Innovation, Technology, and Knowledge Management

Marta Peris-Ortiz
João J. Ferreira *Editors*

Cooperative and Networking Strategies in Small Business

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Innovation, Technology, and Knowledge Management

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Series Foreword

The Springer book series *Innovation*, *Technology*, *and Knowledge Management* was launched in March 2008 as a forum and intellectual, scholarly "podium" for global/local, transdisciplinary, transsectoral, public–private, and leading/"bleeding" edge ideas, theories, and perspectives on these topics.

The book series is accompanied by the Springer *Journal of the Knowledge Economy*, which was launched in 2009 with the same editorial leadership.

The series showcases provocative views that diverge from the current "conventional wisdom" that are properly grounded in theory and practice, and that consider the concepts of ***robust competitiveness***,[1] ***sustainable entrepreneurship***,[2] and ***democratic capitalism***,[3] central to its philosophy and objectives. More specifically, the aim of this series is to highlight emerging research and practice at the dynamic intersection of these fields, where individuals, organizations, industries, regions, and nations are harnessing creativity and invention to achieve and sustain growth.

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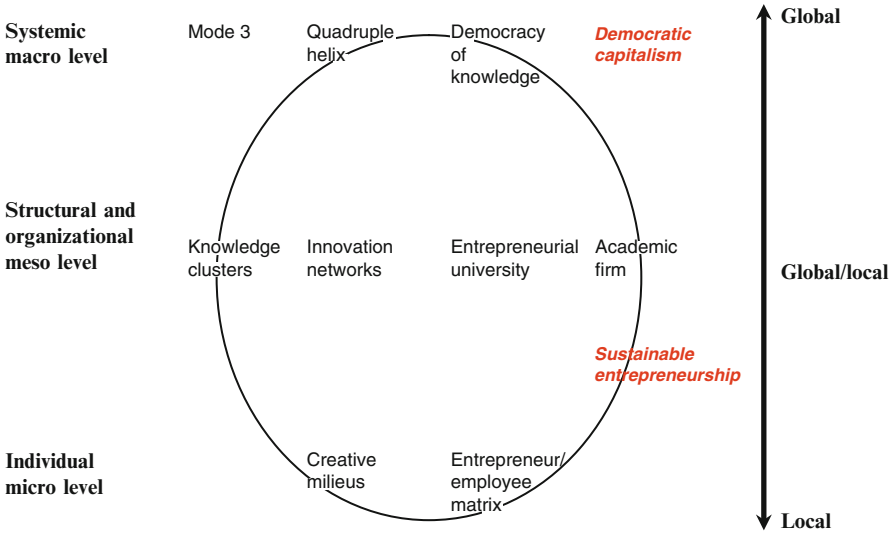
[1] We define *sustainable entrepreneurship* as the creation of viable, profitable, and scalable firms. Such firms engender the formation of self-replicating and mutually enhancing innovation networks and knowledge clusters (innovation ecosystems), leading toward robust competitiveness (E.G. Carayannis, *International Journal of Innovation and Regional Development* 1(3), 235–254, 2009).

[2] We understand *robust competitiveness* to be a state of economic being and becoming that avails systematic and defensible "unfair advantages" to the entities that are part of the economy. Such competitiveness is built on mutually complementary and reinforcing low-, medium-, and high-technology and public and private sector entities (government agencies, private firms, universities, and nongovernmental organizations) (E.G. Carayannis, *International Journal of Innovation and Regional Development* 1(3), 235–254, 2009).

[3] The concepts of *robust competitiveness and sustainable entrepreneurship* are pillars of a regime that we call "*democratic capitalism*" (as opposed to "popular or casino capitalism"), in which real opportunities for education and economic prosperity are available to all, especially—but not only—younger people. These are the direct derivatives of a collection of topdown policies as well as bottom-up initiatives (including strong research and development policies and funding, but going beyond these to include the development of innovation networks and knowledge clusters across regions and sectors) (E.G. Carayannis and A. Kaloudis, *Japan Economic Currents*, p. 6–10 January 2009).

Books that are part of the series explore the impact of innovation at the "macro" (economies, markets), "meso" (industries, firms), and "micro" levels (teams, individuals), drawing from such related disciplines as finance, organizational psychology, research and development, science policy, information systems, and strategy, with the underlying theme that for innovation to be useful it must involve the sharing and application of knowledge.

Some of the key anchoring concepts of the series are outlined in the figure below and the definitions that follow (all definitions are from E.G. Carayannis and D.F.J. Campbell, *International Journal of Technology Management*, 46, 3–4, 2009).



Conceptual profile of the series *Innovation*, *Technology*, and *Knowledge Management*

- The "Mode 3" Systems Approach for Knowledge Creation, Diffusion, and Use: "Mode 3" is a multilateral, multinodal, multimodal, and multilevel systems approach to the conceptualization, design, and management of real and virtual, "knowledge-stock" and "knowledge-flow," modalities that catalyze, accelerate, and support the creation, diffusion, sharing, absorption, and use of cospecialized knowledge assets. "Mode 3" is based on a system-theoretic perspective of socioeconomic, political, technological, and cultural trends and conditions that shape the coevolution of knowledge with the "knowledge-based and knowledge-driven, global/local economy and society."
- Quadruple Helix: Quadruple helix, in this context, means to add to the triple helix of government, university, and industry a "fourth helix" that we identify as the "media-based and culture-based public." This fourth helix associates with "media," "creative industries," "culture," "values," "life styles," "art," and perhaps also the notion of the "creative class."

- Innovation Networks: Innovation networks are real and virtual infrastructures and infratechnologies that serve to nurture creativity, trigger invention, and catalyze innovation in a public and/or private domain context (for instance, government–university–industry public–private research and technology development coopetitive partnerships).
- Knowledge Clusters: Knowledge clusters are agglomerations of cospecialized, mutually complementary, and reinforcing knowledge assets in the form of "knowledge stocks" and "knowledge flows" that exhibit self-organizing, learning-driven, dynamically adaptive competences, and trends in the context of an open systems perspective.
- Twenty-First Century Innovation Ecosystem: A twenty-first century innovation ecosystem is a multilevel, multimodal, multinodal, and multiagent system of systems. The constituent systems consist of innovation metanetworks (networks of innovation networks and knowledge clusters) and knowledge metaclusters (clusters of innovation networks and knowledge clusters) as building blocks and organized in a self-referential or chaotic fractal knowledge and innovation architecture,[4] which in turn constitute agglomerations of human, social, intellectual, and financial capital stocks and flows as well as cultural and technological artifacts and modalities, continually coevolving, cospecializing, and cooperating. These innovation networks and knowledge clusters also form, reform, and dissolve within diverse institutional, political, technological, and socioeconomic domains, including government, university, industry, and nongovernmental organizations and involving information and communication technologies, biotechnologies, advanced materials, nanotechnologies, and next-generation energy technologies.

Who is this book series published for? The book series addresses a diversity of audiences in different settings:

1. *Academic communities*: Academic communities worldwide represent a core group of readers. This follows from the theoretical/conceptual interest of the book series to influence academic discourses in the fields of knowledge, also carried by the claim of a certain saturation of academia with the current concepts and the postulate of a window of opportunity for new or at least additional concepts. Thus, it represents a key challenge for the series to exercise a certain impact on discourses in academia. In principle, all academic communities that are interested in knowledge (knowledge and innovation) could be tackled by the book series. The interdisciplinary (transdisciplinary) nature of the book series underscores that the scope of the book series is not limited a priori to a specific basket of disciplines. From a radical viewpoint, one could create the hypothesis that there is no discipline where knowledge is of no importance.
2. *Decision makers—private/academic entrepreneurs and public* (*governmental*, *subgovernmental*) actors: Two different groups of decision makers are being addressed simultaneously: (1) private entrepreneurs (firms, commercial firms,

[4] E.G. Carayannis, *Strategic Management of Technological Learning*, CRC Press, 2000.

academic firms) and academic entrepreneurs (universities), interested in optimizing knowledge management and in developing heterogeneously composed knowledge-based research networks; and (2) public (governmental, subgovernmental) actors that are interested in optimizing and further developing their policies and policy strategies that target knowledge and innovation. One purpose of public *knowledge and innovation policy* is to enhance the performance and competitiveness of advanced economies.

3. *Decision makers in general*: Decision makers are systematically being supplied with crucial information, for how to optimize knowledge-referring and knowledge-enhancing decision-making. The nature of this "crucial information" is conceptual as well as empirical (case-study-based). Empirical information highlights practical examples and points toward practical solutions (perhaps remedies); conceptual information offers the advantage of further driving and further-carrying tools of understanding. Different groups of addressed decision makers could be decision makers in private firms and multinational corporations, responsible for the knowledge portfolio of companies; knowledge and knowledge management consultants; globalization experts, focusing on the internationalization of research and development, science and technology, and innovation; experts in university/business research networks; and political scientists, economists, and business professionals.
4. *Interested global readership*: Finally, the Springer book series addresses a whole global readership, composed of members who are generally interested in knowledge and innovation. The global readership could partially coincide with the communities as described above ("academic communities," "decision makers"), but could also refer to other constituencies and groups.

Washington, DC, USA

Elias G. Carayannis
Series Editor

Foreword

Cooperation and networking are two ways for small businesses to compensate for the lack of internal resources that inherently result from being small. Firms think strategically about cooperation and networking because these are of increasing importance for the firm competitiveness and cannot be left to chance. It notably means deciding who to collaborate with and in which contexts.

The small firm's cooperation and networking activities might not only be with other small firms. There is a large variety of agents with which these connections may be developed, including large firms and universities. At times, public incentives may contribute to the establishment of these connections. An example would be an R&D project that is developed in a consortium consisting of one, or more, university research lab, a global firm and SMEs. This example is not fiction: this cooperation exists around the world. It emerges—powerfully—when trust emerges.

Connections can be also between small firms and local schools. Cooperation can mean not just internships for students, but also joint traditional learning and apprenticeship agreements. These arrangements are also a way for firms to compensate for lack of internal training capacity and for the schools to network, sharing information and developing partnerships with the economic sector.

Much has been said about the importance of the small firm regarding R&D, new knowledge flows and innovative activity. Firms need not have an own lab. However, developing cooperation agreements with external R&D and innovation partners or having an internal absorptive capacity appears crucial. Smallness can lead firms to share even this absorptive capacity by jointly creating and funding a technology watch and transfer position. *Mutatis mutandis*, the same may hold for export or international joint ventures developed to seize the new opportunities offered by globalization. What appears important, in a globalized and rapidly changing world, is keeping a dynamic capacity. A way to dynamically feed this capacity is for small firms to identify and join networks that share new emerging knowledge or new ideas.

It is a great pleasure for me to write the foreword of this edited book by Marta Peris-Ortiz and João Ferreira. They have collected an outstanding set of tremendous contributions to the field. I am fully confident that the reader will benefit from the knowledge that each chapter offers individually and from the synergy that results from having read every chapter. With an incredible wealth of detail, the current state of research regarding small businesses' cooperative and networking is expressed in this exceptional collection.

Namur, Belgium Marcus Dejardin

Contents

Chapter 1
Cooperation and Networks in Small Business Strategy: An Overview

Marta Peris-Ortiz and João J. Ferreira

Abstract Cooperation and networks is a fashionable topic. It is receiving increased attention in popular management publications, as well as specialized academic journals. This chapter presents a state-of-the-art view about cooperative and networking strategies in small business. Furthermore, we highlight the main contributions of the chapters included in this book. It provides an opportunity to advance our understanding about cooperative and networking strategies. It also addresses questions particularly critical to business cooperation and network strategies and encourages examining their impact in different contexts. In this chapter, we outline a short description of the author's contributions.

1.1 Introduction

The cooperation paradigm, seen as an alternative approach, was first proposed in the late 80s (Contractor & Lorange, 1988). The Business world became comprised by multifaceted and advanced networks of relationships and was encouraged by strategic cooperation (Child, Faulkber, & Tallman, 2005). The management literature provides extensive coverage of the different issues that encourage firms to cooperate and embrace cooperative relationships (Ferreira, Fernandes, & Raposo, 2014; Ferreira, Raposo, & Fernandes, 2014; Franco & Haase, 2015). Cooperation between firms and industries is a means of leveraging and aggregating knowledge and generating direct benefits in terms of innovation, productivity, and competitiveness (Ferreira, Fernandes, et al., 2014; Street & Cameron, 2007).

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Cooperation enables firms to boost firm levels of competitiveness (Li & Zhong, 2003). Cooperative and competitive (co-opetition) networks are apparently located at the extreme ends of the spectrum of strategic relationships and alignments. Various options and decisions made within the framework of strategic alliances may be identified and differentiated (BarNir & Smith, 2002; Bengtsson & Kock, 2000). Belderbos, Carree, Diederen, Lokshin, and Veugelers (2004) argue that R&D cooperation between competing firms also facilitates the search for incremental efficiency gains and consequently a competitive advantage. According to Álvarez, Marin, and Fonfría (2009) the establishment of networks has been an emerging issue over the last decades in order to understand the new challenges in the competitiveness of firms, focusing increased attention by scholars in several knowledge fields as well as in practitioners.

Simultaneously with a theoretical acceptance of the importance of a sustained competitive advantage to formulate strategy, there is a growing understanding that cooperative and networking behavior among small firms is at the root of many success stories in today's small business management. This condition demands an effort to develop a study of both aspects of cooperation and networks as compatible, complementary facets of a unique reality. Definitely, the cooperative and networking relationships of a small business can be the source of its competitive advantage. Enhancement of local resources and capabilities for the generation and dissemination of knowledge is still an issue for defining public policies in many countries.

The book aims to collect the most recent research and best practices in the cooperative and networking small business field, identifying new theoretical models and describing the relationship between cooperation and networks in small business strategy context.

1.2 Theoretical Background

Recognizing that organizations fail to contemplate all the resources and skills needed to remain competitive and ensure their survival independently is one of the factors that underscore the need to develop joint actions in networks. In the organizational field, the concept of networks has several approaches, covering a wide variety of relationship formats between firms, such as clusters, strategic alliances, outsourcing relationships, subcontracting, industrial districts, consortia, franchises, cooperation networks among others. Small and medium-sized enterprises (SMEs) use of business networks has grown impressively in recent decades due to increasingly complex innovation process (Nordman & Tolstoy, 2016). Innovation orientation and innovative activities are essential for SME to become or remain competitive, particularly in a global market where information is extensively accessible and new products and services are constantly being introduced (Lema, Madrid-Guijarro, & Martin, 2016). Sustainable, well-conceived, and well-managed innovation networks can give clear benefits to SME (Iturrioz, Aragón, & Narvaiza, 2015). Institutional network support is crucial for the entrepreneurial SME and economic competitiveness.

Oparaocha (2015) examines the influence of the use of institutional networks by SMEs in the context of international entrepreneurship and suggests that institutional network relationships have a positive effect on the internationalization process of SMEs. Innovative processes of SME in cross-border business relationships are very contextualized by several network dimensions as well as the relational dimension (Nordman & Tolstoy, 2016).

SMEs develop many types of relationships with a diversity of players in the business environment (Zain & Ng, 2006). Some studies have emphasized different aspects of networks that can be found, depending on the interfaces and connections that exist within each particular network collaboration (Oparaocha, 2015). Lin and Jin (2016) examine the effect of network relationship on the performance of SMEs. They conclude that SME strongly depend on external entities and cooperate with partners to improve their performance. According to Nordman and Tolstoy (2016), SMEs need a moderately higher level of innovative collaboration in their partnerships with foreign market customers to adapt opportunities considered in home and international market networks into innovative outcomes in comparison to opportunities considered in host market networks.

The literature shows a difference of the factors essential for the motivation of creating a network into knowledge sharing, accelerating innovation, reducing transaction costs, improved reputation, and new market opportunities conception (Lin & Jin, 2016). Managers of firms working in a network of business relationships may apply an interfirm perspective toward change expectations. Learning and knowledge sharing is a constant process between network players. Knowledge sharing is vital to be or remain competitive (Bhatti, Larimo, & Carrasco, 2016).

Partnership with external agents has become a strategic domain for enterprises in the networking world of business, and SME need to collaborate to complement internal resources due to the lack of economies of scale in R&D (Iturrioz et al., 2015). According to Bougrain and Haudeville (2002), networks strengthen SMEs' competitiveness by providing them with an opportunity window on technological change, market necessities, and strategic choices made by other enterprises. Networks are vital providers of several varieties of knowledge (Pittaway, Robertson, Munir, Denyer, & Neely, 2004).

The cooperation networks seem particularly designed to reduce uncertainties by increasing flexibility and adapt to changes and which do not seem to contradict with the operation of market rules in a cooperation–competition (co-opetition) game. Co-opetition is a phenomenon where competitors collaborate with each other in order to create value and a bigger market for the enterprises involved, to further compete for the created or expanded market (Brandenburger & Nalebuff, 1996). There are various approaches in the literature to explain the role of networks and co-opetition in the business context. Game theory, Resource-based View (RBV), and theory of transaction costs have shown a major role in this context demonstrating that co-opetition can be an advantageous alternative for SMEs.

In the light of game theory, co-opetition is not an altruistic strategic process; it is a rational posture. Collaboration with a competitor becomes advantageous when it generates an increase in the market to be held forward by the organizations involved

(Bengtsson & Kock, 2000; Cousins, 2002). This explanation applies to interorganizational relationships where involved actors seek to differentiate themselves through innovation, increasing global demand for their product or services. In this case, the competition occurs with other substitute products or services (Walley, 2007). The expected result in a successful co-opetition relationship is an expanded market or newly created markets to be played by the organizations which cooperated to create them, which would not happen if the co-opetition had not occurred.

RBV also helps to theoretically illuminate the phenomenon of co-opetition (Rusko, Merenheimo, & Haanpää, 2013). When enterprises compete, they choose to share resources to promote the increased market size in which they operate. Such sharing can involve tangible resources such as equipment, physical space or means of transport, or intangible resources, in information sharing cases and joint activities of Research & Development (Ritala & Hurmelinna-Laukkanen, 2013). By sharing these resources, enterprises in co-opetition increase their value generation capacity through a combination of resources which they individually possess, once combined, these features act synergistically and produce results greater than the sum of the results that could be obtained by each enterprise separately (Gnyawali & Park, 2009; Schiavone & Simoni, 2011).

In turn, the theory of transaction costs enables observation of the risks of co-opetition. According to this approach, enterprises seek to minimize the costs involved in providing their goods or services. These costs do not involve only those directly associated with the production or offer the service, but also the transaction costs, which are those that are present in negotiations, drafting contracts, performance monitoring, or social intellectual efforts for the development of innovations (Luo, 2007).

Thus, co-opetition is a way in which enterprises seek alliances that enable them to reduce the total cost of operations for the enterprise to create or expand markets and increase the profit potential of the organizations involved (Chin, Chan, & Lam, 2008). However, as individuals have limited rationality and are prone to opportunism, there may be breached agreements and appropriations of untraded resources by one of the enterprises. This argument makes co-opetition a highly risky strategy from the point of view of the theory of transaction costs (Barge-Gil, 2010) and for this reason, some authors point out serious reservations to its adoption (Bouncken & Kraus, 2013). However, protection mechanisms, such as patents and contracts help manage risk and enable the joint operation in some cases (Zhou & Xu, 2012).

Some studies have facilitated better understanding of the factors affecting the outcome of a co-opetition, especially in order to seek to create conditions that inhibit the opportunistic behavior described earlier. The success of the strategic relationship depends on the ability of organizations to establish an interaction that balances the sharing and protection of knowledge, in order to promote the creation of value by minimizing the room for opportunism. To interact in a context of co-opetition, enterprises often experience structural dilemmas that reveal different logics regarding the dynamics between collaboration and competition.

The integration of enterprises in central locations enables cost reduction and sharing of resources, which enhances the creation and acquisition of knowledge and the preservation and diffusion of knowledge. Through industrial networks, the creation

and acquisition of knowledge and the preservation and dissemination of knowledge can influence performance in terms of innovation and enhance the management of the internal knowledge of the enterprises. Enterprises can thus acquire resources and reduce costs, and thereby reinforce the effects of the relationships established within the clusters and influence the performance in terms of innovation in enterprises.

Cooperation between agents of value chain and industry–academia can be a solution to update the knowledge and technical management skills. Enterprises and government should establish points of cooperation, as the knowledge management is one of the factors that leverage competitiveness (Lai, Hsub, Lin, Chen, & Lin, 2014). Trust presents itself not only as a requirement for knowledge sharing with competitors, but also for activities involving the sharing of tangible resources, essential especially for co-production processes (Bonel & Rocco, 2007). Therefore, it is argued that trust, when present, eliminates transaction costs that could negatively impact the potential of the joint allocation of resources to generate value for competitors (Zineldin, 2004). Co-opetition can offer financial gain advantages for enterprises involved in this form of strategic performance, but also poses a risk to those involved, as regards the actual possibilities of converting the partnership into financial gains (Gnyawali & Park, 2009). This is due to the idea that the possibility of expropriation of resources by one of competitors is often perceived by competitors, which can lead, for example, to asymmetric knowledge sharing (Ritala & Hurmelinna-Laukkanen, 2013).

1.3 Overview of Book Contents

This book includes 11 chapters related to cooperative and networking Strategies in Small Business in different contexts. Jointly, the chapters in this book reflect varied approaches. They examine the theme using different theoretical backgrounds and different methodologies. Individually, each chapter offers rich insights regarding the phenomenon they examine.

Chapter 2 undertaken by C. Fernandes and J. Ferreira, *Cooperation and Co-opetition in SME Networks: A bibliometric Study* analyzes, through a bibliometric study, the scientific field of cooperation and competition in order to better grasp how this triad has evolved over time. They classified this systematic literature review into three periods of analysis: 1963–2000 as the big bang approach to competition and cooperation, 2001–2009 as the period with competition camouflaged by cooperation, and 2010–2015 as the psychology of cooperation and competition period.

Chapter 3, *Determinants of university cooperation networks as a mechanism for regional development: The case of Beira Interior (Portugal)* by M. Franco, H. Haase and A. Reis studies the influence of university cooperation networks on their regional economy. They try to respond to the question: What are the determinants of university cooperation networks? And they found that an entrepreneurial university has a crucial role in attracting firms to its region. Furthermore, they suggest that

strong regional partnerships with globally acting firms may represent a solution to slow down the migratory flow of young graduates.

Chapter 4, *Cooperation and networks in small wineries: A case study of Rutherglen, Australia,* by V. Ratten focuses on the cooperation and networks of wine producers in the Rutherglen area of Australia by taking a case study approach. She discusses small business strategies of the wineries in this area in terms of family businesses, newcomers, and investment partners.

Chapter 5 by A. Braga, C. Marques, Z. Serrasqueiro, V. Braga and A. Correia, *The KIBS Contribution for Innovation and Competitiveness within Business Networks* aims to identify the extent in which knowledge-intensive business services (KIBS) contribute to the acceleration ok knowledge both internally and within business networks. Based on a quantitative study, they show that KIBS play a role in transmitting knowledge and contributing, in different forms, for the process of firm innovation of the firms.

Chapter 6, *Relationship learning strategy as a mechanism of network and the effectiveness of green innovation* by A. Leal-Millán, G. Albort-Morant, A. Leal-Rodríguez, and A. Ariza-Montes proposes a conceptual model to test the effect of relationship learning and knowledge base on the green innovation performance. They found that firms which invest and involve themselves in relationship learning mechanisms are more likely to foster green innovations.

Chapter 7 by S. Zohrabyan, P. Fernandes, R. Lopes and J. García, *Connecting funding to entrepreneurs: a profile of the main crowdfunding platform* aims to analyze the financing phenomenon of crowdfunding and to investigate the relations between crowdfunders, project creators, and crowdfunding websites. They show that there is a direct and positive relationship between the money needed for the projects and the money collected from the investors for the projects, per platform.

Chapter 8, *Geographies of Growth: comparing Oxfordshire a core high-tech region in the UK with an emerging high-tech region—the Centro of Portugal* by H. Smith, S. Romeo, L. Farinha and J. Ferreira, compares the evolution of the Oxfordshire high-tech economy with a newer and much smaller high-tech region, Region Centro of Portugal. Using allowed quantitative data provides evidence of what makes regions distinctive, how the performance of regions with some similar and some different attributes compare, and what might contribute to or inhibit their potential growth trajectories. The nature of entrepreneurship and innovation in these two regions were explored as well is responses to the growth of that activity by the local triple helix actors

Chapter 9 by A. Ramos and A. Lora *Hedonic and utilitarian effects on the adoption and use of social commerce* aims to explore the consumer behavior model in social commerce, introducing the social commerce concept as a new commercial formula. They confirm satisfactory results on the relationships proposed, highlighting the influence of hedonic and utilitarian values on attitude and perceived usefulness.

Chapter 10, *Knowledge creation in temporary organizations* by Rutten, studies knowledge creation in temporary organizations (TOs) to address the relationship between TOs and their permanent environment. Based on a case study of twelve interorganizational TOs, he observed that knowledge creation is a process of interaction in an organizational context that must combine hierarchy/control and flexibility/autonomy elements.

The last chapter (Chap. 11), *Collaborative networks between Corporate Universities, customers and SMEs: integrating strategy towards value creation,* by A. Alonso-Gonzalez, M. Peris-Ortiz and J. Mauri-Castello analyzes the possibility of establishing collaborative networks between corporate universities of large companies and their SME partners as a way to establish and empower a common and integrated strategy to improve the processes of these small business partners.

1.4 Conclusions

Cooperation and networks are concepts intricately linked to each other, and analyzing issues at their interface is crucial to understanding the best practices in the cooperative and networking small business field. This book provides a comprehensive, well organized, and richly illustrated study of cooperation and networks in small business strategy. While pertinent for managers and business students, it broadly draws on the most up-to-date research, making it also a valued source for academics studying cooperation and networks and the wide array of small business strategy issues they raise.

We expect this book links academic research and draws on practitioner experience to offer a comprehensive understanding of how and why cooperation and network strategies in small business denote not only indispensable fields of study but also the very foundations for small business management and economics area.

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Chapter 2
Cooperation and Coopetition in SME Networks: A Bibliometric Study

Cristina Fernandes and João J. Ferreira

Abstract The theory and research existing on relationships between competitors concentrates either on competitive relationships or on cooperative relationships and broadly argues that one relationship type harms or threatens the other. However, what do we really understand about progress in the literature on the strategic triad—cooperation, competition, and coopetition? Through bibliometric analysis, we aim here to contribute to providing a state-of-the-art overview on this theme in order to better grasp how this triad has evolved over time. To this end, this study applies a combination of bibliometric techniques such as citations, co-citations, and social network analysis to examine the scientific field of cooperation and competition. The survey conducted resulted in 1151 articles with publication dates between 1963 (Article 1) and 2015 (29 articles). We classified this systematic literature review into three periods of analysis: (1) Period I (1963 and 2000), the big bang approach to competition and cooperation; (2) Period II (2001 and 2009), with competition camouflaged by cooperation; and (3) Period III (2010–2015), the psychology of cooperation and competition.

2.1 Introduction

In recent years, many firms have engaged in various types of cooperative agreements as a strategic response to the uncertainty driven by rising levels of global competition, the emergence of new markets, and rapid technological change.

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Under such circumstances, it becomes difficult for individual firms to gain access to all the resources necessary to developing and sustaining competitive advantages while simultaneously attempting to construct the next generation of advantages. As such, previous research has consistently associated the presence of strong interorganizational relationships with a series of critical results including better innovation, access to markets, the reduction of costs, and higher levels of financial performance. Despite a sharp increase in the numbers and forms of cooperative business relationships, researchers have also noted that such agreements are very often characterized by high rates of failure and subsequent participant dissatisfaction (Park & Ungson, 2001). Research and development (R&D)-based cooperative relationships feature among the core factors explaining the differences in levels of innovation and both between firms as well as between regions. The literature analyses and discusses cooperation between competitors as advantageous within a framework of combining and deploying the resources and capacities of firms otherwise actually engaged in mutual competition (Bengtsson & Kock, 2000). Strategy-based research generally tends to address competition and cooperation as opposite ends of a single continuum. Some authors deem this inappropriate as inherently obliging the selection of one over the other through arguing that one increases at the expense of the other. Applying a definition within this logic infers that firms are either competing or cooperating and this does not amount to coopetition. Coopetition only occurs whenever the same actors are simultaneously competing and cooperating. Within this theoretical framework, propose how the paradoxical simultaneity of competition and cooperation implies that coopetition needs describing along two continua: one of cooperation and the other of competition.

Research understanding the coexistence of competition and cooperation proves crucial to attaining a better grasp of the sheer variety of empirical phenomena that range from technological innovation to institutional change. Analysis of competition studies does furthermore demonstrate that cooperation and the relationships between competitors represent facets frequently overlooked in the broader literature.

