CORA Cork Open Research Archive
Cartlann Taighde Oscailte Chorcaí

Title	A tango with a gorilla: An exploration of the microfoundations of open innovation partnerships between young innovative companies and multi-national enterprises
Authors	Barrett, Gillian;Tsekouras, George
Publication date	2022-09-20
Original Citation	Barrett, G & Tsekouras, G 2022, 'A tango with a gorilla : An exploration of the microfoundations of open innovation partnerships between young innovative companies and multi-national enterprises', Technovation, vol. 117, 102561, pp. 1-17. https://doi.org/10.1016/j.technovation.2022.102561
Type of publication	Article (peer-reviewed)
Link to publisher's version	https://www.scopus.com/pages/publications/85131781795 - 10.1016/j.technovation.2022.102561
Rights	© 2022, The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (https://creativecommons.org/licenses/by/4.0/). - https://creativecommons.org/licenses/by/4.0/
Download date	2026-10-05 11:49:07
Item downloaded from	https://hdl.handle.net/10468/18664

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Technovation 117 (2022) 102561

Contents lists available at ScienceDirect

Technovation

journal homepage: www.elsevier.com/locate/technovation

A tango with a gorilla: An exploration of the microfoundations of open innovation partnerships between young innovative companies and multi-national enterprises

Gillian Barrett [a,*], George Tsekouras [b]

[a] Cork University Business School, University College Cork, Ireland
[b] CENTRIM, University of Brighton, UK

ARTICLE INFO

Keywords:
Open innovation
Young innovative companies
SMEs
Multi-national enterprises
Microfoundations

ABSTRACT

Our purpose is to clarify the microfoundations of open innovation (OI) in young innovative companies (YICs) in partnering with large multi-national enterprises (MNEs). Despite the progress in OI SME research, YICs remain understudied, and we know little about the nuances and complexity of how OI is managed. Through a qualitative research design, we explore four cases and twelve projects within the information communications technology (ICT) and medical device (MD) industries. Based on an analysis of primary and secondary data at the OI project level, we reveal five types of micro-foundations. These microfoundation types include YIC antecedent, YIC behaviour, MNE antecedent, MNE behaviour and joint action – which are found to influence the outcome of an OI project between an YIC and an MNE. These microfoundation types are deemed as either enabling (positive impact on the YIC OI project outcome) or limiting (negative impact on the YIC OI project outcome). The captured evidence asserts that is the lower-level activities both antecedents and behaviours that ultimately influence and shape the OI project and thus the innovation outcome. This study advances the OI literature and clarifies how the aggregation of this wide range of microfoundations – both antecedents and behaviours, shapes the OI project outcome. Our research illustrates that the deliberate management of microfoundations is a necessary constructive element in an OI project between an YIC and an MNE. Microfoundations provide a guiding rail for YICs to reflect, learn and create value.

1. Introduction

Open Innovation (hereafter, OI) is one of the key advances in innovation studies in recent years (Martin, 2012; Dabić et al., 2021), built on the permeability of organisational boundaries and assumes that the necessary innovation knowledge and expertise does not reside solely within the organisation (Chesbrough, 2003; Dahlander et al., 2021). The literature has long acknowledged the experience of adopting OI from a large corporation perspective (Mortara and Minshall, 2011), and also advancing into Small and Medium sized Enterprises (SMEs) (van de Vrande et al., 2009; Lee et al., 2010). However, the OI experience of young innovative ventures (YICs[1]) has received little attention, especially in the context of OI partnerships with multi-national enterprises (MNEs) (Usman and Vanhaverbeke, 2017).

YICs are key drivers of economic growth and development (Schumpeter, 1934; Colombelli et al., 2016). Such firms exhibit many strengths including a closeness to the market, agile and unbureaucratic processes and informal organisation structures (Spender et al., 2017; Colombo et al., 2006). However, these organisations are highly diverse (Nooteboom, 1994) and face many challenges including uncertainty (Fisher et al., 2020), *liability of newness and smallness* (Aldrich and Yang, 2012; Gimenez-Fernandez et al., 2020), lack of resources (Rothwell, 1991; Hoffman et al., 1998) and possibly a lack of entrepreneurial and/or managerial experience (Low and Macmillan, 1988). Such factors contribute to higher failure rates amongst YICs than established firms (Audretsch et al., 2020; Colombelli et al., 2016). OI offers YICs a pathway to overcome such challenges by leveraging MNE partnerships and given the potential benefits for YICs, it merits a deeper focus.

* Corresponding author.
E-mail addresses: gillian.barrett@ucc.ie (G. Barrett), g.tsekouras@brighton.ac.uk (G. Tsekouras).

[1] The term young innovative venture is used as the studied firms are in early stage of development (less than 6 years old) and revenues are being generated primarily through customer sales.

https://doi.org/10.1016/j.technovation.2022.102561
Received 20 August 2021; Received in revised form 11 February 2022; Accepted 25 May 2022
Available online 9 June 2022
0166-4972/© 2022 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

OI partnerships between YICs and MNEs are characterised by a large asymmetry of power in terms of resources, infrastructure, and political influence (Prashantham and Birkinshaw, 2008). This asymmetry is more critical for the weaker side of the relationship, namely the YIC, especially the way the management team perceive this asymmetry and consequently the way it manages the OI interactions with MNE partners. To understand these OI interactions, there is a need to delve into microfoundations, i.e., the ground level activities – previous experiences, underlying attitudes, actions, behaviours and individual routines (Lewin et al., 2011; Teece, 2007; Felin et al., 2012) that influence and shape the outcome of the OI project between an YIC and an MNE. Thus, enhancing our insights into the differences and outcomes of such organisations. According to Foss (2011: 1416) "there are compelling philosophical reasons why microfoundations need to be provided for our theories".

Despite progress in understanding OI SME adoption, studies remain at a collective level and a gap remains both within our understanding of the microfoundations of OI SME adoption and in particular, within the YIC context in partnering with MNEs (West and Bogers, 2016). Hence, our research concentrates on the microfoundations of OI adoption between YICs and MNEs, essentially exploring *how* YICs interact with MNEs throughout the various stages of an OI project.[2] In short, this initial explorative study leads us to ask the following overarching research question, namely, *how do microfoundations influence OI projects between YICs and MNEs?*

We address this research question through a qualitative, multiple case study methodology built on evidence collected from four YIC case studies and twelve OI projects with MNEs within two high-tech industries – Information and Communications Technology (ICT) and Medical Devices (MD). In the paper, we go beyond the firm-level unit of analysis and take a fine-grained perspective exploring each OI project (i.e., the temporary organisation) (Turner and Müller, 2003) and the underlying microfoundations that influence the outcome through the egocentric perspective of the YIC (Wasserman and Faust, 1994). To date, much research has focused on the MNE perspective (Usman and Vanhaverbeke, 2017), we address this imbalance and take the YIC perspective.

For each OI project, we study the objective, enablers, challenges and the factors influencing the innovation outcome. Our findings propose five types of microfoundations (YIC antecedent, YIC behaviour, MNE antecedent, MNE behaviour and joint action (both parties[3]) that influence the success of an OI partnership between an YIC and an MNE. We also highlight three enabling microfoundations (founder's experience and knowledge, relationships, partnering strategy) and two limiting microfoundations (weak partner fit, MNE inexperience). This research contributes to the OI SME perspective by providing a deeper understanding of the OI phenomenon between YICs and MNEs[4] (West and Kuk, 2016; Usman and Vanhaverbeke, 2017). OI SME research has gained importance, SMEs are not all the same and a gap remains in the context of YICs (Criscuolo et al., 2012; Greul et al., 2016) – how YICs manage OI projects with MNEs. Through analysis at the fine-grained OI project level, this study reveals the interactions between the focal organisation i.e., YICs and their MNE partners throughout the OI project. Essentially, exploring the underlying microfoundations that influence and shape the OI project outcome. Each microfoundation was categorised as an *antecedent* – a structural element or as a *behaviour* – a course of action evident throughout. Finally, we explore how these microfoundations change as the OI project evolves through the innovation process.

[2] This explorative study focuses on OI from the sole firm perspective of the YIC.

[3] One project was categorised as an 'Other' limiting microfoundation as it didn't fit within the proposed five microfoundation categories.

[4] This is achieved from the egocentric YIC perspective.

2. Theoretical background

OI has received significant scholarly and practitioner attention (Stanko et al., 2017; Randhawa et al., 2016). Chesbrough and Bogers, 2014: 17) offer the most recent OI definition: "… a distributed innovation process based on purposively managed knowledge flows across organisational boundaries, using pecuniary and non-pecuniary mechanisms in line with each organisation's business model". In its infancy, OI research focused on firm-centric research primarily within large high-tech organisations (Gassmann et al., 2010). However, the research has widened to include SMEs (Spithoven et al., 2013; Barrett et al., 2021), young firms (Greul et al., 2016), low-tech industries (Trott and Simms, 2017; Alvarez and Iske, 2015), networks (Rampersad et al., 2010) and communities (West and Lakhani, 2008). The analysis level has also widened beyond the firm level (Bogers et al., 2017), to include analysis at the intra-organisational level i.e., project, individual and team (Bahemia et al., 2018; Du et al., 2014; Ahn et al., 2017; Salter et al., 2015), extra-organisational level i.e., individual users, communities (Bogers et al., 2010; Autio et al., 2013), inter-organisational level i.e., alliances, networks, eco-systems (Adner and Kapoor, 2010; Van Der Borgh et al., 2012; Radziwon and Bogers, 2019) and finally, at regional and societal levels (Chesbrough, 2011; Chesbrough and DI Minin, 2014). Despite this plentiful research, there are gaps that need to be addressed.

2.1. Open innovation in high-tech YICs

Previous contributions have argued that OI adoption for SMEs simply makes sense (Vanhaverbeke et al., 2018). However, little evidence exists on how young SMEs with a high innovation potential execute OI. Typically, all YIC innovation activities are taking place within a unique project context, its purpose is usually the development and market introduction of a new product (or service). Many YICs thrive in the development of innovative technologies (Acs and Audretsch, 1987; Schneider and Veugelers, 2010; Storey, 1994; Hoffman et al., 1998; Colombelli et al., 2016) including disruptive technologies (Henderson and Clark, 1990; Henderson, 1993). However, YICs typically struggle to secure resources for exploiting such technologies (Lee et al., 2010; Gans and Stern, 2003) limited by their *liability of newness* and *smallness* (Gimenez-Fernandez et al., 2020; Aldrich and Yang, 2012). As Vossen (1988) outlined, MNE strengths lie within their extensive resources whereas SMEs strengths are largely behavioural (Audretsch et al., 2020). OI offers YICs resources and other benefits including global reach, revenue generation, market entry, building credibility, complementing knowledge and developing capabilities. Therefore, YICs have much to gain from adopting OI (Vanhaverbeke et al., 2018; Prashantham and Birkinshaw, 2008) and thus, a clear rationale for OI adoption exists. Conversely, MNEs are always fighting the risk of developing core rigidities and OI is a very efficient strategy to achieve this (Christensen, 2006; Leonard-Barton, 1992). However, OI is a challenge regardless of organisational size, age and/or experience. This 'natural match' between YICs and MNEs can be compromised by the microfoundations of their interaction activities. For instance, the perceptions of the YICs managers who tend to perceive the collaboration process as full of risk and potential pitfalls (Prashantham and Birkinshaw, 2008) can become a critical problem for these interactions by undermining the OI projects or leading to an unfair split of revenue between the YIC and its large partner. If this potentially valuable interaction is to be managed to the desired effect, its microfoundations and the way they influence the outcome of the OI project need be understood in detail.

