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# Leveraging Public and Private Resource Partners: The open innovation strategy of an early stage SME

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## Abstract

Leverage of both triple helix stakeholders through open innovation (OI) by early-stage SMEs is an area of inter-organisational collaboration that remains understudied. This chapter seeks to address this gap in the literature by exploring an exemplar case study of an early-stage medical device SME and the role of harnessing the R&D potential of public and private resources through collaborative projects for venture growth and the development of technological disruptive R&D. This study examines the partner resources harnessed, the objectives and nature of these engagements and the enablers/constraints of the SME in leveraging open innovation to advance their technological platform development. The analysis highlights that early-stage SMEs are capable of pursuing an OI strategy to leverage university-industry-Government resources and that the breadth of organisational collaborators increases as their capability to manage such collaborative R&D projects increases. Harnessing the potential of these external entities has enabled the SME case to raise the necessary funding, build industrial credibility and achieve R&D co-creation to progress their disruptive technology closer to market launch and to grow the venture.

## 1 Introduction

The model of the triple helix (Etzkowitz and Leydesdorff, 2000) recognises the potential benefit for regional development in terms of innovation and venture creation when the stakeholders of University-Industry-Government engage purposively. Similarly, the paradigm of open innovation (OI) has gained prominence within the innovation literature as to how research and development (R&D) can be advanced through harnessing externally controlled resources to complement internal assets (Chesbrough and Bogers, 2014). The OI research to date has been particularly skewed towards large-scale enterprises practices (Chesbrough, 2003, Chesbrough, 2012, Chesbrough and Brunswicker, 2013, Viskari et al.,

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2007, Huston and Sakkab, 2007, Mortara and Minshall, 2011, Mortara and Minshall, 2014), with the efforts of small to medium enterprises (SMEs) being primarily ignored until recently (Kraus et al., 2019). SMEs, especially high tech early-stage SMEs offer the potential for significant value appropriation and regional development. Yet, little is understood of how the early-stage SME<sup>1</sup> (ESME) category (Greul et al., 2016, Usman and Vanhaverbeke, 2017, Brunswicker and van de Vrande, 2014, West and Kuk, 2016, Eftekhari and Bogers, 2015) adopt OI practices to support such technological development. It is within this context that the research is undertaken and is the focus of this paper.

SMEs are an essential segment of the industry base that contributes significantly to economic growth and technological innovation (Acs and Audretsch, 1987, Hoffman et al., 1998, Gassmann et al., 2010) and are thus worthy of study (Vanhaverbeke, 2012, van de Vrande et al., 2009). Rothwell and Dodgson (1994) describe the innovation advantages of SMEs as mostly behavioural, comprising of flat organisational structures that are fast, reactive and flexible to changing market requirements and where management is fast learning and quick decision making. Yet despite these advantages, SMEs experience significant resource (human, financial and capital) limitations (Acs and Audretsch, 1987, Vossen, 1988) and OI would appear a credible SME strategy to pursue given these deficits and the potential impact on the SME's future of the developing innovation (Hagedoorn, 1990). OI offers potential benefits to organisations including sharing of R&D costs and risks, opportunity to complement internal knowledge base and revenue generation (Dahlander and Gann, 2010, Gassmann, 2006). However, these advantages are counter-balanced by challenges such as selecting the right partner, managing the OI process and negotiating and appropriating value (Salter et al., 2014, du Chatenier et al., 2010, Dooley et al., 2016) for the organisation. While these benefits and challenges of OI are theoretically open to all organisations, for early-stage SMEs, such problems may appear impossible due to lack of industrial experience (e.g. academic spin-outs), the relative resource constraints of the venture (Dooley et al., 2017, Prashantham and Birkinshaw, 2008), ability to attract suitable partners and the significant length of R&D route to market.

Currently, we know relatively little about *if* and *how* ESMEs adopt OI (Greul et al., 2016, Eftekhari and Bogers, 2015, Kraus et al., 2019, Brunswicker and van de Vrande, 2014) and how such ESMEs overcome the challenges of OI (Bogers et al., 2017). To address this question, the research considers the case of an Irish ESME (DiagCo), established in the medical device (MD) industry, to develop a complex and potentially disruptive technological platform for the global market. The likelihood of any ESME being capable of developing such products without the leverage of externally controlled resources of public and private entities is low. Yet, these ESMEs may lack the necessary capabilities that prohibit the harnessing of OI's potential. The research findings of DiagCo's development over its first five years highlights that such firms can leverage OI not only to access the existing complementary intellectual property (IP) to support R&D advancement but also to underpin co-creation, reputational credibility and even funding of the venture.