Given the importance and the complexity of defining and applying these two concepts, this research aims to chart the evolution of these two concepts. We carry out bibliometric analysis in order to evaluate both just how this theme developed over particular periods and the main sources for the literature. This is currently a method universally deployed to assess the research carried out (Mutschke, Mayr, Schaer, & Sure, 2011), incorporating the application of quantitative analysis and statistical publications such as articles and their respective citations (Thomsom Reuters, 2008), serving to evaluate the research performance as it returns information on every activity in a particular scientific field (Hawkins, 1977; Osareh, 1996).

This contributes through providing a detailed and systematic literature review on the strategic triad—cooperation, competition, and coopetition, charting those

theories and perspectives that have contributed most to this field and, alongside a better overall understanding, enabling the identification of some new trends. We applied a combination of bibliometric techniques such as citations, co-citations, and social network analysis to examine the scientific field on cooperation and competition and resulting in the systematic classification of the literature into three periods: (1) Period I (between 1963 and 2000), the big bang approach to competition and cooperation; (2) Period II (2001 and 2009), competition camouflaged by cooperation; and (3) Period III (2010–2015), the psychology of cooperation and competition.

2.2 Conceptual Framework

To better formulate horizontal strategies, firms need to identify interrelationships between all competitors across multiple dimensions with potential and competitive impact and seeking out different standards and forms of interrelationship. These mutual relationships may reveal early indicators of the emerging presence of new competitors and furthermore assist the firm in processes of self-identification. Above all, the possibility of advantages and earnings and even the need to ensure one's own business survival are factors that in themselves explain and justify organizations striving for such interrelationships and overcoming fears over broadening their range of competitors.

Competitors convey an important factor in studying cooperation as organizational strategies necessarily focus on the feasible possible moves that competitors might come to take. This is a finding that includes arguments from both game and transaction cost theories (Lado, Boyd, & Hanlon, 1997). Ideas developing around issues stemming from game and resource theories provide evidence as to just why coopetition may prove more profitable than mere competition between noncompetitor firms and, in particular, the reason such may prove profitable in relation to the returns on innovation-related activities.

Cooperative and competitive relationships apparently fall at the extreme ends of the spectrum of strategic relationships and alignments. Nevertheless, we may consider the agreements and compromises reached within the framework of competition and cooperation while also highlighting the limitations and advantages of either adopting one or the other in comparison with combining them into strategic alignments. As a result of combinations of cooperative and competitive behaviors, the various options and decisions made within the framework of a strategic alliance are susceptible to identification and differentiation (Bengtsson & Kock, 2000): relationships in which cooperation predominates, relationships in which competition prevails as well as those in which both competition and cooperation coexist, thus termed here as coopetition.

According to these perspectives, competitors are occasionally placed in positions resulting in positive sum games, thus benefiting all participants (the game theory approach). In addition, competitors may sometimes hold similar knowledge and shared market knowledge that fosters and encourages such cooperation (the resource-based approach). Furthermore, from the transaction costs perspective, coopetition is deemed an extremely risky deal as competitors have individual business incentives that may result in opportunistic and free-rider type behaviors (Park & Russo, 1996). This perception of high risk levels might prove an obstacle to cooperation between competitors. Accordingly, some authors have suggested coopetition may not prove a strategy appropriate to the production of future innovations (Nieto & Santamaria, 2007).

In this context of cooperative processes, firms need to clearly grasp that their internal process structures are to be shared with the respective other members of the established alliance and to the extent of fostering new links between chains of value. Hence, the composition of cooperative networks may thus contribute toward strengthening relationships with suppliers, reducing capital requirements, and opening up access to technology and interchanges with knowledge-intensive institutions and firms.

2.3 Methodology

We collected citation data and co-citation indices from the Science Citation Index Expanded (SCI-Expanded), the Social Science Citation Index (SSCI) and the Social Science Citation Index (A & H CI), compiled by the Thomson/Reuters-ISI online databases which contain thousands of scholarly publications and bibliographic information about the authors, affiliations, and quotation references. The survey spanned the Web of ScienceTM Core Collection database in May 2015 and covered articles published in Business/Economics journals without any chronological filter alongside a survey applying the expression ("Cooperation" & "Competition") while incorporating only English language articles. This survey process resulted in 1151 articles with publication dates between 1963 (Article 1) and 2015 (29 articles). In order to analyze the research trends and developments, we classified these articles into three periods: (1) Period I (1963 and 2000), corresponding to the emergence and early years; (2) Period II (2001 and 2009), alluding to the growth and maturation of the field; and (3) Period III (2010–2015), referring to the latest developments.

Regarding the statistical and analytical methods, we initially analyzed the database by a descriptive analysis of the 1151 articles resulting from the data collection process mainly applying graphical methods, frequency tables, and descriptive measures (mean and standard deviation) with these methods also serving for analysis of source countries, the most relevant journals, the coauthoring of standards, and citation analysis.

To assess potential patterns among the articles, we analyzed how the incidence of co-citation given that whenever a set of articles are frequently co-cited, this likely indicates shared and common ideas and thus generally depicting the central themes and intellectual structures for a particular field of knowledge (Leydesdorff & Vaughan, 2006).

2.4 Results

2.4.1 Core Literature

Table 2.1 features the most frequently cited articles on cooperation and competition. Fehr and Schmidt (1999) conclude that there is strong evidence that people exploit their bargaining power in competitive markets, but not in bilateral trade situations, and that people furthermore exploit the advantage of opportunities in voluntary cooperation games, however whenever given the opportunity to punish free riders, stable cooperation gets maintained. Bolton and Ockenfels (2000) describe a simple on game theory-based model built on the premise that both their financial rewards and their relative returns motivate people. This model reports observations on games in which equity is a factor, reciprocity plays a role, and where competitive behaviors are observed. Khanna, Gulati, and Nohria (1998) reveal how the tension between cooperation and competition affects the dynamics of alliances. The competitive aspects of alliances prove more severe when the contribution of any company toward common benefits is high. The authors introduce a measurement for the relative scope of any company within an alliance to encapsulate how the set of opportunities available to each company outside of that alliance generates impacts on their behavior within the alliance and suggesting that companies may deviate from theoretically ideal behavior patterns

With regard to the most cited articles in each of the three periods analyzed (Table 2.2), the four most cited articles published between 1963 and 2000 identically remain the most cited for the period as a whole. In period II (2001–2009), the most cited articles are by Falk and Fischbacher (2006), formalizing a reciprocal theory which takes into account how people evaluate the goodness of an action not only for its consequences but also its underlying intention, and Tsai (2002) who, based on the social network perspective on organizational coordination, investigates the effectiveness of coordination mechanisms for sharing knowledge through intraorganizational networks, which consist of both collaborative actions and competition between organizational units and concluding that the sharing of internal knowledge within an organization with several units requires both a formal hierarchical structure and informal lateral relations as coordination mechanisms. In period III (2010–2015) the two most quoted articles are by Sutter, Haigner, and Kocher (2010), who analyze one public good trial game to suggest

Table 2.1 List of core literature and citations by period

	Article	Overall	Period I	Period II	Period III
1	Fehr and Schmidt (1999)	2045	19	833	1193
2	Bolton and Ockenfels (2000)	1218	4	552	662
3	Khanna et al. (1998)	493	26	239	228
4	Stuart (1998)	487	0	206	281
5	Falk and Fischbacher (2006)	416	0	118	298
6	Teece (1992)	407	85	176	146
7	Tsai (2002)	389	0	124	265
8	Grant and Baden-Fuller (2004)	382	0	127	255
9	Stuart (1998)	321	9	157	155
10	Liebeskind (1996)	317	14	163	140
11	Zollo et al. (2002)	300	0	105	195
12	Das and Teng (2000)	267	0	113	154
13	Hagedoorn and Schakenraad (1994)	266	43	127	96
14	Park and Russo (1996)	246	22	117	107
15	Gnyawali and Madhavan (2001)	245	0	109	136
16	Charness and Dufwenberg (2006)	234	0	42	192
17	Kumar and Van Dissel (1996)	230	22	107	101
18	Masclet et al. (2003)	229	0	83	146
19	Bengtsson and Kock (2000)	229	0	68	161
20	Mowery, Oxley, and Silverman (1998)	222	4	108	110
21	Cachon and Zipkin (1999)	203	3	137	63
22	Lado et al. (1997)	184	11	84	89
23	Simonin (1999)	175	0	100	75
24	Gans et al. (2002)	169	0	67	102
25	Hagedoorn and Duysters (2002)	166	0	70	96
26	Bolton, Katok, and Ockenfels (2004)	165	0	63	102
27	Robertson and Gatignon (1998)	162	6	80	76
28	Hill, Hitt, and Hoskisson (1992)	157	39	62	56
29	Nieto and Santamaria (2007)	156	0	22	134
30	Alper, Tjosvold, and Law (1998)	155	3	88	64
31	Fehr and Fischbacher (2002)	151	0	52	99
32	Park and Ungson (2001)	149	0	46	103
33	Dana, Cain, and Dawes (2006)	146	0	29	117
34	Andreoni, Harbaugh, and Vesterlund (2003)	143	0	46	97
35	Fritsch and Lukas (2001)	140	0	56	84
36	Falk, Fehr, and Fischbacher (2005)	134	0	37	97
37	Chen and Li (2009)	130	0	1	129
38	Beersma, Hollenbeck, Humphrey, Moon, and Conlon (2003)	127	0	48	79
39	Jorde and Teece (1990)	126	49	47	30
40	Piller and Walcher (2006)	124	0	20	104

(continued)

Table 2.1 (continued)

	Article	Overall	Period I	Period II	Period III
41	Rege and Telle (2004)	122	0	28	94
42	Sefton, Shupp, and Walker (2007)	118	0	13	105
43	Che and Yoo (2001)	114	0	59	55
44	Cox, Friedman, and Gjerstad (2007)	113	0	18	95
45	Bandiera, Barankay, and Rasul (2005)	113	0	30	83
46	Katz and Oordover (1990)	113	53	37	23
47	Johnson, McMillan, and Woodruff (2002)	112	0	64	48
48	Schmitz (1999)	111	2	58	51
49	Sudhir (2001)	108	0	69	39
50	Rochet and Tirole (2002)	104	0	49	55

Table 2.2 List of core literature by period (# of citations)

Period I	#	Period II	#	Period III	#
Fehr and Schmidt (1999)	2045	Falk and Fischbacher (2006)	416	Sutter et al. (2010)	68
Bolton and Ockenfels (2000)	1218	Tsai (2002)	389	Kilduff and Brass (2010)	64
Khanna et al. (1998)	493	Grant and Baden-Fuller (2004)	382	Blanco, Engelmann, and Normann (2011)	51
Stuart (1998)	487	Zollo et al. (2002)	300	Gummerum et al. (2010)	39
Teece (1992)	407	Gnyawali and Madhavan (2001)	245	Gnyawali and Park (2011)	37
		Charness and Dufwenberg (2006)	234	Chen et al. (2010)	36
Liebeskind (1996)	317	Masclet et al. (2003)	229	Oezer, Zheng, and Chen (2011)	32
Das and Teng (2000)	267	Gans et al. (2002)	169	Hamman et al. (2010)	32
Hagedoorn and Schakenraad (1994)	266	Hagedoorn and Duysters (2002)	166	Bullinger et al. (2010)	30
Park and Russo (1996)	246	Bolton et al. (2004)	165	Malhotra (2010)	28

that participation rights reinforce cooperation in groups and with endogenous choice groups typically voting for the reward option even while punishment proves even more effective at maintaining high levels of cooperation, and Kilduff and Brass (2010) who, in keeping with the growing popularity of the social networking perspective on various organizational areas, undertake a review on the coherence of research in terms of the main ideas from which the diversity of new research stems before evaluating the indications resulting alongside the current debates and controversies.

2.4.2 Co-citation Network Analysis

The articles that are cited less frequently return a lower level of impact on research in this field and, hence, this analysis focuses only on those articles published up to 2010 receiving at least 50 citations with articles published after 2010 requiring least 20 citations. Based on these criteria, the survey identified 46 articles from period I, 77 articles from period II, and 19 articles from period III. In total, this co-citation analysis spanned 142 articles.

Table 2.3 lists the higher frequency co-cited articles, and correspondingly noting that the articles receiving the highest number of co-citations are as follows: (1) Bolton and Ockenfels (2000) and Fehr and Schmidt (1999) with 925 co-citations; (2) Falk and Fischbacher (2006) and Fehr and Schmidt (1999) with 258 co-citations; and (3) Bolton and Ockenfels (2000) and Falk and Fischbacher (2006) on 221 co-citations.

Based on the arrays of co-citations for each period, we produced co-citation networks. We would note that the period I network includes only those co-citations made between 1963 and 2000, the period II network includes the co-citations between 2001 and 2009 while including articles from both periods I and II with the period III network featuring co-citations between 2010–2015 in articles from across periods I, II, and III. These networks did not include those articles containing no co-citations. For each respective network, we calculated the centrality measures in order to assess the core items in each of the periods under study.

Table 2.3 List of top co-citations in terms of frequency

Citation 1	Citation 2	Co-citations
Bolton and Ockenfels (2000)	Fehr and Schmidt (1999)	925
Falk and Fischbacher (2006)	Fehr and Schmidt (1999)	258
Bolton and Ockenfels (2000)	Falk and Fischbacher (2006)	221
Charness and Dufwenberg (2006)	Fehr and Schmidt (1999)	76
Bolton and Ockenfels (2000)	Cox et al. (2007)	74
Cox et al. (2007)	Fehr and Schmidt (1999)	70
Khanna et al. (1998)	Park and Russo (1996)	62
Fehr and Schmidt (1999)	Masclet et al. (2003)	60
Dana et al. (2006)	Fehr and Schmidt (1999)	56
Bolton and Ockenfels (2000)	Charness and Dufwenberg (2006)	55
Cox et al. (2007)	Falk and Fischbacher (2006)	55
Hagedoorn and Schakenraad (1994)	Stuart (1998)	55
Stuart (1998)	Stuart (1998)	55
Falk et al. (2005)	Fehr and Schmidt (1999)	53
Masclet et al. (2003)	Sefton et al. (2007)	51
Charness and Dufwenberg (2006)	Ellingsen and Johannesson (2004)	50

Table 2.4 Top 10 articles with greatest centrality in Period I (1963–2000)

Article	Degree	Closeness	Betweeness
Teece (1992)	16	50	131.2
Jorde and Teece (1990)	11	57	36.4
Singh and Mitchell (1996)	11	59	40.4
Hagedoorn and Schakenraad (1994)	11	61	14.2
Park and Russo (1996)	11	61	12.4
Khanna et al. (1998)	10	62	6.5
Lado et al. (1997)	7	64	6.5
Hennart, Kim, and Zeng (1998)	7	65	0.5
Katz and Oordover (1990)	5	63	44.0
Motta (1992)	5	63	44.0

Table 2.4 shows the centrality measures for the period I co-citation network. The Teece (1992) article returned the highest degrees of centrality and of centrality betweenness and the lowest level of closeness centrality. Hence, given this article was not only the most cited together but also featured in the greatest number of articles as well as registering various connections between these three items in close conjunction with nearby items and positioned closest to the network's center and thus played a central role in the research into cooperation and competition produced in the period between 1963 and 2000. Other publications with high levels of article-related centrality were Jorde and Teece (1990), Hagedoorn and Schakenraad (1994), and Park and Russo (1996).

Based on the co-citation arrays for each period, we produced co-citation networks. We would note that the period I network includes only co-citations from between 1963 and 2000, the period II network includes co-citations from between 2001 and 2009 including articles from both periods I and II, while the period III network includes co-citations from between 2010 and 2015 returned by articles from periods I, II, and III. These networks did not include any articles containing no co-citations. For each network, we calculated centrality measures in order to assess the core items in each period under study.

Table 2.5 presents the co-citation centrality measures for the period II network. The articles by Khanna et al. (1998) and Teece (1992) ranked highest in terms of centrality and betweenness centrality and with the lowest centrality closeness values. In conclusion, these articles were quoted by the largest number of articles icqç their connections passing nearest these articles and closest to the center of the network in positional terms and, hence, in period II played a major role in shaping research into cooperation and competition. Articles by Stuart (1998), Park and Russo (1996), Das and Teng (2000), Fehr and Schmidt (1999), Grant and Baden-Fuller (2004), and Zollo, Reuer, and Singh (2002) also made a crucial contribution toward research on cooperation and competition between 2001 and 2009.

Table 2.5 Top 10 articles with greatest centrality in Period II (2001–2009)

Article	Degree	Closeness	Betweeness
Khanna et al. (1998)	48	268	329.6
Teece (1992)	43	277	340.5
Stuart (1998)	37	284	215.5
Park and Russo (1996)	37	284	122.1
Das and Teng (2000)	36	278	255.3
Fehr and Schmidt (1999)	36	279	128.2
Grant and Baden-Fuller (2004)	36	286	100.9
Zollo et al. (2002)	36	288	152.2
Tsai (2002)	34	278	299.8
Lado et al. (1997)	34	285	159.5

Table 2.6 Top 10 articles with greatest centrality in Period III (2010–2015)

Article	Degree	Closeness	Betweeness
Khanna et al. (1998)	57	307	309.2
Tsai (2002)	55	272	1424.3
Stuart (1998)	54	311	214.2
Fehr and Schmidt (1999)	51	295	1364.0
Park and Russo (1996)	48	298	396.6
Bolton and Ockenfels (2000)	47	307	639.8
Teece (1992)	47	318	219.9
Hagedoorn and Schakenraad (1994)	44	321	265.5
Das and Teng (2000)	43	289	348.3
Gnyawali and Madhavan (2001)	43	321	194.0

Table 2.6 displays the top ten articles in the core co-citation network for period III. Articles by Khanna et al. (1998), Tsai (2002), and Stuart (1998) reported the highest degrees of centrality with the Tsai (2002), Fehr and Schmidt (1999), and Bolton and Ockenfels (2000) articles holding the highest betweenness centrality while articles submitted by Fehr and Schmidt (1999), Park and Russo (1996), and Das and Teng (2000) reported the lowest closeness centrality. Although these articles were published either in period I or early in period II, they have retained a key role in cooperation and competition research in recent years.

2.5 Discussion

2.5.1 Period I: The Big Bang Approach to Competition and Cooperation

Discussions on the relationship between firm size and innovation were already outdated at this time because the limits on companies had already become distorted over the previous decades. Strategic alliances—constellations of bilateral agreements between companies—were increasingly needed to support innovative activities. Such alliances serve to facilitate complex coordination beyond what the price system can perform while simultaneously avoiding the dysfunctional properties often associated with hierarchical desires and objectives. Antitrust laws and competition policies need to recognize that these new organizational forms are often the functional antithesis of cartels even while potentially displaying certain structural similarities. Thus, a more complete understanding of contracts and bilateral agreements may reveal when and how cooperation supports and does not impede innovation and competition (Teece, 1992). Should innovation and technology prove difficult to disassociate, strategic technology partnerships between companies had already by this time become a subject attracting increasing interest. This interest was present not only among all the companies experiencing this mode of economic organization but also for researchers from a wide variety of academic subjects. Then, Teece (1992) went on to attempt to measure the effects of technology on strategic partnerships involving companies engaged in such joint efforts (Hagedoorn & Schakenraad, 1994). However, having triggered this interest and defense of strategic alliances and cooperation in general, the field then began to defend how companies have to own private institutional capabilities enabling them to ever more effectively protect their knowledge from expropriation and imitation (Liebeskind, 1996). This simultaneously also acts in protection of competition. Thus, despite the undeniable advantages of cooperation, there must be this defense so that competition still remains effective. And the striking of this balance sparked controversy with Park and Russo (1996) defending how the presence of competition between joint venture partners beyond their respective scope of agreement seriously affected the survival chance of this operation. Khanna et al. (1998) reinforce the importance of this issue. They convey how the tensions between cooperation and competition affect the dynamics of learning alliances. “Private benefits” and “co-benefits” differ in the incentives they nurture for investment in learning. The competition aspects of alliances are more severe whenever a private company shares high proportions of common benefits. Stuart (1998) also demonstrates how the intensity of cooperation and its respective level of success interacts with the extent of dominance of the participant companies. Thus, there is this disruption between the importance of cooperation to the success and performance of companies and the simultaneous need for companies to seek out partners for cooperation

among competitors and resulting in another perspective on how the economic environment determines whether the just and fair types or the selfish types of cooperation predominate in the overall behaviors of organizations (Fehr & Schmidt, 1999). Thus, fairness in relations of cooperation began to emerge in the literature stemming from the idea that businesses engage in behaviors based on the premise that people are motivated as much by financial reward as by status. This thus explains the options taken by individual participants in games of observation which incorporate equity as a crucial factor. Finally, this period displays a maturing of concepts appealing to a full understanding of the instability of alliances based on the notion of internal tensions. This encapsulates how strategic alliances represent environments in which conflicting forces develop and perceived as consisting of three vectors of competition, i.e., cooperation in relation to competition, the rigidity against flexibility, and short-term versus long-term orientations. This framework stresses the explanation of the intrinsic vulnerability of alliances in terms of a wide range of their internal contradictions and allows us to take an integrated approach to examining the incidence, dynamics, and eventual dissipation of these inherent instabilities. This furthermore discusses the different interrelationships between internal tensions and their respective impacts on the different types of strategic alliances (Das & Teng, 2000).

2.5.2 Period II: Competition Camouflaged by Cooperation

This period starts out with the study by Gnyawali and Madhavan (2001) detailing how companies incorporate into cooperative networks of relationships that influence the flow of funding between the respective participants. Flow dynamic features and the different structural positions lead to imbalances and competitive behaviors displayed by the most influential companies toward their partners in the network. Tsai (2002), based on the social network perspective on organizational coordination, studies the effectiveness of coordination mechanisms for sharing knowledge in intraorganizational networks, consisting simultaneously of collaborative actions and competition between organizational units, while concluding that the sharing of internal knowledge within an organization consisting of several units requires a formal hierarchical structure and informal lateral relations as coordination mechanisms. At this same time, Zollo et al. (2002) put forward an evolutionary leap in the reasoning behind the economies generated within the context of strategic alliances and examine just how the routinization processes influence the actual level of partnership cooperation agreement implementation. In so doing, they introduce the concept of interorganizational routines, defined as stable patterns of interaction between two companies developed and refined over repeated collaborations before proposing how specific partner features, such as technology and the general accumulation of experience in partnering—influence the extent to which alliances result in the accumulation of

knowledge, creating new opportunities for growth, and enabling partnership participant companies to achieve their strategic goals. This continuity incorporates the returns on innovation obtained through market competition over the product or through cooperation with established companies (through licensing, alliances, or acquisition). It was then argued that the success of these returns depends on imperfections in the ideas existing in the market (Gans, Hsu, & Stern, 2002). Furthermore, because innovation in this period increasingly represents a factor of success for companies, the preferences that companies show and how they apply external sources of innovative skills, such as strategic technology alliances, mergers and acquisitions, or a mixture thereof, were also subject to study. This posited how these choices get shaped by different environmental conditions and firm-specific circumstances, such as those related to business protectionism (Hagedoorn & Duysters, 2002). When companies are already in cooperation processes, at one time or another, the question arises over giving up on or continuing with this alliance. Hence, factors such as the monetary costs of exit come into play against considerations as to how maintaining the cooperation process also enables companies to "watch over" those who would become their competitors (Masclet, Noussair, Tucker, & Villeval, 2003). This again approaches the issues underlying cooperation or competition with the findings indicating a preference for cooperation rather than competition.

This also proves the period when the knowledge society concept and its respective knowledge-based theories trigger an exponential interest among researchers (Grant & Baden-Fuller, 2004). The development of a theory based on the effective knowledge about forming an alliance became inhibited by a simplistic view of alliances as vehicles for organizational learning in which strategic alliances are presumed to be motivated by the company desiring to gain knowledge from its cooperation with others. This then proposes that the main advantage actually stems from market access rather than the acquisition of knowledge. Based on the distinction between knowledge generation and knowledge application, we may grasp how alliances contribute to efficiency in the application of that knowledge; first, by increasing the efficiency with which the knowledge is integrated into the production of complex goods and services and second, by increasing the efficiency of knowledge deployment.

Falk and Fischbacher (2006) formalize the reciprocity theory, which takes into account how people evaluate the goodness of actions not only by their consequences but also by their underlying intentions. This deepened the study of the impact of communication on trust and cooperation and demonstrated its respective level of importance to partnership outcomes. Individuals strive to live up to the expectations of others, to avoid blame and, as such, are susceptible to modeling by recourse to psychological game theory (Charness & Dufwenberg, 2006).

We may therefore conclude how the second period is characterized by efforts to apply different theories to the study of cooperation and competition. This furthermore also verifies how competition exists prior to any cooperation process. Indeed, this mind-set proves difficult to change even during ongoing processes of

cooperation. There is inevitably a very large resistance to companies cooperating without taking a competitive attitude toward their partners in an attitude rendered particularly as competition lies at the very root of the reasons driving the founding of the companies themselves.

2.5.3 Period III: The Psychology of Cooperation and Competition

This period saw the proposal of means to analyze cooperation and competition that perceived emotions such as anger, guilt, and other moral emotions as important drivers of strong reciprocity and the corresponding willingness to sacrifice one's own resources for those of others (Gummerum, Hanoch, Keller, Parsons, & Hummel, 2010). Furthermore, this also raised another approach that deemed personalized social information as an effective tool for increasing the level of public goods provision (Chen, Harper, Konstan, & Li, 2010). Sutter et al. (2010) analyze one public goods game before then suggesting that participation rights reinforce cooperation in groups with choices by endogenous groups typically voting in favor of the reward option even if punishment proves even more effective in maintaining high levels of cooperation. Additionally, Kilduff and Brass (2010), due to the growing popularity of the social networking perspective in various organizational fields, carried out a review of the coherence of the body of research in terms of its main ideas, from which the diversity of the new research derived, while also evaluating the findings and prevailing controversies.

The relationships among the lead actors, perceived as cooperative relations, are commonly assumed to be motivated by the comparative advantage of efficiency gains. However, lead actors may also delegate tasks to avoid taking direct responsibility for selfish or unethical behaviors (Hamman, Loewenstein, & Weber, 2010).

While the principle of competition was identified as conducive to innovation, community-based innovation competitions additionally propose the scope for interaction and cooperation among participants. This duality makes striving for innovation such an interesting field whether for academia or for management practice (Bullinger, Neyer, Rass, & Moeslein, 2010). Thus, an approximately high performance in terms of innovation interlinks with a ratio of stronger or weaker cooperation to a greater or lesser extent. Thus, stronger and higher level cooperative relationships boost the level of innovation.

This period sees the proposal of the "competitive stimulus" decision-making model and incorporating features of the strategic environment (e.g., rivalry and time pressure) as factors driving the motivations underpinning competitive behaviors (Malhotra, 2010). Thus, we arrive at the concept of coopetition, which conveys the simultaneous pursuit of cooperation and competition (Gnyawali & Park, 2011). Coopetition represents a useful challenge to companies seeking to address major

technological challenges in order to generate benefits for partner companies and to foster technological innovation. Coopetition among corporate giants drives subsequent coopetition among other companies to result in advanced technological development. In addition, co-resource competition plays an important role in enhancing common benefits as well as the proportion of these obtained by the respective participant companies.

2.6 Conclusions

The paradoxical characteristics of coopetition are better addressed along two continua: one of cooperation and the other of competition. Coopetition studies with these two continua still remain uncommon. Due to the intrinsic characteristics of coopetition, coopetition decisions may be seen as difficult and counterintuitive. To address this problematic issue, we propose a strategic decision-based approach to coopetition decisions. Given this approach focuses on executives—those responsible for taking strategic decisions—one problematic facet stems from carrying out empirical studies on this group in keeping with perceptions as regards the difficulties in effectively accessing them and encapsulating the actual decision-making processes.

In this article, we do propose the benefits arising from adopting a strategic triad perspective. The problem arises out of the standard models for approaching this strategic triad failing to take into consideration the paradoxical nature of coopetition. The challenge (that should be addressed in future works) involves designing and verifying a descriptive model that effectively considers the two coopetition continua.

Even though barely addressed, decisions nevertheless remain central to understanding coopetition. To deal with this reality, we based our reasoning on strategic choices, a firmly established and well-developed field of strategy.

