012, undefined. (n.d.). Inbound open innovation activities in high-tech SMEs: the impact on innovation performance. *Taylor & FrancisV Parida, M Westerberg, J FrishammarJournal of Small Business Management, 2012*•Taylor & Francis. Retrieved July 31, 2023, from <https://www.tandfonline.com/doi/abs/10.1111/j.1540-627X.2012.00354.x>
- Parida, V., Patel, P., Wincent, J., Business, M. K.-J. of, & 2016, undefined. (n.d.). Network partner diversity, network capability, and sales growth in small firms. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S0148296315006426>
- Partanen, J., Möller, K., Westerlund, M., ... R. R.-I. M., & 2008, undefined. (n.d.). Social capital in the growth of science-and-technology-based SMEs. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S0019850108000655>
- Paula, F., Innovation, J. D. S.-I. J. of, & 2019, undefined. (n.d.). The role of the appropriability mechanisms for the innovative success of Portuguese small and medium enterprises. *World ScientificFDO Paula, JF Da SilvaInternational Journal of Innovation Management, 2019*•World Scientific. Retrieved August 16, 2023, from <https://www.worldscientific.com/doi/abs/10.1142/S1363919619500324>
- Perng, S., Kitchin, R., Geoforum, D. M. D.-, & 2018, undefined. (2018). Hackathons, entrepreneurial life and the making of smart cities. *Elsevier*. <https://doi.org/10.1016/j.geoforum.2018.08.024>
- Peruchi, D., ... D. de J. P.-J. of B., & 2022, undefined. (n.d.). Moving towards digital platforms revolution? Antecedents, determinants and conceptual framework for offline B2B networks. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S0148296321009504>
- Pervan, S., Al-Ansaari, Y., Management, J. X.-I. M., & 2015, undefined. (n.d.). Environmental determinants of open innovation in Dubai SMEs. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S0019850115001984>

- Piezunka, H., & Dahlander, L. (2014). "Distant Search, Narrow Attention: How Crowding Alters Organizations' Filtering of User Suggestions." *Academy of Management Proceedings*, 2014(1), 12513. <https://doi.org/10.5465/AMBPP.2014.12513ABSTRACT>
- Planning, D. R.-L. R., & 2017, undefined. (n.d.). Dynamic capabilities and firm performance. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S0024630117300638>
- planning, H. C.-L. range, & 2010, undefined. (n.d.). Business model innovation: opportunities and barriers. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S0024630109000569>
- policy, A. A.-R., & 2001, undefined. (2001). The relative effectiveness of patents and secrecy for appropriation. *Elsevier*, 30, 611–624. <https://www.sciencedirect.com/science/article/pii/S0048733300001001>
- policy, J. W.-R., & 2003, undefined. (2003). How open is open enough?: Melding proprietary and open source platform strategies. *Elsevier*. [https://doi.org/10.1016/S0048-7333\(03\)00052-0](https://doi.org/10.1016/S0048-7333(03)00052-0)
- Policy, S. M.-I. E. and, & 2004, undefined. (n.d.). When means become ends: considering the impact of patent strategy on innovation. *Elsevier*. <https://doi.org/10.1016/j.infoecopol.2003.09.008>