OI adoption provides an opportunity for YICs to tap into external capabilities whilst reducing costs and risks of R&D, building credibility and reputation and complementing internal knowledge with access to market channels (Parida et al., 2012; van de Vrande et al., 2009). Nevertheless, OI is not easy and presents many challenges and pitfalls (Prashantham and Birkinshaw, 2008; van de Vrande et al., 2009) – challenges only exacerbated in YICs. Such challenges include the 'David

and Goliath' experience, knowledge protection, intellectual property (IP) negotiation and the wider learning process (of how to access, connect and interact with a larger and more powerful organisation) (Minshall et al., 2010; Oakey, 2013; Freel and Robson, 2017). These challenges affect both large corporations and SMEs but the final output and advantage has a far greater impact on the SME than the large corporation (Hagedoorn, 1990).

Although there has been considerable debate within the literature on the definition of high-tech industries (Pavitt, 1984; Hatzichronoglou, 1997; Grimpe and Sofka, 2009), firms within high-tech industries are clearly different from those in non-high-tech industries (Qian and Li, 2003). Firms in high-tech industries typically invest significantly in R&D and innovation whilst experiencing greater uncertainty, higher risk, more intense competition (Kobrin, 1991) and higher levels of technological change (Hagedoorn et al., 2005). Also, they tend to have shorter product life cycles which pressurises firms to respond to changing customer and market needs (Hagedoorn et al., 2006). As outlined earlier, research into SME OI adoption is considerable; however, research in high-tech YICs has been scant despite their economic and social significance.

2.2. Microfoundations of OI YIC adoption

Microfoundations research has received considerable attention in recent years (Foss, 2011; Eisenhardt et al., 2010; Devinney, 2013). It has been described as a "movement and a way of thinking" within the strategy and organisation theory research streams (Felin et al., 2015: 577). However, the literature extends into many other research areas including innovation management (Grigoriou and Rothaermel, 2014; Ryan et al., 2018; Bertello et al., 2022; Yildiz et al., 2021). Barney and Felin (2013) highlight the lack of consensus within the literature on what constitutes microfoundations research. The authors articulate several "half-truths and misconceptions" including (1) a sole focus on individuals, (2) lead to an infinite regress, (3) can be dealt with by borrowing theories and (4) deny the role of structure. Furthermore, the authors acknowledge the importance of aggregation in its construal and highlight that microfoundations and "organisational analysis should be fundamentally concerned with how individual level factors aggregate to the collective level" (ibid: 145).

Principally, the emerging microfoundation literature asserts that the consequences of macro actions (i.e. organisational level) can to be understood from the underlying micro perspective (i.e., individual level) (Contractor et al., 2019; Teece, 2007; Locatelli et al., 2020). However, Barney and Felin (2013) highlight a mis-conception from such an assertion and stress the importance of both elements of microfoundations – *micro* and *foundations*: "reducing …. everything to individuals is only *micro* – not microfoundational**.** In other words, the foundations portion of microfoundations is important in that it places emphasis on the need to specifically understand the unique, interactional and collective effects that are not only additive but also emergent." These microfoundations are the underlying processes, activities, actions, behaviours occurring at the ground level, "enriching the knowledge base" and enabling the organisation to "integrate, reconfigure, add or subtract resources" (Teece, 2020: 10, 24). Thus, the study of microfoundations in this OI YIC context may help reveal the competencies and processes required to support the development of necessary innovation capabilities (Eisenhardt and Martin, 2000; Teece, 2020).

The intra-organisational level i.e., project, individual and team (Bahemia et al., 2018; Du et al., 2014; Ahn et al., 2017; Wynarczyk et al., 2013; Bogers et al., 2018) is important as OI SME adoption tends to be a project level decision rather than an overall strategic decision (Vanhaverbeke et al., 2014) which is due to the realisation of gaps in complementary assets, skills and capabilities (Teece, 1986; Vanhaverbeke and Cloodt, 2006). For instance, Bagherzadeh et al. (2019), investigating contributory OI factors using a quantitative study of 201 US firms, concluded that projects with different attributes (i.e., complexity and uncertainty) require different managerial factors (openness, partner choice, OI mechanism, collaboration process and internal firm practices) to achieve OI management success. Bogers et al. (2018) conducted a study of Danish firms and found a direct link between individual employees' educational diversity and the extent to which the firm engages with external sources for innovation. Furthermore, analysis at this individual level reveals the intricate peculiarities of *how* OI is executed (i.e., the microfoundational level) which may hold the key for OI venture success (Locatelli et al., 2020; Davies and Brady, 2016; Du et al., 2014; Scuotto et al., 2020; Ahn et al., 2018).

High-tech YICs are clearly different entities from their larger counterparts, therefore the research to date on OI practices in large firms and even in SMEs is not transferable to YICs. This research study addresses this gap and presents insights into the underlying microfoundations of activities occurring at the ground level from the perspective of the YIC i.e., those internal level actions, behaviours and routines that ultimately influence and shape the OI project outcome. Thus, seeks to answer the following aforementioned research question: *how do microfoundations influence OI projects between YICs and MNEs?*

3. Methodology

3.1. Research context

The research design is a qualitative, multiple case study (Eisenhardt, 1989; Yin, 2009; Berends et al., 2014) (leveraging the Goffin et al. (2019) method[5] at the planning phase). This approach was preferred due to the scarcity of empirical insights into OI YIC adoption and offered an opportunity to reveal the nuances and complexity of the underlying microfoundations (Ryan et al., 2018). Multiple case studies typically result in more accurate, generalisable and robust results (Eisenhardt and Graebner, 2007; Yin, 2009; Goffin et al., 2019) and in this study, was deemed appropriate due to the depth concern (Miles et al., 2014).

The research setting is the information and communications technology (ICT) and medical devices (MD) industries. These industries offered many advantages including high growth, innovation potential, and importance to the Irish economy. Ireland is a small open economy, highly dependent on foreign direct investment (FDI) due to a deliberate governmental policy to attract same. This strategy has been successful for the local and national economy, a number of key clusters have formed (Giblin and Ryan, 2012). Ireland is now a recognised leader in both the ICT and MD sectors in Europe, nine of the top ten US ICT firms and also nine of the top ten global MD firms are located in Ireland (IDA, 2022a; IDA, 2022b). Such inward FDI leads to *technology spillover* to the local economy contributing to greater economic growth and productivity (Campa and Cull, 2013; Ruane and Ugur, 2005). These spillovers are especially relevant in this YIC context.

The primary sample included four Irish YIC case studies and twelve OI projects. These organisations were purposefully selected due to their early stage, high innovation intensity, global nature and expected collaboration activities with MNEs. Eisenhardt (1989) recommends four to ten as a suitable case number to facilitate theoretical saturation. Twelve OI projects between the focal organisation – the YIC and their OI MNE partners (see Table 1 for case and project details) were studied due to the potential *intrinsic value* to the YIC (Stake, 1995). The YIC founders/CEOs were selected as research participants due to their key role as leaders, key decision makers and primary influencers within their organisation (Wasserman, 2012) but importantly, due to their *de facto* role as OI project managers/champions.

[5] Goffin et al. (2019) developed an evaluation template (termed case study evaluation template: CASET) to objectively assess case study articles against quality criteria.

Table 1
List of four cases and twelve OI projects.

Case	Case/project background
Case A (ICT)	Case A is a cloud computing company, six years old and employing 20 (primarily R&D) and serving customers globally.
Project A – I	Sourcing technology using inbound licensing with an IT software MNE (MNE A).
Project A – II	Testing market using outbound licensing with an IT hardware MNE (MNE B).
Project A – III	Scale-up production using the coupled mode with a supply chain MNE (MNE C).
Project A – IV	Scale-up sales using the coupled mode with a IT hardware MNE (MNE D).
Case B (ICT)	Case B is a sensing technology company providing a wearable platform using sensor based digital health solutions, six years old and employing 20 (primarily R&D) located both in Ireland and the US, serving customers globally.
Project B – I	Sourcing technology using inbound licensing with an IT software MNE (MNE E).
Project B – III	Scale-up technology and sales using the coupled mode with a telecommunications MNE (MNE F).
Project B – IV	Scale-up technology and sales using the coupled mode with a telecommunications MNE (MNE G).
Case C (MD)	Case C is a technology-based MD company, four years old, employing 20 (primarily R&D) in Ireland and serving customers globally.
Project C – I	Licensing out technology using outbound licensing with an MNE life sciences partner (MNE H).
Project C – II	Scale-up sales via product co-development with an MNE life sciences partner (MNE I).
Case D (MD)	Case D is an Irish diagnostic point of care company, six years old and employing 20 people (primarily R&D). The company provides a platform to enable routine blood testing from general practitioner offices and other test settings.
Project D – I	Sourcing technology using inbound licensing with an ICT MNE partner (MNE J).
Project D – II	Testing market using a coupled mode with an MNE technology partner (MNE K).
Project D – III	Testing market using a coupled mode with an MNE healthcare partner (MNE L).

3.2. Data collection

Data collection was an iterative process conducted during a one-year period. In preparation for each interview, significant secondary research was conducted on each YIC and founder/CEO. In phase one, semi-structured interviews (8 in total) with the founders/CEOs were conducted to understand and explore the strategic logic of innovation activities, how innovation is managed and if, how and with whom OI is leveraged. These interviews lasted 30–40 min each. Subsequently, comprehensive, face-to-face and semi-structured interviews were completed to explore in depth the previously revealed OI projects with MNEs and the ground level activities at play. These interviews (13 in total) lasted 60–90 min, they were audio-recorded and transcribed verbatim. We adopted an egocentric YIC perspective (Wasserman and Faust, 1994) in collecting primary data as this OI project is the channel by which the YIC acquires vital resources and knowledge. Potential bias was addressed through multiple sources and archival data.

Saturation was deemed to have been reached as inputs from the participants began to overlap from the previous initial interviews (Sandelowski, 2008). The interviews were complemented with non-recorded notes about each interview e.g., office environment, working space, whiteboards, participant demeanour and engagement throughout the interview. Case study narratives and a timeline of key events focusing on the OI project facts were shared with research participants (Gersick, 1994; Yin, 2009) which mitigated against informant bias. This was followed by a series of telephone calls and emails which facilitated the triangulation process coupled with the substantial secondary data gathered post interview on each OI project and MNE.