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Chapter 3
Determinants of University Cooperation Networks as a Mechanism for Regional Development: The Case of Beira Interior (Portugal)

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Abstract The present chapter aims to understand the influence of university cooperation networks on their regional economy. It focuses on the following research question: What are the determinants of university cooperation networks? To attain this objective, we pursued two exploratory case studies in Portugal focusing on firms cooperating with the University of Beira Interior. For data gathering, interviews with key informants and documentary analysis were used. It was found that an entrepreneurial university has a crucial role in attracting firms to its region. Moreover, strong regional partnerships with globally acting firms may represent a solution to slow down the migratory flow of young graduates. In the formation of university cooperation networks, scientific and technological know-how and well-equipped premises are the most attractive factors for firms to engage in cooperation. Again, offering paid work placements for graduates is an important incentive for universities to enter in a network.

3.1 Introduction

Higher education institutions play a determinant role in the economic development of their regions (Etzkowitz, 2003). Since a couple of years, universities are experiencing a change, not only due to the introduction of new laws but also the economic and social development. This leads to universities' so-called third mission. Capitalizing on knowledge is at the heart of this new mission, connecting higher education institutions to the users of knowledge and making the university an economic actor.

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The entrepreneurial university, a concept used by Etzkowitz (1983), describes the various changes universities have been subject to in terms of mission and reflects their more active role in directly promoting the transfer of their research results. When they were initially created, universities' main mission was teaching and development of basic research, and only later did they begin to concentrate on knowledge transfer (Feldman & Desrochers, 2003; Kirby, 2006).

In this context, various studies reveal a considerable increase in cooperation networks between universities and firms (e.g. Franco & Haase, 2015; Meyer-Krahmer & Schmoch, 1998). This is due not only to growing recognition of the importance of university research for innovative activities, but also to structural changes, such as budget restrictions related to public financing. In this way, universities have adopted a more aggressive and 'entrepreneurial' stance in seeking new sources of resources for research (Mowery & Sampat, 2005).

According to Bercovitz and Feldman (2008), universities' relationship with firms has also gained weight due to four interconnected factors: (1) the development of new technological platforms such as computing, cell biology and materials science; (2) the growing scientific and technical content in all types of industrial production; (3) the need for new sources of finance for academic research and (4) the prominence of government policies aiming to increase the economic returns on publicly funded research through stimulating the transfer of university technology.

In this connection, university cooperation networks allow local and regional actors to concentrate their resources on improving their central competences, taking advantage of their partners' complementary capacities in emerging fields (Garette & Dussauge, 2000). These types of cooperation networks are formal links established between independent organizations, so that both parties can attain their goals. Therefore, a cooperation network allows an organization to be entrepreneurial and innovate successively.

However, most research reveals a tendency to carry out case studies and the lack of a theoretical framework to understand the interrelations between the factors affecting the development of entrepreneurial universities' missions (Guerrero & Urbano, 2012), as well as their collaboration with the business world. So to fill these and other gaps in the literature, this study aims to understand the influence of university cooperation networks on their regional economy. This study seeks to answer the following research question: What are the determinants of university cooperation networks?

Under these premises, the main contribution of this book chapter is to develop theory and a better understanding of the effect of university cooperation networks, which can be understood from the perspective of (collaborative) entrepreneurship, inasmuch as this joins the interests of different institutions in fulfilling common projects with influence and the capacity for regional intervention.

The structure of the next sections is as follows: Sect. 3.2 provides a literature review about the entrepreneurial university and university cooperation networks. Here some concepts are discussed along with the main reasons leading universities to adopt these cooperation networks. One important motive for establishing university networks is to facilitate the university–industry cooperation. Section 3.3 offers the description of the research methodology used. In Sect. 3.4, two case studies

about the role of university networks as mechanisms to enhance cooperation with regional firms are described and characterized. By doing so, the various dimensions going along with this will also be presented. In Sect. 3.5, this chapter concludes with some final considerations and implications for theory and practice.

3.2 Literature Review

3.2.1 Entrepreneurial University

Universities have faced various cultural, educational, institutional and legal challenges in order to survive in an increasingly competitive and global environment. As a result of these challenges, entrepreneurial universities emerge with a common strategy centred on being entrepreneurial in all aspects (Etzkowitz, 1983; Kirby, 2006). This is not surprising, since from their creation universities have been considered an innovation to overcome societies' needs. However, universities are complex organizations that include a number of overlapping communities (Finlay, 2004), where the economic benefit of universities locally or regionally is often not very perceptible at a first glance. In this respect, Feldman and Desrochers (2003) discovered this situation can be attributed to the lack of incentives and stimulus for the commercial activity that could potentially have benefited the region. Therefore, the entrepreneurial university appears as an instrument which not only provides a workforce and added value, with the creation or transformation of knowledge, but also improves individuals' attitudes and values. In recent years, universities have emerged as an opportunity since they give examples of good practices, strategies, solutions and recommendations for the authorities and political decision-makers.

According to Audretsch (2009), entrepreneurial universities have a wider role than simply creating knowledge transfer; an entrepreneurial university contributes and provides leadership for the creation of thought, actions and entrepreneurial institutions. This author considers these contributions as 'entrepreneurship capital'. From this perspective, universities are the central actors and have an active role in promoting teaching, innovation, knowledge transfer and entrepreneurship (Guerrero & Urbano, 2012).

The entrepreneurial university is characterized by organizational adaptation to environmental changes (Clark, 1998), its distinctive governance (Subotzky, 1999), with activities directed towards development of entrepreneurial culture at all levels (Kirby, 2002), its contribution to economic development, the creation of new undertakings (Chrisman, Hynes, & Fraser, 1995) or commercialization of research (Jacob, Lundqvist, & Hellsmark, 2003). Applying these parameters, the entrepreneurial university is able to innovate, recognize and create opportunities; work as a team; accept risk and respond to challenges (Guerrero, Urbano, Cunningham, & Organ, 2014). In addition, it can conceive substantial change in its organizational character, adopting a more promising stance for the future (Clark, 1998). In general, these entrepreneurial universities provide their students, researchers and staff with suitable environments to explore business activities. According to this perspective, in economics, the

university's role is considerably wider than simply facilitating technology transfer (Audretsch, 2009). In fact, the entrepreneurial university is obliged to carry out three missions simultaneously: teaching, research and entrepreneurship.

3.2.2 Universities and Regional Development

Universities' role at the regional level can be approached from different perspectives. Modern universities have evolved from the medieval model in which they served as repositories of knowledge and wisdom, with the preservation and transfer of knowledge as the main objectives. Instead, universities' mission has always been redefined, so as to respond successfully to the complex and ever-growing needs of the society and region which support it and with which it is involved. On one hand, the university should reorganize itself according to criteria of performance and competitiveness in the field of scientific research, and on the other, take on new responsibilities in the professional training of the young generation: (1) provide young people with the necessary education for citizenship in a democratic society, (2) transmit the values of a shared culture and (3) contribute to improving people's living standards and developing the community.

Universities are the major producers of fundamental knowledge and they have been claimed to be one of the main drivers of a region's economic growth. Theories of endogenous growth constructed on the information characteristics of knowledge as introduced by Arrow (1962) suggest that knowledge creation would increase the production of more efficient processes and products, consequently stimulating growth (Romer, 1994). In this vein, universities are key elements of transformation of an economy through knowledge, as they have a dominant position in knowledge production. However, for knowledge to be able to contribute to economic development and growth there must be transfer of knowledge to industry, in the form of new business undertakings (Acs, Audretsch, Braunerhjelm, & Carlsson, 2009; Braunerhjelm, Acs, Audretsch, Braunerhjelm, & Carlsson, 2010).

The natural role of universities in regional economic development is less well understood than is often presumed (Bramwell, Nelles, & Wolfe, 2008). According to endogenous economic theory (Lucas, 1988; Romer, 1994), investment in knowledge and human capital creates economic growth. Nevertheless, besides creating commercial scientific knowledge (patents, licences and agreements) and that of qualified research (post-graduate students), universities generate other impacts, such as attracting new business opportunities, jobs, talent and collaboration with local, regional and international agents.

Students can also act as important channels through which knowledge is transmitted to regions' industries. For example, various studies, including Nelson and Gavin (1992) and Murmann (2003) show that students represent a critical channel of the latest theories, scientific research laboratory techniques and know-how to the chemical, pharmaceutical and other industries. Universities' recent involvement in technological development and wealth creation has indeed shown that academic research

has enormous potential for technological applications which are still at an early stage of development and can serve a variety of industrial purposes (Colyvas et al., 2002; Jensen & Thursby, 2003). Here, entrepreneurship is seen as the principal mechanism to ensure the flow of radical technological change in the economy and in economic exploitation of knowledge (Audretsch, 1995; Klepper & Sleeper, 2005).

In the strategy of Europe 2020, the European Union reiterates universities' role in regional development. In this respect, the Practical Guide of the European Commission (2011) presents four mechanisms through which universities can contribute to regional development: (1) increasing regional innovation through research activities; (2) promoting firms, business development and growth; (3) contributing to the development of human capital and regional skills and (4) improving social equality through cultural regeneration and development.

The university's role in regional and local development was also approached with great interest by the Organization for Economic Cooperation and Development (OECD). Ahmad and Seymour (2008), in an OECD study, suggest a set of criteria that should be taken into consideration in assessing a university's role in local and regional development: (1) knowledge creation through the transfer of research and the latest technology; (2) the transfer of knowledge to society through education and human resource development and (3) cultural and civic development of the community, which can create ideal conditions for innovation.

3.2.3 University Cooperation Networks

The model of the university with an entrepreneurial spirit has been increasingly highlighted in recent decades, opening the path for universities' participation in local and regional terms (Clark, 1998). For example, Pawłowski (2009) believes that one of the most important factors influencing local and regional development is inhabitants' entrepreneurial behaviour and innovative spirit, and gives universities an essential role in stimulating this behaviour.

Universities' contribution to local and regional development can also be understood in terms of training and strengthening formal and informal connections/networks in order to attain social, civic and cultural objectives. Therefore, universities that benefit from well-organized networks in the regions they belong to can exert a significant influence on local and regional development. University cooperation networks bring mutual benefits to those involved, qualified human resources, the use of research and development units for innovation or improvement of products and services. Indeed, according to Goldstein (2010), much of the literature dealing with the role of universities and regional economic development focuses on the importance of considering universities as 'drivers' of the regional economy, as a result of their multiple interventions.

The university–industry relationship begins when a firm looks for a research partner to solve a particular problem, or pursues help or cooperation for a technology supplier's research. In this context, firm seeks to create bonds with the local

university to facilitate the exchange of knowledge and technology (Lee, 2000). According to Etzkowitz (2003), the literature shows that the most common strategies are joint ventures in research and development (R&D) contracts, where both parties share costs; agreements where the university supplies human resources and the firm provides the material resources that can be paid for in cash or in R&D; licences for permission to use intellectual property.

Thus, one important motive for establishing university networks is to facilitate the university–industry cooperation. In this sense, university cooperation networks receive attention as mechanisms allowing several organizations to share resources, overcome resources shortages and enhance their innovative capacities. Nevertheless, despite their increasingly frequent application, certain doubts still remain concerning university cooperation networks, in particular with regard to the motives, success factors, obstacles and benefits underlying such relationships. Scrutinizing these aspects is the objective of the present study.

3.3 Research Methodology

3.3.1 Research Design and Case Selection

In order to fulfil the research objective, this study adopted a qualitative research design, in order to gain an in-depth understanding of the potential role of university cooperation networks for regional development. Qualitative research essentially promotes an understanding of problems from the perspective of the subjects of the research. This approach allows a thorough description of a phenomenon, since it aims at understanding, in detail, individuals' points of view on a given matter. However, it lacks the ability to generalize the findings (Neuman, 2010). Within the qualitative approach, the case study method was chosen (Yin, 2014). The case study consists of studying a phenomenon, limited in time and action, and allows detailed information to be collected (Rowley, 2002).

As the university cooperation network partner, the University of Beira Interior (UBI) was chosen. The UBI is located in the Portuguese town of Covilhã, previously considered the 'Portuguese Manchester', due to the long tradition, dynamics and quality of its woollen products. However, in the 1970s, Covilhã was hit by a crisis in this industry: large and small factories began to show serious weaknesses which led to their closure, with disastrous social and economic consequences for that inland region of Portugal. In this scenario, the idea emerged to create a higher education institution in the region, so as to provide its population with the possibility of continuing their post-secondary education without having to move to other parts of the country, which usually meant leaving permanently. It was therefore decided to choose the UBI and try to discover the role this university plays for regional development.

As for the university cooperation partner, the decision felt on a multiple exploratory case study, analysing the cooperation of UBI with Portugal Telecom's (PT) Data Center (case 1) and Altran (case 2). The two firms set up in the region of Beira Interior are large scaled and have a formalized cooperation with UBI.

3.3.2 Data Collection and Analysis

Among the techniques of qualitative research, the interview, documentary analysis and participatory observation (all used in this study) are some that respond best to the characteristics of this research approach (Patton, 1990; Yin, 2014). These techniques put the researcher in direct contact with those involved (in this case, UBI, PT Data Center and Altran) and allow detailed understanding of each one's situation and the interrelation existing between UBI and these firms. As Yin (2014) mentions, it is important to find out the actual situations in their real and time dimensions, the 'here and now' in their social context.

To carry out these two case studies, key informant approach was used, and so the head of each institution was interviewed, the person who defines its strategy, namely the Rector of UBI, the General Director of PT Data Center and the Director of Human Resources in Altran. The three interviews, based on different scripts, were held in July and September 2015 and lasted 1 h on average.

In research of a qualitative nature, recourse to analysis of existing and published documents is also of value (Yin, 2014). The use of documents in this study (documents about the development of UBI and the firms, internet sites and collaboration protocols between UBI and PT Data Center and between UBI and Altran) allowed the time dimension to be added. Such documentary analysis favours comprehension of the process of evolving or maturing of the phenomenon subject of analysis.

Data analysis was carried out through their triangulation, since there was more than one source of information (Patton, 1990), i.e. it was done through articulation between the evidence drawn from the field work and the documents studied. Crossing the information obtained (interview and documentary analyses) allowed improvement and greater reliability of the research (Yin, 2014). The information was also systemized in quotations from the statements gathered from the interviewees and in a table created to allow comparative analysis.

3.4 Findings

Two case studies about the role of university cooperation networks as a mechanism for regional development are described and characterized according to the underlying motives, success factors, obstacles and benefits. Indeed, this section shows how these factors determine university cooperation networks.

3.4.1 Characterization of the Parties Involved

3.4.1.1 University of Beira Interior

As referred to earlier, the UBI is a State Institute of Higher Education, situated in the town of Covilhã, Portugal. The UBI has its origins in 1973 with the founding of Covilhã Polytechnic Institute, being the first higher education institution in Covilhã. In 1975, this Institute received its first 143 students in three courses. The institution became the University Institute of Beira Interior in 1979. Finally, in 1986, it was renamed University of Beira Interior and granted full university status. Currently, UBI has around 6900 students and 1100 collaborators spread over the five faculties (Arts and Letters, Sciences, Health Sciences, Social and Human Sciences, Engineering).

3.4.1.2 PT Data Center

The PT Data Center, established in September 2013 in the city of Covilhã, has an outstanding capacity to hold and manage information technology and cloud computing infrastructure. This eighth Data Center of Portugal Telecom aims to strengthen the country's capacity as a centre for exporting storage capacity for firms' data and technological services. The investments made this facility a cornerstone of Portugal Telecom's cloud services. PT Data Center is internationally certified by the Uptime Institute as Tier III, a certification that underlines its high level of performance, security and availability. With a Power Usage Effectiveness ratio of 1.25, Data Center is a reference worldwide.

3.4.1.3 ALTRAN Portugal

The Altran Group, a French multinational, already exists for 30 years. It has over 20.000 collaborators, 500 key-accounts worldwide and operates in more than 20 countries. The group has had a presence in Portugal since 1998, the Altran brand being consolidated in 2009. They have worked with clients for 14 years, carrying out projects and responding to market challenges. In July 2013, Altran Portugal established a training academy in partnership with UBI, the Fundão Local Authority and the Employment and Professional Training Institute (IEFP) overseen by the Ministry of the Economy and Employment. This academy war created in the sphere of the advanced training centre in the city of Fundão. As a result of the training, 50 % of trainees have guaranteed employment, through a work-placement contract signed with Altran and the training academy.

3.4.2 Case Analyses

Presentation and interpretation of the information gathered was based on various dimensions. These dimensions are presented and analysed later: motives, success factors, obstacles/difficulties and results/benefits.

3.4.2.1 Motives

Regarding the motives for forming protocols/partnerships/networks among the organizations analysed, they are found to provide benefits for those involved. In this connection, the Rector of UBI stated:

—"*That is the principle of the cooperation, that both parties should benefit*". This principle is also sustained by Teng and Das (2008), as in their essence, networks allow the organizations involved to combine their resources creatively to establish competitive advantages. As Lewis (1992) argues, networks unite cooperative strategic schemes, with the main objective of satisfying the needs of the parties involved, and the advantage of sharing risks. One of the conditions for forming cooperation networks, according to the same researcher, arises due to the shortage or absence of resources. A cooperative relationship implies the understanding that the parties involved are open to exchange and share resources and skills, in order to create value and develop additional resources and capacities, to reach a competitive advantage. From the results obtained, the university (UBI) networks established with the two firms (PT Data Center and Altran) are motivated by the needs felt by all parties, more specifically the partners' critical and limited resources.

UBI takes on entrepreneurial tasks, advertises knowledge and creates firms. In addition, firms acquire an academic dimension, share knowledge among themselves and develop higher and higher levels of skills. On this aspect, the Director of Data Center mentions that:

—"*UBI was ready to create master or post-graduate courses, through the Faculty of Engineering, which would respond to the needs of Data Center Covilhã*". Indeed, in the market study made by Portugal Telecom to discover the best place for a Data Center in Portugal, UBI appeared as an important point, not only due to the educational supply with great know-how in the most relevant areas for this type of infrastructure, information technology, but also because the land available for the premises was already used by the aeronautics course at UBI. However, according to the interviewee from Data Center, "*decisive were the negotiations with Covilhã Local Authority, which dealt with getting the land, as well as all associated matters, particularly with the water supply among others*".

When asked, the interviewee from Altran said that:

"*With this initiative/network, we took one more step towards the 'nearshore' Centre becoming a reference in Portugal and also somewhere promoting technology and job creation in the country! The training we carried out is directed to 25 final-year students, and Altran will recruit 50 % of this group of trainees, that is, the ones who show they benefited most from the training*".

"*This cooperation network with UBI, IEFP and Fundão Local Authority let us launch the academy, which showed itself to be an excellent opportunity for new graduates to become part of a multinational firm and work on international, challenging and innovative projects*", added the Director of Human Resources at Altran.

The Rector of UBI also mentioned the fact of: "*Altran Portugal presenting an investment proposal for the amount of 12 million euros aiming to create 200 new jobs by 2018, to be created mostly in Fundão following expansion of the Nearshore Centre activities, in developing solutions in the sphere of critical systems and real time applications, machine-driven big data & connectivity solutions, included in the global supply of 'intelligent systems'. It will also develop projects related to R&D and complex connectivity solutions related to the internet of things*". Therefore, a university like UBI is unquestionably found to benefit from coming closer to the business world as an appropriate line of action given the real needs of the socio-economic environment it is part of.

Hence, from the evidence obtained, the cooperation networks between UBI and the two firms studied here are a fundamental instrument for consolidating common objectives based on optimization of their scientific-technological potential and their competitive capacities.

3.4.2.2 Success Factors

Concerning the critical success factors of the cooperation network between UBI and PT Data Center as well as between UBI and Altran, the Rector of UBI stated that "*it is relational capital*", the dominant factor for the success of these and other cooperative relationships. On this aspect, he also underlined that:

"*The greater the benefits and advantages achieved for both parties the greater the capacity for future understandings. UBI aims to attract new students from all regions of the country, but in addition wants its graduates to be employed in firms in the region so as not to abandon an area that is already at a disadvantage due to its inland situation and the almost total loss of the woollen industry in the region*". The partnership with Portugal Telecom also aimed for the internationalization of UBI, promoting a direct link with Brazil, since Portugal Telecom was connected to the Brazilian Oi telecommunication company, which would allow a close link with Brazil in attracting new students to UBI.

Furthermore, the head of PT Data Center seeks highly qualified staff in the specific areas of its operations. The interviewee stated that: "*UBI always showed great willingness to analyze training proposals and within its capacities always gave a positive answer, providing not only its lecturers, researchers and premises for training or actions considered pertinent for Data Center*". This interviewee also said that "*the idea emerged for joint publicity with hoardings placed in various towns in the north of the country so as to highlight the UBI-Portugal Telecom partnership and so attract young people to the areas of information and communication technology*".

3.4.2.3 Obstacles/Difficulties

The cooperation networks studied here (cases 1 and 2), while presenting numerous advantages, also face some obstacles and difficulties in their implementation. This reinforces the idea of Todeva and Knoke (2005), warning of cases where cooperative relationships can present doubts which become a difficulty, when new structures, new practices and different movements between partners must be carried out. In these circumstances, the Rector of UBI highlighted as an obstacle of the networks formed:

—"*the change in the administration of Portugal Telecom, causing negotiations to become less dynamic, since the commitments taken on by the previous administration were maintained. In truth, it has not developed from that date, and now we are waiting for a meeting with those now in charge of ALTICE, the new owner of the Covilhã Data Center*".

In this aspect, the Director of PT Data Center stated that "*these were matters out of the hands of the Data Center Covilhã management, but in one way or another limited the collaboration between the Data Center and other institutions obviously including UBI. Despite maintaining the existent cooperation, the truth is that in this period of uncertainty, collaborations have not made progress*".

Summing up, the Rector emphasized that:

—"*The main obstacles arise from our location, our isolated situation (…) problems of density. We don't have a young population, there's a relentless flow of people, who leave the region, and more recently, to go abroad, a new migratory flow*". Here, and considering the Rector's observations, attracting firms like PT Data Center and Altran is also a way to slow down this exodus, holding on to the young people who graduate in the area of information technology at UBI.

As an obstacle, the Rector of UBI also pointed out the relationship with Covilhã Local Authority, stating there is no "*perfect inter-institutional cooperation with the local council*" in the use of infrastructure, also saying that "*Fundão, for example, provides another type of conditions*".

In this context, Teng and Das (2008) concluded that obstacles between organizations can arise in relation to human, technological, physical and organizational resources. The authors added that a network can facilitate partner equity in the concern about opportunism in partnerships, for example, preventing an opportunistic partner for leaving immediately after benefiting from the other party. Moore and Weiler (2009) mentioned that greater attention is essential in relation to network processes. Elements such as commitment, trust, open communication, flexibility and the capacity to manage conflicts are factors to take into consideration.

Based on the study made here, the management and subsequent implementation of university cooperation networks are not found to be free from difficulties. If it is true that a partnership can be achieved successfully so that the parties involved obtain mutual benefits, it is also nonetheless true that the implementation and development of cooperation networks can lead to negative results.

3.4.2.4 Results/Benefits

Although difficulties can limit the formation of networks, it is likely that through this cooperative strategy, the organizations involved can achieve a greater dimension, share costs and risks, obtain organizational gains and stimulate learning. In Portugal, the new Teaching Career Statute RJIES (Decree-Law No. 205/2009, of 31 August 2009) is seen as a determinant factor in incentivizing university–industry cooperation. For example, Article 4 of the Statute, on the duties of university lecturers, states that it is their responsibility to "*participate in tasks of university extension, scientific dissemination and increasing the economic and social value of knowledge*". Therefore, and regarding the initial expectations and goals to be reached by the networks studied here (cases 1 and 2), the Rector of UBI stated:

—"*The initial expectations were to attract new students specifically to areas in which UBI has enormous expertise and has premises and laboratories able to respond to the needs of firms we cooperate with, namely in information and communication technology, electromechanics, electrotechnics and computing*".

The Rector also mentioned "*the importance of the protocol in academic training, because besides attracting new students to the institution, it also allows the preparation of future specialized professionals in the area of information technology and cloud services for the Technological Centre of the Portugal Telecom Group, allowing retention of those graduates, through paid work-placements, in both the Covilhã Data Center and Altran*".

In this connection, the Director of the Data Center said that:

—"*It is also our aim, through this network, as was foreseen in the scope of the collaboration, to include UBI graduates in the Trainee Programme, which aims to provide Portugal Telecom with younger human capital, bring new forms of knowing, thinking and acting, and also to attract, employ and retain young people with great potential. We believe that only through attracting, employing and retaining young people with great potential will we continue to be a firm of excellence that innovates and banks on quality. In this respect, UBI's contribution has been fundamental.*"

Then again, according to the networks formed, the partnership between UBI and Altran aims for close collaboration between the university and the firm in the fields of research, technological development, recruitment of graduates in computer and electrical engineering or similar and work placements. Altran can also open up places for curricular or extracurricular work practice of different lengths, as suits the company.

To sum up, UBI is a prestigious institution, with technical, scientific and human resources in the area of greatest interest to PT Data Center and Altran, i.e. information technology, as well as the appropriate technical means for this purpose.

3.4.3 Comparative Synthesis

Table 3.1 shows for each organization studied here, the motives and success factors, as well as the obstacles and potential results in implementing the cooperation networks.

Table 3.1 Comparative synthesis

	UBI	PT Data Center	Altran
Motives	• Increase student numbers	• Moving away from major urban centres	• R&D projects
	• Retain UBI graduates in the region	• R&D projects	• Academic know-how
	• Business know-how	• Academic know-how	
Success factors	• Highly qualified human resources	• Connection to the Brazilian Oi	• Firms that operate worldwide
	• Research laboratories with the latest technology	• Firms that operate worldwide	• Providing paid work placements to UBI graduates
	• Own training centre	• Providing paid work placements to UBI graduates	
Obstacles/difficulties	• Low state funding	• Serious economic crisis leading to the sale to ALTICE	• Migratory flow of young graduates
	• Isolated situation	• Migratory flow of young graduates	
	• Migratory flow of young graduates		
Results/benefits	• Retaining UBI graduates in the region	• Highly qualified staff in different areas, but mainly information and communication technology	• Highly qualified staff in different areas, but mainly information and communication technology
	• Interlinking science and research		• Work placements

3.5 Conclusions and Implications

In today's world, universities play an ever-increasing role. Besides their traditional functions of teaching and research, they are challenged to contribute to the economic and social development of a region and society in general. Cooperation networks between universities and local firms represent an opportunity to promote and develop skills in the different fields of knowledge, so impacting their regional economy. In this connection, the present study focused on the determinants of university cooperation networks. Based on the empirical evidence obtained by this study, it can be deducted that inter-organizational cooperation networks are a specific type of

entrepreneurship, namely collaborative entrepreneurship, in that they join the interests of different organizations in achieving common projects with value and social intervention, facilitating integration and openness, in this specific case, of UBI.

Concerning the motives for creating the partnerships studied here, UBI intends to match its academic training with the region's new technological situation stimulated by the arrival of PT Data Center and Altran. Similarly, its aim is to ensure that its related faculties, department, centres, services and offices and/or other entities use the means and services of the Portugal Telecom Group, particularly the technological platforms provided by the Data Center. This firm, in turn, aims to collaborate in adapting and implementing UBI's new academic training, and concentrate its efforts on providing, and ensuring that the other firms in the Portugal Telecom Group provide their technical means and services whenever requested by UBI.

Altran seeks close collaboration with UBI in the fields of research, in placing specific problems for technological development, recruitment of graduates in computer and electrical engineering or similar and work placements. Through this type of partnership, it is possible to promote development of better employability and stimulate a process of lifelong learning through training.

As for the critical success factors for the formation of cooperation networks, the scientific and technological know-how of the university with premises equipped with the latest technology directed to teaching and to development of scientific research is the most attractive factor for firms to engage in cooperation. Again, offering paid work placements for university graduates, ideally at an international scale, is an important incentive for universities to enter in a network with local firms.

Among the obstacles found, the most serious ones are due to the isolated geographical location, problems of population density, an ageing population, the relentless exit of people from the region, more recently to foreign countries, in a new migratory flow. In fact, the sustainability and competitiveness of the Portuguese economy is greatly affected by unprecedented mass emigration of qualified people, meaning the loss of hundreds of thousands of young people with a high productive capacity, and by a negative return on the major investment made by Portugal in educating the most qualified generation ever. Young graduates see greater monetary rewards, career progression and greater labour stability in other countries than that offered in the region of Beira Interior.

As for the expected results/benefits, it came evident that a strong network between a higher education institution such as UBI and globally acting firms such as the PT Data Center and Altran may represent a solution to slow down the exodus of highly qualified young people. Therefore, the empirical evidence obtained allows the conclusion that UBI has a crucial role in attracting firms to the region, as is the case of the PT Data Center and Altran, leading to the retention of senior staff trained by the same university. UBI's collaboration with these firms is vital for development of innovation and growth strategies. With the formation of university cooperation networks such as those studied here, it is possible to strengthen economic, social and technological development at the regional level aiming to promote continued investment in the area of information technology, as well as adapting academic training at UBI to the new technological situation in the Beira Interior region stimulated by the arrival of both PT Data Center and Altran.