- Popa, S., Soto-Acosta, P., and, I. M.-C.-T. F., & 2017, undefined. (2017). Antecedents, moderators, and outcomes of innovation climate and open innovation: An empirical study in SMEs. *Elsevier*. <https://doi.org/10.1016/j.techfore.2017.02.014>
- Prakash, Y., review, M. G.-S. management, & 2008, undefined. (n.d.). Exploring the relationship between organisation structure and perceived innovation in the manufacturing sector of India. *Go.Gale.Com Y Prakash, M Gupta Singapore Management Review*, 2008•*go.Gale.Com*. Retrieved August 16, 2023, from <https://go.gale.com/ps/i.do?id=GALE%7CA174010302&sid=googleScholar&v=2.1&it=&linkaccess=abs&issn=01295977&p=AONE&sw=w>
- Prpić, J., Shukla, P., Kietzmann, J., Horizons, I. M.-B., & 2015, undefined. (n.d.). How to work a crowd: Developing crowd capital through crowdsourcing. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S0007681314001438>
- publishing, Á. B.-L., & 2017, undefined. (2017). Institutional repositories versus ResearchGate: The depositing habits of Spanish researchers. *Wiley Online Library Á Borrego Learned Publishing*, 2017•*Wiley Online Library*, 30(3), 185–192. <https://doi.org/10.1002/leap.1099>
- Publishing, B. B.-L., & 2016, undefined. (n.d.). The open access movement at a crossroads—are the big publishers and academic social media taking over? *Helda.Helsinki.FiBC Björk Learned Publishing*, 2016•*helda.Helsinki.Fi*. Retrieved August 16, 2023, from [https://helda.helsinki.fi/dhanken/bitstream/handle/123456789/167487/Bjo\\_rk2016preprint.docx?sequence=1](https://helda.helsinki.fi/dhanken/bitstream/handle/123456789/167487/Bjo_rk2016preprint.docx?sequence=1)
- quarterly, H. T.-M., & 2005, undefined. (n.d.). Information technology relatedness, knowledge management capability, and performance of multibusiness firms. *JSTORH Tanriverdi MIS Quarterly*, 2005•*JSTOR*. Retrieved August 16, 2023, from <https://www.jstor.org/stable/25148681>
- Quinton, S., Canhoto, A., Molinillo, S., Pera, R., & Budhathoki, T. (2018). Conceptualising a digital orientation: antecedents of supporting SME performance in the digital economy. *Taylor & Francis S Quinton, A Canhoto, S Molinillo, R Pera, T Budhathoki Journal of*



- Strategic Marketing*, 2018•Taylor & Francis, 26(5), 427–439.  
<https://doi.org/10.1080/0965254X.2016.1258004>
- Ratinho, T., Technovation, E. H.-, & 2010, undefined. (n.d.). The role of science parks and business incubators in converging countries: Evidence from Portugal. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S0166497209001382>
- Research, A. P.-J. of B. I. and, & 2018, undefined. (2018). Network structure and open innovation: the role of trust in product development. *Inderscienceonline.ComAH PratonInternational Journal of Business Innovation and Research*, 2018•*inderscienceonline.Com*, 15(1), 44–61.  
<https://www.inderscienceonline.com/doi/abs/10.1504/IJBIR.2018.088467>
- Review, A. P.-M. R., & 2018, undefined. (n.d.). From social network to firm performance: The mediating effect of trust, selling capability and pricing capability. *Emerald.ComAH PratonManagement Research Review*, 2018•*emerald.Com*.  