3.3. Data analysis

The primary unit of analysis is the OI project between the focal organisation – the YIC and the MNE partner. Data analysis was an iterative process across several stages (Eisenhardt and Graebner, 2007). First, we developed an understanding of the two selected industries – ICT and MD. Second, we developed a temporal narrative for each case, using the archival and interview data, detailing each OI project – mechanisms, partners, objectives, challenges and outcomes. This was followed by the coding stage. All transcripts were reviewed in detail, categories were assigned, and codes were extracted. Each line of transcript was examined and conceptual coding applied using *in vivo* coding[6] (Van Maanen, 1979) followed by second cycle coding methods using descriptive codes (Saldaña, 2012) whereby data "lumps" were "split" and more meaningful codes were applied (ibid). The archival data was also examined and coded. Fig. 1 summarises the process we followed and provides an overview of the data structure elements.

Within and cross case analysis concentrated on describing the key events in the case history (Miles and Huberman, 1994; Eisenhardt, 1989). This was an iterative process – back and forth between the raw data, the case study narrative and the subsequent interviews (Siggelkow, 2007). Finally, cross case analysis was conducted by engaging in comparison and contrasting of categories and dimensions using a series of matrices and meta-matrices (Miles et al., 2014; Spiggle, 1994) where patterns were extracted to enable deeper exploration of the research question. Extensive data triangulation (Patton, 2002) took place which involved collecting multiple sources of data but "for the purpose of corroborating the same fact of phenomenon" (Yin, 2009: 116). Member checks were used to confirm the validity of the case study narrative and findings. These comments were reflected in the overall representation of the case studies.

Each of the identified microfoundations were characterised as *enabling* (i.e., a positive impact on the YIC OI project outcome) or *limiting* (i.e., a negative impact on the YIC OI project outcome). For instance, "previous relationship and developed trust between the YIC and the MNE" was characterised as enabling but "unrealistic and misunderstood expectations of the YIC" was characterised as limiting. Each microfoundation was also linked to the YIC, the MNE or Joint Action. Joint action is when a microfoundation cannot be 'assigned' to the YIC or the MNE. Finally, a microfoundation was deemed an *antecedent* – a structural element of the relationship, developed prior to the developed OI interaction; or a *behaviour* – an agency aspect of the relationship, a course of action chosen during the OI interaction.

3.4. Within and cross case analysis

To facilitate comparison of the underlying microfoundations, two elements were identified for each OI project. First, partner capability in terms of *capability fit* within each OI project. Second, OI *outcome* from two perspectives – innovation and economic.

Resources were defined as the main contribution the partner brings to the OI project. For instance, YIC resources could be the "product development" while the MNE resources could be "commercial [resources]" (further details provided in Table 2 and Table 7). The capability fit was defined using previous literature (Jacobides, 2006) and was deemed high when the complementarity of knowledge (between the two partners) is such that "a new, reintegrated set of solutions [come] about

[6] In vivo coding is part of the first cycle coding methods (Saldaña, 2012; Van Maanen, 1979), the data is rooted in the participant's own language by using direct quotations.

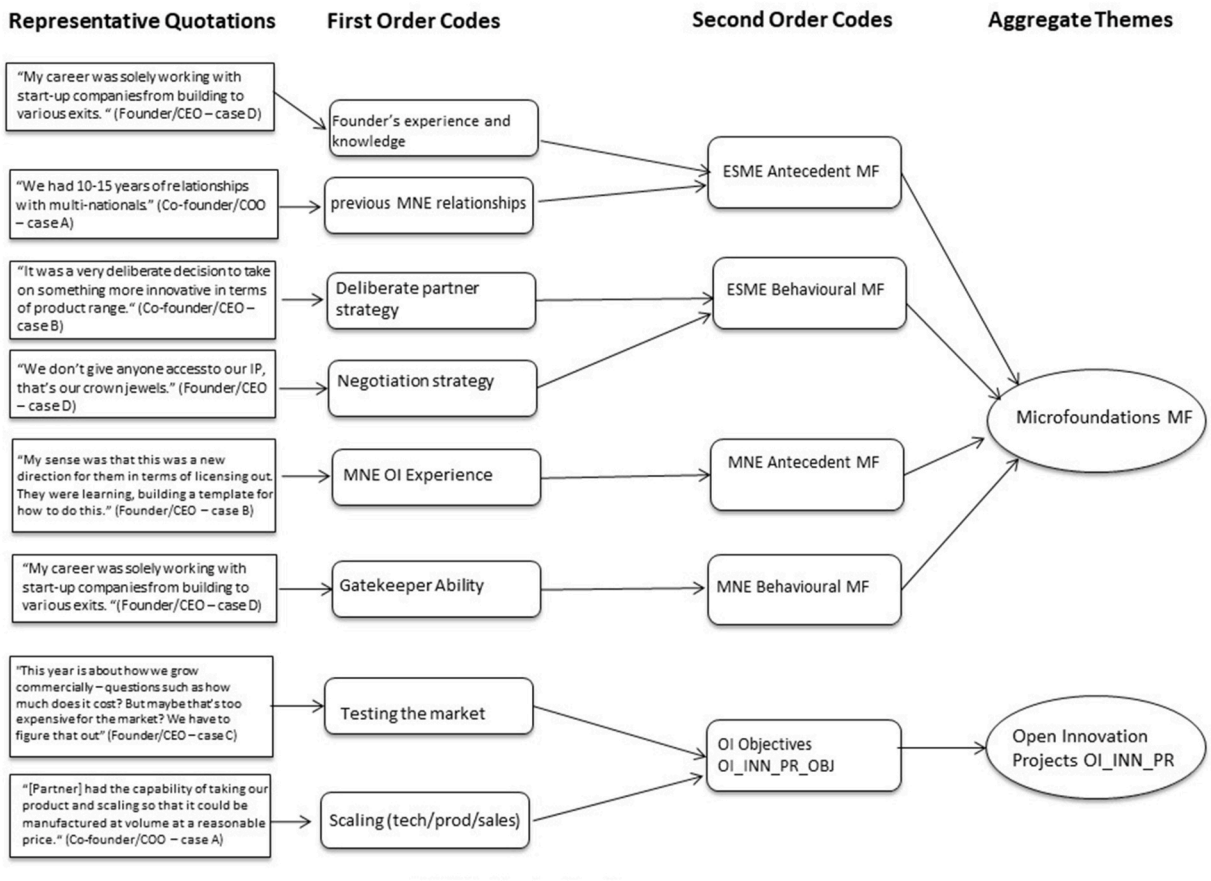

Fig. 1. Data structure overview.

despite the resistance of entrenched incumbents" (ibid: 159), shaping "firm-level and aggregate technological and strategic advances" (ibid: 160).

The outcome[7] of each OI project was analysed from two perspectives. First, OI engagement that led to innovation outcomes (e.g., the development of a product prototype, patent, capability development, new technology, new collaborations, new network development but no economic outcome yet). Second, OI engagement that led to positive economic outcomes through the development of an innovation (e.g., increased sales/market share, new business model, new geography etc.).

4. Findings

We present our findings as follows. First, we describe each of the four YIC cases and their respective OI projects with MNE partners. Second, we explore the types of microfoundations identified and then reveal the underlying microfoundations identified in each of these five categories – both enabling and limiting.

4.1. Case studies

4.1.1. Case A

Case A is a cloud computing company, six years old,[8] employing 20 (primarily R&D) and serving customers globally from Ireland. The founders have significant ICT industry and managerial experience including working with MNEs.

OI project [A – I] was initiated with MNE A to license-in software. The founders had prior working experience with MNE A executives where mutual trust and respect existed. The founders, due to redundancy pending, seized an opportunity to license-in new technology: "They [MNE A] had no interest in an acquired technology but we saw it as an *opportunity*. So, we licensed it and built our product based on the technology" (co-founder/COO). Leveraging *absorptive capacity*, the founders identified the opportunity which facilitated the development and commercialisation of the technology (Presenza et al., 2017). This strong OI project outcome was due to the founder's extensive industry and commercial experience coupled with the effectual relationship with MNE A executives which facilitated a deep understanding of how to collaboratively work. This relationship continuity plus the dedicated MNE gatekeeper contributed to a positive project outcome. Overall, the YIC founders understood the norms, behaviours and practices, emphasising the importance of *how* to work with MNEs.

OI project [A – II] was subsequently initiated with MNE B primarily to acquire revenue: "We licensed out IP to a potential competitor [MNE B] … We were introduced by [MNE A]. MNE B were interested in our technology and we needed money. Cash is king at an early stage". But also, this project helped to test and size the market. The required revenue was generated, however, challenges existed – lack of strategic alignment (due to MNE B turmoil), and lack of an MNE project gatekeeper.

Finally, two coupled co-development OI projects [A – III & IV] with MNE C and MNE D were embarked upon to scale global production and sales. Overall, these projects were deemed positive in terms of outcome, but similarly challenges existed. For A – III, the lack of MNE OI experience coupled with the absence of an MNE gatekeeper were contributory factors adding time and complexity: "We experienced two challenges: first, there was nobody on the other side for a long time and second, OI was brand new to them". However, the YIC's prior OI project

[7] The outcomes were ranked as strong, limited or none.
[8] At the time of data collection.

Table 2
OI projects by case.

CASE A OI Project	Capability fit	OI projects with strong outcomes				OI projects with limited or no outcomes			
		Limiting microfoundations		Enabling microfoundations		Limiting microfoundations		Enabling microfoundations	
I. Sourcing technology (Inbound with MNE/IT Software – MNE A)									
YIC resources: Opportunity analysis *MNE resources: Technology IP*	High			Previous relationship and developed trust with the MNE. Familiarity with MNE routines and procedures Strong Absorptive Capacity of the YIC (20 R&D staff) Continuity of relationship (stable MNE gatekeeper) Clear and visible benefit for MNE	YIC-a YIC-a YIC-b MNE-b MNE-a				
II. Testing market (Outbound with MNE/IT Hardware – MNE B)									
YIC resources: Product *MNE resources: Market channels*	High					Turmoil in MNE in the middle of organisational restructuring Lack of consistency in resources MNE Gatekeeper kept changing Low strategic commitment on OI product (for MNE?)	MNE-b MNE-b MNE-b MNE-a	Referral from other MNE – previous partner (MNE A)	YIC-a
III. Scale-up production (Coupled with Supply Chain Provider – MNE C)									
YIC resources: Product *MNE resources: Manufacturing capability*	High	Lack of MNE Gatekeeper Lack of face-to-face meetings Knowledge gap on ground situation in manufacturing site Lack of OI experience by MNE Unrealistic & misunderstood expectations from YIC	MNE-b MNE-b MNE-a MNE-a YIC-b	Strategic priority for founder Learning venture for MNE to lead to more businesses Skilful and 'patient' relationships management by the YIC founder OI resilience by the YIC	YIC-b MNE-a YIC-b YIC-b				
IV. Scale-up sales (Coupled with MNE/IT Hardware – MNE D)									
YIC resources: Product *MNE resources: Market channels*	High					Protection policy not revealing customer's preferences Distance from and lack of direct feedback from customer	MNE-b JA		