This study presents implications for theory and practice in this field of research. Based on the empirical evidence obtained from the two case studies, the intention is to contribute to knowledge of entrepreneurial universities' role in promoting development in their regions, and more specifically identify the bonuses generated for higher education institutions, for firms and society in general. As stressed by Perry and Wiewel (2005), jointly with local government, universities and firms are key actors for regional development.

In practical terms, UBI is seen as important in attracting firms to the Beira Interior region, but it is local, regional or national government, through their policies, that can be decisive in attracting firms to the area. It is goodwill and providing conditions that will make firms set up in isolated regions. Therefore, the action of Covilhã Local Authority was determinant in securing the PT Data Center and that of Fundão Local Authority in securing Altran. With these partnerships between several local agents/actors, a direct impact on job creation in the region is hoped for as well as a stimulus for the regional economy through employing the working-age population in various types of services (accommodation, restaurants or transport).

Finally, this study presents some limitations, principally the fact of being limited to only two cases/networks. Given this limitation, it is suggested that future studies consider other cases/partnerships, as well as the involvement of more organizations with cooperation protocols, so that a comparative study can be made.

Another limitation is related to the fact of cooperation networks being integrated in a framework of constant change and instability, and this phenomenon can influence the research. Indeed, a cooperation network is a complex process in constant change, as partners join and strengthen their partnerships for their own specific purposes and others abandon the project. In case 1 studied here, the sale of PT Data Center caused stagnation of the collaboration partnership with no further development at the time of this study.

Due to the above, it is suggested that future studies include local government bodies, namely local authorities, since they also play a decisive role in attracting firms to the region. Negotiations in terms of granting premises and other types of logistic support can be handled more directly with local government entities. Consequently, future research should analyse the role of government policies in regional development.

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Chapter 4
Cooperation and Networks in Small Wineries: A Case Study of Rutherglen, Australia

Vanessa Ratten

Abstract Due to the high resource costs and global competitiveness of the wine industry it is important for businesses to cooperate and form networks. This is especially crucial for the sustainability and growth of small wineries that compete based on the quality and reputation of their products. This chapter will focus on the cooperation and networks of wine producers in the Rutherglen area of Australia. The small business strategies of the wineries in this area will be discussed in terms of family businesses, newcomers, and investment partners. The belief in coopetition for small wineries will be explained and how this has resulted in the region being at the forefront of the Australian wine industry. The spirit of innovation in the small wineries business strategy will be explored by taking a case study approach focusing on Campbell's Wines, one of the oldest family owned wineries in Rutherglen. Suggestions for future innovation based on small business strategies will be discussed.

4.1 Introduction

The wine industry is part of Australian society due to its cultural and landscape applications (Dowling, 1999). Small wineries are important to the economic development of regions as they provide financial security and employment (King & Morris, 1997). The role of small wine producers to the economy comes from a wine maker's know-how and expertise being part of its valuable resources (Alonso, 2015). Australia is the fifth largest exporter of wine in the world and has a large number of small wineries located in rural regions (WineAustralia, 2012). There are more than 2572 wineries in Australia making the country among the top ten wine producers in the world. The competitiveness of the Australian wine industry has been attributed to the cooperation and networks existing among small firms.

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The wine industry is a focus of both regional and national governments because of its economic performance. Old world wineries usually refer to European wines with a long wine making history (Cambourne et al., 2000). Old world wine regions have focused marketing on their regional characteristics and new world wine regions have followed similar strategies (Magistris, Groot, Gracia, & Albisu, 2011). New world wines refer to countries with more recently established vineyards and this includes Australia (Frochot, 2000). Despite the century old tradition of wine producers in countries like Australia they are still considered new world wines (Strickland, Smith-Maguire, & Frost, 2013).

Soosay, Fearne, and Dent (2012) discusses how the Australian wine industry has been successful due to its cooperative strategies and use of networking to encourage cooperative behavior in terms of economic and social relationships. Networked firms are a feature of successful industries as they encourage collaboration. The resource-based view has been adopted to explain the competitiveness and clusters of firms (Li & Geng, 2012). The networks and collaboration of small firms in the Rutherglen wine region have consequences for the internationalization of the industry as they utilize both financial and nonfinancial resources for their global competitiveness. A central theme in research about small firms is the benefits that might be achieved from collaboration and networks (Ratten, 2006). This chapter is concerned with small firm research, as it examines the benefits of collaboration to a wine region.

The Rutherglen wine area has a uniqueness that gives it a competitive advantage in the global wine industry due to its tradition of making wines with a regional flavor. Despite the importance of the Rutherglen wine industry to the Australian wine market, there is still little known about small firm strategy and networks in the region. This is due to there being much global competition for wine particularly for small niche producers. Many small wineries promote family heritage as a way to compete in the global market. An example of this is Sorrenberg winery in the Mosel river in Germany, which has over a 500-year history of winemaking (Strickland et al., 2013). Marketing about family heritage and the small size of wineries is important (Vaudour, 2002). This chapter focuses on small firm and strategic competitiveness of Rutherglen wineries by analyzing a small family winery in Northeast Victoria, Australia. Campbells Wines is well-established family owned winery that has a history with the industry (Strickland et al., 2013).

Previous research has focused on wine heritage and the importance of marketing for global competitiveness (Beverland, 2005). The wine industry is connected to the socioeconomic and environmental sustainability of a region (Alonso, Bressan, O'Shea, & Krajsic, 2015). In addition, there have been significant developments in the wine industry due to changes in consumption patterns and technological advancements (Alonso et al., 2015). Some old wine countries such as Spain have seen a decrease in domestic consumption (Alonso & Liu, 2012). Alonso et al. (2015, p. 66) state that the 'new world wine group' represents "wine countries predominately located in the Southern Hemisphere, particularly Argentina, Australia, Chile, New Zealand and South Africa, and some in the Northern Hemisphere, such as Canada and the USA (California)." The Australian wine industry is a new world wine producing country that has developed because of its networks and innovation strategies.

The wine industry is an agricultural industry typically associated with European tradition. Small family owned wineries are the norm in the Australian wine industry (Frochot, 2000). In order to highlight the small family owned wineries, Australia's first families of wine was established in 2009. This chapter focuses on the gap in the research by examining the purpose of small firm strategies and networks in wineries. The main research question of this chapter is: Why use small firm strategies and networks in regional wineries for their global competitiveness?

This chapter is structured as follows. First, the importance of small firms to the wine industry is discussed. Second, the resource-based view of the firm is explained as the theoretical framework. Third, a case study of Campbells Wines a small family owned winery in Rutherglen is analyzed in terms of clusters and networks helping drive global competitiveness. Finally, the chapter concludes by discussing implications for small firm strategies in the wine industry.

4.2 The Resource-Based View of the Firm

A firm's resources provides the foundation for its long-term goals and strategic direction (Alonso, 2015). Resources are generally defined as anything that is a strength or weakness for a firm (Wernerfelt, 1984). The resource-based view of the firm is a prominent theory in strategic management and small business research. The key emphasis of the theory is how resources lead to competitive advantage. Grant (1991) discusses resources as being the basis for profitability and capabilities involve the use of capacity of resources to perform. This means that resources usually involve the more tangible aspects of a firm and capabilities more the process elements (Alonso, 2015). Barney (1991) proposed that resources need to be valuable, rare, inimitable, and nonsubstitutable in order to derive a competitive advantage. The resource-based view has been applied to analyze the competitiveness of the wine industry (Alonso, 2015). This is due to the wine industry utilizing resources for their competitive advantage. The resource-based view of the firm is useful to understand strategy in the wine industry as it helps explain the distinctive resources impacting global competition. A study by de Oliveira Wilk and Fensterseifer (2003) studied wine clusters in Brazil by applying a resource-based view framework. Wine firms utilize resources to strategize and compete in the global market. Wine is considered as a distinct resource as it often is a niche product based on authentic branding (Beverland, 2005). This is due to wine having cultural and historical linkages due to the connections with regions (Alonso, 2015). As part of Barney's (1991) seminal article on resources, there are historical-dependent resources that affect competitiveness. This historical resource can include family heritage, which is used in the marketing of wines particularly for niche markets (Strickland et al., 2013). Holland, Smit, and Jones (2014) in a study about Canadian wine regions discussed how emerging wine destinations focus on regional culture for their competitiveness. Regional resources important for wine companies include cultural, environmental, human, and symbolic aspects (Holland et al., 2014). The case of Rutherglen provides a link with the resource-based view of the firm and incorporates small firm network strategies, which are discussed in the next section.

4.3 Small Firm Network Strategies

Networking activity both internal and external to a cluster is an entrepreneurial process for firms (Dubini & Aldrich, 1991). Networks enable firms to access valuable resources including knowledge and information (Ratten, 2007). Social networks are particularly important for building reputations and for social legitimacy (Sorenson, 2003). To develop social networks it is important that trust exists between partners (Ratten, 2013). This is due to trust forming the basis for relational exchanges (Granovetter, 1985). Trust enables collective learning to occur through the sharing of resources (Ring & Van de Ven, 1992). External networks utilize trust as a way to disseminate important strategic information affecting a firm's competitiveness (Ratten, 2014). These external networks include knowledge about ideas and practices that lead to innovation (Parker, 2010). Firms can build their competitiveness when they have innovation systems, which integrate localized relationships with international networks (Cooke, 2005).

The resource-based view is useful to understanding the role of networks and clusters in an industry. This is due to resources such as cultural and social traditions, heritage and identity being linked to the ability of a network to achieve global competitiveness. There are usually networks of interfirm linkages that exist in geographic clusters (Greve, 2009). In networks, firms share knowledge and information about behavioral intentions (Powell, 1991). Networks are helpful for firms to utilize labor and inputs in order to collaborate with other firms. Firms that have networks with international linkages incorporate dynamic adoptive systems (Cooke, 2005). The success of a firm largely depends on the effectiveness of their external networks (Ratten, 2015). In natural resource-based regions wine networks play an important role in building institutional support for strategic change (Bas & Kunc, 2012).

The wine industry utilizes external networks to sell and market their products (Giuliani, 2013). Beverland (2009) in a study of wine marketing managers found that relationship between buyers and sellers of wine affects competitiveness. External shared resources are important to firms in a network. Networks have contributed to regional economic growth due to their social and market connectivity (Maskell & Lorenxen, 2004). Small firms utilize network-based policies to encourage regional development. Networks are helpful in contextualizing an entrepreneur within a social environment (Low & MacMillan, 1988). Entrepreneurs utilize different types of networks depending on the stage of a business.

Formal networks consist of accountants, banks, and lawyers who have knowledge and contacts from their professional expertise. Formal networks are commonly utilized when entrepreneurs have specific information they require. Informal networks include family and friends, which although not always business related impacts the success of entrepreneurial ventures. The entrepreneurial process has shifting networks of social relations that facilitate business development. These networks facilitate linkages between entrepreneurs, opportunities, and resources (Low & MacMillan, 1988). Networks are an integral part of new business formation as they help diffuse and apply knowledge. This is helpful in selection and retaining the most appropriate knowledge given the business circumstance.

Individuals utilize networks in different ways depending on the social factors affecting information processing. Cognition and behavioral traits help to process how information is acquired and the way it is used by entrepreneurs. New venture creation involves a multistep process from starting a venture, the environment surrounding the venture, and how the venture is processed. Entrepreneurs create value when they utilize networks based on situational and environmental factors. Cooperative networks and small business clusters provide competitive advantages for regions when resources are bought together (Deery, O'Mahony, & Moors, 2012). Resources in cooperative networks can include complementary or dependent sources of activities from a firm's value chain. The wine industry benefits from incorporating a range of stakeholders within a certain region (O'Mahony, Hall, Lockshin, Jajo, & Brown, 2006).

Networks involve geographic concentrations of interconnected firms that are linked by a common interest (Novelli, Schmitz, & Spencer, 2006). Due to the complementarities of firms within a specific region networks facilitate cooperative behavior. The cooperation might be in the form of economic and social relationships that facilitate communication (Deery et al., 2012). The key feature of networks to operate efficiently is that they are mutually dependent on the sharing of resources (Hall, Cambourne, Macionis, & Johnson, 1997). This facilitates partnerships to develop based on the pooling of resources that enhance efficiency. Networks are especially important in regional ecosystems due to their ability to leverage resources from different stakeholders. There are four main categories of networks important in facilitating business development: action sets, business dyads, organizational sets, and tourism networks (Hall, Johnson, & Mitchell, 2000). Deery et al. (2012) utilize these categories to discuss their importance in the wine industry. Action sets happen when interacting organizations work together for a common goal (Hall et al., 2000). This is important for small wine firms that utilize regional names as part of their branding. Business dyads occur when two businesses collaborate for a common purpose and goal (Deery et al., 2012).

In wine regions, often wineries and tourism operators will join forces to market their products. Organizational sets usually happen when a number of firms form a group centered around a common goal. For wine firms, the establishment of groups or associations helps provide information and knowledge (Deery et al., 2012). Tourism networks are evident in wine regions as the making of wine individuals often want to experience. When businesses work together social capital is increased and used for a specific purpose. The development of networks for small firms is sometimes hard as it takes time to establish fruitful relationships. Beverland and Lockshin (2000) studied wineries as organizational life cycles to determine how they grow and develop. The Napa Valley in California is an example of a small boutique winery forming networks to facilitate global recognition (Deery et al., 2012). Wineries have a distinctive life cycle approach as there are distinct stages of development. These include winery establishment, winery recognition, regional prominence, maturity, and decline (Deery et al., 2012).

4.4 Wine Regions

The wine industry is experiencing constant global competition due to changing consumer needs and technological innovations (Campbell & Guibert, 2006). The wine industry has specific characteristics due to its export growth, global competitiveness, and emphasis on sustainability (Aylward, 2006). Micro, small, and medium wineries exist due to the emotional connection many individuals feel with the wine industry (Alonso et al., 2015). Small entrepreneurial family firms contribute to the social capital of regions by providing innovative solutions (Morrison, 2006).

Deery et al. (2012) proposed that there are four different types of wine regions: emerging, growing, mature, and rejuvenating. Emerging wine regions have few networks existing between firms due to the young nature of firms in the region. Normally emerging wine regions will have a strategy focused on forming alliances with tourism and marketing providers to bring financial resources to the region (Deery et al., 2012). Growing wine regions have "established product with some alliances and networks and a growing reputation for good food and wine" (Deery et al., 2012, p. 296). This means that there is increasing global recognition about the reputation of wine coming from this region. Mature wine regions already have established networks in place due to their experience in the industry. Rejuvenating wine regions have established identities in the market but are changing based on business requirements.

Wine consumers are becoming more demanding given the greater competition in the global market (Barrena & Sanchez, 2009). This development has affected the way small firms enter into collaborative agreements. As more new technologies, competition, and customer segments develop there has been an increased need for small firms to compete but also collaborate. This is directly related to the wine industry that has many small firms wanting to be recognized in the international marketplace.

Getz and Brown (2006) discuss how there are multiple stakeholders in the wine industry such as customers, growers, and tourism groups, which affect network relationships. This is more evident in the wine industry as the cultural and heritage considerations give rise to more emphasis on collaboration (Alonso et al., 2015). Networks and collaboration apply to Rutherglen's wine industry due to the historical significance of the region and cultural connection. The Australian government has encouraged partnerships between small firms in the wine industry by facilitating marketing and information transfer advantages (Wargenau & Che, 2006). In Spain, the wine industry is supported by government institutions that give financial and aid expertise to small firms (Hall & Mitchell, 2004). In Italy, the Movements for Wine Tourism was established in 1993 by government, private entities, and nonprofits to promote the efforts of wine regions (Presenza, Minguzzi, & Petrillo, 2010). Small firms in the wine industry also include suppliers of products and services used to make the wine (Croce & Perri, 2010). These suppliers act as stakeholders by encouraging networks and information sharing about wine regions (Alonso et al., 2015).

Cooperation is fostered in the wine industry when positive relationship exists between the community, suppliers, and customers (Croce & Perri, 2010). This cooperation can be at the local and regional level but is enhanced when international networks are incorporated into the wine industry. Small wine firms can achieve better

brand identity and reputation by collaborating with international partners to gain better credibility (Koch, Martin, & Nash, 2013). Even in small firms there needs to be innovation in order to encourage collaboration among firms. Small firms often have significant levels of innovation in niche markets. This is important to niche wine firms that operate in a relatively small scale. Some small firms in rural areas are lifestyle orientated instead of having a pure profit motive. Small boutique wine companies contribute to rural areas by trying new methods in order to compete better.

Wine regions have a high level of interrelationships between economic and social linkages. The wine industry utilizes cooperation more than other industries due to its position in regional development, business growth, and tourism investment (Morris & King, 1997). Wine growing regions have a distinctive terroir, which refers to the characteristics of the region in which it is grown (Barham, 2003). Terroir is classified depending on the advertising, identity, plant growing, and territory of a region (Vaudour, 2002). Human relationships are important in the wine industry due to the need for quality (Moran, 2001). Many small-scale wine growers have entered the industry due to lifestyle reasons (Cambourne et al., 2000). Many small wine growers sell direct to consumers and this is part of their marketing strategy (Charters & Menival, 2011).

Networks develop in the wine industry from the collaboration between producers, tourism, and consumers (Telfer, 2001). Holland et al. (2014) discuss how newly developed wine regions utilize clusters as a way to pool knowledge. These clusters have common or complementary objectives about how to achieve economies of scale (Blandon, Henson, & Cranfield, 2009). Sometimes clusters are embedded in a specific wine region in order to encourage better negotiation between buyers and producers (Holland et al., 2014).

4.5 Research Methodology

The cooperation and networks of small wineries can be considered an emerging theme in strategic management studies. This research takes a case study approach, which allows for in-depth detailed analysis (Yin, 1994). Case studies enable an understanding of how and why events occur in a single location or company setting (Hlady-Rispal, 2002). For this research a small-sized Australian winery: Campbells Wines was chosen due to its networks and collaboration in the Rutherglen area.

4.5.1 Rutherglen

The Rutherglen wine industry is classified as a rejuvenating region compared to the more mature Yarra Valley region of Victoria (Deery et al., 2012). This is due to the wineries in Rutherglen being old but having a resurgence in interest. Victoria has a strong presence in the wine industry and the government devotes money to the

continual interest in the region. Rutherglen is a small wine region with a hot climate famous for its red wines. North-eastern Victoria is one of the largest wine areas in Australia but consists of mostly small firms. Rutherglen is close to the Murray river and considered one of the oldest vine growing districts in Australia (Houghton, 2001). The wineries in Rutherglen form a triangle around the town due to their close proximity with the Murray river (Houghton, 2001). Rutherglen wine has imperfect inimitability due to the geographic conditions and way wine is produced in the region. The climate of Rutherglen is similar to the Rhone region in France, which produces a high natural sugar level for grapes. Rutherglen was traditionally a gold mining town that has since reorientated itself as a wine growing area.

The Rutherglen wine region was established in the 1850s during the time of the gold rush in Australia. Rutherglen is an area located in the North-east of Victoria, Australia known for its wine. Many of the wineries established in the 1800s are still in existence and they include All Saints Estate, Campbells, Chambers Rosewood, Gehrigs, Morris, Mount Prior, and St Leonards. Due to the many small wineries in Rutherglen, a cooperation was formed called the Winemakers of Rutherglen. This network incorporates 19 wineries that help each other with common concerns including marketing and business development. All Saints Estate was Australia's first winery in 1878 to win the gold medal at the Paris Exhibition. Many of the Rutherglen wineries are still family owned businesses. The Rutherglen area is known for its distinctive fortified wine. The geographic location of Rutherglen has a lot of sunshine and a warmer climate. Due to its small size of some Rutherglen wineries they have been marketed as "tiny wineries" and include Calica Town, Lilliput Wines, Mt Ophir Estates, and Scion Vineyard. Most of the wineries in Rutherglen are small boutique family owned businesses. Table 4.1 states most of the wineries that exist in the Rutherglen area of Victoria, Australia.

The most famous wines from Rutherglen are Rutherglen Muscat and Topaque. Despite the small size of wineries in Rutherglen, there is innovation with new production and marketing methods. Rutherglen has a long dry ripening season, which impacts the taste of its wines. Rutherglen is located 3 h from Melbourne. There has been an increased interest in Rutherglen toward Southern European varieties due to the climate. Many of the wines produced in Rutherglen come from the vines planted more than a century ago. Rutherglen wineries have utilized old vine fruit including

Table 4.1 Rutherglen wineries

All Saints Estate	Lilliput Wines
Anderson Winery	Morris Wines
Buller Wines	Mount Prior Vineyard
Campbell Wines	Pfeiffer Wines
Chambers Rosewood Winery	Rutherglen Estates
Cofield Wines	St Leonards Vineyard
John Gehrig Wines	Scion Vineyard and Winery
Jones Winery and Vineyard	Stanton and Killeen Wines
King Jack Winery	Valhalla Wines
Lake Moodemere Estate	Warrabilla Wines

French Mondeuse and Portuguese Nacional. Almost a quarter of Australia's wine was produced in Rutherglen in 1900 but the 1905 outbreak of the vine disease phylloxera reduced the yields. Most of the initial wine was exported to the United Kingdom in the 1900s. The Rutherglen wine area experienced a resurgence in 1967 with the establishment of the Rutherglen Wine Festival.

4.6 Campbells Wines: Case Study[1]

One of the most well-known wine producers in Rutherglen is Campbells Wines, which is a fifth generation family business with 140 years of winemaking experience (http://www.campbellswines.com.au/story/our-history; www.rutherglenvic.com/rutherglen-wineries; www.winemakers.com.au/home/history). Campbells Wines is known for its full bodied red table wines that have a distinctive taste from the climate and soil conditions. Campbells Wines was the first wine in Australia's history to win the perfect score by Wine Spectator magazine. Campbells Wines is one of the original winemakers from Rutherglen still in existence today (Strickland et al., 2013). Campbells Wines emphasizes on its website that family is its competitive advantage. There are more than 2900 wineries in Australia but Campbells differentiates itself by its family wine making tradition (Strickland et al., 2013).

Campbells Wines was established by a Scottish immigrant turned gold miner in Australia called John Campbell. He famously said "there is more gold in the first 6 in. than there is lower down" referring to the riches to be made from wine instead of digging for gold. As many immigrants had come to Australia in search of gold there was a need for them to establish other businesses when the gold rush had finished. John Campbell started his winery business with planting the Bobbie Burns vineyard in 1870 named after the famous Scottish poet in Rutherglen. Fifteen years after the first vineyard was grown he constructed a cellar in 1885 and this building is still in existence. In the early 1900s, the vine disease phylloxera destroyed many vines, which meant that John Campbell's son David Campbell had to try new types of vineyards better suited to the geographic conditions of Rutherglen. David Campbell followed his father's footsteps in the business by replanting vineyards by grafting European wine grapes with phylloxera disease-resistant American rootstocks. The third generation of Campbells Wines was then developed by David's son Allen Campbell. The third generation of the Campbell Wine family utilized a different strategy to previous generations by selling smaller sized wine to both customers and retailers. This strategy was successful in diversifying the small business from bulk lots to more manageable smaller sized sales. Allen's sons Malcolm and Colin Campbell were the fourth generation of the family. Colin Campbell studied agriculture and focused on introducing technological innovations to the business. This included cooling and fermentation equipment to be used in the production of the wines. The introduction of these technological innovations to the business

[1] For more detail see www.campbellwines.com.au/story/our-history; www.rutherglenvic.com/rutherglen-wineries; www.winemakers.com.au/home/history.

enabled white wines to be made. In 1965, a different type of vine Pedro Ximenez bush wines were planted to further diversify and ensure less risk exposure to disease. In 1960, the vineyards were replanted to a 4 foot T trellis enabling better disease control and easier picking. In 1972, a new sales and tasting room was established encouraging wine tourism and regional emphasis on the Rutherglen area.

In 1981, a mechanical harvester was purchased to pick grapes. This enabled more efficient picking of grapes and was partly the result of the Campbell families travel to California on a study tour. In 1982, exporting to the United States started and in 1983 the Campbell family had a study tour of European vineyards. In 1987, Colin Campbell further increased his international knowledge of wine production by travelling to Portugal to study Port and Cork production of wine. In 1989, the fifth generation of Campbells started with Andrew Campbell. More technological innovation was introduced in 1990 with a new tank press being used to enable better fruit flavors in the wines. In 1996, exports to Singapore commenced and this opened up the Asian export market. In 1998, the Muscat of Rutherglen network was established. This network was started in order to classify Rutherglen Muscat and Tokay wine in order to meet quality standards. In 1999, drip irrigation was introduced on the vines that enabled water saving methods. In 2000 the sixth generation of the Campbell family continued the business with the reputation of Campbells Wines being enhanced with Robert Parker the world's most influential wine critic ranking them as high quality. In 2004, a network called the Rutherglen young bloods was established to highlight emerging talent in the area. In 2012, Campbells wine Merchant Prince Rate Rutherglen Muscat won the Victoria's wine of provenance award. In 2016, Campbells won an Australian wine industry award for their contribution to the wine industry.

4.7 Future Research Suggestions

The findings of this chapter provide avenues for future research. Future studies could continue examining micro, small, and medium-sized wineries in terms of their networks based on geographic and cultural conditions. This would be helpful to see if small family owned wineries utilize networks differently depending on their regional location. While this chapter has focused on Rutherglen as a rejuvenating wine region, future studies could focus on emerging regions to see if the same small firm business strategy applies. This might involve taking a longitudinal approach to help identify the networks that provide the most opportunities to small sized wineries. Studies could be conducted on an international scale to compare small wineries from Rutherglen with their old wine regions typically from Europe. This would potentially allow for making better cultural comparisons about small business and network strategies. As Rutherglen is geographically far from the more traditional Old Wine countries there may be some interesting new strategies being used that can be transplanted to other geographic locations. This would also help New Wine countries identify strategies that can help government and policy makers to come up with better educational resources.

4.8 Conclusion

This chapter sought to increase knowledge about small firm strategy in Rutherglen wine companies by adopting the resource-based view of the firm. The resource-based view aligns with the competitive strategy of small wine firms in Rutherglen. The uniqueness of Rutherglen wine links with the resource-based view. The implications of this chapter influence the wine industry but also related industries including tourism. The resource-based view was confirmed as a useful way to understand small business strategy in Rutherglen wine companies.

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Chapter 5
The Contribution of KIBS to Innovation and Competitiveness in Business Networks

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Abstract This chapter seeks to analyse, based on a quantitative approach, the relationship between knowledge, cooperation and co-creation of innovation through knowledge-intensive business services (KIBS) and other organisations (i.e. clients, higher education institutions [HEIs] and other firms/institutions). The main findings suggest, given the context of KIBS firms, that co-creation of innovation is greatly influenced by cooperation with HEIs (i.e. co-creation of technological innovation) and knowledge codification (i.e. co-creation of non-technological innovation). The results have conceptual implications—further deepening the understanding of co-creation processes in innovation research—and practical implications—facilitating decision-making processes in innovation based on cooperation, networks and the strategic management of knowledge.

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5.1 Introduction

Knowledge-intensive business services (KIBS) play a fundamental role in innovation and competitiveness in contemporary economies, but academic research on KIBS is still relatively incipient. This justifies the present effort to identify the extent to which KIBS contribute to the acceleration of knowledge, within both organisations and business networks (i.e. cooperation).

Increasingly, experts recognise that service firms are not merely passive recipients of innovations developed in process industries. On the contrary, these firms innovate for themselves (Gallouj & Weinstein, 1997; Tether, 2003). Researchers also widely recognise that innovation in this sector affects all sectors of the economy. Certain types of services have a particularly strong tendency to transfer their innovations to other economic activities.

Some studies have focused on the role that KIBS play in innovation systems, in which cooperation with firms from other sectors increases the performance of these firms and their regions (Ferreira, Marques, & Fernandes, 2012; Leiponen, 2005; Miles et al., 1995). In this way, KIBS facilitate innovation processes in the economy, including for sectors other than services.

KIBS have been show to play an extremely important and dynamic role in innovation (den Hertog, 2000; Freel, 2006; Hipp, Gallego & Rubalcaba, 2012; Howells & Tether, 2004; Koch & Stahlecker, 2006; Kubota, 2009; Mas-Vérdu, Wensley, Alba, & Álvarez-Coque, 2011; Muller, 2001; Toivonen, 2004), since they create a 'knowledge bridge' or 'innovation bridge' between business and science (Czarnitzki & Spielkamp, 2003; Miles et al., 1995). Therefore, it appears to continue to be pertinent to analyse KIBS, which, according to Miles et al. (1995, p. 18), provide 'economic activities which are intended to result in the creation, accumulation and dissemination of knowledge'.