A single ESME case study was chosen due to its ability to provide unique insights plus its potential as a "*revelatory case*" (Yin, 2009). This case study relied on three data sources,

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<sup>1</sup> The term early-stage SME, as opposed to 'start-up', is used as the case study in question is in its early stage of development and is generating revenue. The early-stage implies flat organisation structures, informal innovation processes and planning; individual and entrepreneurial decision making (SMITH, K. G., MITCHELL, T. R. & SUMMER, C. E. 1985. Top level management priorities in different stages of the organisational life cycle. *Academy of Management Journal*, 28, 799-820.)

including semi-structured interviews with the ESME founder/chief executive officer (CEO), follow-up emails and phone calls for clarification purposes and secondary data. Substantial desk research was conducted before and after interviews with the founder, which resulted in the collection of significant secondary data to facilitate the triangulation process (Yin, 2009). This was followed by a case write-up including the case study narrative and a timeline of the key events in the ESME's history, which the founder/CEO reviewed and commented upon thus facilitating reliability and validity. Data were analysed at the level of the ESME and the individual OI projects (Du et al., 2014, Vanhaverbeke et al., 2014, Bahemia and Squire, 2010), which enabled us to unpack the underlying details. Conducting OI research at these different levels of analysis (firm and project level) provides for a more comprehensive understanding of OI (Chesbrough, 2006, Randhawa et al., 2016) especially given the short-term, reactive nature that personifies the ESME context. We used a series of tables and matrices to organise the data (Miles et al., 2014), thus going back and forth between theory and data.

The chapter is structured by first outlining the case study and the individual OI projects adopted. It then proceeds to discuss the collaboration partners, the OI mechanisms used (i.e. modes and forms) and the motives. Finally, we then reveal the primary challenges experienced by DiagCo and how these challenges were overcome.

## 2 Case Study – DiagCo

DiagCo is an Irish medical device ESME, which provides a platform to enable the decentralisation of routine medical testing from central laboratories into general practitioner offices, medical clinics, pharmacies and potentially other test settings. At the time of research, the company was six years old and employed 20 people (primarily in R&D) and was still progressing its primary product offering towards market launch and thus is deemed to be in the early stages of enterprise development. The company's founder/CEO was an engineer with significant multinational enterprise (MNE) managerial experience but lacked specific contacts and knowledge of the medical device industry: *"I was prepared to take twelve months out to understand the medical industry.... To ask the stupid questions and to bring a solution from left field for a problem that may or may not exist"*. His engineering knowledge allowed an entrepreneurial opportunity within the MD industry to be identified and cognisant of his knowledge deficit, the founder/CEO deliberately recruited the *'right'* internal team and subsequently *'right'* external partners to address structural holes. Through this approach, DiagCo built a credible, multidisciplinary R&D team, that possessed the absorptive capacity to partner with world-class university research institutes, established global medical device players and both European Union (EU) and national enterprise support agencies to advance their R&D and ensure credibility and compliance in the highly regulated MD industry. Three key challenges facing this ESME development were how to progress their R&D to realise a regulatory aligned, market-ready medical device, how to establish credibility with existing industry stakeholders and how to continue to secure the funding streams necessary for the continued growth of the company, especially given the length of development time to market of their innovation. In resolving these challenges, DiagCo's founder/CEO leveraged the capabilities of University-Industry-Government resources through OI practices as a core strategy to develop the R&D and to bring the technological platform to market: *"we would figure out who [complementary partner] had the budget and then work at getting an R&D project going with them that aligned with our R&D"*

[trajectory].” Interestingly, while the purposeful harnessing of complementary resources to overcome internal capability deficits was deliberate, targeted *entrepreneurial strategy* (Mintzberg and Waters, 1985) of the founder/CEO and driven by their strong relational capability, the management team were largely unfamiliar with the open innovation paradigm and instead viewed their approach as simply ‘*common sense*’. Irrespective, the ESME, DiagCo, has benefited significantly from its leverage of the capabilities of Government support agencies, University research institutes and industrial partners in advancing the maturity of their R&D and growth of the venture through successful execution of OI related projects<sup>2</sup> (see table 1 for further project details).

**Table 1** OI Project Details

Project <sup>3</sup>	OI Mechanism (Form/Mode)	OI Partner	Motive – pecuniary / non-pecuniary
I. Sourcing technology	Inbound licensing/Outside-in	International University [Uni – A] Government [Gov – A]	Acquire complementary IP to support technology development. Enhance reputation and credibility in the industry. Enhanced ability to acquire funding to support the venture.
II. Sourcing technology	Inbound licensing/Outside-in	Industry – MNE [MNE – A]	Acquire complementary knowledge (IP and regulatory) to support technology development. Defensive purposes of alignment with the larger-scale company. Enhance reputation and credibility in the industry.
III. Acquisition of specialised resources and knowledge	Co-creation R&D/Coupled	National University [Uni – B]	Access specialised resources and equipment of public research centre to build increased research capacity and capabilities aligned with internal R&D trajectory.
IV. Extend the reach of technology into a new market	Co-creation R&D/ Coupled	EU/Government Agency [Gov – B]	Access to matched public funds for the extension of the platform to enter a new market. Enhance reputation and credibility in the industry. Increased breadth of network of potential collaborators.
V. Acquisition of specialised resources and knowledge	Co-creation R&D/ Coupled	Industry – MNE [MNE – B] (participated in a university accelerator programme before embarking on this OI project)	Acquire complementary knowledge (IP and regulatory) to support technology development. Access to funding stream for growth and scale development. Enhance reputation and credibility in the industry.
VI. Extend the reach of technology into a new market	Co-creation R&D/ Coupled	EU/Government Agency [Gov – C]	To access funds for the extension of the platform to enter a new market. Enhance reputation and credibility in the industry.

