

Contributions to Management Science

Gabriela Fernandes
Lawrence Dooley
David O'Sullivan
Asbjørn Rolstadås *Editors*

Managing Collaborative R&D Projects

Leveraging Open Innovation
Knowledge-Flows for Co-Creation



Springer

Contributions to Management Science

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David O'Sullivan • Asbjørn Rolstadås
Editors

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In Memoriam

Prof Paul Benneworth
1974–2020

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Managing Collaborative R&D Projects



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1 Collaborative Innovation

The competitiveness and sustainability of a modern organisation depends on its ability to innovate successfully. Innovation is the combined activity of generating new knowledge and the subsequent successful exploitation of this for benefit (von Stamm 2008; O'Sullivan and Dooley 2008). Innovations rarely involve a single technology or market but instead a requirement to bring a complex bundle of knowledge together into a value-adding configuration. Thus, innovation is not only about accessing and using knowledge about components but also about its integration to solve market needs (Tidd and Bessant 2009). The current perspective of the innovation process views it as an interactive and networked system, spanning independent organisational boundaries to draw on complementary knowledge, experience and capabilities from increasingly diverse sources (Tidd and Bessant 2009; Philpott et al. 2011). Engaging with organisations from other geographic areas (Narula 2004) or cross-industry sectors (Enkel and Heil 2014) can nurture and

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stimulate an organisation's innovation process by exposing firms to new yet complementary capabilities of collaboration partners.

The bringing together of complementary knowledge capability and resources supports the creation of technological competencies (Schoenmakers and Duysters 2006), especially where such resources/capabilities are not internally available or are challenging to obtain efficiently within the market (Das and Teng 2000; Lewis et al. 2010). Organisations that successfully harness external knowledge through inter-organisational relationships will have greater innovation scope and are likely to realise a more significant competitive advantage over those organisations solely relying on internal capabilities (Rothwell 1994; Gratton 2000; Chesbrough 2003; de Faria et al. 2010). Innovation is applied knowledge management (O'Sullivan and Dooley 2008) and understanding the complexity of inter-organisational relationships that underpin effective integration of this 'non-redundant' knowledge is essential for innovation potential. Managing an organisation's knowledge assets within networks and converting it into commercially successful products and services is an intricate and difficult to manage process (Jaffe 1989; Balconi et al. 2004). The collaborative challenges associated with R&D include how to achieve synergistic integration of culture and routines of collaborating organisations (Spekman et al. 1996; de Rond 2003; Dooley et al. 2013), aligning realistic and mutually beneficial objectives (Doz and Hamel 1998), and achieving the synergistic mix of knowledge and network ties (Gubbins and Dooley 2013) that nurtures collective benefit. Barringer and Harrison (2000) also identify challenges such as financial/organisational risk, partner co-dependency, partial loss of decision autonomy, loss of organisational flexibility and anti-trust/anti-competitive implications to this list of collaborative challenges and stress the strategic nature of such decision since *'in the end, the decision to participate in an inter-organisational relationship must be a probabilistic assessment of strategic rather than economic value'* (2000, p 396).

Industry is increasingly reliant on open innovation (Chesbrough 2003) to enhance internal capabilities and develop new trajectories and skillsets. Universities are often the main repository of such exploratory knowledge (Scandura 2016). The increasing competitiveness and the appearance of new science-based industries have decentralised the industrial research activities, where external sources of knowledge (such as universities) have gained importance in the eyes of firms (Sá and Litwin 2011). *'Knowledge and technology transfer between academia and industry is expected to spur innovation, as this kind of collaboration combines not only heterogeneous partners but more importantly, heterogeneous knowledge'* (Rajalo and Vadi 2017, p 42).

Government agencies increasingly promote university–industry collaborations through public funding to stimulate the regional ecosystem (known as triple helix model) and consequently, collaborative research between industry and university is becoming increasingly prevalent (Perkmann et al. 2011). University–industry collaborations are expected to play an important role by the development of innovative products, technologies and processes for industry. They are influenced by both geographical proximity and the quality of these universities. However, industries appear to give preference to the research quality, i.e. existent knowledge, of the

university over geographical closeness (Laursen et al. 2011). Yet, collaborative university–industry R&D requires a high commitment of both partners and takes place when the relationship between university and industry is in some way more consolidated (Perkmann et al. 2013).