CASE B OI Project	Capability fit	OI projects with strong outcomes		OI projects with limited or no outcomes	
		Limiting microfoundations	Enabling microfoundations	Limiting microfoundations	Enabling microfoundations
I. Sourcing Technology (Inbound with MNE IT Software – MNE E)					

(*continued on next page*)

Table 2 (*continued*)

CASE B OI Project	Capability fit	OI projects with strong outcomes Limiting microfoundations		Enabling microfoundations		OI projects with limited or no outcomes Limiting microfoundations	Enabling microfoundations
YIC resources: *Opportunity analysis* *MNE resources:* *Technology IP*	High	Size of MNE – many MNE resources (specialists) working on the project	MNE-a MNE-b	Previous relationship with Enterprise Ireland (EI) EI used to facilitate partner matching process	YIC-a YIC-b		
		Conversion of technology into a product	Other	YIC founder had good personal chemistry with MNE gatekeeper –> successful match Continuity of contact throughout project. MNE gatekeeper translated requirements (legal, regulatory etc.) to SME First time MNE embarked upon licensing out – pressure to succeed	JA MNE-b MNE-a		
II. Scale-up technology and sales – commercialisation (Coupled with MNE telecommunications firm – MNE F)							
YIC resources: Product to marketing/sales *MNE resources: Market channels*	High	Change of direction from research customers to commercialisation with end users/customers posed a challenge YIC needed to resource in additional areas – software, marketing & sales	YIC-a YIC-a	Proactive engagement of the YIC in searching for the 'right' partners	YIC-b		
III. Scale-up technology and sales – commercialisation (Coupled with MD US company – MNE G)							
YIC resources: Market *MNE resources: Market channels*	High	Setting overambitious plans: extending scope and reach into new market segment in a new geography	JA	YIC learnings from previous commercialisation provided the confidence to engage with a partner in a new market segment	YIC-a YIC-b		

CASE C OI Project	Capability fit	OI projects with strong outcomes Limiting microfoundations		Enabling microfoundations		OI projects with limited or no outcomes Limiting microfoundations		Enabling microfoundations	
I. Licensing out technology (Outbound with MNE partner – MNE H)									
YIC resources: *Opportunity Analysis* *MNE resources:* *Commercial*	Low					Lacking face to face contact with MNE gatekeeper and resources Lack of commercial experience – founder was naive in dealings with MNE Hazardous partner matching process – cold calling – lack of knowledge	JA YIC-a YIC-b	Founder determination and resilience to succeed	YIC-b
II. Scale-up sales via product co-development (Outbound with MNE partner – MNE I)									
YIC resources: *Product Development* *MNE resources:* *R&D*	High	Unclear of market appetite and demand e.g. how to price? From concept development to market testing: MNE reluctant to put resources beyond this	YIC-b MNE-b	Learnings from previous project – more commercially savvy than during previous project Learnt to say no, maturity in negotiation and "selectively revealing" – what to reveal v's what not to reveal Doing homework in advance – meeting preparation – understanding role of attending, objectives of meeting etc.	YIC-a YIC-b YIC-b				

CASE D OI Project	Capability fit	OI projects with strong outcomes Limiting microfoundations	Enabling microfoundations		OI projects with limited or no outcomes Limiting microfoundations	Enabling microfoundations
I. Sourcing Technology (Inbound with MNE ICT partner – MNE J)						
	High		Deliberate targeted search to find suitable partner	YIC-b		

(*continued on next page*)

Table 2 (*continued*)

CASE D OI Project	Capability fit	OI projects with strong outcomes			OI projects with limited or no outcomes	
		Limiting microfoundations	Enabling microfoundations		Limiting microfoundations	Enabling microfoundations
YIC resources: Opportunity Analysis *MNE resources: Commercial*			Founder with experience of working with MNEs – understood the norms and behaviours	YIC-a		
II. Test market (Coupled with MNE technology partner – MNE K)						
YIC resources: Product development *MNE resources: R&D*	High		Leaders in industry targeted by founder Face – to – face meetings secured Founder was protective of IP and the team and slow to share with MNE until legal agreements in place	YIC-b JA YIC-b		
III. Test market (Coupled with MNE healthcare partner – MNE L)						
YIC resources: Product development *MNE resources: R&D*	High		Proactive founder engagement with MNE gatekeeper Careful and detailed management of project by the founder Strong technical team supporting the project (whilst working in the background)	YIC-b YIC-b YIC-b		

(YIC-a: YIC antecedent; YIC-b: YIC behaviour; MNE-a: MNE antecedent; MNE-b: MNE behaviour; JA: Joint Action).

experience proved significant as they demonstrated resilience and patience: "I guess what we wanted versus what they expected to give us has taken time … they now have a better understanding of what YICs want as opposed to what large companies want". In A – IV, this project facilitated entry to new geographies: "we are trying to get into US and Europe, our OEM partner has that reach. …. we couldn't afford direct selling." However, OEM partnering challenges existed including customer separation and customers' needs being lost in translation " … sometimes you don't get to see the end customer … you have customers by proxy."

4.1.2. Case B

Case B is a sensing technology company providing a wearable platform using sensor based digital health solutions, six years old and employing 20[9](primarily R&D) located both in Ireland and the US and serving customers globally.

Case B leveraged Enterprise Ireland (EI)[10] as an intermediary to assist in partner selection to source an innovative product: "we wanted a product with real technological superiority and to use that as our launch pad" (CEO/co-founder). Subsequently, EI facilitated an introduction to MNE E who were sitting on an IP estate and "made the strategic decision to start turning this [IP estate] into a revenue centre rather than a cost centre". This licensing-in project was the first OI experience for both the YIC and MNE and three key enablers contributed to the positive project outcome. First, the YIC co-founder employed deliberate project management practices. Second, a strong relationship existed between the MNE gatekeeper and the YIC co-founder: "They were straight talkers, they are not what you would immediately think of your corporate VC type guys. I thought he [gatekeeper] was very good to deal with. He explained everything … we didn't have legal counsel". Finally, the strategic objectives for both parties were aligned: "They were good at understanding how to work with a smaller company … They wanted to make it work".

Case B's two subsequent projects with MNE F & G [B – II and III] focused on scaling and commercialising their technology in distinct markets. Positive learnings and experience from B – I influenced *how* to manage these two projects and emphasised the importance of partner fit. Thus, the search commenced for the *right* partner(s) for subsequent OI projects.

4.1.3. Case C

Case C is a technology-based MD company, four years old and employing 20[11] (primarily R&D) in Ireland and serving customers globally. Founded by an academic scientist and using patented technology, the company develops microscopic capsules to protect ingredients, and delivers innovative solutions to global customers in the sports, human and animal nutrition markets.

OI project [C – I] was initiated to license-out patented technology to MNE H. The early years were spent developing technology, securing patents and thus, a strong impetus to commercialise these assets for revenue existed: "we have 10 global patents and we needed to commercialise them. It was my first time writing a business plan and being a scientist, this was not easy" (founder/CEO). The firm also lacked market knowledge and project C – I provided an excellent opportunity to test market readiness and to devise a pricing strategy: "we need to compare ourselves and benchmark to what's there already. This [project] will help".

The project outcome was limited as strategic objectives for both parties were not aligned, fuelled by a difficult working relationship with MNE H. Contributory factors included the founder's naivety and lack of commercial acumen combined with a geographical distance, which further impacted on the OI project execution: "They were brutal, they were really sharks. They paid for the first sample, but they didn't want to pay for anything after that. They didn't want to pay for a license or anything … it was hard".

Due to this adverse experience, future OI projects were influenced in terms of who the organisation partnered with and how the founder managed the relationship: "My learnings have improved and increased rapidly, my whole approach to business has changed". A subsequent OI co-development project was initiated with MNE I to achieve further customer acquisition and sales (C – II). The key learnings from project C – I supported the process. First, *selectively revealing* – knowing what to reveal versus what not to reveal: "I am now completely confident to say *no*, I cannot tell you that. That is difficult being a scientist because you are proud to talk about achievements … [MNE H] were constantly fishing for knowledge". Second, the founder now plans meticulously for all meetings/calls ensuring clarity: "I always prepare, I didn't before … I now research the company, I have a clear idea of who is going to be on the call".

4.1.4. Case D

Case D is an Irish diagnostic point of care company, six years old, employing 20[12]people (primarily in R&D) and serving customers globally. The company provides a platform to enable the decentralisation of routine blood testing from central reference laboratories into general practitioner offices, and other test settings.

OI project [D – I] was initiated to license-in software from MNE J. The founder's background in engineering coupled with ICT managerial and industry experience was an asset; however, he lacked MD industry knowledge and expertise. This MD industry deficit was used as a motivator to deliberately source the *right* partner. The CEO deliberately targeted MNE J as the first OI partner, due to their surplus technology and the competitive advantage that this potentially could deliver: "we licensed technology from [MNE partner] who had acquired X companies … that gave us IP that many of our competitors didn't have. So, we licensed that portfolio for *defensive and credibility reasons* if you will".

Two subsequent OI projects with MNEs K & L (D – I & II) were initiated and outcomes were strong due to the founder's deliberate and strategic management. First, the founder deliberately targeted global industry leaders, to partner with the *best* and those he deemed as a suitable *fit*. Second, due to the founder's extensive MNE experience, he understood how to manoeuvre the internal MNE complexities. Finally, the founder meticulously managed the project – protecting both the firm's IP and the wider team until the relationship developed and contracts were in place, thus preventing knowledge leakage: "Commercially, I manage the projects. Technically, once contracts are closed, [R&D lead] would manage that aspect." IP protection was a concern for the founder and this influenced how relationships were managed: "We would be very tight in terms of IP …. .I wouldn't give the partners access to the team until the relationship is truly developed."

4.2. Microfoundation types

We now explore the five types of microfoundations identified namely as YIC antecedent, YIC behaviour, MNE antecedent, MNE behaviour and Joint Action. Then we reveal the underlying microfoundations identified in each of these five categories – both enabling and limiting.

4.2.1. YIC antecedent microfoundations

Four YIC antecedent microfoundations that were deemed influential in the OI interactions with MNEs (further YIC details within Table 3 – enabling and limiting): (1) YIC founder's experience and knowledge (2) Familiarity with MNE norms and routines (3) Previous relationships (4)

[9] At the time of data collection.

[10] EI is an Irish economic development agency focused on helping Irish-owned businesses develop and scale their businesses www.enterprise-ireland.com.

[11] At the time of data collection.

[12] At the time of data collection.

Table 3
YIC antecedents and behaviours: Enabling and limiting microfoundations.