<https://doi.org/10.1108/MRR-03-2017-0080>
- Review, H. C.-C. M., & 2007, undefined. (n.d.). The market for innovation: implications for corporate strategy. *Journals.Sagepub.ComH ChesbroughCalifornia Management Review*, 2007•*journals.Sagepub.Com*. Retrieved August 15, 2023, from <https://journals.sagepub.com/doi/pdf/10.1177/000812560704900301>
- review, P. M.-A. economic, & 2005, undefined. (n.d.). How do patent laws influence innovation? Evidence from nineteenth-century world's fairs. *Aeaweb.OrgP MoserAmerican Economic Review*, 2005•*aeaweb.Org*. Retrieved August 16, 2023, from <https://www.aeaweb.org/articles?id=10.1257/0002828054825501>
- review, R. R.-I. marketing, & 1994, undefined. (1994). Towards the fifth-generation innovation process. *Emerald.ComR RothwellInternational Marketing Review*, 1994•*emerald.Com*, 11(1), 7. <https://doi.org/10.1108/02651339410057491>
- review, U. L.-C. management, & 2007, undefined. (n.d.). The drivers of technology licensing: An industry comparison. *Journals.Sagepub.ComU LichtenthalerCalifornia Management Review*, 2007•*journals.Sagepub.Com*. Retrieved August 16, 2023, from <https://journals.sagepub.com/doi/abs/10.2307/41166406>
- Roberts, N., Galluch, P., Dinger, M., quarterly, V. G.-M., & 2012, undefined. (2012). Absorptive capacity and information systems research: Review, synthesis, and directions for future research. *JSTORN Roberts, PS Galluch, M Dinger, V GroverMIS Quarterly*, 2012•*JSTOR*, 36(2), 625–648. <https://www.jstor.org/stable/41703470>
- Rodríguez, F., gerenciales, C. G.-E., & 2011, undefined. (n.d.). El talento humano y la innovación empresarial en el contexto de las redes empresariales: el clúster de prendas de vestir en Caldas-Colombia. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S0123592311701644>
- Rohm, A., Kashyap, V., ... T. B.-J. of B. &, & 2004, undefined. (n.d.). The use of online marketplaces for competitive advantage: a Latin American perspective. *Emerald.ComAJ Rohm, V Kashyap, TG Brashear, GR MilneJournal of Business & Industrial Marketing*, 2004•*emerald.Com*. Retrieved August 16, 2023, from <https://www.emerald.com/insight/content/doi/10.1108/08858620410556318/full/html>
- Rosenbusch, N., Brinckmann, J., Venturing, A. B.-J. of business, & 2011, undefined. (2011). Is innovation always beneficial? A meta-analysis of the relationship between innovation and performance in SMEs. *Elsevier*, 26, 441–457.  
<https://doi.org/10.1016/j.jbusvent.2009.12.002>

- Rumanti, A. A., Rizana, A. F., & Achmad, F. (2023). Exploring the role of organizational creativity and open innovation in enhancing SMEs performance. *Journal of Open Innovation: Technology, Market, and Complexity*, 9(2), 100045. <https://doi.org/10.1016/j.joitmc.2023.100045>
- Rumanti, A., Rizana, A., Access, F. R.-I., & 2021, undefined. (n.d.). The impact of open innovation preparation on organizational performance: a systematic literature review. *IEEE Explore*. *IEEE Org* AA Rumanti, AF Rizana, F Ramadhan, R Reynaldo IEEE Access, 2021 • IEEE Explore. *IEEE Org*. Retrieved July 31, 2023, from <https://ieeexplore.ieee.org/abstract/document/9531616/>
- Salge, T., Farchi, T., ... M. B.-J. of P., & 2013, undefined. (2013). When does search openness really matter? A contingency study of health-care innovation projects. *Wiley Online Library* TO Salge, T Farchi, MI Barrett, S Dopson *Journal of Product Innovation Management*, 2013 • Wiley Online Library, 30(4), 659–676. <https://doi.org/10.1111/jpim.12015>