University–industry R&D collaborations are based on interactive relationships of trust (Plewa et al. 2013) and commitment between partners aiming to create mutual value over time, which allows diffusion of creativity, ideas and skills, hence promoting a bilateral exchange of knowledge (Ankrah et al. 2013). Collaborative university–industry R&D initiatives are usually organised as projects or programmes. They exist to produce new results under pre-defined research objective(s), within several constraints (time, cost and resources), resulting in a set of benefits for both partners. A programme is a set of projects that are somehow related and aimed at achieving a set of significant benefits that are more than just the sum of the projects they consist of (Nieminen and Lehtonen 2008; Pellegrinelli 2011). However, sometimes the concept of the programme is misunderstood, and commonly, programmes are perceived as projects in the context of university–industry R&D collaborations.

Literature research concerning university–industry R&D collaboration has concentrated primarily on the existence and effects of the so-called ‘cultural gap’. The factors identified include conflicts over ownership of intellectual property, academic freedom to publish, differences of priorities and time horizons. However, the majority of the problems associated with the ‘cultural gap’ can be alleviated by good project management (PM) (Barnes et al. 2006). Recently, Huang and Chen (2017) show that the existence of university–industry collaboration management mechanisms has significant effects on the academic innovation performance of universities, namely the presence of a formal, standardised and structured process to manage benefits resultant from these collaborations. This aligns with the perspective of Barnes et al. (2006, p 399), who highlight the importance of a ‘*project manager to harmonise the differing objectives, perspectives and modes of operation of often diverse organisations*’.

2 Innovating in Practice

The turbulence of the modern world, both economic and societal, demands ever-increasing innovation to meet emerging challenges. While the need for continuous innovation is evident, how to do so effectively remains one of the core challenges to be addressed by researchers and practitioners (Barbosa et al. 2020). Consequently, current perspectives of the innovation process view it as an interactive and networked system that spans organisational boundaries to draw on knowledge, experience and capabilities from diverse sources (Rothwell 1992; Tidd and Bessant 2009). Organisations that are successful in harnessing the potential of external knowledge collaboration for R&D projects have greater scope to undertake complex innovation activity and are likely to realise competitive advantage over organisations

relying solely on internal capabilities (Rothwell 1994; Gratton 2000; Chesbrough 2003; de Faria et al. 2010). Innovation research of the past decade has primarily focused on addressing these challenges through ‘*Open Innovation*’ (Chesbrough 2003) and ‘*Project Management*’ (Brocke and Lippe 2015; Barbosa et al. 2020).

The success of innovative ideas developed through inter-organisational collaboration depends as much on the process of open innovation (OI) than of the idea itself (Chesbrough 2004). OI needs to be wisely managed to execute an R&D project effectively and deliver proposed project benefits. According to the Frascati Manual (OECD 2015), for activities to be classified as R&D, they must meet five central criteria: (1) Novel; (2) Creative to advance existing knowledge; (3) Degree of uncertain regarding the outcome, cost and time allocation; (4) Systematic in management and finally (5) Transferable or reproducible. A collaborative R&D project is defined as a temporary organisation with a collaborative work environment, within a specific application context defined, but of interest to all partners engaged. These collaborative projects consist of consortia of heterogeneous, yet synergistic partners (industries, universities and research institutions) with collective responsibilities for the achievement of desired outcomes and, in most cases, with public funding support (Brocke and Lippe 2015). Collaborative R&D is based on the principle of symbiosis, i.e. each partner has a different set of capabilities that enable the leveraging of OI knowledge-flows for co-creation and value appropriation from the collaboration. However, this also brings complexity, which, if not well managed, generates conflicts among partners, hindering innovation and ultimately leading to collaboration failure. There are several reasons behind unsuccessful collaborations, namely: different levels of commitment between partners; lack of a trust bond between partners; different motivations and objectives; unclear requirements; and poor planning and monitoring of progress (Brocke and Lippe 2015; Nsanzumuhire and Groot 2020).

The management of the innovation process, especially in collaborative contexts, requires mastering the capabilities of goal setting, problem-solving, design thinking, project, programme and portfolio management, team building, collaboration and knowledge management (O’Sullivan and Dooley 2008). PM has long been viewed as a key innovation management mechanism for the effective execution of innovation projects (O’Sullivan and Dooley 2008). Although essential, in the context of collaborative R&D projects, this view is simplistic. PM needs to be seen as one of a portfolio of Innovation management tools and techniques that together provide the best opportunity for project success (O’Sullivan and Dooley 2008). Creating and maintaining benefits from collaborative R&D projects requires moving beyond current PM knowledge, and integrate the foundational role of both PM and innovation management in collaborative R&D projects’ management process (Midler et al. 2016). PM and innovation management frameworks bring forward different principles, processes, tools and techniques for achieving greater project success (Midler et al. 2016; Mugge and Markham 2013; Müller et al. 2019), that when effectively combined, allows the leveraging of OI knowledge-flows for co-creation.