YIC antecedent		YIC behaviour	
Limiting	**Enabling**	**Limiting**	**Enabling**
1. Founder's experience and knowledge		***1. YIC founder attitude***	
Lack of commercial experience for the YIC's founder	Learnings from previous project – more commercially savvy		Strategic priority for founder
Change of direction from research to commercialisation with end users/ customers	Learning from previous commercialisation provided confidence to engage with MNE		Founder determination
2. Familiarity with MNE norms and routines		***2. YIC absorptive capacity***	
	Familiarity with MNE routines & procedures	Hazardous partner matching process – cold calling – lack of knowledge for partners	Absorptive Capacity of the YIC (20 R&D staff)
	Founder with experience of working with MNEs – understood the norms & behaviours		Strong technical team supporting the project (whilst working in the background)
3. Previous relationships with MNEs		***3. Deliberate partner strategy***	
	Previous relationship and developed trust with MNE		Proactive engagement of the YIC in searching for the 'right' partners
	Previous relationship with intermediary providing assistance		Deliberate targeted search to find suitable partner
	Referral from other MNE – previous partner		Leaders in industry targeted by founder
			Intermediary to facilitate partner matching process
4. Need for complementary assets		***4. Negotiation strategy/skills***	
YIC needed additional resources – software, marketing & sales		YIC founder was naive in dealings with MNE	Founder was protective of IP and team thus slow to share with MNE until legal agreements in place
			Learnt to say no, maturity in negotiation & "selectively revealing" – what to reveal versus not
		5. Relationship management & resilience	
		Unrealistic and misunderstood expectations from the YIC	Proactive founder engagement with MNE gatekeeper
			Skilful and patient relationship management by the YIC founder
			Founder resilience to succeed/OI YIC resilience
		6. Manage interaction	
		YIC is unclear of market appetite and demand	Doing homework in advance – meeting preparation – understanding roles, objectives etc.
			Careful and detailed management of project

Need for complementary assets.

YIC founder's experience and knowledge. YICs are typically stronger at the front-end of the innovation process – opportunity recognition, invention of new products/services. However, they typically lack experience and/or skills to pursue commercialisation activities (Lee et al., 2010) which can potentially create a strategic divergence between the YIC and the MNE. We observed in C – I, the founder's lack of commercial experience which limited the OI project outcome.

Familiarity with MNE norms and routines. This research has shown insights into the significance for YICs of knowing what is/what is not important for partnering MNEs and notably, for the MNE executives. Our case studies provided evidence of how founder's familiarity with the MNE environment influenced the outcome of an OI project e.g. A – I and D – I, the founders successfully manoeuvred into the right knowledge base within the partnering MNE and thus, secured access to the required technology.

Previous relationships. Referrals from an MNE to a partnering MNE can be helpful in this respect since they play the role of selecting and filtering the *right* partnerships for the YIC, e.g. A – II whereby the YIC successfully tested the market with an MNE partner (due to partner referral). Previous relationships with partnering MNEs are significant as they incorporate a level of trust and credibility which supports the new OI project (Bruneel et al., 2017). A similar experience in B – I, whereby the YIC leveraged an established relationship with a national innovation intermediary to identify the appropriate MNE to source new technology. In effect, this organisation used the social capital (Fleming and Waguespack, 2007; Rass et al., 2013) developed with the intermediary to identify the chosen partner, i.e., highlighting partner compatibility in terms of the necessary technology but also strategic vision and values.

Complementary assets. YICs need complementary assets as they typically lack all competencies and skills (Teece, 1986). For instance, an MNE may have a suitable technology for the YIC but not the marketing or sales capabilities in the relevant market niche e.g. B – II. Tensions within the OI project are thus expected between the YIC and the MNE, limiting the outcome and the benefits of the project.

4.2.2. YIC behaviour microfoundations

Six YIC behaviour microfoundations were deemed influential in shaping the OI YIC interaction with MNEs: (1) YIC founder attitude (2) YIC absorptive capacity (3) Deliberate partner strategy (4) Negotiation strategy (5) Relationship management and resilience (6) Manage interaction.

YIC founder attitude. From the interview data, we observed this microfoundation as influential on the OI interactions between the YIC and the MNE. The founder's determination to see the project through, despite any emerged difficulties and challenges, is a key factor. This is exemplified in project A – III where despite the presence of several limiting microfoundations, the founders executed an OI project delivering strong outcomes in scaling-up production.

YIC absorptive capacity. Our evidence highlights the YICs' capacity to identify, transfer and translate the required know how from the MNE, thus, contributing to a positive OI outcome. This microfoundation played an instrumental role in the OI interaction. Those YICs who demonstrated strong R&D capabilities were proficient in managing the MNE interactions, whether the mission was to source technology (A – I) or to test the market (D – III).

YIC deliberate partnering strategy. This strategy manifested in the deliberate targeting of industry leaders as partners (e.g. D – II & III). These cases highlight the founder's grand ambitions and purposeful strategy in partner selection. We also saw evidence of the effective use of an intermediary to facilitate the partner matching process (B – I) whereas in contrast a hazardous partner matching process was associated with limiting OI outcomes (C – I).

Founder negotiation strategy. Our evidence illustrated how an YIC founder approached the MNE negotiations with a naive (or romantic) attitude, which had a limiting consequence (C – I). However, a positive impact was observed when the founder meticulously planned the negotiation, utilising a *selective revealing* strategy (Henkel, 2006) (C – II) or the *timely sharing* of information with the MNE (D – II). This *paradox of disclosure* (Arrow, 1962) or *paradox of openness* (Laursen and Salter, 2014) is a challenge for several YICs embarking on OI projects with MNEs especially for inexperienced founders.

Relationship management and resilience. Once a partnership has been secured, the OI interaction benefits those YIC founders who effectively manage the relationship, demonstrating a degree of patience and endurance. Other contributory factors enabling OI processes include a proactive engagement with the MNE gatekeeper, and a resilience and determination to succeed. This was demonstrated in C – I and D – III, highlighting the skilful, patient and resilient relationship management from both YIC founders.

Manage interaction. The YIC ability to meticulously plan *how* to work with MNE partners, namely clarify the objectives, roles, responsibilities and how to manage the day to day demands of the OI project (D – III) is significant on the OI process. On the other hand, an YIC with unclear ideas about the market 'appetite' and demand has been found to have a limiting role (C – II).

Table 4
MNE antecedents and behaviours: Enabling and limiting microfoundations.

MNE antecedent		MNE behaviour	
Limiting	**Enabling**	**Limiting**	**Enabling**
1. MNE strategic priority		***1. Continuity of contact***	
Low strategic commitment on OI product	Clear and visible benefit for MNE from the OI project	Lack of MNE Gatekeeper	Continuity of relationship (stable MNE gatekeeper)
	Learning venture for MNE to lead to more businesses	MNE Gatekeeper kept changing	Continuity of contact throughout project
		Turmoil in MNE due to organisational restructuring	
2. MNE OI experience		***2. Consistency of MNE resources***	
Lack of experience in OI venture by MNE	Pressure to succeed: First time licensing out	Lack of consistency in resources	
		From concept development to market testing: MNE reluctant to put resources beyond this stage	
		3. Gatekeeper ability	
			MNE gatekeeper translated (legal, regulatory) requirements to YIC
		4. Organisational integration capability	
		Customers' preferences not shared due to MNE protection policy	
		Too many MNE specialists working on OI project	
		Knowledge gap on ground situation in manufacturing	

4.2.3. MNE antecedent microfoundations

Two MNE antecedent microfoundations were identified (further MNE details within Table 4 – enabling and limiting): (1) MNE strategic priority (2) MNE OI experience.

MNE strategic priority. MNEs are complex organisational environments usually pursuing a portfolio of innovation projects with several partners. Each innovation project gets a different priority as some are of higher strategic importance and/or of greater interest to the management team. Such *important* projects can have an enabling impact on the OI process (A – I). However, if OI projects are of low strategic interest to MNEs, this can limit the impact on the OI process (A – II). OI projects can be strategically important, both for its economic output but also its future learning potential for similar OI projects (A – III).

MNE OI experience. Previous OI experience can also play a role in enabling or limiting the interaction with a partnering YIC. Our evidence has revealed how poor planning can contribute to the overall outcome i.e., when an MNE has made the decision to engage in OI but the relevant procedures have not yet been developed (A – III) which is in contrast with an MNE that has developed procedures (B – I), understands how to work with YICs and is thus, better placed to successfully execute.

4.2.4. MNE behaviour microfoundations

Four MNE behaviour microfoundations that can affect the OI

Table 5
Joint Action (both YIC and MNE): Enabling and limiting microfoundations.

Joint Action	
Limiting	**Enabling**
1. Face-to-face contact	
Lacking face to face contact between YIC and MNE gatekeeper and other resources	Face – to – face meetings secured between MNE Gatekeeper & YIC founder
2. Personalities Compatibility	
	YIC founder had good personal chemistry with MNE gatekeeper
3. Strategic planning quality	
Setting overambitious plans: extending scope and reach into new market segment in a new geography	
Distance from and lack of direct feedback from customer	

interaction with YIC (1) Continuity of contact (2) Consistency of MNE resources (3) Gatekeeper ability (4) Organisational integration capability.

Continuity of contact. Our evidence points to the importance of continuity of contact between the YIC management team and the MNE allocated project resources. The MNE gatekeeper is a stabilising influence and an enabling OI factor as demonstrated by the evidence (A – I & B – I) as opposed to often changing MNE gatekeepers, e.g. A – II due to wider MNE organisational restructuring. The lack of gatekeeper and overall project ownership (A – III) can also cause strain in the OI relationship between YICs and MNEs.

Consistency of MNE resources. If the MNE fails to provide adequate consistent resources throughout the course of the innovation process, the outcome of the OI project can be negatively impacted. Our evidence revealed e.g. C – II whereby the MNE failed to provide adequate resources during the scaling-up process (after licencing the technology) with negative impact on the innovation outcome.

Gatekeeper ability. The ability to perform the complex *gatekeeper* role impacts the OI interaction between the MNE and the YIC. A consistent MNE gatekeeper can play a positive role in deepening the relationship by guiding the YIC to the appropriate MNE resources, assisting with connections, translating the legal and regulatory requirements and in general *championing* the YIC innovation project within the MNE. If the gatekeeper's ability is limited in these areas, our research suggests the quality of the OI interaction between YIC and the MNE is limited (B – I). These findings are in line with the ideas expressed by Narsalay et al. (2016) who also stressed the importance of *hands-on and active* senior leaders in OI projects.

Organisational integration capability. This study highlighted cases whereby the MNE refused to share the (relevant) customers' preferences with the YIC because of a stringent regulatory framework (A – IV) and the MNE's inability to bring the relevant specialists together for an OI YIC project (B – I). Equally if the MNE lacks the detailed knowledge of external subcontractors, a limiting impact can be felt in an OI project (A – III). Obviously, the YIC is powerless in addressing such shortcomings, especially if gatekeeper (A – III) or access to the final customers (A – IV) are the issues.

4.2.5. Joint action microfoundations

Three 'clusters' of joint action microfoundations were identified (further details within Table 5): (1) Face-to-face contacts (2) Personalities compatibility (3) Strategic planning quality.

Face-to-face contact. OI is a difficult endeavour and our research highlights the importance of face-to-face contact to build and deepen relationships, to avoid or smooth tensions. Our evidence points to face-to-face communications – at least from the YIC point of view, as enabling (C – I) whilst their absence was found to be limiting the OI interaction (A – III).