## 2.1 DiagCo’s development through collaborative projects

DiagCo has spent the last six years developing its medical device platform and growing the scale and value of its venture. Since its foundation, a Government high potential start-up

<sup>2</sup> These OI projects are described in adoption sequence.

<sup>3</sup> OI Projects are listed in the sequence of adoption by DiagCo.

programme has supported it, where the venture has received both managerial guidance in terms of market entry, sales/partner engagement strategies and mentoring programmes plus also initial access to public funding to support its technical advancement involving vouchers to fund development to solve a specific technical problem. These interactions have also assisted in widening both the industrial and financing sources of the founder/CEO by making initial introductions. The first OI collaboration (Project I) to support this ESME in the development of its R&D occurred during the first twelve months of the firm's existence and was initiated to acquire technology from a leading US university [Uni A] through a licensing-in deal. The benefits derived by the ESME from this collaboration with the 'world-class' University were twofold. First, DiagCo needed access to this background IP and by working with this research partner in the knowledge transfer process, up-skilled in the technological domain quickly and achieved access to human resource capability outside the scope of an SME. Second, research collaboration with this internationally renowned University helped establish research credentials and credibility of the firm within their industry. This licensing-in Project, the credible IP transferred into the ESME and the relationship with the international University helped to differentiate it from its competitors. It assisted in opening doors to the funding sources required (business angels and venture capital firms (VC's)) to finance the development of the platform. The importance of collaboration with complementary external resources was highlighted in a quote by the founder/CEO, "[Partnering was] *for more strategic reasons if you will. We had... to entice them to invest in the company. What is also crucial for us... is credibility; when we go to investors and mention [Partner name], we have credibility straight away*".

Following the success of Project I, where the acquired technology enabled the ESME to advance their internally developed R&D, the management team began to seek out other potential partners. Reflecting on this, the ESME identified challenges in accessing and securing partnering opportunities, given both the scale of the company and the non-medical device background of the founder/CEO. Despite these constraints, the quality and technological novelty of their R&D, together with the disruptive opportunity of their potential market offering; these were critical factors for initial partner discussions. Likewise, these factors also facilitated the ESME in accessing deeper funding sources to permit more ambitious R&D development. Following a thorough search and 'due diligence' of prospective partners, the company targeted an industrial company that was a global diagnostics player [MNE A] and the founder/CEO commenced a purposeful process of engagement "*it sometimes took 3-4-5-10 referrals to get to the right person, I had to be tenacious at it.*" Following persistent relationship building, DiagCo achieved their second collaboration (Project II), driven by a desire to access a legacy portfolio of IP held, but unexploited, by MNE A and also to gain industrial credibility of being associated with a global leader. Despite being small in scale, DiagCo deliberately targeted the most advantageous rather than most accessible collaborative partners given the strategic importance to venture sustainability of continued R&D development. Reflecting on the experience, the founder/CEO highlighted the importance of time since it is not just about securing access to the '*right*' organisation but also building trust with the '*right*' people to achieve desired objectives and deliver benefits for all parties engaged.

While DiagCo continued to develop its R&D, its limited internal resources constrained its capacity. One such technological objective, which was constrained, was the miniaturisation of their innovative device. This resulted in DiagCo's third collaboration [project III] to facilitate development. Given the ESME limited financial resources, DiagCo sought out suitable EU research funding that they leveraged to achieve this objective through a

partnership with a public research centre [Uni B], who possessed both the required specialist equipment and research expertise: *“those items are too expensive for us to invest in... [Partnering we were able to] leverage their huge amount of capital, test and simulation equipment”*. This partnership was not only vital in achieving the miniaturising goal but also in facilitating two-way learning within the collaborative context of the Project, further enriching DiagCo’s internal R&D capability: *“...the PI (primary investigator) had an industry background, understood what we were about, they were learning from us and vice versa”*.

As DiagCo worked through the highs and lows of inter-organisational collaboration to advance its R&D, its capabilities to manage such projects and take on larger scale initiatives increased. Their next collaboration [Project IV] is viewed by the ESME as one of those *“eureka”* moments. While considering the wider application of the device, the question of *“where else might this work”* led to exploratory discussions with the European Space Agency (ESA) for further platform extension. Previous management team connections with the ESA, aided the exploration of synergies in objectives and potential funding opportunities for DiagCo. Realising a significant R&D overlap with this public research institution, DiagCo embarked on their next collaborative Project through a matched funding model to advance the R&D frontier: *This Project was perfectly aligned with our R&D and... they [ESA] loved it*. As with all its collaborations, DiagCo made sure that they maintained IP ownership of emerging technologies within the medical device context, maximising their potential for a future appropriation of value. Over two years, the research teams synthesised their collective R&D capability towards their shared objective and enabled further advancement towards the launch of the innovative platform. The non-pecuniary benefit of collaboration with this and past partners has enhanced DiagCo’s reputation and enhanced the ESME’s ability to attract both new collaborative partners and funding sources.