During the lifetime of collaborative R&D projects, dynamics are created among the organisations involved, namely related to knowledge transfer, which have impacts on the organisations that may go beyond the objectives of the ongoing

initiative, resulting, for example, in further projects to explore other ideas (Manning 2017). However, as OI might compromise secrecy, which might be required by some organisations of the consortium, a careful balance between open and closed innovation practices might be needed during the project lifetime (Du et al. 2014). These, and other challenges that emerge in UICs, mainly due to the different nature of the organisations involved, lead to the need for adapting the governance and management approaches used (Du et al. 2014).

3 Book Objectives

This book brings together several multidisciplinary studies around the topic of managing collaborative R&D projects that leverage OI knowledge-flows for co-creation. Seventeen chapters have been developed to present readers with key challenges, case studies and best practices for improving the impact and benefits of collaborative R&D projects. The book is written in an accessible style for managers, decision-makers, principal investigators and project managers in industry, government, universities and research institutes to support the achievement of long-term benefits and societal impact. It is also of interest to university governance boards, funding agencies and corporate and government investors. The ideas and principles outlined in the book apply to any organisation from service to manufacturing and from public sector to private. Features to be found within the chapters of the book include:

- Case studies and real-life examples of OI and project management.
- New approaches to collaboration among established universities and industries.
- New insights into governance and management of collaborative R&D projects.
- Challenges and opportunities within major collaborations.
- Practical roadmaps for more effective OI and project management.
- Critical enablers for delivering project and programme values, benefits and impacts.

4 Book Structure

To guide the reader in accessing key knowledge presented, the chapters have been divided into five parts and their associated chapters. The parts are:

1. Literature Reviews.
2. Industry Collaborations.
3. University–Industry Collaborations.
4. Collaborative Project Management.
5. Collaboration Impact and Value.

4.1 Literature Reviews

Part I of the book presents two detailed reviews of the state-of-the-art literature around OI and PM related to collaborative R&D and the role of managers. In their chapter ‘*A systematic literature review of open innovation and R&D managers*’ Cunningham, Foncubierta-Rodríguez, Martín-Alcázar and Perea-Vicente find that there has been a limited research focus on the role of individual actors and the human side of OI within the literature. They attempt to address this imbalance using a systematic literature review to thematically analyse the R&D leader role. They identify three main themes from the literature: implementation, fear and firm performance. Using these themes, they organise a literature framework and outline future avenues of research. They argue that there is a need to undertake further research on the role of R&D leader to adequately equip and support them in the day-to-day management of collaborative innovation (Cunningham et al. 2020).

The second chapter of this part of the book by Bravo, Vieira, Bredillet and Pinheiro undertakes a ‘*Review of collaborative project management approaches in R&D projects*’. They find that approaches are as diverse as the collaborative R&D projects they aim to manage, but all share the same goal, i.e. to increase the success and value of projects. Their chapter presents a review of the leading PM approaches based on processes, results, competencies and agility. Each approach, they find, includes one or more parameters and standards. They find that in collaborative projects, common language problems are frequent and highlight the importance of securing collective agreement before starting engagement. The research also highlights that choice of management framework must be intelligent and adaptable, with the necessary investments in place to reinforce long-term collaborative work in terms of both scientific achievements and market-aligned output (Bravo et al. 2020).

4.2 Industry Collaborations

In times of turbulence, the locus of innovation shifts to the network (Powell et al. 1996) as organisations strive to reduce risk exposure and time to market by leveraging the capabilities of other independent organisations rather than develop them internally. This extended resource-based view of the firm has a definite advantage, encompassing linkages with complementary partners including suppliers, intermediaries, complementor and competitor enterprise, universities and even government organisations. While the collective pooling of network resources offers significant potential for knowledge sharing and co-creation, there are multiple challenges in achieving the necessary integration and mutual understanding of objective and value appropriation to achieve the same. Part II of the book focusses on *Industry Collaborations*, consisting of five chapters that explore the complexity of this context and its implications for managing collaborative R&D projects.