- Santamaría, L., Jesús Nieto, M., Barge-Gil, A., Santamaría, L., & Nieto A Barge-Gil, M. J. (2010). The Relevance of Different Open Innovation Strategies for R&D Performers Relevancia de distintas estrategias “Open Innovation” para las empresas que hacen. *Cyberleninka.Org*, 13, 93–114. [https://doi.org/10.1016/S1138-5758\(10\)70025-6](https://doi.org/10.1016/S1138-5758(10)70025-6)
- Sapienza, H., Parhankangas, A., venturing, E. A.-J. of business, & 2004, undefined. (2004). Knowledge relatedness and post-spin-off growth. *Elsevier*. <https://doi.org/10.1016/j.jbusvent.2003.06.002>
- Schenk, E., & Guittard, C. (2009). *Crowdsourcing: What can be Outsourced to the Crowd, and Why?* [https://shs.hal.science/file/index/docid/439256/filename/Crowdsourcing\\_eng.pdf](https://shs.hal.science/file/index/docid/439256/filename/Crowdsourcing_eng.pdf)
- ScholarWorks, S., West, J., Gallagher, S., Professor, A., & Gallagher Assistant Professor, S. (2006). Challenges of open innovation: the paradox of firm investment in open-source software. *Wiley Online Library* J West, S Gallagher *R&d Management*, 2006 • Wiley Online Library. <https://doi.org/10.1111/j.1467-9310.2006.00436>
- science, B. B.-M., & 2013, undefined. (2013). Crowdsourcing new product ideas over time: An analysis of the Dell IdeaStorm community. *Pubsonline.Informs.Org* BL Bayus *Management Science*, 2013 • pubsonline.Informs.Org, 59(1), 226–244. <https://doi.org/10.1287/mnsc.1120.1599>
- science, K. B.-M., & 2010, undefined. (2010). Open platform strategies and innovation: Granting access vs. devolving control. *Pubsonline.Informs.Org* K Boudreau *Management Science*, 2010 • pubsonline.Informs.Org, 56(10), 1849–1872. <https://doi.org/10.1287/mnsc.1100.1215>
- Scuotto, V., Del Giudice, M., & Carayannis, E. G. (2017). The effect of social networking sites and absorptive capacity on SMES' innovation performance. *Journal of Technology Transfer*, 42(2), 409–424. <https://doi.org/10.1007/S10961-016-9517-0>
- Shankar, R., Venturing, D. S.-J. of B., & 2019, undefined. (n.d.). Accelerating strategic fit or venture emergence: Different paths adopted by corporate accelerators. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S0883902617308376>
- Soto-Acosta, P., Popa, S., Technology, D. P.-M.-T. J. of, & 2017, undefined. (2017). Social web knowledge sharing and innovation performance in knowledge-intensive manufacturing SMEs. *Springer* P Soto-Acosta, S Popa, D Palacios-Marqués *The Journal of Technology Transfer*, 2017 • Springer, 42(2), 425–440. <https://doi.org/10.1007/s10961-016-9498-z>

- Spithoven, A., Vanhaverbeke, W., economics, N. R.-S. business, & 2013, undefined. (2013). Open innovation practices in SMEs and large enterprises. *SpringerA Spithoven, W Vanhaverbeke, N RoijackersSmall Business Economics, 2013•Springer, 41(3), 537–562.* <https://doi.org/10.1007/s11187-012-9453-9>
- Strategies, S. van der G.-C. &, & 2014, undefined. (2014). Smarten up! open data, toolkits and participation in the social city. *Papers.Ssrn.ComS van Der GRAAFCommunications & Strategies, 2014•papers.Ssrn.Com, 96, 35.* [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2636324](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2636324)
- Sutcliffe, K., journal, A. Z.-S. management, & 1998, undefined. (1998). Uncertainty in the transaction environment: an empirical test. *Wiley Online LibraryKM Sutcliffe, A ZaheerStrategic Management Journal, 1998•Wiley Online Library, 19, 1–23.* [https://onlinelibrary.wiley.com/doi/abs/10.1002/\(SICI\)1097-0266\(199801\)19:1%3C1::AID-SMJ938%3E3.0.CO;2-5](https://onlinelibrary.wiley.com/doi/abs/10.1002/(SICI)1097-0266(199801)19:1%3C1::AID-SMJ938%3E3.0.CO;2-5)