In the last two years, DiagCo has continued to advance its R&D but has had a greater exploitative rather than exploratory focus to its collaboration efforts. First, they partnered with an industrial company (MNE – B) that, globally, has the dominant market share of their target market [Project V]. While DiagCo recognised that the MNE’s interest was from a technology scanning perspective: *“they love engaging in these types of projects to vetting the company, to check if this is a technology they want to bring in-house”*, their interest was to gain a more in-depth insight of regulatory/compliance issues that could impede the platform’s market adoption. This partnership was yet again a deliberate effort of the founder/CEO to strengthen the credibility and reputation of DiagCo within the industry and enable the leading industrial player *“see what we are doing as disruptive, and they [could decide if they] wanted to be part of it and were willing to invest”*. The final collaborative Project to date [Project VI] has been an EU funding initiative, undertaken to extend the platform reach into additional diagnostic capabilities attractive to the market. The targeting of public funding to continue scaling and developing the technology is viewed as advantageous since it allowed the ESME maintain control over the emerging foreground IP, either through the provision of background IP or contractual ‘first right of acquisition’ conditions. Another key advantage of this particular project was that it provided access to a wide array of international healthcare providers and research centres, thus helping to raise the profile of DiagCo and undertake market research for its launch.

These OI projects highlight the deliberate and targeted efforts by the ESME founder/CEO and management team to recruit collaborative partners through OI projects. The founder/CEO realised early on the path to establishing a disruptive medical device platform

that this ambitious vision was not possible without accumulating external resources, knowledge and capabilities from both public and private research sources through collaborative R&D partnerships. DiagCo adopted OI as an entrepreneurial strategy; engaging in ever increasingly ambitious projects and consistently adding to their internal capability and assets in terms of financial, IP, networks and industrial credibility that nurture the venture along its pathway to growth. Additional to this, the management team has been enhancing the OI maturity of their firm, gaining valuable experience of how to manage more complex inter-organisational collaborations.

## *2.2 OI partners and mechanisms (forms and modes)*

DiagCo began operations with a relatively small network to draw on given the founder/CEO's lack of medical device experience. However, over the first six years of this ESME, the management team have successfully collaborated with a range of partner types, including university research centres, industry companies (MNEs) and European Union/Governmental agencies. Perhaps unsurprisingly, DiagCo commenced OI by collaborating with a university partner, licencing in IP into the venture to complement their internal R&D. Initial targeting of a public institution by the ESME was driven by the IP they possessed and their global reputation as the leading University in the field. While these factors determined the specific partner, it is likely that beginning the OI journey with a heavily transactional knowledge transfer into the embryonic venture and initially partnering with a public rather than commercial partner, provided DiagCo with greater certainty of the outcome and less risk of IP leakage. Importantly, the ESME targeted the 'world's best' to partner with, being consciously aware of the associate benefit of association with such a renowned institution and the potential leverage in attracting future partners. While DiagCo's initial experience was highly positive and while they highlighted a degree of frustration with the perceived lack of urgency by the public institution and getting to the right decision-maker to "*make things happen*", it was the basis for further collaborations, including OI project III with University B.

Following the experience of Project I, DiagCo felt encouraged to undertake other collaborations, including those with industrial companies that might be perceived as a threat to the ESME. Again, DiagCo was ambitious with its partner selection, pursuing prestigious partners of high value to their growth trajectory. Aside from the reputational credibility, partnering with these commercial MNEs filled structural holes in the ESME's industry knowledge and provided access to significantly increased network of professional linkages. While there were reservations at the early stages of industry partner interaction as trust developed, the founder/CEO's past MNE experience and commercial acumen gave DiagCo reassurance of their ability to negotiate and manage the contractual requirement to appropriate value. While the relative scale of the ESME and MNE industrial partners was significant in terms of the power and resources (finance, legal, time duration) they had at their disposal, DiagCo felt comfortable interacting with large companies since they had an industrial reputation to uphold and thus were less likely to behave in an opportunistic manner detrimental to the smaller partner.

The benefits of DiagCo's collaborative engagement has been heavily skewed towards exploitative purposes (i.e. pecuniary) given the necessity for commercialisation of the technology to sustain the venture and the requirement of regulatory approval to access the



market. However, critical non-pecuniary motives of research credibility and industrial reputation derived from the OI projects and learning enhancing the ESME's absorptive capacity (Zahra and George, 2002, Huang and Rice, 2009) have also nurtured the venture development and supported raising of required finance. Overall, DiagCo's decisions to engage in such partnerships were heavily influenced by *strategic factors* towards the development of the venture rather than purely economic or operational necessity considerations (Doz and Hamel, 1998). DiagCo primarily used exploitative OI forms (licensing-in & co-operative R&D) within the outside-in OI and coupled modes realising both pecuniary and non-pecuniary motives. Academic research has paid most attention to the outside-in model of OI (West and Bogers, 2013) with both the inside-out and coupled modes of OI remaining less understood (ibid). While DiagCo demonstrates both outward-in and coupled modes of OI knowledge exchange, the absence of activity from the inward-out mode by the ESME may reflect the focused R&D undertaken to date and the lack of any extra or 'redundant' IP within their knowledge store that the venture feels comfortable appropriating value through transfer to another entity.