A general definition of KIBS, provided by den Hertog (2000, p. 505), is 'private companies or organisations that depend on professional knowledge', that is organisational knowledge or experience related to specific disciplines or domains (i.e. technical areas) that contributes to providing products and intermediary services. Based on this definition, it is clear that, despite their close relationship with innovation and technology, KIBS can be—or not—related to technology. Thus, they do not have to be technologically intensive, but they are always knowledge intensive.

As knowledge is an intangible asset, KIBS face the problem or challenge of managing their resources during the special process of knowledge sharing and reproducing of specific features within business sectors. In addition to KIBS' importance in terms of the creation and dissemination of knowledge, they are strongly related to innovation processes, which are a key catalyst for growth and economic development. KIBS play a role in facilitating innovation by interfacing between the generic knowledge available in the economy and tacit knowledge located within firms.

In the present research, we sought to deepen the theoretical and empirical understanding of KIBS in order to make progress towards conceptualising their influence on business clients' innovation processes. In addition, we wanted to contribute to

management practices by offering firms a more complete knowledge of ways to increase competitiveness, particularly in relation to both KIBS and business clients from any activity sector. More essentially, we intended to provide through this study some important suggestions and improvements for national adjustment policies.

This chapter is structured as follows. The next section examines theories supporting hypotheses that involve the possible relationships between co-creation of innovation, knowledge and cooperation. After discussing some methodological considerations, the results are presented, and the chapter concludes with a reflection on the study's most important limitations and implications for management practice, as well as suggestions for future avenues of research.

5.2 Conceptual Framework

5.2.1 Co-creation of Innovation

KIBS make up a category of service activities that is often highly innovative in its own right, as well as facilitating innovation in other organisations. den Hertog (2000) suggests that KIBS function as facilitators, carriers or sources of innovation, and, through their almost symbiotic relationship with client firms, some KIBS function as co-producers of innovation (den Hertog, 2000; Mas-Vérdu et al., 2011; Muller & Doloreux, 2009).

KIBS can be divided into two types: technological and professional. According to Flikkema, Jansen, and Van Der Sluis (2007), innovations can be classified as technological when they apply to products/services or processes or as non-technological innovations when referring to organisational and marketing aspects. Johnson, Edquist, and Lundvall (2003) point out that, traditionally, studies of innovation have focused much more on technological rather than non-technological innovation, and service and organisational innovation has been relatively neglected. Technological innovation, as an integral part of innovation activities, was one of the first approaches used in innovation activities. Schumpeter (1934) distinguishes between five types of innovation. Two varieties exist in technological innovations (i.e. the introduction of new products and of new processes), while the remaining three are connected to non-technological innovation (i.e. opening new markets, developing new sources of raw materials and creating new organisational structures).

The production of services is often, according to den Hertog (2000), the result of a joint effort of the service provider and client. In this co-production process, the quality of the resulting service product largely depends on the quality of interactions and communication between the service provider and client. An important role of KIBS is providing a point at which more general scientific and technological information and more local requirements and problems of clients fuse and then disperse into the economy. One result of this interaction is also that feedback from clients can shape innovations in service firms, just as much as service firms can influence their customers' innovation processes.

The rationale for dedicating special attention to the role of KIBS–client relationships is twofold. First, prior studies have indicated that the successful co-creation of business services requires collaborative relationships (Bettencourt, Ostrom, Brown, & Roundtree, 2002; Chen, Tsou, & Ching, 2011; Hu, Lin, & Chang, 2013). Second, acquiring, sharing and interacting with knowledge are vital to value co-creation (Grönroos & Voima, 2012; Lusch, Vargo, & Tanniru, 2010; Payne, Storbacka, & Frow, 2008).

In line with this perspective, den Hertog (2000) suggests that analyses of the role of KIBS in innovation processes bring into focus the ways in which knowledge is produced and used in the economy, as well as the role of KIBS in these processes. The cited author further argues that, in addition to discrete and tangible forms of knowledge exchange, process-oriented and intangible forms of knowledge flows are crucial in these relationships.

5.2.2 Knowledge

Some studies of KIBS have investigated their relationships with clients—usually firms from others sectors (Antonelli, 1998; Biderbeek, den Hertog, & Chehab, 1998; Kox, 2002)—because KIBS have begun to be recognised as producers of innovation and drivers of the dissemination of knowledge through their close relationships with clients (den Hertog, 2000; Muller, 2001). According to the literature, KIBS play a role in facilitating innovation by interfacing between the generic knowledge available in the economy and the tacit knowledge located within firms (Kubota, 2009).

Hansen (2002) differentiates between two types of knowledge management: personalisation and codification. According to the cited authors, personalisation focuses on dialogues between individuals, while codification extracts knowledge from the individuals who develop it and reutilises this knowledge to achieve various purposes. Thus, for some authors (López-Nicolás & Meroño-Cerdán, 2011; Wu & Lin, 2009), organisations have to find a good balance between system strategies for codification and those strategies that concentrate more directly on human factors through personalisation. In this context, researchers suggest that personalisation, which focuses on tacit knowledge, is more valuable when firms seek to reinforce competitiveness than codification is, especially when the latter concentrates on explicit knowledge (Storey & Hahn, 2010).

According to Capasso, Dagnino, and Lanza (2005), the past decade has seen an increase in the literature focusing on generating processes that share, identify and transfer knowledge within and between firms. Lanza (2005) reinforces Dyer and Nobeoka's (2000) finding that the development of new knowledge—along with the concurrent partners—has increasingly been undertaken in order to obtain a competitive advantage through improved product quality and innovation, despite the great difficulty and risk that these tasks entail. Lanza (2005) adds that this knowledge development process consists of two related phases: sharing and creating. Thus, competing businesses' knowledge sharing with partners is a key step in effective knowledge creation activities that allow firms to compete successfully in the market. The cited author also presents the results that may arise from this process, as shown in Fig. 5.1.

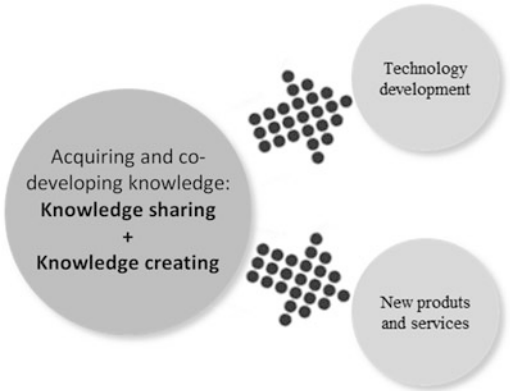

Fig. 5.1 Co-opetition goal. *Source*: Adapted from Lanza (2005)

KIBS act as transmitters of knowledge, contributing in different ways to the innovation processes of related firms (Biderbeek et al., 1998; Hauknes, 1998; Miles et al., 1995). Several researchers go further and underline the role of KIBS as co-producers of innovation (Bettencourt et al., 2002; den Hertog, 2000; Wong & He, 2005). Therefore, the following hypothesis was developed for the present study:

H1: *Knowledge has a positive influence in co-creation of innovation.*

5.2.3 Cooperation

According to Lanza (2005), when firms cooperate, they can share and/or create knowledge. These results in a favourable output for the firms involved, either in the form of technology or new products/services, in other words, some form of innovation.

According to Hipp, Gallego, and Rubalcaba (2012), service activities are characterised by pronounced cooperation with external agents in the development of innovative activities. KIBS are more likely to introduce organisational innovations within their production systems, and these services tend to require collaboration with external agents in innovation processes to a greater extent than most sectors do. This is particularly true when considering cooperation with clients, customers, competitors or higher education institutions (HEIs). In addition, researchers have found that the impact of innovations produced by using clients as important sources of information is more prominent in KIBS than this impact is in the case of industrial organisations (Hipp et al., 2012).

Networks can assume a large variety of forms. These differences can be seen from contrasting perspectives and can be related to different issues. The first distinction centres on the relationships of firms to other organisations in their value chain, resulting in vertical or horizontal networks. Horizontal networks are constituted by firms operating in the same stage of the value chain. In this case, cooperation is known in the literature as 'co-opetition' (Brandenburger & Nalebuff, 1996) because

relationships are a mix of cooperation and competition. Vertical networks occur when firms occupying different stages along the value chain are brought together into a network. In terms of outcome, differences between vertical and horizontal networks are to be expected since relationships between firms vary in nature and the objectives of their cooperation differ.

In other ways, firms' involvement with each other may also be different in terms of the formality of ties. Within this dimension, relationships can be informal agreements or cooperative arrangements. Informal relationships are usually those that result from daily interactions and that, most of the time, arise from personal contacts. Formal agreements and cooperative agreements are based on more formal relationships, in which transactions are protected by contracts and written agreements. In this case, there is transaction costs associated with cooperation.

Regarding the types of relationships between actors, Conway (2000) proposes two different forms of networks. Informal or social networks are those based on social relations created within businesses, and formal networks are those that happen between firms as formal organisations. Blundel and Smith (2001) also studied business networking and found four different approaches: industrial districts and spatial clusters, supply chain networks, entrepreneurial networks and innovation networks.

Space has a particular role to play in cooperative relationships. Networks can be developed between firms that are geographically concentrated or distant from each other. When firms share the same geographical location, face-to-face interaction is easier, so more trust is to be expected. It is also more likely that business relationships, because of more frequent face-to-face interaction, become personal relationships and those weak ties become strong ties.

Networks can also be distinguished by their origin. According to Nicolini (2000), a network can emerge from different firms' willingness to cooperate, or a network can be induced. Spontaneous networks are free, unstructured agreements among firms, while sustained networks are those that are created and supported by local authorities. The latter networks appear when market conditions do not allow the rise of spontaneous cooperation. Their initiation relies on the choices of social planners who make decisions by evaluating regional welfare. Hite and Hesterley (2001) suggest that, as a result of the necessity to respond to resource challenges, which are characteristic of emergence and early growth stages, networks evolve from more identity-based, path-dependent connections (i.e. during emergence) to more calculating relationships (i.e. in the early growth stage). This represents a shift in the strategic context of firms due to an increase in the firms' ability to actively manage their external networks. Basically, this distinction refers not to different networks but to different stages of the same networks.

Associated with the strength of ties is the question of network density. From this perspective, a network can be sparse or dense. Dense networks occur when all the nodes are connected and no structural holes exist. The underlying advantages of dense networks are that trust and cooperation can be developed through collective monitoring and sanctioning. However, the information provided by these networks is often overlapping and coming from multiple sources. In contrast, sparse networks

provide firms with the ability to obtain—and broker—contacts, information and resources. Trust and cooperation are not so easily developed as these networks lack a governance mechanism to prevent opportunistic behaviours.

Cooperation ventures can vary in regard to their goals. Nevertheless, this does not mean that networks have to embody just one aim, as they can involve multi-purpose cooperation. In some cases, cooperation is regarded as just a locus for innovation. In this sense, firms join together in order to innovate. However, firms may be willing to cooperate in diverse aspects of business and embody these purposes in long-term relationships.

As a result of these findings, the following hypothesis was defined for the present study:

H2: *Cooperation has a positive influence in co-creation of innovation*.

Based on the literature review, a conceptual model of research was proposed, as shown in Fig. 5.2.

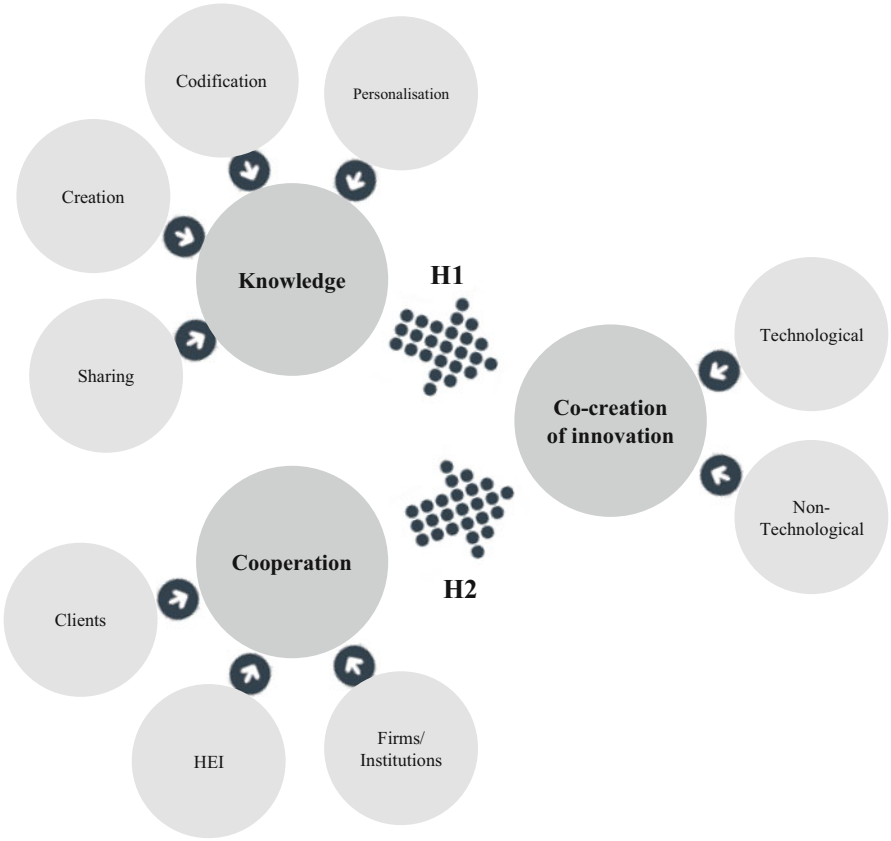

Fig. 5.2 Proposed model

5.3 Method

The present research is a quantitative study, based on data collected through a survey. A questionnaire was administered to a sample of firms that were in operation in 2014 and 2015. The data were collected and analysed using multivariate statistical techniques in order to provide insights that contribute to achieving the study's goals and testing the research hypotheses.

5.3.1 Sample and Procedures

In order to test the proposed research model and research hypotheses, data were collected via a structured questionnaire distributed online to 397 firms that were listed as in operation and contactable in the database of the Inquérito ao Potencial Científico e Tecnológico Nacional (Survey of National Scientific and Technological Potential). This survey is conducted every year throughout Portugal. The surveyed firms were selected from the last reported year (i.e. 2012) based on their claim to have carried out research and development (R&D) activities and integrated four sectors: businesses, government institutions, HEIs and private non-profit organisations. The data collection took place from May to December 2015. Valid questionnaires were obtained from 58 firms.

5.3.2 Measures

In order to operationalise the variables, we conducted a further literature review and adapted scales validated in previous studies, as described earlier. The questionnaire included questions selected from four instruments: Community Innovation Survey—CIS2012, Fernandes, Ferreira, and Marques (2011), Hashi and Stojčić (2013) and López-Nicolás and Meroño-Cerdán (2011) (see Table 5.1).

5.3.3 Research Setting: Characteristics of KIBS

The dataset used in this study consists of 58 KIBS firms and 53 variables concerning cooperation, knowledge and co-creation of innovation. Data were collected from Portuguese KIBS chief executive officers (CEOs) between June and December 2015.

The 53 variables were grouped into five sections of items in the questionnaire, for which some descriptive statistics are provided in Tables 5.2, 5.3 and 5.4. All the items were measured on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree).

Answers concerning questions about co-creation of innovation, made up of nine five-point items, have means between 2.07 (non-technological innovation)

Table 5.1 Theoretical foundations of scales used

Variables	Dimensions and items	Theoretical foundation
Co-creation of innovation	Nine items divided into two dimensions:	Hashi and Stojčić (2013)
	• Technological innovation—1 item	CIS (2012)
	• Non-technological innovation—1 item	
Knowledge	Fifteen items divided into four dimensions:	López-Nicolás and Meroño-Cerdán (2011)
	• Personalisation—4 items	CIS (2012)
	• Codification—4 items	
	• Sharing—4 items	
	• Creation—3 items	
Cooperation	Twenty-nine items divided into three dimensions:	Fernandes et al. (2011)
	• Clients—10 items	CIS (2012)
	• HEI—9 items	
	• Others firms/institutions—10 items	

Note: all items were evaluated on a five-point scale

Table 5.2 Component and item statistics—co-creation of innovation

Component/item	Component loading	Sample adequacy	Item-total correlation	Mean	Standard deviation
Technological innovation ($\alpha = 0.779$)				**2.590**	
External acquisition of R&D	0.807	0.836	0.572	2.59	1.487
Acquisition of software and equipment	0.492	0.769	0.391	2.88	1.377
Acquisition of knowledge from another organisation	0.673	0.735	0.501	2.41	1.312
Training in innovation activities	0.760	0.788	0.629	2.62	1.282
Introduction of innovation in the market	0.747	0.842	0.692	2.45	1.340
Non-technological innovation ($\alpha = 0.803$)				**2.147**	
Design	0.777	0.647	0.550	2.34	1.207
Other non-technological innovation (except design and market)	0.848	0.749	0.780	2.09	1.097
New European markets	0.660	0.783	0.501	2.07	1.168
New non-European markets	0.770	0.860	0.660	2.09	1.113

and 2.88 (technological innovation), with a standard deviation of around one. Answers for questions about knowledge, covered by 15 items, have means between 2.96 (knowledge sharing processes) and 4.26 (personalisation), with a standard deviation of around two. Answers concerning the 29 items about coop-

Table 5.3 Component and item statistics—knowledge

Component/item	Component loading	Sample adequacy	Item-total correlation	Mean	Standard deviation
Personalisation ($\alpha = 0.820$)				**3.936**	
Receives advice from supervisor	0.913	0.679	0.781	4.15	0.841
Carries out informal meetings to share knowledge	0.832	0.730	0.712	3.91	1.181
Enjoys a close relationship with a mentor who facilitates the transfer of knowledge	0.672	0.839	0.621	3.68	1.156
Shares knowledge easily with co-workers	0.600	0.750	0.584	4.26	0.880
Creates knowledge through cooperation with customers	0.551	0.611	0.428	3.68	0.976
Codification ($\alpha = 0.715$)				**3.264**	
Shares experiences with other firms	0.727	0.740	0.476	3.15	1.099
Establishes protocols about how to share knowledge inside the firm	0.678	0.684	0.534	3.32	1.384
Establishes protocols about how to share knowledge outside the firm	0.624	0.568	0.554	3.11	1.396
Shares knowledge through manuals and internal documents	0.623	0.738	0.405	3.53	1.012
Takes minutes of meetings to document results of projects and working groups	0.566	0.590	0.413	3.21	1.291
Knowledge creation and acquisition ($\alpha = 0.700$)				**3.591**	
Creates firm priorities and builds up knowledge and dissemination	0.809	0.736	0.644	3.83	1.014
Learns from other organisations	0.803	0.658	0.524	3.53	0.868
Acquires knowledge easily through manuals and documents	0.538	0.780	0.404	3.42	0.989
Knowledge sharing ($\alpha = 0.681$)				**3.255**	
Shares knowledge with clients	0.816	0.531	0.519	3.55	1.030
Shares knowledge with staff and other firms	0.748	0.554	0.519	2.96	0.940

Table 5.4 Component and item statistics—cooperation

Component/item	Component loading	Sample adequacy	Item-total correlation	Mean	Standard deviation
Cooperation with clients ($\alpha = 0.913$)				**3.418**	
Reduces overall costs	0.832	0.708	0.791	2.98	1.378
Learns with a cooperation partner	0.809	0.677	0.694	3.40	1.107
Shares technology and knowledge	0.795	0.693	0.754	3.52	1.111
Suggests ideas for improving products (goods/services) or processes	0.786	0.677	0.717	4.04	1.009
Elevates operational efficiency	0.782	0.646	0.722	3.52	1.313
Develops new products and/or processes	0.763	0.739	0.715	3.86	1.143
Develops new concepts	0.739	0.582	0.653	3.56	1.280
Generates formal and informal exchanges of people and ideas	0.703	0.557	0.692	3.30	1.199
Expands market share in geographical area of operation	0.579	0.787	0.555	3.72	1.341
Shares R&D costs	0.558	0.803	0.555	2.28	1.089
Cooperation with HEIs ($\alpha = 0.892$)				**2.757**	
Shares technology and knowledge	0.867	0.596	0.782	3.04	1.351
Develops new concepts	0.802	0.601	0.722	2.98	1.327
Develops new products and/or processes	0.786	0.592	0.687	3.17	1.291
Learns with a cooperation partner	0.733	0.513	0.676	3.09	1.248
Generates formal and informal exchanges of people and ideas	0.725	0.585	0.647	3.06	1.389
Shares R&D costs	0.715	0.678	0.602	2.13	1.115
Increases operational efficiency	0.683	0.609	0.681	2.79	1.334
Expands market share in geographical area of operation	0.650	0.562	0.627	2.26	1.113
Reduces overall costs	0.452	0.521	0.411	2.30	1.121
Cooperation with other organisations ($\alpha = 0.938$)				**3.067**	
Suggests ideas for improving products (goods/services) or processes	0.848	0.622	0.799	3.64	1.317

(continued)

Table 5.4 (continued)

Component/item	Component loading	Sample adequacy	Item-total correlation	Mean	Standard deviation
Generates formal and informal exchanges of people and ideas	0.830	0.712	0.820	3.13	1.236
Increases operational efficiency	0.819	0.534	0.788	3.18	1.302
Expands market share in geographical area of operation	0.788	0.702	0.674	3.29	1.254
Shares technology and knowledge	0.784	0.772	0.762	3.07	1.232
Learns with a cooperation partner	0.773	0.804	0.762	3.27	1.268
Develops new products and/or processes	0.766	0.720	0.743	3.29	1.424
Develops new concepts	0.750	0.718	0.775	2.91	1.411
Reduces overall costs	0.736	0.542	0.665	2.58	1.215
Shares R&D costs	0.709	0.813	0.729	2.31	1.145

eration (i.e. HEIs, clients and other firms/institutions) have means between 2.13 (cooperation with HEIs) and 4.04 (cooperation with clients), with a standard deviation of around one.

In this study, we did a factor analysis of several management concepts, in particular co-creation of innovation, cooperation and knowledge, as well as linear regression. The objective of the factorial analysis was to reduce the initial number of variables while keeping their common characteristics. Linear regression was performed in order to estimate the contribution of different factors to co-creation of technological and non-technological innovation. All the statistical analyses presented were performed using *IBM SPSS 22.0.*

5.4 Findings and Discussion

In this section, we describe the results of the aforementioned factor analysis and linear regression to allow the presentation and discussion of the findings, followed by conclusions. Using the principal components analysis (PCA) method, the variables concerned with innovation clients were reduced from nine variables to only two components (see Table 5.2). All the statistical analyses presented were performed using IBM SPSS 22.0.

We started by checking if PCA was an adequate method by using Bartlett's sphericity test, Kaiser–Meyer–Olkin (KMO) statistics and anti-image. Next, we computed the principal components, loadings and communalities. The decision on the number of components to retain was a compromise between maximising the explained initial dataset variability and reducing the initial number of variables.

In order to express the common variability between the initial variables, rotation was performed and the factors obtained.

The KMO statistic is 0.778. Therefore, since $0.7 < 0.756 < 0.8$, we concluded that there is an average adequacy of the PCA because about 80 % of the correlations are significant. When the Bartlett's test, in which the null hypothesis is the identity correlation matrix, has a p-value of approximately $0 < 0.05$, then the null hypothesis can be rejected, and it is possible to conclude that the correlations between the involved variables are sufficiently high. Therefore, we concluded that running a PCA was adequate in this context.

According to the Kaiser criterion, when a correlation matrix is used, all components corresponding to eigenvalues less than one should be excluded. Applying this criterion, the first two components were extracted; as these explained a total of 58.902 % of the variance in the original data (see Table 5.2): 29.774 % is related with the first factor and 29.127 % with the second factor. The remaining components were excluded for having eigenvalues smaller than one.

After performing a Varimax rotation, the relationships between the principal components and the original variables became clearer and more explainable. The rotated component matrix, suppressing small coefficients with an absolute value below 0.35, is presented in Table 5.2.

Since all factorial scores are greater than 0.50, no items were eliminated from the analysis. The Cronbach's alpha estimates the internal consistency of factors (i.e. reliability). The alpha for the first factor is approximately 0.8, which indicates high reliability, according to Hair, Black, Babin, and Anderson (2014). The alpha for the second factor is approximately 0.8, which also indicates high reliability.

Using the PCA method, the variables concerned with knowledge were reduced from 15 variables to four components. Using the same criteria as in the previous analysis, the first four components were extracted, which explained a total of 64.446 % of the variance in the original data, with 19.749 % related with the first factor, 17.334 % with the second, 14.601 % with the third and 12.762 % with the fourth factor. The remaining components were excluded for having eigenvalues smaller than one. The KMO statistic is approximately 0.7, and the p-value for Bartlett's test shows that the correlation matrix is significantly different from the identity matrix. Therefore, a factorial analysis could be performed. Using the PCA method, the 15 variables are reduced to four components. We performed a Varimax rotation and suppressed coefficients with an absolute value below 0.35, obtaining the scores presented in Table 5.3.

Since all factorial scores are greater than 0.50, no items were eliminated from the analysis, and we considered the factor with the highest score value from each item. The Cronbach's alpha for the first factors is greater than 0.8, which indicates high reliability. The other factors' alphas are close to 0.7, which indicates medium reliability.

Using the PCA method, the variables concerned with cooperation were reduced from 29 variables to only three components. The first three components were extracted; as these explained a total of 71.579 % of the variance in the original data (see Table 5.4). The remaining components were excluded for having eigenvalues smaller than one. The KMO statistic is approximately 0.708, and the p-value for Bartlett's test shows the correlation matrix is significantly different from the identity matrix, so a factorial analysis could be performed.

Again using the PCA method, the 29 variables are reduced to three components. We then performed a Varimax rotation and suppressed coefficients with an absolute value below 0.35, obtaining the scores presented in Table 5.4.

Since all factorial scores are greater than 0.50, no items were eliminated from the analysis, and we considered the factor with the highest score value from each item. The Cronbach's alphas for the first factors are greater than 0.89, which indicates high reliability.

The goal of the analyses was to study the importance of each factor defined earlier in regard to knowledge and cooperation in technological innovation or co-creation with clients and non-technological innovation. By analysing the correlation matrix and the significance level of 10 %, we were able to observe a significant positive correlation between 'cooperation with clients' and 'knowledge sharing', 'cooperation with HEIs' and 'knowledge creation' and 'co-creation of technological innovation' and 'cooperation with HEIs'. However, we found a negative correlation between 'cooperation with HEIs' and 'knowledge sharing'. These correlations suggest that HEIs may be drivers of knowledge creation, but clients may also be a source of new knowledge (see Table 5.5).

We also examined these relationships using two linear regressions with the dependent variables 'co-creation of technological innovation' and 'co-creation of non-technological innovation' and the dependent variables of factors related with knowledge and cooperation (results in Table 5.6). This procedure was implemented using the 'Enter' method to introduce variables, but the Wald test of parameters significance showed non-significant *p*-values, so a stepwise method was performed

Table 5.5 Correlation matrix

	K1	K2	K3	K4	CO1	CO2	CO3	InC1	InC2
Personalisation (K1)	1								
Codification (K2)	0.000	1							
Knowledge creation (K3)	0.000	0.000	1						
Knowledge sharing (K4)	0.000	0.000	0.000	1					
Cooperation with other firms/ institutions (CO1)	–0.204	–0.180	–0.012	0.006	1				
Cooperation with clients (CO2)	0.152	–0.012	0.269	**0.516****	0.000	1			
Cooperation with HEIs (CO3)	–0.035	0.203	**0.312***	**–0.317***	0.000	0.000	1		
Co-creation of technological innovation (InC1)	0.242	–0.022	0.243	–0.063	–0.058	0.232	**0.411****	1	
Co-creation of non-technological innovation (InC2)	0.101	0.220	–0.019	–0.009	0.114	0.247	0.101	0.000	1

*significance level 0,05 (2-tailed); **significance level 0,01 (2-tailed)

Table 5.6 Results of linear regressions

	Co-creation of technological innovation	Co-creation of non-technological innovation
Personalisation	–	
Codification		0.343
Cooperation with HEIs	0.411	–
R	**0.411**	**0.343**
***R* square**	**0.169**	**0.118**
Adjusted *R* square	**0.150**	**0.0982**

using Akaike information criterion to insert or remove independent variables. The best linear model, according to this criterion, is:

Co-creation of innovation (technological; non-technological) $= \beta_0 + \beta_1$* *(knowledge: codification; personalisation; creation; sharing)* $+ \beta_2$* *cooperation (with: clients + HEIs + other organisations)*

These results show that cooperation with HEIs explains approximately 17 % of clients' technological innovation variance. The regression coefficient is 0.411, which means that, when cooperation with HEIs increases, one unit in co-creation of technological innovation increases about 41 %. In addition, codification explains approximately 12 % of co-creation of non-technological innovation variance. The regression coefficient is 0.343, which means that, when codification increases one unit, co-creation of non-technological innovation increases about 34 %.