- Tang, T. (Ya), Fisher, G. J., & Qualls, W. J. (2021). The effects of inbound open innovation, outbound open innovation, and team role diversity on open source software project performance. *Industrial Marketing Management, 94, 216–228.* <https://doi.org/10.1016/j.indmarman.2021.02.013>
- Technology, F. B.-I. J. of, & 2004, undefined. (n.d.). Global licensing strategies and technology pricing. *Inderscienceonline.ComF BidaultInternational Journal of Technology Management, 2004•inderscienceonline.Com.* Retrieved August 15, 2023, from <https://www.inderscienceonline.com/doi/abs/10.1504/IJTM.2004.003959>
- Technovation, E. H.-, & 2011, undefined. (2010). Open innovation: State of the art and future perspectives. *Elsevier, 31, 2–9.* <https://doi.org/10.1016/j.technovation.2010.10.002>
- Technovation, U. L.-, & 2010, undefined. (n.d.). Technology exploitation in the context of open innovation: Finding the right 'job'for your technology. *Elsevier.* Retrieved August 15, 2023, from <https://www.sciencedirect.com/science/article/pii/S0166497210000490>
- Teirlinck, P., Technovation, A. S.-, & 2013, undefined. (2013). Research collaboration and R&D outsourcing: Different R&D personnel requirements in SMEs. *Elsevier, 33, 142–153.* <https://doi.org/10.1016/j.technovation.2012.11.005>
- Tippins, M., journal, R. S.-S. management, & 2003, undefined. (2003). IT competency and firm performance: is organizational learning a missing link? *Wiley Online LibraryMJ Tippins, RS SohiStrategic Management Journal, 2003•Wiley Online Library, 24(8), 23.* <https://doi.org/10.1002/smj.337>
- Todorova, G., review, B. D.-A. of management, & 2007, undefined. (n.d.). Absorptive capacity: Valuing a reconceptualization. *Journals.Aom.OrgG Todorova, B DurisinAcademy of Management Review, 2007•journals.Aom.Org.* Retrieved August 6, 2023, from <https://journals.aom.org/doi/abs/10.5465/AMR.2007.25275513>
- Tranekjer, T., Management, M. K. P. I., & 2012, undefined. (n.d.). The (unknown) providers to other firms' new product development: what's in it for them? *Wiley Online LibraryTL Tranekjer, MP KnudsenJournal of Product Innovation Management, 2012•Wiley Online Library.* Retrieved August 15, 2023, from <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1540-5885.2012.00974.x>
- Transfer, N. S.-T. J. of T., & 2021, undefined. (n.d.). Collaborative innovation in emerging innovation systems: Evidence from Central and Eastern Europe. *SpringerN StojčićThe Journal of Technology Transfer, 2021•Springer.* Retrieved August 16, 2023, from <https://link.springer.com/article/10.1007/s10961-020-09792-8>
- Trantopoulos, K., Krogh, G. von, Wallin, M., quarterly, M. W.-M., & 2017, undefined. (n.d.). External knowledge and information technology. *JSTORK Trantopoulos, G von Krogh,*

- MW Wallin, *M WoerterMIS Quarterly*, 2017•JSTOR. Retrieved August 16, 2023, from <https://www.jstor.org/stable/26629648>
- Udimal, T., Jincai, Z., and, I. G.-A. P. J. of I., & 2019, undefined. (n.d.). Dynamics in rural entrepreneurship—the role of knowledge acquisition, entrepreneurial orientation, and emotional intelligence in network reliance and. *Emerald.ComTB Udimal, Z Jincai, IA GumahAsia Pacific Journal of Innovation and Entrepreneurship*, 2019•emerald.Com. Retrieved August 16, 2023, from <https://www.emerald.com/insight/content/doi/10.1108/APJIE-03-2019-0021/full/html>
- Van De Vrande, V., De Jong, J. P. J., Vanhaverbeke, W., & De Rochemont, M. (2009). Open innovation in SMEs: Trends, motives and management challenges. *Elsevier*, 29, 423–437. <https://doi.org/10.1016/j.technovation.2008.10.001>