### 3 OI challenges and management practices used to overcome

The harnessing of external resources by an ESME from stakeholders across the triple helix (i.e. the interaction between private, public and academic sources) is evidently of strategic advantage to the growth of the firm (Etzkowitz and Leydesdorff, 2000). However, given that OI is a complex management practice and challenging to execute successfully (van de Vrande et al., 2009), it can pose challenges, particularly for ESMEs collaborating with more significant, more powerful partners (Prashantham and Birkinshaw, 2008). Analysing the case of DiagCo highlights two critical challenges that the organisation had to overcome in harnessing the potential of OI to grow their venture (see table 2).

**Table 2** OI Challenges and management practices used to overcome

Challenges	Management Practices used to overcome these challenges
Selecting and accessing the ' <i>right</i> ' partner	<ul style="list-style-type: none"> <li>• Building the '<i>right</i>' team</li> <li>• The deliberate targeting of potential partners</li> <li>• Identification of key individuals (i.e. decision-makers – project managers, principal investigators) within potential partners <ul style="list-style-type: none"> <li>○ prior managerial experience assisted in these practices</li> </ul> </li> </ul>
Protection of IP and knowledge	<ul style="list-style-type: none"> <li>• Formal and informal safeguards in place leading to the 'tightly coupled' partnerships</li> <li>• Protection of team and knowledge – selectively revealing/paradox of openness</li> <li>• Meticulous and personal management of each Project by the founder/CEO</li> </ul>

### 3.1 Challenge 1: Selecting and accessing to the ‘right’ partners

The first OI challenge encountered by DiagCo was finding and securing access to the ‘right’ partners. DiagCo, like many ESMEs, was a fledgeling operation without customers or market-ready products and thus was challenged in attracting the right partner. The resource limitations, both in terms of firm size\age and its internal R&D assets impeded access to collaboration partners (Aldrich and Auster, 1986), as did the founder/CEO’s lack of industry knowledge and expertise and network linkages. Small firms are strong at seeking opportunities; however, they typically lack resources to appropriate value from these same opportunities due to limited knowledge and market influence (Ketchen et al., 2007, Ireland et al., 2003). It was the disruptive potential of the novel technology, coupled with the entrepreneurial drive of the founder/CEO, that were key factors for DiaCo in overcoming this challenge. The case shows strong evidence of *strategic entrepreneurship* (Ketchen et al., 2007, Hitt et al., 2011) and the central role of the founder/CEO in the strategic trajectory of the ESME. Embedded within this challenge was the hidden problem of finding the ‘right’ person within the collaboration partner, with whom to build a relationship. The importance of these ‘hands-on and active’ individuals, involved in the operational management of the collaborative projects (Narsalay et al., 2016) was crucial to success, and DiagCo's experience highlights that there is often a time lag from when institutional agreements are signed until practical knowledge benefits flow towards the ESME. The research reveals that while securing access to ‘right’ resources is invaluable in advancing ESME R&D [Project III with Uni – A and project IV with Gov – A], it is relational development with the ‘right’ individual that facilitates the necessary knowledge flows (Kale et al., 2000).

Reflecting on DiagCo’s success in harnessing the potential of collaborative R&D to develop their venture, the analysis highlights three management capabilities/practices that have enabled their ability to attract the “right” partner organisations. First, in considering ‘how’ to attract suitable partners, the founder/CEO was keen to develop a credible multidisciplinary R&D team with the necessary technical expertise and capabilities as this would help alleviate some of the barriers in selecting and accessing the ‘right’ partners. Again, he leveraged his managerial experience and background in attracting and recruiting team members renowned for their technical leadership and capabilities: “*The team is broadly multidisciplinary...there is magic if you will that within the team, the fact that it is multidisciplinary and the fact that the platform is being developed and advanced in parallel across all areas.*” This multidisciplinary team provided the necessary foundation and credibility to commence the process of attracting the ‘right’ partners.