Personalities compatibility. This can be an intervening factor affecting the quality of the face-to-face meetings. These face-to-face meetings involve more often the YIC founder and the MNE gatekeeper. When these two people hold similar values, normative orientations and/or compatible perspectives, driven by the OI project mission, the face-to-face meetings deliver much more for the OI relationship between the two sides (B – I).

Strategic planning quality. Our research has identified cases whereby inadequate strategic plans affected the OI interactions and results. For instance, strategic plans that did not include direct access by the YIC to the final customers (A – IV) failed to produce the required scaling-up results. Furthermore, over ambitious plans agreed between the two parties (B – III) played a limiting role to the OI interaction.

5. Discussion and concluding comments

This paper clarifies *how* microfoundations influence OI projects between YICs and MNEs. Utilising a microfoundations lens, we analyse twelve YIC OI projects between four Irish YICs and partner MNEs. We identify five microfoundation types – YIC antecedent, YIC behaviour, MNE antecedent, MNE behaviour and joint action – which are found to influence the outcome of an OI project between an YIC and an MNE. These microfoundation types are deemed as either *enabling* (positive impact on the YIC OI project outcome) or *limiting* (negative impact on the YIC OI project outcome). We know that SMEs (Lee et al., 2010) and YICs (Greul et al., 2016) are adopting OI. Despite this progress in OI SME research, we know little about the nuances and complexity of *how* OI is managed. The captured evidence asserts that is the lower-level activities i.e., antecedents (e.g., previous experience and relationships) and behaviours (e.g., deliberate partner searching, relationship management and resilience) that ultimately influence and shape the OI project and thus the innovation outcome. This is not to deny the role of other factors in the OI project success (such as the economic case and the capabilities fit) but to complement these factors with microfoundations that can enhance or damage the outcome. In other words, our research illustrates that the deliberate management of microfoundations is a necessary constructive element in an OI project between an YIC and an MNE.

5.1. Theoretical implications

Our research elucidates how the *aggregation* (Barney and Felin, 2013) of this wide range of microfoundations – both antecedents and behaviours, shapes the OI project outcome. As outlined by Barney and Felin (2013: 145) "organisational analysis should be fundamentally concerned with how individual level factors aggregate to the collective level". Our evidence reveals how the relative impact of enabling microfoundations outweigh the impact of the limiting microfoundations (e.g. projects A – I and B – I), the OI project between the YIC and the MNE turns out to deliver strong outcomes. On the other hand, when the limiting microfoundations outweigh the enabling microfoundations, the OI interaction between the YIC and the MNE delivers limited (or no) outcomes (e.g. project A – II). The impact of the enabling or limiting microfoundations is not just a matter of numbers; it is also about the relative significance of each group of microfoundations and the innovation process stage. Also, this aggregated *footprint* of microfoundations of OI between an YIC and an MNE plays a double-edged role. When managed poorly, they moderate OI project activities, producing inadequate outcomes even in cases of good capability fit between the two partners (e.g. projects A–IV and C–I). In fact, microfoundations were found to make an impact at all stages of the innovation process (sourcing technology; testing market; scaling-up) (see Table 6 on OI objectives) in all modes of OI (inbound, outbound, coupled) (see Table 7 for projects overview). The amalgamation of the innovation projects carried out by the YIC and the underlying microfoundations impact on the innovation and economic outcome of the organisation. Cases B and D (strong economic and innovation outcomes) were successful in managing the microfoundations of all OI projects as opposed to Cases A and C (with moderate outcomes) whereby the microfoundations management was mixed (Table 7).

Many YICs, especially those embarking on OI for the first time, are swayed between two extreme perceptions. On the one hand, there is a *romantic* OI notion, whereby YICs foresee OI as a win-win situation with the MNE, exhibiting illusionary beliefs primarily due to a *positive bias* towards OI adoption (Salter et al., 2014). On the other hand, many YICs experience the *dark side* of OI (Stanko et al., 2017; Bogers et al., 2017) with potential little regard for the many challenges OI projects present. Previous literature has described challenges including finding the right channels to access MNEs, the asymmetry of power and resources, the risks of time-consuming characteristics of MNE collaborations and headquarters overriding collaborating team decisions within the MNE (Prashantham and Birkinshaw, 2008; Minshall et al., 2010; Oakey, 2013; Freel and Robson, 2017). Furthermore the risk of aggressive takeover by the MNE as well as the potential failure of an OI project which can have a far greater impact on the SME than the MNE

Table 6
Microfoundations according to OI objective.

OI	YIC-antecedent		YIC-behaviour		MNE- antecedent		MNE-behaviour		Joint Action		OI
Project	Limiting	Enabling	Limiting	Enabling	Limiting	Enabling	Limiting	Enabling	Limiting	Enabling	Outcome
1. Sourcing technology											
A-I		Familiarity with MNE norms & routines Previous relationships		YIC Absorptive Capacity		MNE strategic priority		Continuity of contact			Strong
B–I		Previous relationships		Deliberate partner strategy		MNE OI experience	Organisational integration capability	Continuity of contact Ability of Gatekeeper	Personalities compatibility		Strong
C–I	Founder's experience & knowledge		Deliberate partner strategy Negotiation strategy	Relationship management & resilience						Face-to-face contact	Minimal/no outcome
D-I		Familiarity with MNE norms & routines		Deliberate partner strategy							Strong
2. Testing market											
A-II		Previous relationships			MNE strategic priority		MNE strategic priority Continuity of contact Consistency of resources				Minimal/no outcome
D-II				Deliberate partner strategy Negotiation strategy							Strong
D-III				YIC Absorptive Capacity Relationship management & resilience Manage interaction							Strong
3. Scale-up (technology, production, sales)											
A-III			Relationship management & resilience	YIC founder attitude Relationship management & resilience	MNE experience in OI	MNE strategic priority	Continuity of contact Organisational integration capability		Face-to-face contacts		Strong
A-IV							Organisational integration capability		Strategic planning quality		Minimal/no outcome
B-II	Founder's experience and knowledge Need for complementary assets			Deliberate partner strategy							Strong
B-III		Founder's experience and knowledge							Strategic planning quality		Strong
C-II		Founder's experience & knowledge	Manage interaction	Negotiation strategy Manage interaction			Consistency of resources				Strong

Table 7
Overview of the OI Projects: the impact of microfoundations.

OI project	OI mode	OI partner	YIC resources	MNE resources	Capability fit	Limiting microfoundations	Enabling microfoundations	Overall role of microfoundations	OI Outcome
A-I. Sourcing technology	Inbound	MNE/IT Software (MNE A)	Opportunity analysis	Technology IP	High		YIC antecedent (2[a]) YIC behaviour (1) MNE antecedent (1) MNE behaviour (1)	Enabling	Strong
A-II. Testing market	Outbound	MNE/IT Hardware (MNE B)	Product	Market channels	High	MNE antecedent (1) MNE behaviour (3)	YIC antecedent (1)	Limiting	Minimal/no outcome
A-III. Scale-up production	Coupled	Supply Chain Provider (MNE C)	Product	Manufacturing	High	YIC behaviour (1) MNE antecedent (2) MNE behaviour (2)	YIC antecedent (1) YIC behaviour (2) MNE antecedent (1)	Enabling	Strong
A-IV. Scale-up sales	Coupled	MNE/IT Hardware (MNE D)	Product	Market channels	High	MNE behaviour (1) Joint Action (1)		Limiting	Minimal/no outcome
B–I. Sourcing Technology	Inbound	MNE IT Software (MNE E)	Opportunity analysis	Technology IP	High	MNE antecedent (1) MNE behaviour (1) Other (1)	YIC behaviour (1) MNE antecedent (1) MNE behaviour (1) Joint Action (1)	Enabling	Strong
B-II. Scale-up technology/ sales	Coupled	MNE Telecoms (MNE F)	Product	Market channels	High	YIC antecedent (2)	YIC behaviour (1)	Enabling	Strong
B-III. Scale-up technology/sales	Coupled	MD US Company (MNE G)	Market opportunity	Market channels	High	Joint Action (1)	YIC antecedent (1) YIC behaviour (1)	Enabling	Strong
C–I. Licensing out technology	Outbound	MNE Nutrition (MNE H)	Opportunity analysis	Commercial	Low	YIC antecedent (1) YIC behaviour (1) Joint Action (1)	YIC behaviour (1)	Limiting	Minimal/no outcome
C-II. Co-develop product to scale-up	Outbound	MNE Nutrition (MNE I)	Product development	R&D	High	YIC behaviour (1) MNE behaviours (1)	YIC antecedent (1) YIC behaviour (2)	Enabling	Strong
D-I. Sourcing Technology	Inbound	MNE ICT partner (MNE J)	Opportunity analysis	Commercial	High		YIC antecedent (1) YIC behaviour (1)	Enabling	Strong
D-II. Testing market	Coupled	MNE Technology partner (MNE K)	Product development	R&D	High		YIC behaviour (2) Joint Action (1)	Enabling	Strong
D-III. Testing market	Coupled	MNE Healthcare partner (MNE L)	Product development	R&D	High		YIC behaviour (3)	Enabling	Strong

[a] Number of microfoundations of this type identified in this project.

(Hagedoorn, 1990). Hence, YICs sometimes believing that when they commence an OI project with an MNE, they are invited to *dance with a gorilla* (Prashantham and Birkinshaw, 2008).

These perceptions can blur the vision of OI, concealing what is required for the OI project to succeed. Challenges should not be underestimated or exacerbated but importantly, identified to develop the right responses. More critically, perceptions hide away the wider learning process (how to access, connect and interact with an MNE) that needs to take place within an YIC to deliver successful OI projects (Anand and Khanna, 2000). Our research provided evidence of YICs evolving through various OI projects, together with the founder's experience and learning (Brady and Davies, 2004). Due to the infancy of the YIC, the experience of working with partners across different projects leaves *shadows* (Axelrod, 1984). One-project experience influences the next project experience and at potentially different innovation stages. The YIC makes assumptions about how the project and the relationship should work. For example, if an YIC has a positive OI experience – this will influence *how* they approach the next OI project with subsequent partners based on learnings and value created. Equally a more limiting experience of an OI project can provide the means for reflection and adaptability, leading to possible OI successes in the future (Shepherd et al., 2014). This is the significance of microfoundations – they provide a *guiding rail* for YICs to reflect, learn and create value. As articulated by Eisenhardt et al. (2010: 1265) "Structure guides behaviours and.... improves the reliability of actions". The more YICs practice OI and experience these underlying microfoundations, the more successful they can become, provided they reflect and learn from the experience.

5.2. Practical implications

The findings of this research have practical implications for YIC founders. YICs are different from SMEs, they are at an embryonic stage of development and as such their *newness* and *smallness* is a liability (Aldrich and Yang, 2012). Table 6 presents these differences within the three innovation stages – sourcing, testing and scaling, across all four cases and twelve OI projects. This research study highlights the need for *reflective practitioners* (Schon, 1984) within YICs. There is a need for a holistic and systematic assessment of the microfoundations across each innovation phase before embarking on an OI project. Founders should also be keen to leverage their entrepreneurial traits and behaviours validated in initiating new ventures when embarking on an OI project (Low and Macmillan, 1988). These traits and behaviours are desirable in attracting partners and in closing OI deals but as important in managing the day-to-day challenges of executing OI projects.