5.5 Conclusions

This chapter focused on an analysis of the relationships between knowledge, cooperation and co-creation of innovation as these appear in partnerships between KIBS and other organisations (i.e. clients, HEIs and other firms/institutions). As described earlier in the conceptual framework section, this study was based on an assumption made by several authors (e.g. den Hertog, 2000; Muller & Doloreux, 2009) that KIBS function as co-producers of innovation in an almost symbiotic relationship with client firms.

A quantitative research methodology was used to test hypotheses based on a literature review and a research model that describes the relationships between knowledge, cooperation and co-creation of innovation for Portuguese KIBS and their clients. The most important results of this study show that, given the current context of KIBS, these firms' co-creation of innovation is greatly influenced by cooperation with HEIs (i.e. co-creation of technological innovation) and codification of knowledge (i.e. co-creation of non-technological innovation). We also found that a significant positive correlation exists both between 'cooperation with clients' and 'knowledge sharing' and between 'cooperation with HEIs' and 'knowledge creation', which clearly influences the co-creation of technological innovation. These results confirm the hypotheses of this study (*H1*; *H2*). However, the results also

reveal a negative correlation between 'cooperation with HEIs' and 'knowledge sharing'. These correlations indicate that HEIs could be drivers of knowledge creation, while clients could also be a fount of new knowledge.

This research contributes to the study of KIBS in three ways. First, the results provide a deeper understanding, to be shared within the academic community, of KIBS' influence on the innovation processes of different stockholders involved in business cooperation networks, as well as the process of co-creation in the field of innovation. Second, the present results have practical implications for management practices in terms of decision-making processes in innovation, specifically regarding the strategic management of knowledge and cooperation networks, which allows firms to gain insights that may increase their productivity levels. Last, this research is relevant to national public policy, offering proposals for ways to adjust and improve the sector in question. As KIBS play a role in transferring knowledge in innovation systems, the findings may suggest ways that innovation policy can be reformulated. Given indications that some service industries are particularly prone to using KIBS, innovation policymakers might consider widening the scope of how KIBS are used to realise innovation policy goals.

In future paths of research, the number of questionnaires completed could be increased so that the results can provide a clearer empirical view of how the variables included here relate and interact with other variables. Other causal links and explanations are plausible. For example, a positive correlation may exist between cooperation with firms/institutions and knowledge sharing. In addition, a panel study of KIBS CEOs could be conducted to determine the depth of the present results. Finally, this study could be replicated in different countries using comparative analysis. These improvements and updates would strengthen our understanding of the co-creation of innovation, which can be incorporated within different strategies and interventions in the innovation processes of KIBS and other organisations. For instance, research on these other organisations (i.e. clients, HEIs and other firms/institutions) could analyse more thoroughly the influence of KIBS on these organisations' innovation processes.

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Chapter 6
Relationship Learning Strategy as a Mechanism of Network and the Effectiveness of Green Innovation

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Abstract The purpose of this chapter is to analyse, from a theoretical research approach, the relationship between relationship learning (RL), knowledge base (KB) and green innovation (GI) outcomes. This chapter attempts to argue that a deep and broad KB leads to better GI outcomes. In addition, the theoretical model proposes that firms that invest and involve themselves in RL mechanisms are more likely to indirectly foster GI. Also, we argue how cooperation among firms that occurs through networks or supply chains stimulates the RL mechanisms, eventually affecting the innovation.

In light of the knowledge-based view (KBV) and the relationship view (RV), the two main propositions suggest that firm's GI is greatly influenced both by an integrated broad and deep KB (directly) as the RL activities (indirectly). The proposed research model has conceptual implications (advancing in the application of RV perspective in the field of GI) and practical implications for managers (related to the design and improvement of his or her KB and the engagement in RL strategies).

6.1 Introduction

The global civilisation is more interrelated than ever before. The progressively fuzzy boundaries are incessantly crossing business, mindsets, technologies, people and even societies at a speed unknown until now. The new information and technologies era offers great advantages, but it also involves the anxiety by the imbalances in numerous areas that occur on a global scale.

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This is an unparalleled era in which human behavior and activities are producing physical changes in the Earth that, if passed the planetary limits, can lead to dangerous and unused situations.

New opportunities are opened to the firms, but also new challenges, so that sustainable development is an imperative and, without doubt, the biggest challenge facing today's society. Sustainable development seeks to understand the interactions concerning three complex systems: the world economy, the global society and the physical environment of the Earth (Sachs, 2015). It implies a normative approach on the planet, with the recommendation of a series of objectives to which the world should aspire. In this way, the new era is defined on the basis of new global objectives, the objectives of sustainable development, to promote socially inclusive economic growth and environmentally sustainable.

Therefore, the objectives of sustainable development should guide the world economic diplomacy of the new generation, allowing new forms of global governance: a challenge that involves both government and businesses.

Green innovation is an important way to mitigate or avoid environmental damage. Buyers around the world want and expect to purchase evermore environmentally friendly products and services. Indeed, green innovation is a strategic need for firms, and it offers a great opportunity for meeting buyers' wishes without harming the environment.

By the other hand, in the age of the knowledge-based culture, the knowledge-based assets are contemplated like powerful strategic drivers, and are constantly generated through people's cooperation and knowledge-sharing mechanisms (Grant, 1996). Nevertheless, knowledge creation process is not limited to the internal boundaries of an organisation; above all it is created through networks and cooperation links with customers, suppliers, partners and competitors. So, a knowledge base resulting from the supply-chain relationships is essential for effective green innovation. The ability to conform a deep and broad knowledge base, combining external and internal sources of knowledge, is crucial for supporting innovative processes, green products and services, and so creating better value for customers (Martelo-Landroguez & Cegarra-Navarro, 2014).

When firms share information and knowledge with customers and suppliers through supply-chain management activities, they enhance their knowledge base, capabilities and competitiveness through relationship-level learning. Several studies have acknowledged the need to manage supply-chain relationships and cooperation as strategic issues in firm's outcomes and green innovations (Azzone & Noci, 1998; Chen, Lai, & Wen, 2006; Chiou, Chan, Lettice, & Chung, 2011; Zacharia, Nix, & Lusch, 2011). This framework is operationalised by the 'co-production' and 'ad hoc innovation' thesis.

We propose in this chapter a conceptual model to analyse the effect of relationship learning (as inter-firm cooperation capability) and the firm's knowledge base on the green innovation performance. It has been accepted in the literature that both relationship learning strategy and knowledge base play a basic role in organisational green innovation. However, although there are plenty of research works that study

the existing relationship between knowledge management and the effectiveness of the innovation process, there are certain peculiarities with regard to this link which have yielded some inconclusive results. In addition, there are some distinctive characteristics of the green innovation versus innovation in general, and we have not found previous works in the literature that have studied these relationships for the case of the green innovation. This chapter revisits this research topic with a model that links relationship learning (RL), knowledge base (KB) and green innovation (GI) outcomes. This chapter attempts to argue that a deep and broad KB leads to better GI outcomes. In addition, this study found that firms that invest and involve themselves in RL mechanisms are more likely to foster GI.

The chapter has five sections. Section 6.2 presents the conceptual framework and explains the variables of the proposed research model. Section 6.3 describes the theoretical background, research model and propositions that link the variables. Sections 6.4 offers conclusions and implications (at both academic and managerial levels).

6.2 Conceptual Framework

Recently, literature about cooperation and networks has increased in significance and volume of publications to the extent that favours the development of core competencies and capabilities in the companies. A cooperation strategy allows firms to increase their levels of competitiveness (Li & Zhong, 2003). Especially in small- and medium-sized enterprises, collaboration with suppliers, customers and competitors to co-generate resolutions to problems is vital to a firm's corporate strategy and a way to gain competitive advantage (Belderbos, Carree, Diederen, Lokshin, & Veugelers, 2004). Essentially, firm's collaboration is a tool to pool and use outward and inner knowledge that influences the operative, social and financial results of the companies.

The increasing importance of cooperation, networks and interorganisational relationships has guided to the evolution of a variety of theories to clarify the development of relationships and organisational collaboration. In our opinion, there are two theories that provide the most powerful development of this research topic: the knowledge-based view (KBV) and the relationship view (RV).

The KBV theory proposes that knowledge is an essential strategic resource for a firm to retain a sustainable competitive advantage. As knowledge is created and disseminated throughout the firm, it has the potential to contribute to the firm's value by enhancing its capability to respond to new and unusual situations. The growing importance of knowledge as a critical resource has encouraged managers to pay greater attention to the firm's KM strategies. So, KBV suggests that knowledge is the most vital firm's resources (Grant, 1996; Spender, 1996). KBV recommends the role of the firm is to generate, obtain and utilise managerial knowledge that leads to high-class organisational performance (Nonaka, 1994).

The knowledge can be outlined in several means, the distinction being more accepted that distinguishes between explicit knowledge and tacit knowledge (know what vs. know how). Explicit knowledge can be communicated and is easy to transfer while tacit knowledge is hard to articulate and extremely uncertain to transfer (Kogut & Zander, 1992). Tacit knowledge creates competitive advantages more sustainable in the time, because it is hard to copy, imitate or reproduce, and the process of accruing and applying knowledge is more likely to create new sources of competitive advantage (Grant & Baden-Fuller, 2004).

The KBV classifies two different extents of knowledge management: (1) process and activities to increase a firm's stock of knowledge—exploration or knowledge generation and (2) actions that use existing knowledge to generate value—exploitation or knowledge application (Spender, 1996). In the interorganisational cooperation and networks area, this difference concerning knowledge generation and application agrees to the modes in which knowledge is shared among supply chain or network partners. Knowledge generation focuses on the networks as media of learning in which every partner uses the cooperation to transfer and absorb the partner's knowledge base. On the other hand, knowledge application focuses on a procedure of knowledge sharing in which every firm contacts its partner's stock of knowledge in order to exploit complementarities, but with the aim of upholding its idiosyncratic knowledge base (Grant & Baden-Fuller, 2004).

In this sense, Zacharia et al. (2011, p. 592) stated that '*noted collaborations might exist to exchange and integrate knowledge between buyers and suppliers when products are highly complex and knowledge is* "*imperfectly embedded*" *in the product exchange. In many interactions between firms, the exchange of explicit knowledge is required, and accomplished with very little collaboration … However, when firms work together to address more complicated issues, tacit knowledge critical for success is*≅*likely to reside in both organizations. In such cases, the firm … requires rich interactions among intra- and inter-organizational networks*'.

The relationship view (RV) of the firm is built on relational models theory (Haslam, 2004) to grow a stakeholder theory of individual stakeholders' contributions to joint value creation. In current knowledge-based economies the main basis of value creation has changed from physical resources to intelligent resources and knowledge, which are characteristically dispersed among manifold agents, stakeholders and firms. As a consequence, organisational success and social welfare in knowledge-based societies progressively rely on 'joint value creation' (Bridoux & Stoelhorst, 2016). This view proposes that distinctive interorganisational relationships are an imperative foundation of competitive advantage. When firms cooperate in a way that enables a blend of knowledge stocks and organised action, the synergistic effect of combined resources can be a source of competitive advantage (Dyer & Singh, 1998). Consequently, RV theory holds that organisations that can access and deploy knowledge bases and capabilities through such relationships are likely to realise greater success.

6.2.1 Relationship Learning (RL)

Once companies share information and knowledge with customers and suppliers, they enrich their knowledge base, capabilities and competitiveness through relationship-level learning. In our conceptual framework, we adopt broadly the meaning from Cheung, Myers and Mentzer (2011) and the creative definition from Selnes and Sallis (2003, p. 86) of the RL activities 'as an ongoing joint activity between the customer and the supplier organisations directed at sharing information, making sense of information, and integrating acquired information into a shared relationship-domain–specific memory to improve the range or likelihood of potential relationship-domain–specific behaviour. Relationship learning is thus a process to improve future behaviour in a relationship. We further propose that relationships vary in terms of their learning capabilities, and thus some relationships perform better because they have developed appropriate learning mechanisms'. Consistent with Selnes and Sallis (2003) perspective, Cheung et al. (2011) contemplate RL as a multidimensional construct consisting of three components: *information sharing*, *joint sensemaking* and *knowledge integration* into a relationship-specific memory. As per Mesquita, Anand and Brush (2008), they advocate the relational vision to explain how these three dimensions influence the buyer–supplier cooperation relationship and consequently enhance the knowledge base. This previous statement can be supported in the nature of the RL construct, which may be conceptualised as a joint action in which the two parties struggle to generate more value jointly than they would produce separately. Selnes and Sallis (2003) believe that the capability of a relationship to learn is linked with how it is managed and the trust environment in which it is inserted.

Selnes and Sallis (2003) have identified, as a first dimension of RL, that information sharing between the two parties in a customer–supplier relationship is a starting point and a central element of working relationship and affects RL, thereby achieving operational efficiency. Second, the dialogue within the two parties in a customer–supplier cooperation relationship constitutes a relationship-specific element of interpretation (sensemaking) of the shared information. However, individual and groups vary in the ways they make sense of the same information, or lack the knowledge to make sense of it. For this reason, firms involved in an RL experience must use several mechanisms to joint sensemaking of information. Organisations in a customer–supplier relationship introduce management meetings, face-to-face communications in visit programmes, informal interpersonal networks and task-force teams and cross-functional teams as instruments to cooperate, solve operational problems in the relationship and create joint learning arenas. Finally, partners in networks 'develop relationship-specific memories into which acquired relationship-specific knowledge is integrated' (Selnes & Sallis, 2003, p. 83). Relationship memories are shared, and manifest in documents, computer memories, etc. They involve the common history, values of the partners and joint lessons learned, facilitating the knowledge integration process.

Despite its importance, little or no research exists about how firms' relationship learning may affect the link between knowledge base and green innovation performance, and not much is known about how relationship learning influences the deployment of a firm's existing knowledge base and thereby facilitates green innovation. Moreover, an investigation of the role of relationship learning may refine our conceptual understanding of the KB–GI link.

6.2.2 Knowledge Base (KB) Breadth and Depth

Innovation redesigns the competitive scenery and creates new market opportunities. Various approaches have been proposed to identify its drivers (Smith & Tushman, 2005). Among them, the KBV has gained importance (Zhou & Li, 2012). The principal assumption of KBV is that new product creativity is a function of the firm's ability to manage, maintain and create knowledge (Grant, 1996). More recently, Zhou and Wu (2010) asserted that a firm's existing KB, namely its knowledge breadth and depth, represents its main resource for innovation development.

According to the KBV, a firm's existing knowledge base sets up its possibility and ability to understand and employ new knowledge to decision-making, problem solving or innovations (Ahuja & Katila, 2001). Knowledge breadth and depth are two distinct dimensions of a knowledge base that reveal both the structure and the content of the knowledge a firm has. The knowledge breadth refers to the degree to which the firm's knowledge repository contains diverse and multiple domains. The knowledge depth indicates the level of sophistication and complexity of knowledge in key fields (Bierly & Chakrabarti, 1996). The breadth attribute captures the horizontal dimension of knowledge and heterogeneous knowledge content, whereas the depth attribute reflects a vertical dimension and unique, complex, within-field knowledge content (Zhou & Li, 2012).

6.2.3 Green Innovation (GI)

Industrial activity, heavy car usage and many other human activities lead to air emissions that cause climate change, pollution, greenhouse gas emissions and human disorders, so firms in the twenty-first century must offer green solutions that protect the environment.

Innovation is an important way to mitigate or avoid environmental damage. Sherry and Stubberud (2013, p. 47) reported the following on green technologies: '*Green technologies can have a double benefit for business—the feel good rewards that come from creating environmentally sustainable products and the practical financial benefits that can contribute to improved competitiveness and overall business success*'. Consumers throughout the world want and expect to purchase

evermore environmentally friendly products and services. Indeed, GI is a strategic need for firms, and it offers a great opportunity for meeting buyers' wishes without harming the environment.

GI has become a dominant approach within manufacturing industries so that manufacturers can achieve eco-friendly improvement in reply to increasing environmental pressure. Previously, investing in eco-friendly activities was understood as an unnecessary investment; nevertheless today's severe ecological rules and the existing popularity of environmentalism have changed competitive strategies, procedures and patterns for firms (Porter & Van der Linde, 1995). The 'green' tag is a stimulus for non-stop innovation, creating new market opportunities for firms to satisfy new consumer demands and thereby create customer capital (Leal-Millán, Roldán, Leal-Rodríguez, & Ortega-Gutiérrez, 2016).

GI can comprise both green products and green processes, and includes innovation in technologies involved in energy saving, pollution prevention, waste recycling, green product designs and corporate environmental management (Chen et al., 2006). Chang (2011, p. 361) stated the following regarding GI: '*If companies are willing to undertake green innovation enthusiastically, they can obtain the advantage from differentiation and low cost which can even change the existing competitive rules*'.

6.3 Theoretical Background, Model and Propositions

The following sections explain the relationships among the key variables included in the proposed research model (Fig. 6.1). On the basis of our literature review, we propose that KB and RL play different roles in contributing to GI. Using the KBV and the RV perspectives, we propose that RL strategies are antecedents—precede—the KB breadth and depth. Then, we propose that the breadth and depth of the KB are connected with GI outcomes. The central theme of our proposed model, therefore, is that understanding the relationship among the knowledge base, its antecedents and its consequences can lead to a better comprehension of the link between learning process, knowledge management and firm green innovation.

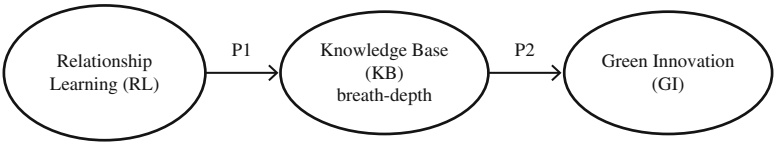

Fig. 6.1 Proposed model

6.3.1 Relationship Learning as a Determinant of the Knowledge Base

The resource-based view is grounded on the statement that gaining and maintaining sustainable competitive advantages is a function of the firm's essential resources and capabilities. This way, resources and capabilities are the main source of a firm's success; heterogeneity in firm resources will lead to dissimilarities in competitive advantage and firm performance. Therefore, a firm's knowledge management and learning systems characterise an effort to exploit valuable intangible resources, such as technical capabilities, knowledge bases or management know-how. Such resources and capabilities defy easy transferences but are deployable in multiple organisations, departments and people at a low cost. Consequently, the major driver of knowledge-based management is the stock of knowledge and knowledgeable resources stored by the firm. So, the importance of the KB is resulting from an increase in the economic rent that accrues from these firm-specific knowledge resources.

The antecedent that we propose pertains to the firms' RL strategies. KBV theory proposes that knowledge is an indispensable strategic resource for a firm to preserve a sustainable competitive advantage. As knowledge is created and disseminated both at the firm level as between different firms, it has the potential to contribute to the firm's value by increasing its ability to respond to new and sporadic situations. The growing importance of knowledge and learning process as a critical resource and capability has stimulated managers to pay better attention to the firm's RL strategies.

Firms that work in cooperation with different stakeholders generate learning processes in common and shared knowledge and information spaces. Consequently, they enhance their KB, its capabilities and competitiveness through relational-level learning. Thus, RL activities may influence the size and the effectiveness of the KB. According to the perspective of Selnes and Sallis (2003), we consider RL to be similar to, but theoretically distinctive from, the more broad concept of organisational learning. We specifically consider RL as a multidimensional construct consisting of three variables: information sharing, joint sensemaking and knowledge integration. Following Mesquita et al. (2008), we believe that the relational view provides the necessary perspective to explain how these dimensions influence KB.

Vargo and Lusch (2004) contend that the first flow between organisations in networks is information. It is this information that facilitates the co-production of products which meet market demands from the viewpoint of quality, delivery and prices. Consequently, *information sharing* is the give-and-take of information between buyer and supplier about end-user needs and preferences, marketplace configurations, technologies, and policies of partners, and unforeseen problems (Selnes & Sallis, 2003). Recent research on knowledge transfer mechanisms indicates that information about the market environment, customer and competitors is a driver of a market-oriented strategy. Operational efficiencies are achieved through the exchange of information and this can benefit both members. In particular, the exchange between

partners with regard to information, resources, markets and technologies, with subsequent advantages for learning, scale and scope economies, allows buyers and suppliers to enhance its KB, and achieve strategic objectives, such as risk sharing and outsourcing their value-chain stages (Gulati, Nohria, & Zaheer, 2000).

Joint sensemaking is defined as the development of understanding, knowledge, experience and memories between past actions, the success of these actions and future actions (Fiol & Lyles, 1985). The management of joint sensemaking activities has become increasingly important given its augmented role in new product development and KM processes. Organisations differ in the ways in which they make sense of the same information, and thus there are differences in the mechanisms or devices involved in the sensemaking process. Logically, these differences could cause asymmetries in the conformation of the KB of the partners.

Firms develop structures in which organisational members operate in a knowledge-exchange system and learn from worldwide experiences, but particularly through direct partnerships (Cheung et al., 2011). An important aspect of KM designed to facilitate learning from one firm node to another is through cross-organisational teams, information-sharing forums and informal meetings, and is designed to create learning arenas between organisations (Selnes & Sallis, 2003). It is the acquisition of tacit, team-based knowledge that helps firms accrue advantages in turbulent markets (Mesquita et al., 2008). Other authors claim that the use of joint sensemaking events assists performance-related outcomes by enhancing new product outputs and new process innovations as well (Cheung et al., 2011).

Knowledge integration appears when firms develop relationship-specific memories whereby knowledge specific to that relationship is stored in the organisations' collective thoughts, beliefs and values. Distinctive routines are also developed in the form of programmed formal and informal procedures for how the firm partners interact. Integration is the attribute of the state of cooperation that exists between departments that are required to attain a unity of effort due to the demands of the environment (Cheung et al., 2011). This definition is usually applied to units within a firm. However, the notion of integration can also be used to comprehend relationships between organisational units from different firms. Here, knowledge integration consists of an arrangement of interests (cooperation) as well as an alignment of actions (coordination) (Gulati, Lawrence, & Purnam, 2005) and how this benefits the enhancement of the KB. For instance, integrative tools like consolidated databases relative to product, service and market information help to facilitate knowledge transfers, and expand the KB of the firms, and consequently innovation.

By other hand, knowledge management (KM) studies suggest that KM strategies can be primarily categorised based on two key dimensions: KM focus and KM source. In the KM focus dimension, KM strategies can be categorised as explicit oriented and tacit oriented. The second dimension to position KM strategy is grounded on the firm's primary source knowledge. This way, KM strategies can be classified as internal oriented and external oriented across this length. External-oriented strategy hopes to bring knowledge from outside sources via either acquisition or imitation and then transfer the knowledge throughout the organisation. Internal-oriented strategy focuses on creating and sharing knowledge within the

limit of the firm (Choi, Poon, & Davis, 2008). The RL view would fit into this second type of external-oriented strategies, and the RL's activities and interfirm cooperation process help to locate, capture and absorb external knowledge that expands the organisational KB.

Several studies suggest a complementary relationship between KM strategies. The central proposition is that adopting a full set of KM strategies is related to high performance, while the adoption of individual KM strategies results in little or insignificant performance gain. These studies showed that a complementary set of explicit–tacit, even tacit-internal-oriented plus explicit-external-oriented strategies, resulted in higher performance (Bierly & Chakrabarti, 1996; Choi & Lee, 2003; Leal-Rodríguez, Roldán, Leal, & Ortega-Gutiérrez, 2013). This complementary set of KM strategies leads to there being synergies and expands the firm's KB and the GI outcomes. The more focused an organisation's strategy is on getting as much internal and external, tacit and explicit knowledge, the more depth and breadth its KB will gain. By applying this rationale, we propose that:

P1. Relationship learning has a positive influence on knowledge base

6.3.2 Green Innovation as a Consequence of the Knowledge Base

The study on organisational knowledge has recognised some scopes across which organisational KB can be discerned and has assessed the implications of these dimensions for knowledge-related consequences. The size of a KB has been associated to the organisation's innovative productivity (Ahuja & Katila, 2001). Likewise, the degree of overlying between different organisational KB has been connected to an organisation's capability to absorb outside knowledge from its geographical or technological neighbours (Lane & Lubatkin, 1998). Organisational KB has occasionally been characterised as sets of rudiments or individual pieces of knowledge embodying the content of what the organisation knows (Ahuja & Katila, 2001; Fleming, 2001). The previous literature has focused on the number of elements in a KB (its size) or the identities of those elements compared to the KB outside the organisation (its relatedness). Yet, it has not considered how the structure by which different knowledge elements are combined together or isolated from each other in different clusters will affect the organisation's capability to combine knowledge components for innovation.

Very useful innovations frequently occur from the interaction between deep knowledge born from specialisation and variety created through broad exploration (Katila & Ahuja, 2002) and the integrative mechanisms that link them both. Specialisation nurtures a deep understanding of a specific area, an ease of use arising from the recurrent application of a few components and superior knowledge of the interconnections among a set of components, as well as from the problems in connecting the components to each other (Katila & Ahuja, 2002). A broad exploration offers a contact to new ideas, innovative applications and distinctive new variations

and combinations of a given set of components (Katila & Ahuja, 2002; March, 1991). Integrative mechanisms ensure that the deep knowledge assimilated through specialisation is matched with the novel applications identified through a broad exploration. To explain the generation of useful innovations, it then becomes relevant to understand how different knowledge-based structures—from integrated to modular—can provide all three mechanisms of this mix: a exploration breadth, deep knowledge and integrative mechanisms. These permit an exploration breadth to be combined effectively with deep knowledge (Katila & Ahuja, 2002; Yayavaram & Ahuja, 2008).

To foster effective innovations, firms must fulfil two requirements: a broad and deep KB. A firm with broad knowledge has stored know-how through a diversity of masteries and heterogeneous market fields through its extensive knowledge exploration (Prabhu, Chandy, & Ellis, 2005). In addition to knowledge sharing, a broad KB provides the sharing process through which the organisation can connect and assimilate its broad knowledge. It does so across dissimilar fields in unexpected and unusual configurations which generate breakthrough ideas for great innovation (Zahra & George, 2002). On the other hand, an organisation with a knowledge depth is likely to benefit from market and customer knowledge attainment. This organisation with a deep knowledge base accumulated thorough familiarity and know-how about existing green technologies and green markets can develop green core competencies. These can be in the form of technical or professional expertise, and the organisation tends to involve in actions in its current, specialised fields to foster its GI.

Past research suggests that in the search process that underlies recombinant inventions, maintaining a balance between depth and breadth is critical to successful invention (Katila & Ahuja, 2002; Prajogo & Ahmed, 2006). The size and structure of an organisation's KB can determine how well it manages knowledge resources and creates an innovation capacity (Yayavaram & Ahuja, 2008). Such tacit–explicit and external–internal knowledge integration is likely to affect how firms entirely exploit the potential of their KB and generate GI. By applying this rationale, we propose that:

P2. A broad and deep knowledge base positively affects green innovation

6.4 Conclusions and Implications

This chapter has focused on a theoretical analysis of the relationship among RL, KB and GI. To this end, we have proposed a research model to argue that a deep and broad KB can positively influence GI performance. In addition, the proposed theoretical model stars a debate in favour that firms that invest and involve themselves in RL mechanisms and strategies are more likely to indirectly foster GI. Also, the model argues how cooperation among firms that occurs through networks or supply chains stimulates the RL mechanisms, finally affecting the enhancement of firm KB.

Using a conceptual framework founded on the knowledge-based view (KBV) and the relationship view (RV) this chapter has raised two main propositions, suggesting that firm's GI is greatly influenced both by an integrated broad and deep KB (directly) as the RL activities (indirectly). In summary, this study simultaneously examines (1) RL as an antecedent of the KB and (2) the GI as a consequence of the same.

Our chapter makes a contribution by enhancing the understanding of the RL activities in order to boost GI outcomes in the firms. The RL variable is regarded as key GI driver in environmental oriented companies because external information and knowledge flow offer potentially valuable experiences that, combined with internal knowledge, can be exploited to create new superior knowledge. Consequently, our model complements previous theory and offers theoretical arguments focusing on the social and relational aspects of the interfirm cooperation that facilitates organisational learning, knowledge management and innovation in organisations.