Second, the founder/CEO deliberately targeted industry leaders and influencing organisations (i.e. Government/EU agencies, global universities) as potential partners. The research revealed a purposeful strategy on the part of the ESME to search for and potential access partners. This was aided through the participation in a Health Care accelerator programme which provided access to a first professional network. Likewise, DiagCo pursued and won many innovation awards, which brought credibility and positive visibility to the venture. Third, building on this early momentum, the founder/CEO attended leading industry tradeshow and conferences, which assisted in the identification of *key* individuals and budget holders within leading industry organisations. Through active networking and tenacity, the founder/CEO ‘courted’ key individuals within these organisations, secured meetings and partnerships through articulating the firm’s overall vision, the potential for industry disruption and the team’s calibre and expertise. As outlined, this took conscious

effort and resilience. These practices were recursive for each collaboration partner, and the founder/CEO was relentless until he secured the all-important initial meeting with the ‘right’ person. Given his industry background, he knew how MNEs behaved; he understood the norms and practices and knew *how* to work within the MNE organisational structures. Overall, this experience and knowledge proved invaluable in searching for and securing access to the ‘right’ collaboration partners.

### 3.2 Challenge 2: Ensuring adequate value appropriation

The second OI challenge encountered by DiagCo related to its concerns regarding the ability to appropriate value for the ESME from their collaborations. Developing a new medical device is a long, costly, risky and complicated process (Davey et al., 2011, Hogan, 2005) and protection of assets and value appropriation is of crucial importance to all stakeholders. DiagCo had secured 30 patents which were the primary organisational assets and thus, IP protection was a significant concern and a considerable challenge when collaborating with commercially savvy MNEs. The analysis of this case highlights three management capabilities/practices that have enabled DiagCo appropriate value from their collaborations.

At the initial stage of each Project, DiagCo insisted on formal protection mechanisms and safeguards between the parties: *“in the early stages, we used non-disclosure agreements”*. These initial safeguards provided the ESME with a sense of security to engage in discussions with the external organisation to explore potential synergies. Throughout the process, the founder/CEO led interaction and involved in a strategy of ‘selective protection’, and ‘selective revealing’ (Henkel, 2006) with OI partners as the emerging context for opportunity developed. This strategy encompasses a vital issue of all collaborating organisations but more so when relative scale/power is significant since knowledge exchange is necessary to identify synergistic opportunities and build trust. Still, until trust exists between parties, then the perception of being vulnerable to IP exploitation can impede the knowledge shared. DiagCo's experience highlights the necessity of allowing time to develop relationships to harness opportunity potential, possessing unique complementary resources of interest to the partner and having partners that valued their established reputation assisted in meaningful and worthwhile knowledge exchanges for both parties: *“they don’t want to take the chance of us partnering with anybody else.”* This ‘paradox of disclosure’ (Arrow, 1962) was a challenge to a greater or lesser degree for all DiagCo’s OI projects, their deliberate strategy of partial disclosure of elements of proprietary knowledge while controlling and safeguarding access to other factors provided the context for the necessary trust to develop between parties.

Another practice employed by the founder/CEO, in enhancing the ability to appropriate value, was the protection of his R&D team at the early stages of OI projects. The founder/CEO felt a sense of duty to the team and shielded them away from partner interaction until ways of workings were established. Only when the founder/CEO was confident that the partnership opportunity and the underpinning relationship were strong, that the wider R&D team were then introduced: *“I wouldn’t give any of these partners access to the team until the relationship is well and truly developed”*. An advantage of this founder/CEO practice was to minimise the likelihood of accidental IP leakage to the partner organisation early on and also to reduce the risk of losing key talent. The founder/CEO worked closely with each partner until the dyad was a tightly coupled partnership (Barringer and Harrison, 2000), underpinned by formal agreements and structures. These rules and structures provided a meaningful

expectation that others behave in a competent and benevolent way (Nooteboom, 2004). They provided a process for knowledge exchange, learning and co-creation to occur.

Overall, the challenge of how to appropriate value from these collaborations was overcome through the founder/CEO's deliberate and meticulous management of each OI partnership. Their purposeful and skilful management of each project stage, using a combination of formal and informal safeguards, '*selectively revealing*' key proprietary elements and continually developing collaborative relationship trust by reinforcing mutual advantage nurtured an environment of reciprocity where the ESME appropriated value.

#### **4 Conclusion**

While research of OI within the SME has gained prominence within the literature in recent years (Kraus et al., 2019), the niche category of ESME OI practice remains underexplored (Criscuolo et al., 2012). ESME's are important in delivering new innovative and disruptive technologies and for the regional employment that they create. Through case analysis, this chapter explores how ESMEs can provide value from open innovation and harness the R&D potential of public and private resources through various open innovation modes for venture growth and the development of their technological disruptive R&D.

The research case highlights that the leverage of University-Industry-Government resources through OI adoption is a legitimate and advantageous development strategy for ESMEs to advance its R&D. This research makes two novel contributions. First, exploring OI at the project level highlights an OI adoption path of ESMEs as their collaborative capability and internal R&D develops. The findings reinforce the importance of public research institutions and support agencies in the early stages of the ESME development, validating the potential of collaboration and enabling a maturing of capability for successfully interacting with private organisations and the broader ecosystem. Second, this case study highlights the pivotal role of the ESME founder/CEO in adopting OI. The ESME challenges experienced in terms of selecting and accessing the '*right*' partner and ensuring adequate value appropriation are heavily determined by the founder/CEO's vision, their network and *strategic entrepreneurship*.