For policy makers, there is an opportunity to encourage and incentivise state agencies and publicly funded research centres (Roper and Hewitt-Dundas, 2013) to act as *honest brokers* between YICs and MNEs and focus on the unique resource needs and capabilities of YICs. There is also an opportunity to provide training and development initiatives to state agencies to act as *network leaders* (McAdam et al., 2014) in fulfilling this intermediary role (Padilla-Meléndez et al., 2013). Policy makers also play an important role in providing programmes and financial measures to help YICs protect their innovations and intellectual property (Colombelli et al., 2020) but also to aid growth and development (Alperovych et al., 2020).

The findings of this research are constrained by the study limitations. Our research is a snapshot of an evolving context and thus more exploratory and longitudinal research would be advantageous as many other microfoundations may exist. Thus, further research to extend our study to include other industries (high and low tech) and geographies, a wider study encompassing cases from similar open European countries (i.e., The Netherlands, Finland, Denmark, Norway) would be beneficial considering the global nature of the YICs. Also, we explored the OI projects from the egocentric perspective of the YIC founder/CEO, a wider study encompassing the MNE perspective would also be beneficial to understand if/how these perceptions match between both parties. Finally, given this early stage is a temporary status, a study exploring the growth of YICs would be beneficial and if/how OI has aided such growth (Alperovych et al., 2020).

References

Acs, Z.J., Audretsch, D.B., 1987. Innovation in large and small firms. Economics Letters 23, 109–112.

Adner, R., Kapoor, R., 2010. Value creation in innovation ecosystems: how the structure of technological interdependence affects firm performance in new technology generations. Strategic management journal 31, 306–333.

Ahn, J.M., Minshall, T., Mortara, L., 2017. Understanding the human side of openness: the fit between open innovation modes and CEO characteristics. R&D Management.

Ahn, J.M., Minshall, T., Mortara, L., 2018. How do entrepreneurial leaders promote open innovation adoption in small firms? Vanhaverbeke. In: W, F.F., Roijakkers, N., Muhammad, U. (Eds.), Open Innovation in SMEs. World Scientific.

Aldrich, H.E., Yang, T., 2012. What did Stinchcombe really mean? Designing research to test the liability of newness among new ventures. Entrepreneurship Research Journal 2.

Alperovych, Y., Groh, A., Quas, A., 2020. Bridging the equity gap for young innovative companies: the design of effective government venture capital fund programs. Research Policy 49, 104051.

Alvarez, H., Iske, P., 2015. Internal capabilities and external knowledge sourcing for product innovation in LMT SMEs. Journal of Innovation Management 3, 55–70.

Anand, B.N., Khanna, T., 2000. Do firms learn to create value? The case of alliances. Strategic Management Journal 21 (3), 295–315.

Arrow, K., 1962. Economic welfare and the allocation of resources for invention. *The rate and direction of inventive activity*. Economic and social factors. Nber.

Audretsch, D., Colombelli, A., Grilli, L., Minola, T., Rasmussen, E., 2020. Innovative start-ups and policy initiatives. Research Policy 49, 104027.

Autio, E., Pathak, S., Wennberg, K., 2013. Consequences of cultural practices for entrepreneurial behaviors. Journal of International Business Studies 44, 334–362.

Axelrod, R., 1984. The Evolution of Cooperation. Basic Books, New York.

Bagherzadeh, M., Markovic, S., Bogers, M., 2019. Managing Open Innovation: A Project-Level Perspective. IEEE Transactions on Engineering Management.

Bahemia, H., Sillince, J., Vanhaverbeke, W., 2018. The Timing of Openness in a Radical Innovation Project, a Temporal and Loose Coupling Perspective. Research Policy.

Barney, J., Felin, T., 2013. What are microfoundations? Academy of Management Perspectives 27, 138–155.

Barrett, G., Dooley, L., Bogue, J., 2021. Open Innovation within High-Tech SMEs: A Study of the Entrepreneurial Founder's Influence on Open Innovation Practices. Technovation.

Berends, H., Jelinek, M., Reymen, I., Stultiëns, R., 2014. Product innovation processes in small firms: combining entrepreneurial effectuation and managerial causation. Journal of Product Innovation Management 31, 616–635.

Bertello, A., De Bernardi, P., Santoro, G., Quaglia, R., 2022. Unveiling the microfoundations of multiplex boundary work for collaborative innovation. Journal of Business Research 139, 1424–1434.

Bogers, M., Afuah, A., Bastian, B., 2010. Users as innovators: a review, critique, and future research directions. Journal of Management 36, 857–875.

Bogers, M., Foss, N.J., Jacob, L., 2018. The "human side" of open innovation: the role of employee diversity in firm-level diversity. Research Policy 47, 218–231.

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.

Brady, T., Davies, A., 2004. Building project capabilities: from exploratory to exploitative learning. Organization Studies 25, 1601–1621.

Bruneel, J., Spithoven, A., Clarysse, B., 2017. Interorganizational trust and technology complexity: evidence for new technology-based firms. Journal of Small Business Management 55, 256–274.

Campa, D., Cull, R., 2013. Ireland's foreign direct investment sector: the impact of a hypothetical Irish Euro zone exit. Business and Economics Journal.

Chesbrough, H., 2003. Open Innovation: the New Imperative for Creating and Profiting from Technology. Harvard Business Press.