The discussed model also suggests that the GI advantages of KB are contingent on RL factors such as information sharing, joint sensemaking and knowledge integration. However, a subsequent empirical study will be needed to find out the contribution level of each of the three components to the enrichment of the KB and GI performance. In summary, this study reflects the central importance of acquiring and creating new knowledge through relationship learning during external social interactions and firm cooperation. The proposed model offers additional support for the idea that firms should be treated as knowledge-based entities. Furthermore, our chapter suggests that relational learning activities can have a robust impact on the KB–GI link, in such a way that the KB pays off better for those firms which are highly involved in RL. In other words, the link between the KB and GI outcomes may be strengthened when organisations engage in RL activities.

Our research model can provide firm managers with some direct implications about how to manage knowledge resources for green innovation. First, the level of green innovation in certain organisations is usually highly conditioned by a prior accumulation of related knowledge in his KB. Previous related knowledge is in many cases the result of exchange of external knowledge flows, and the source or the key to develop a sustainable competitive advantage based on pursuing GI. Therefore, the RL and interfirm cooperation strategy, KB and GI capability are closely linked.

Second, in line with the work of Zhou and Li (2012), managers should scan the KB that the firm already has and detect whether its size, type, contents and embedded advantages reveal depth and breadth. Then, managers should adjust their knowledge combination mechanisms to fit their organisations' existing KB. To expand the outcomes from accumulated knowledge resources and to enhance GI, we suggest that a firm with a broad and deep KB fortifies its external/internal knowledge/information-sharing processes and should make efforts to shape and increase the RL routines associated with acquiring, absorbing and combining outside knowledge.

Third, with respect to the KM strategy our theoretical model suggests that it is prudent for the companies to foster and ensure that the knowledge generated through

their everyday activity (thoughts, innovative ideas, competences, practical skills, problem-solving techniques, etc.) is properly assimilated, codified, articulated and warehoused within their own KB and repositories. Particularly, the external knowledge results from the cooperation and the relationship dimensions that firms maintain in their day-to-day experience. This knowledge acquisition and KB creation involve reflecting about and verbalising knowledge from customers, suppliers, competitors' best practices, external consulting analyses and results from joint experiences with other organisations.

Finally, the model contemplates RL as a basic issue in realising both KB and GIP. Fitting to this belief, top managers should build strong RL cultures. This sort of culture hurries the exploration for new client information and knowledge, designing external partnership that highlights new green innovations and thus the value of the relationship between the firm and its customers. This relationship culture contemplates interorganisational knowledge flows as a major source of brainpower and new viewpoints.

There are some distinctive characteristics of the GI versus innovation in general that need to be based on a close cooperation and relationship mechanisms with multiple stakeholders. An effective GI needs cooperation with customer and suppliers for product eco-design, for cleaner production process, for green packaging, for using less energy during product logistics, for cutting the excess of inventories and materials, etc. Effective use of broad-deep KB and customer/supplier cooperation relationship on environmental or green concerns are two key capabilities to strengthen and stimulate the firm's GI performance.

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Chapter 7
Connecting Funding to Entrepreneurs: A Profile of the Main Crowdfunding Platforms

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Abstract The general purpose of this chapter is to describe and analyse the financing phenomenon of crowdfunding and to investigate the relations between crowdfunders, project creators and crowdfunding websites. More specifically, it also intends to describe the profile differences between major crowdfunding platforms, such as Kickstarter and Indiegogo. The results showed that both Kickstarter and Indiegogo are among the most popular crowdfunding platforms. Both of them have thousands of users and these users are generally satisfied. Most of them rely on individual approaches for crowdfunding. Despite this, Kickstarter and Indiegogo could benefit from further improving their services. Furthermore, according to the results, it was possible to observe that there is a direct and positive relationship between the money needed for the projects and the money collected from the investors for the projects, per platform.

7.1 Introduction

Nowadays, entrepreneurs and project creators, who want to create, improve and support their businesses, have several possibilities for capitalising their ideas and business. They can rely on venture capital, retained earnings, loans from banks or other financial institutions, for example. However, all of these alternatives can

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pose some difficulties and issues for entrepreneurship, especially for small and microbusinesses. Usually, they search for sources of alternative funding, which could help them to proceed with their projects with a reduced possibility of financial liabilities. One of the best examples is crowdfunding. It is a relatively new phenomenon for entrepreneurship and is becoming more popular and useful for project creators. It can help entrepreneurs to find investors for their projects all over the world. The principle is supported by a worldwide network that can connect entrepreneurs and investors from everywhere. All crowdfunding processes are implemented on crowdfunding websites (platforms), which usually include high level of business flexibility.

The work described in this chapter presents and analyses the funding phenomenon of crowdfunding and investigates the relation among crowdfunders, project creators and crowdfunding websites. It also seeks to find out profile differences between major crowdfunding platforms, such as Kickstarter and Indiegogo. In this sense, the main objective of the study is to identify the overall profile differences between the two main crowdfunding platforms (Kickstarter and Indiegogo).

As crowdfunding is a relatively new phenomenon, it is not surprising that the literature specifically devoted to crowdfunding is new and the scientific literature is not abundant. The literature review tries to provide a complete description of the main scientific papers, with special emphasis on the importance and role of crowdfunding for entrepreneurship, the most important and popular crowdfunding models, such as donation-based, reward-based, lending-based and equity-based crowdfunding models. It also presents financial intermediation theory and the determinants of success.

In the empirical part, the chapter describes the data analysis regarding satisfaction with the two crowdfunding platforms. Data was collected from the crowdfunding websites and from other statistical websites, which includes information about platforms, entrepreneurs, projects, investments and other. The information was complemented with data collected through a survey to assess the user satisfaction with the platforms and their services. The survey includes key questions about Kickstarter and Indiegogo, including issues about popularity, efficiency, crowdfunding areas and advantages and disadvantages of the platform. It also allowed to get information about time and money, important for starting a crowdfunding project. All this information helps to understand future opportunities and expectations for Kickstarter and Indiegogo. There are 62 applied questionnaires from Kickstarter and 78 from Indiegogo. In this regard, to answer to the objective of the study and the research hypotheses, a cluster analysis to identify the profile of users was applied, together with a descriptive analysis to explore the information about popularity of the platforms, their average cost, the most popular area of projects, the profile of users and future opportunities.

The inferential analysis will be used to answer the research hypothesis. All the results are summarized in the conclusion part of this work, which presents the most important findings of the same.

7.2 Conceptual Framework

7.2.1 Definition of Crowdfunding

Business owners and entrepreneurs want to build, grow and support their business. For that they need capital, which is not easy to get by their own means and that usually relies on alternative ways to find. The usual sources of business funding, such as bank lending, venture capital and retained earnings, are difficult to obtain for small and microbusinesses. Entrepreneurs who lack the personal resources needed to finance their businesses turn to family members or friends, sometimes to personal acquaintances, but those sources are seldom sufficient. As a result, many small businesses, that are able to be potentially successful, fail to get funded (Bradford, 2012). Financial sources can be generally divided into two main categories: equity and debt. There are different types for entrepreneurial finance investors (Table 7.1).

Nowadays, the most efficient form of alternative capital is crowdfunding. This is one of several options available to entrepreneurs who are looking to fund their new or working businesses. Crowdfunding is a contemporary way of source founding for new projects, businesses or ideas. For entrepreneurs crowdfunding can be a very effective way to bridge the hole between the earliest stages of funding and capital growth. Although it seems a perfect fit to the objectives, it should not be considered as a complete replacement to traditional channels of funding. In several cases, there is an overlap (Husain & Root, 2015). According to Agrawal, Catalini and Goldfarb (2011, p. 4) "Crowdfunding systems enable users to make investments in various types of projects and ventures, often in small amounts, outside of a regulated exchange, using online social media platforms that facilitate direct interaction between investors as well as with the individual(s) raising funds". Entrepreneurs can develop their new professional connections with other entrepreneurs through sharing their crowdfunding work (Muller, Geyer, Soule, Daniels, & Cheng, 2013).

Although crowdfunding is a relatively new phenomenon and the related literature is only nascent, crowdfunding has been studied by different researchers and approached in popular papers all over the world. Belleflamme, Lambert and Schwienbacher (2014) state that crowdfunding is a practice that "Involves an open call, essentially through the Internet, for the provision of financial

Table 7.1 Different types of entrepreneurial investors

Investors of equity financial source	Investors of debt financial source
Entrepreneurs and team members	Banks
Friends and family	Leasing companies
Business angels	Government agencies
Venture capitalists	Customers/suppliers
Other companies/strategic investors	Bootstrapping
Stock markets	

Source: Adapted from Schwienbacher and Larralde (2010, p. 9)

resources either in form of donation or in exchange for the future product or some form of reward to support initiatives for specific purposes" (Belleflamme et al., 2014, p. 4). The use of the Internet to make "open call" can have a very high level of efficiency for crowdsourcing in general, but it can also become problematic, chiefly when it includes the offering of equity to the crowd (Belleflamme et al., 2014).

According to the definition of Steinberg and DeMaria (2012, p. 2) "Crowdfunding is the process of asking the general public for donations that provide start-up capital for new ventures". Wicks (2013, p. 5) considers that "Crowdfunding is where a large number of people (a crowd) financially support a project by giving a relatively small amount of money either in return for a reward, as a donation, or potentially in return for equity. It is a form of social networking and uses the power of the Internet and online communities to spread the word about a project or product".

7.2.2 Crowdfunding Models

It is possible to represent crowdfunding like a new way for project organisers, entrepreneurs and start-ups to raise money for their purposes. Alleviated by the spread of online technologies (and, specifically, social media), crowdfunding capitalises on the many-to-many form of communication that has already opened up new opportunities in industries, ecommerce (e.g. EBay), accommodation and travel (e.g. Airbnb, Uber). During the last 5 years the size of the crowdfunding market has raised about 23 times (from $1.5 b to $34.4 b) (Husain & Root, 2015). Overall, a distinction can be made between the following four main crowdfunding models (Collins & Pierrakis, 2012; Cornell, 2014; Gajda & Mason, 2013; Husain & Root, 2015; Mitra, 2012; Steinberg & DeMaria, 2012):

(i) Donation-based crowdfunding
(ii) Reward-based crowdfunding
(iii) Lending-based crowdfunding
(iv) Equity-based crowdfunding

Generally, the funding processes on most crowdfunding platforms are similar, regardless of the type of crowdfunding used. The main purpose of crowdfunding platforms is the simplification of processes of transactions through their knowledge (Martinez-Canas, Rubio, & Ruiz-Palomino, 2012). The funding processes begin with a fundraiser initiating a request for funding. Potential investors can examine the offers, and, when it is interesting for them, invest a small amount toward the target amount.

Crowdfunding offers platforms where entrepreneurs have possibilities to display their work to a global community (Gerber & Hui, 2013). Actually, crowdfunding can be used as a way to help entrepreneurs reach new business markets that they could not access offline (Agrawal et al., 2011). Online platforms are the intermediary places for crowdfunding activities, where entrepreneurs and crowdfunders have

possibilities to exchange a particular value for money. These platforms have a few opportunities to be specialised to certain kinds of projects and inhere two eminent roles of users (Hardy, 2013). The act of participating on crowdfunding platforms can improve user's feelings of self-efficacy around their ability to perform and contribute (Kollock, 1999). Participation in social networks, such as Facebook or Twitter, has also been shown to heighten user self-efficacy. A few users go on Facebook to find greater purposes, to receive social support, to sense less uncertainty about oneself or to find a great feeling of self-efficacy (Gangadharbatla, 2008). All business models of crowdfunding platforms are generally based on payments that are charged for each project that is sought to be funded. Frequently, crowdfunding sites charge when there is successful financing. Otherwise, when fundraising is not successful, entrepreneurs pay no fee. A very good and popular example of a site[1] that charges fees in this manner is Kickstarter (Mitra, 2012).

It is really important to understand the effect of crowdfunding on entrepreneurial self-efficacy (Shea & Bidjerano, 2010). It describes the belief one has in one's ability to succeed at tasks essential for entrepreneurship (Bandura, 1997). Entrepreneurial self-efficacy has positive influence on entrepreneurial intentions, performance as well as the entrepreneur, who pursues new ventures and believes in his or her own abilities (Chen, Greene, & Crick, 1998). The high level of success and motivation of entrepreneurs makes higher levels of self-efficacy (Shane, 2003). Crowdfunding provides a specific way to study entrepreneurial self-efficacy given its role as a space for entrepreneurs (Harburg, Hui, Greenberg, & Gerber, 2015). The self-efficacy can strongly influence on entrepreneurial intentions and performance. The entrepreneurs who do not have self-efficacy are unlikely to pursue new ventures and believe in their own abilities (Chen et al., 1998). The theory of Bandura's social cognitive suggests that there are four ways for developing self-efficacy (Bandura, 1997):

- Experience of mastery, which is felt by oneself when succeeding at tasks
- Modelling, which is seeing examples of others succeeding at tasks
- Social persuasion, which is getting feedback and encouragement from others
- Physiological states, which are physical and emotional response to various situations

The findings in the study of Schwienbacher and Larralde (2010) suggest different successful opportunities for for-profit and non-profit organisations. The non-profit organisations have more opportunities to raise the money through crowdfunding and tend to be more successful in achieving their fundraising targets and purposes as compared to for-profit organisations and project-based initiatives. The non-profit organisations may be more prone to commit to qualified products or services if quality comes at the expense of quantity.

(*i*) *Donation-Based Crowdfunding*

This type of crowdfunding characterises situations in which individuals send money to projects or people in need, with no assumptions of a palpable perk in

[1] See at http://www.kickstarter.com/.

exchange for their money (Husain & Root, 2015). The investments on donation sites are, as the name would indicate, donations. It allows fundraisers, primarily from social and cultural groups, creative enterprises and community-based organisations to directly make an online appeal for donations (Baeck, Collins, & Zhang, 2014). According to Baeck et al. (2014, p. 85) "Donation-based crowdfunding is a process, when Individuals donate small amounts to meet the larger funding aim of a specific charitable project while receiving no financial or material return in exchange". Donation-based crowdfunding plays an essential role in the alternative finance processes.

The most popular donation-based crowdfunding sites are Kickstarter and Indiegogo. These platforms allow people and creative projects to have an opportunity for raising money via online donations or pre-purchasing of products or experiences. These two crowdfunding platforms only support donation-based projects. Each of them does not allow contributors to be as an investor or a shareholder, and does not qualify contributors as accredited investors to participate in any financial returns. On the Kickstarter and Indiegogo crowdfunding platforms the creators of project maintain 100 % control over their products and services (www.forbes.com). Crowdfunding platforms are one of the interfaces between entrepreneurs and founders (Song & Boeschoten, 2015).

Donation-based crowdfunding platform is a perfect environment for those who want to gather a community online and to allow them to donate money for social or charitable projects. It can help small organisations and people to raise money for personal or specific charitable purposes. Motivation of funders for this crowdfunding platform expressed as intrinsic and social and benefits is intangible (Nesta Operating, 2012). Donation-based crowdfunding is the best choice for charities and personal campaigns. However, that does not mean that this model cannot be used for start-ups. This model can be effective for social entrepreneurs who are running projects that may be attractive to those interested about that specific issue (Husain & Root, 2015). Donation-based crowdfunding platform represents a small proportion of overall crowdfunding activities (Mitra, 2012).

Donation-based crowdfunding sites are not suggesting financial security to investors. Contributors clearly have no anticipation of profits, because they receive absolutely nothing in return for their contributions. So they only have possibilities for stock or notes and it is not right to consider this contributions as securities (Bradford, 2012).

(*ii*) *Reward-Based Crowdfunding*

This king of crowdfunding model channels money to creatives or entrepreneurs who guarantee sending a reward in exchange for the money. Generally, this model is used to collect pre-orders for innovative products (Husain & Root, 2015). Individuals donate to a specific project with the anticipation of receiving a palpable (but non-financial) reward or product at a later date in exchange for their investment (Baeck et al., 2014). According to Baeck et al. (2014, p. 71) "Reward-based crowdfunding is a process, when Individuals donate towards a specific project with the expectation of receiving a tangible (but non-financial) reward or product at a later date in exchange for their contribution". It is a model that has really attracted the imagination of public

and attention of media. Reward-based crowdfunding is the type of alternative finance that registered the highest usage rate in consumer poll among all examined models (Baeck et al., 2014). In 2015, start-ups worldwide raised US$2.68 billion through reward-based crowdfunding platforms (Barnett, 2016).

For many types of start-ups in various stages of development, the campaigns of reward-based crowdfunding are quite advisable and convenient. They can work efficiently specially for start-ups that are able to promise the end product in return for the contribution. Normally, entrepreneurs have at least a working prototype to show the potential investors before they can turn to crowdfunding, using the investments raised via pre-orders to fund the earliest production run (Husain & Root, 2015). The reward-based crowdfunding sites normally do not include direct revenue-sharing arrangements through. A very good example is the payment of interest and profit sharing from the business. Nevertheless, they could offer different categories of rewards. It depends on the amount of contribution (Mitra, 2012).

The reward-based crowdfunding model is very similar to the pre-purchase model. Frequently, these two models appear together on the same sites. The most useful and popular reward/pre-purchase crowdfunding sites are Kickstarter and Indiegogo (Bradford, 2012). There are many reasons for their popularity. For instance, they do not limit the character of the featured projects. As a result, they have different types of audience, providing an elastic approach when it comes to price and rewarding schemes. They are very appealing to project developers, contributors and scientific community. The reason is the multiplicity of the rewarding schemes that may be suggested by the project manager (Hardy, 2013).

Kickstarter requires its projects to propose rewards, which are not limited to pre-purchase and typically items produced by the projects itself. Unlike Kickstarter, Indiegogo does not require campaigns to offer perks, but it recommends them. Few perks offered on the Indiegogo site follow the pre-purchase model, but it is not mandatory. So, it is possible to conclude that Kickstarter uses "all-or-nothing" funding model, which means that projects are not able to be funded unless they reach their stated funding goal, but Indiegogo prefer to be more flexible and give more chance to entrepreneurs (Bradford, 2012).

Considering the main differences between Kickstarter and Indiegogo in relation with their business model, fee, payment, blog and data statistics, category, prohibition, partnership and restraint it is possible to present some features. Kickstarter follows an "all-or-nothing" business model, which Indiegogo also uses, but Indiegogo also adopts "keep it all" too. For Kickstarter the price of fully funded is 5 %, which means that Kickstarter will take 5 % of the funds for successful projects and it has credit card processing fee by Amazon 3–5 %. Indiegogo has 4 % of fully funded price (successful campaigns and projects) or 9 % of partially funded price (unsuccessful campaigns and projects). It also has 3 % fee for credit card processing and $25 wire fee for projects and campaigns that are not from the USA.[2] Kickstarter accepts payments by using credit cards, and Indiegogo accepts payments by using PayPal online money transfer system. Both are able to have blog, but here there are

[2] See at http://www.indiegogo.com/learn/pricing.

differences related with data releasing. Kickstarter has data release and Indiegogo does not have systematic data release. Generally, there are 13 main categories and 36 subcategories in the Kickstarter crowdfunding platform and 3 main categories and 24 subcategories in the Indiegogo crowdfunding platform. Indiegogo does not have any prohibitions, but Kickstarter has three prohibitions:

1. Charity or cause-funding projects
2. ”Fund my life” projects
3. Other prohibited contents

This type of projects are not allowed to be raised in Kickstarter. So, for these projects more efficient and expedient way is the using of Indiegogo crowdfunding platform (Zhang, 2012).

(*iii*) *Lending-Based Crowdfunding*

This type of crowdfunding is sometimes also known as debt-based crowdfunding or peer-to-peer lending. Lending-based crowdfunding allows individuals to lend money to other individuals or companies, in return for regular (and agreed-upon) interest payments (Husain & Root, 2015). Project possessors typically recommend to return funds to backers over a specified time period and with benefit (although in some cases without profit) (Barnett, 2016). In the lending-based crowdfunding model, multiple funders lend smaller amount of money through online platforms with the expectation of periodic repayment (Segal, 2015). In 2015, start-ups worldwide raised US$25.1 billion through lending-based crowdfunding platforms (Barnett, 2016).

There are two types of lending-based crowdfunding sites:

1. **Sites not offering interest**. The famous one is Kiva, which is the leading crowdfunding site that uses the lending model. Kiva lends to entrepreneurs indirectly, through his or her microfinance partner lenders around the world. Kiva calls this process “field partners”. Usually the local institutions make loans to entrepreneurs before the loan request is even posted on the Kiva website. The lenders often browse the Kiva’s requests and fund each one in any amount from $25 to the loan’s full amount. Kiva gathers and distributes this fund back to the field partners and credit lenders with any repayments the entrepreneurs make. Every lender of the Kiva website receives his or her principal back only. For covering their operating costs, the field partners use any interest received (Bradford, 2012).
2. **Sites offering interest.** There are two huge lending sites that offer interest: Prosper and Lending Club. Sometimes the loans on these sites are not for business purposes. A few loans are for personal expenses, but it is growing up the amount of the small business lending on these sites. They both operate on similar, but not identical, platforms. If there are opportunities for comparing the nature of investors’ participation, it is possible to say that it has changed. Nowadays the lenders on the two sites make indirectly loans to the underlying borrowers (Bradford, 2012).

Lending-based crowdfunding has possibilities for direct borrowing of funds, skipping a few traditional financial institutions, such as banks. This type of crowd-

funding is a development of the peer-to-peer (P2P) model of lending, pioneered by firms such as Lending Club and Zopa. It is possible to distinguish between two approaches:

1. **Microfinance (P2P microfinance).** Peer-to-business resembles micro-financing, so projects and businesses seeking debt apply through the platform uploading their pitch, with members of the crowd taking small chunks of the overall loan. Micro-lending solution is a financial aid usually used by the poorest, offered in small amounts, collected and distributed by non-profit and socially focused platforms (Pazowski & Czudec, 2014).
2. **Social lending (P2P lending),** which operates as an investment: The free funds are appropriated and lent according to certain rules. Payment with interest can be returned in a lump sum or along some sort of payment schedule (Gulati, 2014).

The form of contribution for lending-based crowdfunding is loan. Concerning the form of return, it is possible to repay the loan with low, or even zero, interest rate (Pazowski & Czudec, 2014). Peer-to-peer lending might be a viable financing alternative for entrepreneurs who want to start a small business, especially given the post-recession market. By using P2P lending, it is possible to raise capital by the Internet. We can present P2P lending as a hybrid crowdfunding and marketplace lending, which is a term used for describing online platforms that stand between borrows and lenders. It also encompasses P2P lending, as well as online lending by large institutions (Segal, 2015). P2P lending offers various potential benefits and drawbacks for borrowers and lenders. On the positive side, it might serve credit needs in markets where financial institutions would not lend by using traditional methods (PricewaterhouseCoopers, 2015a, 2015b). On the negative side, P2P loans compared with traditional bank loans tend to carry higher interest rates. The Lending Club and Prosper, which are very popular lending platforms, recommend that lenders diversify across loans (Segal, 2015).

(*iv*) *Equity-Based Crowdfunding*

The fourth type of crowdfunding assumes individuals to purchase equity in a company, with the possibility of that company making an exit (typically, and IPO[3] or acquisition), leading to a financial return (Husain & Root, 2015). Equity-based crowdfunding could create an efficient alternative for small businesses and micro-businesses which are not able to ripen their covet level of credit in an environment where the amount of small business loans being made available is shrinking (Taylor, 2015). In the last 5 years, the equity branch of crowdfunding has become a more and more important financing alternative for start-ups, and volume has doubled every year since 2011.

Equity investment compared with loans sometimes can be more desirable source of funding. The monthly repayments of loan can have negative effect on growth. Equity-based crowdfunding has a similarity with reward-based crowdfunding: entrepreneurs have to be flexible and comfortable with opening up their businesses

[3] Initial Public Offering.

to scrutiny, which is greater for campaigns of equity-based crowdfunding, as investors will want to see business plans and cash flows to date, along with other sensitive information (Husain & Root, 2015).

Equity-based crowdfunding is more efficient and preferable than traditional methods of debt-based funding for several important reasons:

(a) Unlike typical bank loan equity-based crowdfunding does not ask collateral to receive funds.
(b) As equity-based crowdfunding does not assume any initial liabilities it does not have any reasons to increase chances of experiencing bankruptcy and payback is ongoing as a share of future revenues.
(c) Unlike debt-based funding, where bankruptcy may have to be declared in the case of a failed business venture for equity-based crowdfunding no one of investment does not need to be repaid if the business fails (Taylor, 2015).

The market of equity-based crowdfunding is essentially influenced by the legislative environment of its country. Besides, equity-based crowdfunding includes the sale of a security and it has been restrained until now in the USA, the UK, Ireland, France, etc. (Bradford, 2012).

There are a lot of equity-based crowdfunding sites, which can be very useful, profitable and efficient for entrepreneurs and investors. Crowdfunder is a very good and famous example for equity-based crowdfunding. The average size of equity projects is $1.6 million.

7.2.3 International and Geographical Data About Crowdfunding Models and Platforms

As already mentioned, crowdfunding has four main models. All models have been evolving differently, through the last 5 years (Fig. 7.1). The results in the figure show that all crowdfunding models have grown, but here it is clearly seen that the growing level of lending-based crowdfunding model is quite different. At the end of 2015 it had about three times more funding than the other three crowdfunding models together.

Another important indicator is the geographical distribution of alternative finance in the world. It can help to find countries where crowdfunding is popular and an important part of entrepreneurial activities (Fig. 7.2).

Most of the crowdfunding platforms are installed in the UK, which has 65 platforms for alternative financing. Also, there are four countries, such as Spain, France, Germany and the Netherlands, which have more than 30 crowdfunding platforms. Portugal and Armenia have the lowest number of platforms: one platform each.

It is really important to have information about geographical distribution of crowdfunding projects for Kickstarter and Indiegogo. However, the latter does not have this information available, so it is only possible to present data about Kickstarter (Fig. 7.3).

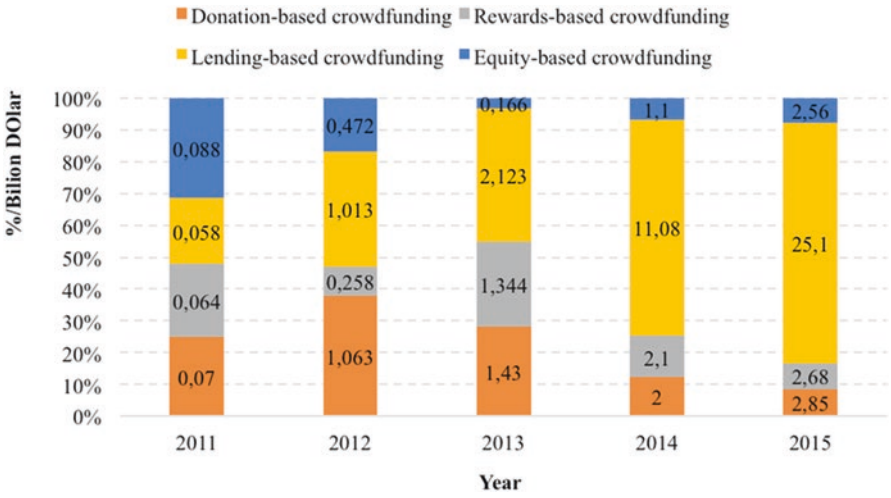

Fig. 7.1 Growth of crowdfunding platforms (CFP). *Source*: Barnett (2016); Husain and Root (2015, p. 5); Gajda and Mason (2013, pp. 5–6)

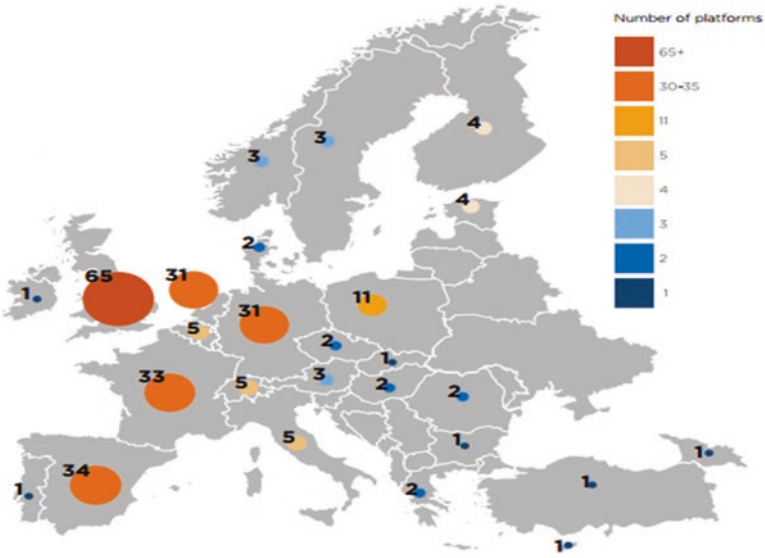

Fig. 7.2 The geographical distribution of surveyed alternative finance platforms in Europe by country. *Source*: Wardrop, Zhang, Raghavendra and Gray (2015, p. 14)

Kickstarter has the highest number of projects in the USA, followed by the UK and Canada. Armenia and Portugal have really small number of crowdfunding projects on the Kickstarter.