Overall, this case study highlights an exemplary strategy of value delivery through OI adoption in the ESME context. ESMEs used partners as strategic investors – universities EU/government agencies and established industry players, not only to advance their internal R&D but also to leverage their development budgets and reputation to acquire the necessary venture financing. Such action achieves R&D co-creation, industry advocates of their disruptive technology and facilitates venture growth as the technology moves closer to market.

## References

- Acs, Z. J. & Audretsch, D. B. 1987. Innovation in large and small firms. *Economics Letters*, 23, 109-112.
- Aldrich, H. & Auster, E. R. 1986. Even dwarfs started small: liabilities of age and size and their strategic implications. *Research in Organisational Behavior*.
- Arrow, K. 1962. Economic welfare and the allocation of resources for invention. *The Rate and Direction Of Inventive Activity: Economic and Social Factors*. Nber.
- Bahemia, H. & Squire, B. 2010. A contingent perspective of open innovation in new product development projects. *International Journal of Innovation Management*, 14, 603-627.
- Barringer, B. R. & Harrison, J. S. 2000. Walking a tightrope: creating value through interorganisational relationships. *Journal Of Management*, 26, 367-403.
- 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., Radziwon, A., Rossi-Lamastra, C., Sims, J. & Ter Wal, A. L. J. 2017. The open innovation research landscape: established perspectives and emerging themes across different levels of analysis. *Industry and Innovation*, 24, 8-40.
- Brunswicker, S. & Van De Vrande, V. 2014. Exploring open innovation in small and medium-sized enterprises In: Henry Chesbrough, W. V., Joel West (Ed.) *New Frontiers In Open Innovation* Oxford University Press.
- Chesbrough, H. 2003. *Open innovation: the new imperative for creating and profiting from technology*, Harvard Business Press.
- Chesbrough, H. 2006. *Open business models: how to thrive in the new innovation landscape*, Harvard Business Press.
- Chesbrough, H. 2012. GE's ecomagination challenge: an experiment in open innovation. *California Management Review*, 54, 140-154.
- Chesbrough, H. & Bogers, M. 2014. Explicating open innovation: clarifying an emerging paradigm for understanding innovation. *New Frontiers in Open Innovation*. . Oxford: Oxford University Press.
- Chesbrough, H. & Brunswicker, S. 2013. Managing open innovation in large firms. *Garwood Center for Corporate Innovation at California University, Berkeley in US & Fraunhofer Society in Germany*.
- Criscuolo, P., Nicolaou, N. & Salter, A. 2012. The elixir (or burden) of youth? exploring differences in innovation between start-ups and established firms. *Research Policy*, 41, 319-333.
- Dahlander, L. & Gann, D. M. 2010. How open is innovation? *Research Policy*, 39, 699-709.
- Davey, S. M., Brennan, M., Meenan, B. J. & Mcadam, R. 2011. Innovation in the medical device sector: an open business model approach for high-tech small firms. *Technology Analysis & Strategic Management*, 23, 807-824.
- Dooley, L., Kenny, B. & Cronin, M. 2016. Interorganisational innovation across geographic and cognitive boundaries: does firm size matter? *R&D Management*, 46, 227-243.
- Dooley, L., Kenny, B. & O'sullivan, D. 2017. Innovation capability development: case studies of small enterprises in the lmt manufacturing sector. *Small Enterprise Research*, 24, 233-256.
- Doz, Y. L. & Hamel, G. 1998. *Alliance advantage: the art of creating value through partnering*, Harvard Business Press.
- Du Chatenier, E., Verstegen, J. A. A. M., Biemans, H. J. A., Mulder, M. & Omta, O. S. W. F. 2010. Identification of competencies for professionals in open innovation teams. *R&D Management*, 40, 271-280.