Chesbrough, H., 2011. Bringing open innovation to services. MIT Sloan Management Review 52, 85–+.
Chesbrough, H., Bogers, M., 2014. Explicating open innovation: clarifying an emerging paradigm for understanding innovation. New Frontiers in Open Innovation. Oxford: Oxford University Press 3–28.
Chesbrough, H., DI Minin, A., 2014. Open social innovation. In: Chesbrough, H., V, W., West, J. (Eds.), New Frontiers in Open Innovation. Oxford.
Christensen, J.F., 2006. Whither core competency for the large corporation in an open innovation world. Open innovation: researching a new paradigm 35–61.
Colombelli, A., Grilli, L., Minola, T., Mrkajic, B., 2020. To what extent do young innovative companies take advantage of policy support to enact innovation appropriation mechanisms? Research Policy 49, 103797.
Colombelli, A., Krafft, J., Vivarelli, M., 2016. To be born is not enough: the key role of innovative start-ups. Small Business Economics 47, 277–291.
Colombo, M.G., Grilli, L., Piva, E., 2006. In search of complementary assets: the determinants of alliance formation of high-tech start-ups. Research Policy 35, 1166–1199.
Contractor, F., Foss, N.J., Kundu, S., Lahiri, S., 2019. Viewing global strategy through a microfoundations lens. Global Strategy Journal 9, 3–18.
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.
Dabić, M., Marzi, G., Vlačić, B., Daim, T.U., Vanhaverbeke, W., 2021. 40 years of excellence: an overview of Technovation and a roadmap for future research. Technovation 106, 102303.
Dahlander, L., Gann, D.M., Wallin, M.W., 2021. How open is innovation? A retrospective and ideas forward. Research Policy 50, 104218.
Davies, A., Brady, T., 2016. Explicating the dynamics of project capabilities. International Journal of Project Management 34, 314–327.
Devinney, T.M., 2013. Is microfoundational thinking critical to management thought and practice? Academy of Management Perspectives 27 (2), 81–84.
Du, J., Leten, B., Vanhaverbeke, W., 2014. Managing open innovation projects with science-based and market-based partners. Research Policy 43, 828–840.
Eisenhardt, K.M., 1989. Building theories from case study research. Academy of Management Review 532–550.
Eisenhardt, K.M., Furr, N.R., Bingham, C.B., 2010. CROSSROADS—microfoundations of performance: balancing efficiency and flexibility in dynamic environments. Organization Science 21 (6), 1263–1273.
Eisenhardt, K.M., Graebner, M.E., 2007. Theory building from cases: opportunities and challenges. Academy of Management Journal 50, 25–32.
Eisenhardt, K.M., Martin, J.A., 2000. Dynamic capabilities: what are they? Strategic Management Journal 21, 1105–1121.
Felin, T., Foss, N.J., Heimeriks, K.H., Madsen, T.L., 2012. Microfoundations of routines and capabilities: individuals, processes, and structure. Journal of Management Studies 49, 1351–1374.
Fisher, G., Stevenson, R., Neubert, E., Burnell, D., Kuratko, D.F., 2020. Entrepreneurial hustle: navigating uncertainty and enrolling venture stakeholders through urgent and unorthodox action. Journal of Management Studies.
Fleming, L., Waguespack, D.M., 2007. Brokerage, boundary spanning, and leadership in open innovation communities. Organization Science 18, 165–180.
Foss, N.J., 2011. Invited editorial: why micro-foundations for resource-based theory are needed and what they may look like. Journal of Management 37 (5), 1413–1428.
Freel, M., Robson, P.J., 2017. Appropriation strategies and open innovation in SMEs. International Small Business Journal 35, 578–596.
Gans, J.S., Stern, S., 2003. The product market and the market for "ideas": commercialization strategies for technology entrepreneurs. Research Policy 32, 333–350.
Gassmann, O., Enkel, E., Chesbrough, H., 2010. The future of open innovation. R & D Management 40, 213–221.
Gersick, C.J., 1994. Pacing strategic change: the case of a new venture. Academy of Management Journal 37, 9–45.
Giblin, M., Ryan, P., 2012. Tight clusters or loose networks? The critical role of inward foreign direct investment in cluster creation. Regional Studies 46, 245–258.
Gimenez-Fernandez, E.M., Sandulli, F.D., Bogers, M., 2020. Unpacking liabilities of newness and smallness in innovative start-ups: investigating the differences in innovation performance between new and older small firms. Research Policy 49, 104049.
Goffin, K., Åhlström, P., Bianchi, M., Richtnér, A., 2019. Perspective: state-of-the-art: the quality of case study research in innovation management. Journal of Product Innovation Management 36, 586–615.
Greul, A., West, J., Bock, S., 2016. Open at birth? Why new firms do (or don't) use open innovation. Strategic Entrepreneurship Journal.
Grigoriou, K., Rothaermel, F.T., 2014. Structural microfoundations of innovation: the role of relational stars. Journal of Management 40 (2), 586–615.
Grimpe, C., Sofka, W., 2009. Search patterns and absorptive capacity: low- and high-technology sectors in European countries. Research Policy 38, 495–506.
Hagedoorn, J., 1990. Organizational modes of inter-firm co-operation and technology transfer. Technovation 10, 17–30.
Hagedoorn, J., Cloodt, D., VAN Kranenburg, H., 2005. Intellectual property rights and the governance of international R&D partnerships. Journal of International Business Studies 36, 175–186.
Hagedoorn, J., Roijakkers, N., Kranenburg, H., 2006. Inter-firm R&D networks: the importance of strategic network capabilities for high-tech partnership Formation1. British Journal of Management 17, 39–53.
Hatzichronoglou, T., 1997. Revision of the High-Technology Sector and Product Classification.
Henderson, R., 1993. Underinvestment and incompetence as responses to radical innovation: evidence from the photolithographic alignment equipment industry. The RAND Journal of Economics 248–270.
Henderson, R.M., Clark, K.B., 1990. Architectural innovation: the reconfiguration of existing product technologies and the failure of established firms. Administrative Science Quarterly 9–30.
Henkel, J., 2006. Selective revealing in open innovation processes: the case of embedded Linux. Research Policy 35, 953–969.
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.
IDA, 2022a. Industry Sectors in Ireland - Information Communications Technology (ICT) [Online]. Ireland: Irish Development Authority. (Accessed 8 February 2022).
IDA, 2022b. Industry Sectors in Ireland - Medical Devices (MD) [Online]. Ireland: Irish Development Authority. (Accessed 8 February 2022).
Jacobides, M.G., 2006. The architecture and design of organizational capabilities. Industrial and Corporate Change 15, 151–171.
Kobrin, S.J., 1991. An empirical analysis of the determinants of global integration. Strategic Management Journal 12, 17–31.
Laursen, K., Salter, A.J., 2014. The paradox of openness: appropriability, external search and collaboration. Research Policy 43, 867–878.
Lee, S., Park, G., Yoon, B., Park, J., 2010. Open innovation in SMEs-An intermediated network model. Research Policy 39, 290–300.
Leonard-Barton, D., 1992. Core capabilities and core rigidities: a paradox in managing new product development. Strategic Management Journal 13, 111–125.
Lewin, A.Y., Massini, S., Peeters, C., 2011. Microfoundations of internal and external absorptive capacity routines. Organization Science 22, 81–98.
Locatelli, G., Greco, M., Invernizzi, D.C., Grimaldi, M., Malizia, S., 2020. What about the people? Microfoundations of open innovation in megaprojects. International Journal of Project Management.
Low, M.B., Macmillan, I.C., 1988. Entrepreneurship: past research and future challenges. Journal of management 14, 139–161.
Martin, B.R., 2012. The evolution of science policy and innovation studies. Research Policy 41, 1219–1239.
Mcadam, M., Mcadam, R., Dunn, A., Mccall, C., 2014. Development of small and medium-sized enterprise horizontal innovation networks: UK agri-food sector study. International Small Business Journal 32, 830–853.
Miles, M.B., Huberman, A.M., 1994. Qualitative Data Analysis: an Expanded Sourcebook. Sage Publications, Incorporated.
Miles, M.B., Huberman, A.M., Saldaña, J., 2014. Qualitative Data Analysis: A Methods Sourcebook. SAGE Publications, Incorporated.
Minshall, T., Mortara, L., Valli, R., Probert, D., 2010. Making "asymmetric" partnerships work. Research-Technology Management 53, 53–63.
Mortara, L., Minshall, T., 2011. How do large multinational companies implement open innovation? Technovation 31, 586–597.
Narsalay, R., Kavathekar, J., Light, D., 2016. A hands-off approach to open innovation doesn't work. Harvard Business Review.
Nooteboom, B., 1994. Innovation and diffusion in small firms: theory and evidence. Small Business Economics 6, 327–347.
Oakey, R.P., 2013. Open innovation and its relevance to industrial research and development: the case of high-technology small firms. International Small Business Journal 31, 319–336.
Padilla-Meléndez, A., Del Aguila-Obra, A.R., Lockett, N., 2013. Shifting sands: regional perspectives on the role of social capital in supporting open innovation through knowledge transfer and exchange with small and medium-sized enterprises. International Small Business Journal 31, 296–318.
Parida, V., Westerberg, M., Frishammar, J., 2012. Inbound open innovation activities in high-tech SMEs: the impact on innovation performance. Journal of Small Business Management 50, 283–309.
Patton, M.Q., 2002. Qualitative Research. Wiley Online Library.
Pavitt, K., 1984. Sectoral patterns of technical change: towards a taxonomy and a theory. Research policy 13, 343–373.
Prashantham, S., Birkinshaw, J., 2008. Dancing with gorillas: how small companies can partner effectively with MNCs. California management review 51, 6–23.
Presenza, A., Abbate, T., Meleddu, M., Cesaroni, F., 2017. Small-and medium-scale Italian winemaking companies facing the open innovation challenge. International Small Business Journal 35, 327–348.
Qian, G., Li, L., 2003. Profitability of small-and medium-sized enterprises in high-tech industries: the case of the biotechnology industry. Strategic Management Journal 24, 881–887.
Radziwon, A., Bogers, M., 2019. Open innovation in SMEs: exploring inter-organizational relationships in an ecosystem. Technological Forecasting and Social Change 146, 573–587.
Rampersad, G., Quester, P., Troshani, I., 2010. Managing innovation networks: exploratory evidence from Ict, biotechnology and nanotechnology networks. Industrial Marketing Management 39, 793–805.
Randhawa, K., Wilden, R., Hohberger, J., 2016. A bibliometric review of open innovation: setting a research agenda. Journal of Product Innovation Management.
Rass, M., Dumbach, M., Danzinger, F., Bullinger, A.C., Moeslein, K.M., 2013. Open innovation and firm performance: the mediating role of social capital. Creativity and Innovation Management 22, 177–194.
Roper, S., Hewitt-Dundas, N., 2013. Catalysing open innovation through publicly-funded R&D: a comparison of university and company-based research centres. International Small Business Journal 31, 275–295.
Rothwell, R., 1991. External networking and innovation in small and medium-sized manufacturing firms in Europe. Technovation 11, 93–112.

Ruane, F., Ugur, A., 2005. Foreign direct investment and productivity spillovers in Irish manufacturing industry: evidence from plant level panel data. International Journal of the Economics of Business 12, 53–66.
Ryan, P., Geoghegan, W., Hilliard, R., 2018. The microfoundations of firms' explorative innovation capabilities within the triple helix framework. Technovation 76, 15–27.
Saldaña, J., 2012. The Coding Manual for Qualitative Researchers. Sage.
Salter, A., Criscuolo, P., Ter Wal, A.L., 2014. Coping with open innovation. California Management Review 56, 77–94.
Salter, A., Ter Wal, A.L., Criscuolo, P., Alexy, O., 2015. Open for ideation: individual-level openness and idea generation in R&D. Journal of Product Innovation Management 32, 488–504.
Sandelowski, M., 2008. Theoretical saturation. The Sage encyclopedia of qualitative methods 1, 875–876.
Schneider, C., Veugelers, R., 2010. On young highly innovative companies: why they matter and how (not) to policy support them. Industrial and Corporate change 19, 969–1007.
Schon, Donald, 1984. *The reflective practitioner: How professionals think in action*, 5126. Basic Books.
Schumpeter, J.A., 1934. The Theory of Economic Development: an Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle. Transaction Books.
Scuotto, V., Beatrice, O., Valentina, C., Nicotra, M., DI Gioia, L., Briamonte, M.F., 2020. Uncovering the microfoundations of knowledge sharing in open innovation partnerships: an intention-based perspective of technology transfer. Technological Forecasting and Social Change 152, 119906.
Shepherd, D.A., Patzelt, H., Williams, T.A., Warnecke, D., 2014. How does project termination impact project team members? Rapid termination,'creeping death', and learning from failure. Journal of Management Studies 51, 513–546.
Siggelkow, N., 2007. Persuasion with case studies. Academy of Management Journal 50, 20–24.
Spender, J.-C., Corvello, V., Grimaldi, M., Rippa, P., 2017. Startups and open innovation: a review of the literature. European Journal of Innovation Management 20, 4–30.
Spiggle, S., 1994. Analysis and interpretation of qualitative data in consumer research. Journal of consumer research 491–503.
Spithoven, A., Vanhaverbeke, W., Roijakkers, N., 2013. Open innovation practices in SMEs and large enterprises. Small Business Economics 41, 537–562.
Stake, R.E., 1995. The Art of Case Study Research. SAGE.
Stanko, M.A., Fisher, G.J., Bogers, M., 2017. Under the wide umbrella of open innovation. Journal of Product Innovation Management.
Storey, D.J., 1994. Understanding the Small Business Sector. London.
Teece, D.J., 1986. Profiting from technological innovation: implications for integration, collaboration, licensing and public policy. Research Policy 15, 285–305.
Teece, D.J., 2007. Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. Strategic Management Journal 28, 1319–1350.
Teece, D.J., 2020. Hand in glove: open innovation and the dynamic capabilities framework. Strategic Management Review 1, 233–253.
Trott, P., Simms, C., 2017. An examination of product innovation in low-and medium-technology industries: cases from the UK packaged food sector. Research Policy 46, 605–623.
Turner, J.R., Müller, R., 2003. On the nature of the project as a temporary organization. International Journal of Project Management 21, 1–8.
Usman, M., Vanhaverbeke, W., 2017. How start-ups successfully organize 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.
Van Der Borgh, M., Cloodt, M., Romme, A.G.L., 2012. Value creation by knowledge-based ecosystems: evidence from a field study. R & D Management 42, 150–169.
Van Maanen, J., 1979. Reclaiming qualitative methods for organizational research: a preface. Administrative Science Quarterly 520–526.
Vanhaverbeke, W., Cloodt, M., 2006. Open innovation in value networks. Open innovation: Researching a new paradigm 258–281.
Vanhaverbeke, W., Du, J., Leten, B., Aalders, F., 2014. Exploring open innovation at the level of R&D projects. In: Chesbrough, H., Vanhaverbeke, W., West, J. (Eds.), New Frontiers in Open Innovation, pp. 115–131.
Vanhaverbeke, W., Roijakkers, N., Usman, M., Frattini, F., 2018. Researching Open Innovation in SMEs. World Scientific.
Vossen, R., 1988. Relevant strengths and weaknesses of small firms in innovation. International Small Business Journal 16.
Wasserman, N., 2012. The Founder's Dilemmas: Anticipating and Avoiding the Pitfalls that Can Sink a Startup. Princeton University Press.
Wasserman, S., Faust, K., 1994. Social Network Analysis: Methods and Applications.
West, J., Bogers, M., 2016. Open Innovation: Current Status and Research Opportunities, pp. 1–8. Innovation.
West, J., Kuk, G., 2016. The complementarity of openness: how MakerBot leveraged Thingiverse in 3D printing. Technological Forecasting and Social Change 102, 169–181.
West, J., Lakhani, K.R., 2008. Getting clear about communities in open innovation. Industry and Innovation 15, 223–231.
Wynarczyk, P., Piperopoulos, P., Mcadam, M., 2013. Open innovation in small and medium-sized enterprises: an overview. International Small Business Journal 31, 240–255.
Yildiz, H.E., Murtic, A., Klofsten, M., Zander, U., Richtnér, A., 2021. Individual and contextual determinants of innovation performance: a micro-foundations perspective. Technovation 99, 102130.
Yin, R.K., 2009. Case Study Research: Design and Methods. Sage publications.