- Verbano, C., Crema, M., Business, K. V.-J. of S., & 2015, undefined. (n.d.). The identification and characterization of open innovation profiles in Italian small and medium-sized enterprises. *Taylor & FrancisC Verbano, M Crema, K VenturiniJournal of Small Business Management*, 2015•Taylor & Francis. Retrieved August 16, 2023, from <https://www.tandfonline.com/doi/abs/10.1111/jsbm.12091>
- Vergara, P. R. (2006). *Las conferencias*. <http://repositorio.ugm.cl/handle/20.500.12743/1268>
- von Hippel, E. (2006). *Democratizing innovation*. <https://library.oapen.org/handle/20.500.12657/26093>
- Von Hippel, E., & Von Krogh, G. (2003). Open source software and the “private-collective” innovation model: Issues for organization science. *Organization Science*, 14(2). <https://doi.org/10.1287/ORSC.14.2.209.14992>
- Wal, A. Ter, Criscuolo, P., Policy, A. S.-R., & 2017, undefined. (n.d.). Making a marriage of materials: The role of gatekeepers and shepherds in the absorption of external knowledge and innovation performance. *Elsevier*. Retrieved August 1, 2023, from <https://www.sciencedirect.com/science/article/pii/S004873331730046X>
- Wang, Z., applications, N. W.-E. systems with, & 2012, undefined. (n.d.). Knowledge sharing, innovation and firm performance. *Elsevier*. Retrieved August 15, 2023, from <https://www.sciencedirect.com/science/article/pii/S0957417412002618>
- Yang, M., Research, C. H.-J. of B., & 2021, undefined. (2021). Stimulating innovation: Managing peer interaction for idea generation on digital innovation platforms. *Elsevier*, 125, 456–465. <https://www.sciencedirect.com/science/article/pii/S0148296319304643>
- Zahoor, N., Change, S. A.-T. F. and S., & 2023, undefined. (n.d.). Be open to failure: Open innovation failure in dynamic environments. *Elsevier*. Retrieved August 16, 2023, from <https://www.sciencedirect.com/science/article/pii/S0040162523003177>
- Zahra, S., ... H. S.-J. of M., & 2006, undefined. (2006). Entrepreneurship and dynamic capabilities: A review, model and research agenda. *Wiley Online LibrarySA Zahra, HJ Sapienza, P DavidssonJournal of Management Studies*, 2006•Wiley Online Library, 43(4), 917–955. <https://doi.org/10.1111/j.1467-6486.2006.00616.x>
- Zahra, S., review, G. G.-A. of management, & 2002, undefined. (2002). Absorptive capacity: A review, reconceptualization, and extension. *Journals.Aom.Org*, 27(2), 185–203. <https://doi.org/10.5465/AMR.2002.6587995>
- Zarrouk, H., Ghak, T. El, Innovation, A. B.-J. of O., & 2021, undefined. (2021). Exploring economic and technological determinants of FinTech startups’ success and growth in the United Arab Emirates. *Mdpi.ComH Zarrouk, T El Ghak, A BakhoucheJournal of Open Innovation: Technology, Market, and Complexity*, 2021•mdpi.Com, 7, 50. <https://doi.org/10.3390/joitmc7010050>

Zhang, H., Shu, C., ... X. J.-J. of I., & 2010, undefined. (n.d.). Managing knowledge for innovation: The role of cooperation, competition, and alliance nationality. *Journals.Sagepub.Com* H Zhang, C Shu, X Jiang, AJ Malter *Journal of International Marketing*, 2010 • *journals.Sagepub.Com*. Retrieved August 16, 2023, from <https://journals.sagepub.com/doi/abs/10.1509/jimk.18.4.74>

Zheng, Y., Studies, H. Y.-J. of M., & 2015, undefined. (n.d.). Does familiarity foster innovation? The impact of alliance partner repeatedness on breakthrough innovations. *Wiley Online Library* Y Zheng, H Yang *Journal of Management Studies*, 2015 • *Wiley Online Library*. Retrieved August 16, 2023, from <https://onlinelibrary.wiley.com/doi/abs/10.1111/joms.12112>