- Du, J., Leten, B. & Vanhaverbeke, W. 2014. Managing Open Innovation Projects With Science-Based And Market-Based Partners. *Research Policy*, 43, 828-840.
- Eftekhari, N. & Bogers, M. 2015. Open for entrepreneurship: how open innovation can foster new venture creation. *Creativity and Innovation Management*, 24, 574-584.
- Etzkowitz, H. & Leydesdorff, L. 2000. The dynamics of innovation: from national systems and “mode 2” to a triple helix of university–industry–government relations. *Research Policy*, 29, 109-123.
- Gassmann, O. 2006. Opening up the innovation process: towards an agenda. *R&D Management*, 36, 223-228.
- Gassmann, O., Enkel, E. & Chesbrough, H. 2010. The future of open innovation. *R&D Management*, 40, 213-221.
- Greul, A., West, J. & Bock, S. 2016. Open at birth? Why new firms do (or don't) use open innovation. *Strategic Entrepreneurship Journal*.
- Hagedoorn, J. 1990. Organisational modes of inter-firm co-operation and technology transfer. *Technovation*, 10, 17-30.
- Henkel, J. 2006. Selective revealing in open innovation processes: the case of embedded linux. *Research Policy*, 35, 953-969.
- Hitt, M. A., Ireland, R. D., Sirmon, D. G. & Trahms, C. A. 2011. Strategic entrepreneurship: creating value for individuals, organisations, and society. *Academy of Management Perspectives*, 25, 57-75.
- Hoffman, K., Parejo, M., Bessant, J. & Perren, L. 1998. Small firms, r&d, technology and innovation in the UK: a literature review. *Technovation*, 18, 39-55.
- Hogan, J. 2005. Open Innovation Or Open House: How to protect your most valuable assets. *Medical Device Technology*, 16, 30-1.
- Huang, F. & Rice, J. 2009. The role of absorptive capacity in facilitating open innovation outcomes: a study of Australian SMEs in the manufacturing sector. *International Journal of Innovation Management*, 13, 201-220.
- Huston, L. & Sakrab, N. 2007. Implementing open innovation. *Research-Technology Management*, 50, 21-25.
- Ireland, R. D., Hitt, M. A. & Sirmon, D. G. 2003. A model of strategic entrepreneurship: the construct and its dimensions. *Journal Of Management*, 29, 963-989.
- Kale, P., Singh, H. & Perlmutter, H. 2000. Learning and protection of proprietary assets in strategic alliances: building relational capital. *Strategic Management Journal*, 21, 217-237.
- Ketchen, D. J., Ireland, R. D. & Snow, C. C. 2007. Strategic entrepreneurship, collaborative innovation, and wealth creation. *Strategic Entrepreneurship Journal*, 1, 371-385.
- Kraus, S., Kailer, N., Dorfer, J. & Jones, P. 2019. Open innovation in (young) SMEs. *The International Journal Of Entrepreneurship And Innovation*, 1465750319840778.
- Miles, M. B., Huberman, A. M. & Saldaña, J. 2014. *Qualitative data analysis: a methods sourcebook*, Sage Publications, Incorporated.
- Mintzberg, H. & Waters, J. A. 1985. Of strategies, deliberate and emergent. *Strategic Management Journal*, 6, 257-272.
- Mortara, L. & Minshall, T. 2011. How do large multinational companies implement open innovation? *Technovation*, 31, 586-597.
- Mortara, L. & Minshall, T. 2014. Patterns of implementation of OI in MNCs. *New Frontiers in Open Innovation*. . Oxford: Oxford University Press.
- Narsalay, R., Kavathekar, J. & Light, D. 2016. A hands-off approach to open innovation doesn't work. *Harvard Business Review*.
- Nooteboom, B. 2004. *Inter-Firm collaboration, learning and networks: an integrated approach*, Psychology Press.

- Prashantham, S. & Birkinshaw, J. 2008. Dancing with gorillas: how small companies can partner effectively with mncs. *California Management Review*, 51, 6-23.
- Randhawa, K., Wilden, R. & Hohberger, J. 2016. A bibliometric review of open innovation: setting a research agenda. *Journal of Product Innovation Management*.
- Rothwell, R. & Dodgson, M. 1994. Innovation and size of firm. *The Handbook of Industrial Innovation*, 310-324.
- Salter, A., Criscuolo, P. & Ter Wal, A. L. 2014. Coping with open innovation. *California Management Review*, 56, 77-94.
- Smith, K. G., Mitchell, T. R. & Summer, C. E. 1985. Top level management priorities in different stages of the organisational life cycle. *Academy of Management Journal*, 28, 799-820.
- Usman, M. & Vanhaverbeke, W. 2017. How start-ups successfully organise and manage open innovation with large companies. *European Journal of Innovation Management*, 20, 171-186.
- Van De Vrande, V., De Jong, J. P. J., Vanhaverbeke, W. & De Rochemont, M. 2009. Open innovation in SMEs: trends, motives and management challenges. *Technovation*, 29, 423-437.
- Vanhaverbeke, W. 2012. Open innovation in SMEs: how can small companies and start-ups benefit from open innovation strategies? Research report. Flanders DC: Vlerick Leuven Gent Management School.
- Vanhaverbeke, W., Chesbrough, H. & West, J. 2014. Surfing the new wave of open innovation research. *New Frontiers in Open Innovation*, 281.
- Viskari, S., Salmi, P. & Torkkeli, M. 2007. Implementation of open innovation paradigm cases: Cisco Systems, Dupont, IBM, Intel, Lucent, P&G, Philips And Sun Microsystems. Lappeenranta University of Technology.
- Vossen, R. 1988. Relevant strengths and weaknesses of small firms in innovation. *International Small Business Journal*, 16.
- West, J. & Bogers, M. 2013. Leveraging external sources of innovation: a review of research on open innovation. *Journal Of Product Innovation Management*.
- West, J. & Kuk, G. 2016. The complementarity of openness: how makerbot leveraged thingiverse in 3D printing. *Technological Forecasting And Social Change*, 102, 169-181.
- Yin, R. K. 2009. *Case study research: design and methods*, Sage Publications.
- Zahra, S. A. & George, G. 2002. Absorptive capacity: a review, reconceptualization, and extension. *Academy of Management Review*, 27, 185-203.