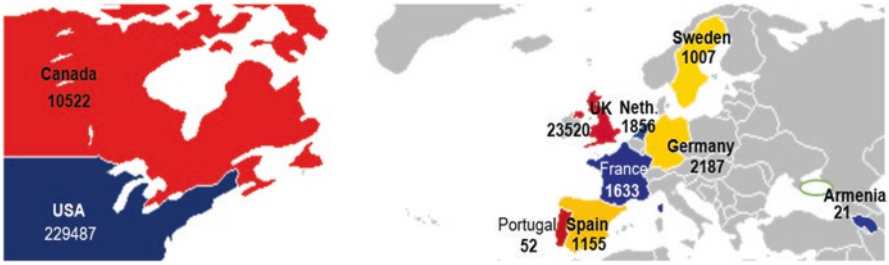

Fig. 7.3 The geographical distribution of crowdfunding projects of Kickstarter platforms by country. *Source*: https://www.kickstarter.com. The date of this data is 19.04.2016

7.2.4 Determinants of Success

This section presents the determination of successful entrepreneurship. By promoting entrepreneurship, the actual purpose is specially to stimulate the entrepreneurs who will be successful after starting up their businesses. For determining duration and profit it uses general results that are the amount of human capital. For retrieving relevant information, it uses social capital and strategies that are equally important for all measures of success. There are five specific determinants of success:

1. **Human capital.** Generally, those who are in higher age want to make less profit and to create less employment. Younger entrepreneurs usually want to make more profits and create more employment.
2. **Financial capital.** Profitability receives negative influence from the amount of income which is not generated from the funded firm. This process makes employment. Generally, firms that are financed with own capital have less employment. When a business partner makes some financial investment, employment achievements are higher.
3. **Social capital.** The influence of other entrepreneurs and profit making is negatively related. When there is a contact with other entrepreneurs it can make positive influence on the employment.
4. **Strategies for keeping up with business.** Entrepreneurs focus on commercial relations in finding relevant information which helps to save business. It shows success for all three measures. When focus is for branch, it is only associated with duration. The focus on direct business relations, which includes customers and suppliers, is linked to profitability. Informal contact with fellow entrepreneurs has a slight influence on generated employment.
5. **Control variables.** Often, when survival of the firm is addressed male entrepreneur performs better than female entrepreneur. There is no significant effect for gender related with profitability and employment. The entrepreneurs, who are active in the services sector of business and consider the (expected) higher income as an important motivation to start the business, do not have more success than their partners (Bosma, Van Praag, & De Wit, 2000).

Based on the literature review, the next "Methodology" section will present specific objectives and research hypotheses of study.

7.3 Methodology

7.3.1 Objective of Study and Research Hypothesis

The main objective of this study is to identify the overall profile differences between major crowdfunding platforms (Kickstarter and Indiegogo). The main emphasis will be placed on a few key points about Kickstarter and Indiegogo, such as advantages and disadvantages, popularity, user tools and some criteria satisfaction of these crowdfunding platforms, on the perspectives of their users.

Based on current research and to answer the main objective of the study, the following specific objectives (SO) were established:

SO_1:	Kickstarter is more popular than Indiegogo
SO_2:	The average cost of projects is more on the Kickstarter than on the Indiegogo
SO_3:	The most popular area on the Kickstarter and Indiegogo is technology
SO_4:	Kickstarter is more popular in the USA than in Europe
SO_5:	Kickstarter has more future opportunities than Indiegogo
SO_6:	Profile of the users on the platforms Kickstarter and Indiegogo
SO_7:	Identify the profile of users of the Kickstarter and Indiegogo platforms

To complement the analysis and for responding to the objectives previously outlined the following research hypotheses (H) have been established:

H_1:	There are differences between users of Kickstarter and Indiegogo platforms with regard to satisfaction
H_2:	There are differences among users of Kickstarter and Indiegogo platforms concerning user-friendliness
H_3:	There are differences between users of Kickstarter and Indiegogo platforms concerning the time period to collecting money for the projects
H_4:	There are differences among users of Kickstarter and Indiegogo platforms related to the money needed for the projects
H_5:	There are differences among users of Kickstarter and Indiegogo platforms related to the money collected from the investors for the projects
H_6:	There is a direct and positive relationship between the money needed for the projects and the money collected from the investors for the projects, per platform

7.3.2 Data Collection and Data Analysis

As it was already presented, the crowdfunding platforms have two main participants:

1. **Entrepreneurs**, who have a project and need certain amount of money for it
2. **Investors**, who have certain amount of money and want to find interesting projects for doing most efficient investments

So, one of the most important steps of crowdfunding platforms is to satisfy the needs of entrepreneurs (project owners) and investors (funders). Otherwise, the dissatisfaction of entrepreneurs and investors will increase, contributing to losing users, which will lead to reduction of the crowdfunding platform dimension.

The main goal of the work described in this thesis, as referred above, is to find out the satisfaction of crowdfunding platforms for two big crowdfunding websites, Kickstarter[4] and Indiegogo,[5] to provide general and useful information about these major crowdfunding platforms and also to find out profile differences between them. For this it will use a few types of collecting data:

1. Satisfaction survey about crowdfunding platforms
2. The highest investments on the crowdfunding platforms
3. The number of projects on the crowdfunding platforms
4. The success rate of projects

The satisfaction survey was answered by entrepreneurs and project owners, who are using or have used Kickstarter and Indiegogo crowdfunding platforms.

To find out another specific information it will collect data about the highest investments on the crowdfunding platforms. For this type of data, information will gather mostly from crowdfunding platforms, yearly reports and scientific researches about the fund turnover and investments of crowdfunding platforms. It will also study the activities of Kickstarter and Indiegogo crowdfunding platforms. During these processes it tries to find out data about the number of projects on the crowdfunding platforms, which will help us to understand how much are crowdfunding platforms popular and user-friendly.

In order to answer the main objective of the study, the research will conduct a quantitative analysis on the features of online crowdfunding platforms—Kickstarter and Indiegogo. Some descriptive statistics will be used to describe the basic features of the data under study for each platform. Some inferential statistics will also be used, with associated hypothesis tests, to help in the deductions to be made from the data collected. Since the intention of this work is to compare the average performance between two independent groups—Kickstarter and Indiegogo—the Student's *t*-test will be used to assess differences between groups. For application of this test there is a need of each independent sample size to be greater or equal than 30 elements or to verify that it follows the normal distribution, resorting to the Kolmogorov-Smirnov test, and confirm that the variances are homogeneous for each independent sample using the Levene test. In order to provide a measure of how closely two ordinal variables are, the Spearman's correlation coefficient (Spearman's rho) will be used.

To identify the profile of users of the Kickstarter and the Indiegogo platforms, a multivariate analysis will be performed, namely using the hierarchical clusters analysis for each user platform under study. A cluster analysis is a useful method to

[4] See at https://www.kickstarter.com/.

[5] See at https://www.indiegogo.com/#/picks_for_you#.

develop empirical classifications describing generic archetypes of a phenomenon (Kaufman & Rousseeuw, 2005). A cluster analysis follows three basic steps (Kaufman & Rousseeuw, 2005):

– First, proximities or distances between the users have to be determined.
– Second, users are grouped according to these measures using a grouping algorithm.
– Third, the optimal number of clusters has to be determined.

The first step is to find the optimum number of clusters, given that initially this is unknown. A hierarchical cluster analysis is performed using the method proposed by Ward (1963). In this methodology, an objective function, defined as the sum of squares of deviations of the individual observations compared with the average of the group, is minimized, aiming at creating groups which have maximum internal cohesion and maximum separate external distance (Greene, 2011). This method uses the variance to evaluate distances between clusters, which results in an efficient approach when compared with other hierarchical methods (for instance, nearest neighbour, furthest neighbour and median clustering). The Ward's distance, D_w, between clusters C_i and C_j is the difference between the total within cluster sum of squares for the two clusters separately, and within cluster sum of squares, which results from merging the two clusters in cluster C_{ij} (Greene, 2011):

$$D_w\left(C_i, C_j\right) = \sum_{x \in C_i} \left(x - r_i\right)^2 + \sum_{x \in C_j} \left(x - r_j\right)^2 - \sum_{x \in C_{ij}} \left(x - r_{ij}\right)^2 \tag{7.1}$$

where r_i is the centroid of C_i, r_j is the centroid of C_j and r_{ij} is the centroid of C_{ij}.

To implement a dissimilarity measure between subjects, the Euclidean distance squared is selected. The distance is defined as the square root of the sum of the squared differences between the values of i and j for all the selected variables ($k = 1, 2, \ldots, p$) (Johnson & Wichern, 2007):

$$D_{ij} = \sqrt{\sum_{k=1}^{p} \left| x_{ik} - x_{jk} \right|^2} \tag{7.2}$$

where x_{ik} is the value of the variable k for cases i and x_{jk} is the value of the variable k for cases j.

In case of the existence of outliers, they must be removed from the analysis.

A common way to visualise the cluster analysis progress is through the draw of a dendrogram, displaying the distance level at which there is a combination user of the Kickstarter and Indiegogo platforms and clusters. Nevertheless, in order to identify the optimal number of clusters, the coefficient of determination (R-Sq.) and the relativised distance between clusters will be used.

In order to undertake hypothesis testing it will take into consideration a level of statistical significance of 5 %.

7.3.3 Sample Size

To perform the multivariate analyses, ten observations per question are needed. In order not to violate this assumption, 200 questionnaires were sent. Cluster analysis is a technique that requires a large sample size (at least ten observations/participants per variable are necessary to avoid computational difficulties). The respondents answered 140 questionnaires. Therefore, the sample size consists of 140 observations (78 Kickstarter and 62 Indiegogo). So, the respondent ratio for survey about satisfaction of crowdfunding platform is 70 %. Generally, the questionnaire has two parts.

1. Three questions about gender, age and type of crowdfunding platform used.
2. Seven questions, which are made especially for finding out satisfaction of entrepreneurs: This is the main part of questionnaire.

The questionnaire has also specific questions for each crowdfunding platform. If the third answer on the first part is Kickstarter, the second part of questionnaire will include questions about Kickstarter and the same for Indiegogo. Questionnaires were sent to entrepreneurs, to assess their opinions about their crowdfunding projects. It is also possible to find, on the crowdfunding platforms, some projects with specific information about their creators, which made it possible to send questionnaires to them. All answers were collected by using these methods.

The assessment of the success rate of crowdfunding platforms requires data about the number of projects that were successfully funded and the number of projects that did not made this goal. Generally, this information is not available and there were some difficulties during the research process, especially for the Indiegogo crowdfunding platform. It was only possible to get information from the Kickstarter, which they update daily.

On the bases of research methodology, the next chapter will present and analyse the results. It will include descriptive analysis, validation of research hypothesis, cluster analysis and success rate calculated for Kickstarter.

7.4 Presentation and Analysis of Results

7.4.1 Descriptive Analysis

From a total of 200 questionnaires that were sent, it was possible to get 140 answers from entrepreneurs regarding their satisfaction with crowdfunding platforms. 56 % (corresponding to a total of 78 respondents) of the questionnaires are relative to the Indiegogo crowdfunding and 44 % (corresponding to a total of 62 respondents) were from Kickstarter crowdfunding platform.

Indiegogo has 49 % (corresponding to a total of 38 respondents) female entrepreneurs and 51 % (corresponding to a total of 40 respondents) male entrepreneurs.

Table 7.2 Factors of choosing Kickstarter/Indiegogo

Alternatives of answers	Kickstarter		Indiegogo	
	n	%	*n*	%
A. It is more popular than Indiegogo/Kickstarter	23	37.1	8	10.3
B. Information about Kickstarter/Indiegogo is more open and it is possible to find out all opportunities	16	25.8	13	16.7
C. I was looking about good experiences for crowdfunding platforms, and I found luckier entrepreneurs in Kickstarter/Indiegogo than in Indiegogo/Kickstarter	9	14.5	16	20.5
D. It was easier to use Kickstarter/Indiegogo platform than Indiegogo/Kickstarter. I found more videos and guidelines about how to work in Kickstarter/Indiegogo platform	8	12.9	13	16.7
E. It was/was not working with "all-or-nothing" model, and it was more efficient for me, because it was a guarantee that I will finish my project from the beginning to end	6	9.7	28	35.9
Total	*62*	*100.0*	*78*	*100.0*

This results help to answer to "*SO_6: Profile of the users on the platforms Kickstarter and Indiegogo*". It has more young users: 63 % (corresponding to a total of 49 respondents) entrepreneurs are less than 27 years old. This situation is gender independent.

Kickstarter has 45 % (corresponding to a total of 28 respondents) female entrepreneurs and 55 % (corresponding to a total of 34 respondents) male entrepreneurs. Like in Indiegogo, it also has more young users: 64 % (corresponding to a total of 40 respondents) entrepreneurs from 62 are less than 27 years old. This situation is gender independent.

By using descriptive analysis, the following tables present final results of survey about entrepreneurs' satisfaction of two huge crowdfunding platforms: Kickstarter and Indiegogo. The results of following tables help to answer the questions related with hypothesis and specific objectives.

To answer to the first specific objective "SO_1: *Kickstarter is more popular than Indiegogo*", the respondents answered to the question "*Why did you choose Kickstarter/Indiegogo as a crowdfunding platform?*". Table 7.2 presents the results for each platform and per alternatives of answers.

Table 7.2 shows that 37.1 % (corresponding to a total of 23 respondents) of Kickstarter's entrepreneurs have chosen this platform because for them it is more popular than Indiegogo. Only 10.3 % (corresponding to a total of eight respondents) of Indiegogo's entrepreneurs have chosen this platform because for them it is more popular than Kickstarter. All these results show that Kickstarter is more popular than Indiegogo, which is the answer of the first specific objective.

To answer to third specific objective "SO_3: *The most popular area on the Kickstarter and Indiegogo is technology*", the respondents answered to the question "*What was the area of your project?*". The results for each platform and per alternatives of answers are presented in Table 7.3.

Table 7.3 Crowdfunding areas of Kickstarter/Indiegogo

Alternatives of answers	Kickstarter		Indiegogo	
	n	%	*n*	%
A. Technology	22	35.5	24	30.8
B. Art	11	17.7	11	14.1
C. Food	7	11.3	15	19.2
D. Small business	10	16.1	14	17.9
E. Environment	7	11.3	10	12.8
F. None of them	5	8.1	4	5.1
Total	*62*	*100.0*	*78*	*100.0*

Table 7.4 The implementation periods of projects for Kickstarter/Indiegogo

Alternatives of answers	Kickstarter		Indiegogo	
	n	%	*n*	%
A. 1–10 days	7	11.3	14	17.9
B. 11–20 days	16	25.8	31	39.7
C. 21–30 days	21	33.9	19	24.4
D. 31–40 days	13	21.0	11	14.1
E. More than 40 days	5	8.1	3	3.8
Total	*62*	*100.0*	*78*	*100.0*

Table 7.3 shows that 35.5 % (corresponding to a total of 22 respondents) of Kickstarter's entrepreneurs and 30.8 % (corresponding to a total of 22 respondents) have done their crowdfunding projects in the technological area. Both of them are highest result, which means that the most popular area for both platform is technology, which is the answer of third specific objective.

For finding out information about average time period that was necessary for money-collecting process, the respondents answered to the question "*Please select time period (days), that was enough for collecting all necessary money for your project*". Table 7.4 shows the results for each platform and per alternatives of answers.

Table 7.4 shows that on Kickstarter 37.1 % (corresponding to a total of 23 respondents) of projects were done in 1–20 days, and for the same period Indiegogo has 57.6 % (corresponding to a total of 45 respondents) of projects, which means that usually Indiegogo has less time period for finishing projects than Kickstarter.

For finding out information about average amount of money, that was necessary to satisfy needs of crowdfunders, the respondents answered to the question "*How much money ($) did you need for your project?*". Table 7.5 presents the results for each platform and per alternatives of answers.

Table 7.5 shows that usually entrepreneurs of Kickstarter need more investments for their projects than entrepreneurs of Indiegogo. 66.1 % (corresponding to a total of 41 respondents) of Kickstarter's entrepreneurs need more than $250,001 money, while only 46.1 % (corresponding to a total of 36 respondents) of Indiegogo's entrepreneurs need the same amount of money. Also, only 33.9 % (corresponding to a total

Table 7.5 Necessary money for finishing projects

Alternatives of answers	Kickstarter		Indiegogo	
	n	%	*n*	%
A. $0–$100,000	8	12.9	22	28.2
B. $100,001–$250,000	13	21.0	20	25.6
C. $250,001–$400,000	24	38.7	16	20.5
E. $400,001–$550,000	10	16.1	14	17.9
F. More than $550,000	7	11.3	6	7.7
Total	*62*	*100.0*	*78*	*100.0*

Table 7.6 The size of investments for projects

Alternatives of answers	Kickstarter		Indiegogo	
	n	%	*n*	%
A. $0–$100,000	6	9.7	17	21.8
B. $100,001–$250,000	12	19.4	20	25.6
C. $250,001–$400,000	13	21.0	18	23.1
D. $400,001–$550,000	17	27.4	17	21.8
E. More than $550,000	14	22.6	6	7.7
Total	*62*	*100.0*	*78*	*100.0*

of 21 respondents) of Kickstarter's entrepreneurs need less than $250,000, while for 53.8 % (corresponding to a total of 42 respondents) of Indiegogo's entrepreneurs this amount of money is enough for finishing their crowdfunding projects.

To complete data of previous table and to answer to second specific objective "SO_2: *The average cost of projects is more on the Kickstarter than on the Indiegogo*" the respondents answered to the question "*How much money ($) did you get from investors of your project?*". The results for each platform and per alternatives of answers are presented in Table 7.6.

Table 7.6 shows that 71 % (corresponding to a total of 44 respondents) of Kickstarter's entrepreneurs have gotten more than $250,001 investments, while only 52.6 % (corresponding to a total of 41 respondents) of Indiegogo's entrepreneurs have gotten the same amount of investments. Also, only 29.1 % (corresponding to a total of 18 respondents) of Kickstarter's entrepreneurs have gotten less than $250,000 investments, while 47.4 % (corresponding to a total of 37 respondents) of Indiegogo's entrepreneurs have gotten the same amount of investments. All these results mean that the average cost of Kickstarter's projects is more than for Indiegogo. It helps to answer to second specific objective.

For finding out the service quality of Kickstarter and Indiegogo, the respondents answered to the question "*Do the tools of Kickstarter/Indiegogo provide all necessary conditions for crowdfunding of entrepreneurs?*". Table 7.7 presents the results for each platform and per alternatives of answers.

Table 7.7 shows that 80.6 % (corresponding to a total of 50 respondents) of Kickstarter's users are satisfied and for Indiegogo it is 71.8 % (corresponding to a total of 56 respondents). Both of them have high level of satisfaction, which means

Table 7.7 Efficient crowdfunding conditions

Alternatives of answers	Kickstarter		Indiegogo	
	n	%	*n*	%
A. Yes, it is completely enough	33	53.2	30	38.5
B. Yes, but it needs to be improved	17	27.4	26	33.3
C. No, it has a few gaps	6	9.7	15	19.2
D. No, it needs to be fully changed	6	9.7	7	9.0
Total	*62*	*100.0*	*78*	*100.0*

Table 7.8 Future opportunities for Kickstarter/Indiegogo

Alternatives of answers	Kickstarter		Indiegogo	
	n	%	*n*	%
A. Yes, because I am fully satisfied	11	17.7	18	23.1
B. Yes, because despite difficulties I have a long experience here and I will be sure for my all steps	20	32.3	25	32.1
C. No, because I am fully unsatisfied	8	12.9	9	11.5
D. No, because I want to try new platforms for my other projects, which will open more opportunities for me	16	25.8	15	19.2
E. It depends on what kind of project I will want to do	7	11.3	11	14.1
Total	*62*	*100.0*	*78*	*100.0*

that usually all necessary conditions provided by these platforms are enough and useful for entrepreneurs.

To answer to fourth specific objective "*SO_4: Kickstarter is more popular in the USA than in Europe*", by using information of Fig. 7.2 the following table presents countries that have the highest number of projects on the Kickstarter crowdfunding platform. The results show that 84.57 % of Kickstarter's projects are in the USA, which is the highest number in the world. Also, the USA has more projects than all European countries that have the highest number of projects in Europe. These results help to answer to fourth specific objective.

To complete data of previous table and to answer to fifth specific objective "*SO_5: Kickstarter has more future opportunities than Indiegogo*" the respondents answered to the question "*If you have a new project, will you choose again Kickstarter/Indiegogo?*". The results for each platform and per alternatives of answers are presented in Table 7.8.

Table 7.8 shows that 50 % (corresponding to a total of 31 respondents) of Kickstarter's users are ready to choose again Kickstarter for their future projects and 55.2 % (corresponding to a total of 43 respondents) of Indiegogo's users are ready to choose again Indiegogo. So, despite lower level of satisfaction, Indiegogo has more users that are ready to continue working with this crowdfunding platform.

Table 7.9 shows the summary of the main results.

Table 7.9 Summary of the main results

Label	Specific objectives (SO)	Main results
SO_1:	Kickstarter is more popular than Indiegogo	37.1 % of users said that Kickstarter is more popular
SO_2:	The average cost of projects is more on the Kickstarter than on the Indiegogo	66.1 % of projects of Kickstarter need more than $250,001 and 53.8 % of projects of Indiegogo need less than $250,000
SO_3:	The most popular area on the Kickstarter and Indiegogo is technology	35.5 % of projects of Kickstarter and 30.8 % of projects of Indiegogo are in the technological area
SO_4:	Kickstarter is more popular in the USA than in Europe	Geographical figure and statistics show that the USA has the highest number of crowdfunding projects for both platforms
SO_5:	Kickstarter has more future opportunities than Indiegogo	The percentage of satisfied users on Indiegogo platforms is 5.2 % more than on Kickstarter platform
SO_6:	Profile of the users on the platforms Kickstarter and Indiegogo	55 % of Kickstarter's user are male and 45 % are female. 51 % of Indiegogo's users are male and 49 % are female

7.4.2 Research Hypothesis Validation

In order to answer the main objective of this current research the results for each research hypothesis will be carried out, in accordance with the explanation presented in Sect. 7.3.2.

Based on the information presented in Table 7.10, and assuming a significance level of 5 %, it can be concluded, with sufficient and significant statistical evidence, that:

- There are no differences between users of Kickstarter and Indiegogo platform with regard to satisfaction.
- There are no differences among users of Kickstarter and Indiegogo platforms concerning user-friendliness.
- There are differences between users of Kickstarter and Indiegogo platforms concerning the time period to collecting money for the projects.
- There are no differences among users of Kickstarter and Indiegogo platforms related to the money needed for the projects.
- There are differences among users of Kickstarter and Indiegogo platforms related to the money collected from the investors for the projects.
- There is a direct and positive relationship between the money needed for the projects and the money collected from the investors for the projects, per platform. This means that when the money needed for the projects increases the money collected from the investors for the projects also increases, although it is clear that there is a closer relationship between the money needed for the projects and the money collected from the investors for the projects in Indiegogo platform.

Satisfaction is a part of certain community with similar priorities and an observation of the realisation and success for Kickstarter and Indiegogo crowdfunding plat-

forms. Both of them have user-friendly conditions, which is one of the most important parts for crowdfunding platforms, because it has direct relation with satisfaction of Kickstarter and Indiegogo (Hemer, 2011).

For increasing the level of success project producers use crowdfunding as a tool to help their projects to get early-phase funding by small investment from the crowds. Generally, for Kickstarter and Indiegogo time period of collecting necessary funds is really short for successful and efficient crowdfunding projects. During the projects that have some groups the period can be long and it has different behaviours for different crowdfunding platforms (Guo, 2011).

Table 7.10 shows final result of research hypothesis.

Table 7.10 Final result for the research hypotheses

Label	Research hypothesis (H)	Applied test	Test value	*p*-Value	Final result
H_1:	There are differences between users of Kickstarter and Indiegogo platform with regard to satisfaction	Student *t*-test	0.596	0.554	Not corroborated
		Levene's test for equality of variances	1.165	0.286	
H_2:	There are differences among users of Kickstarter and Indiegogo platforms concerning user-friendliness	Student's *t*-test	−1.950	0.055*	Not corroborated
		Levene's test for equality of variances	16.380	<0.001	
H_3:	There are differences between users of Kickstarter and Indiegogo platform looks the time period to collecting money for the projects	Student's *t*-test	2.297	0.023	Corroborated
		Levene's test for equality of variances	0.005	0.943	
H_4:	There are differences among users of Kickstarter and Indiegogo platforms related to the money needed for the projects	Student's *t*-test	1.959	0.052*	Not corroborated
		Levene's test for equality of variances	4.082	0.045	
H_5:	There are differences among users of Kickstarter and Indiegogo platforms related to the money collected from the investors for the projects	Student's *t*-test	3.049	0.003	Corroborated
		Levene's test for equality of variances	0.091	0.764	
$H_{6.1}$:	There is a direct and positive relationship between the money needed for the projects and the money collected from the investors for the projects, for Kickstarter	Spearman's rho	0.624	<0.001	Corroborated
$H_{6.2}$:	There is a direct and positive relationship between the money needed for the projects and the money collected from the investors for the projects, for Indiegogo	Spearman's rho	0.710	<0.001	Corroborated

Note: *, the information for equal variances not assumed was used

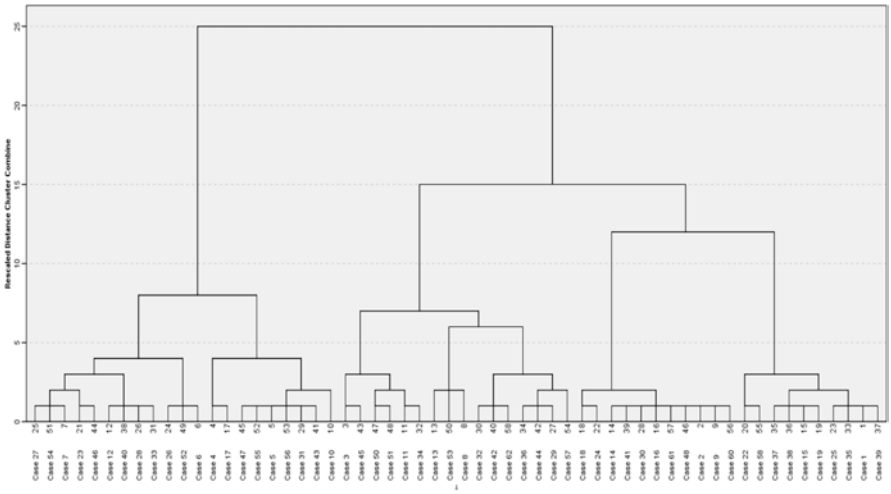

Fig. 7.4 Dendrogram using ward linkage, for users of Kickstarter platform

7.4.3 Cluster Analysis

In this section the results of cluster analysis for each platform will be presented, in order to identify the profile of users of the Kickstarter and Indiegogo platforms (SO_7).

The Kickstarter platform indicates a four-cluster solution that can be clearly interpreted after inspecting the dendrogram (Fig. 7.4). To validate the optimal number of clusters, the coefficient of determination (R-Sq.) was used and the relativised distance between clusters. Figure 7.5 clearly suggests the existence of four distinct clusters. A solution of four clusters was chosen, explaining 40 % of the total variance.

As shown in the previous figure, there are four clusters for Kickstarter crowdfunding platform. By using results of cluster analysis it is possible to decide the names for each cluster. All clusters have their own features, which can be essential bases for naming the clusters.

From Table 7.11 it is possible to find all information about clusters related with questions and answers. It shows percentage of all answers for each question and cluster. The highest level of these percentages shows the most typical characteristics for each cluster. All these effects help to decide the names of clusters. Below are presented all clusters with their names and main characteristics.

Cluster 1: Lucky Entrepreneurs

The cluster Lucky Entrepreneurs describes efficient opportunities for entrepreneurship. Table 7.11 shows that there are 50 % entrepreneurs who have received more than $550,000 and generally 50 % of entrepreneurs are satisfied with services of

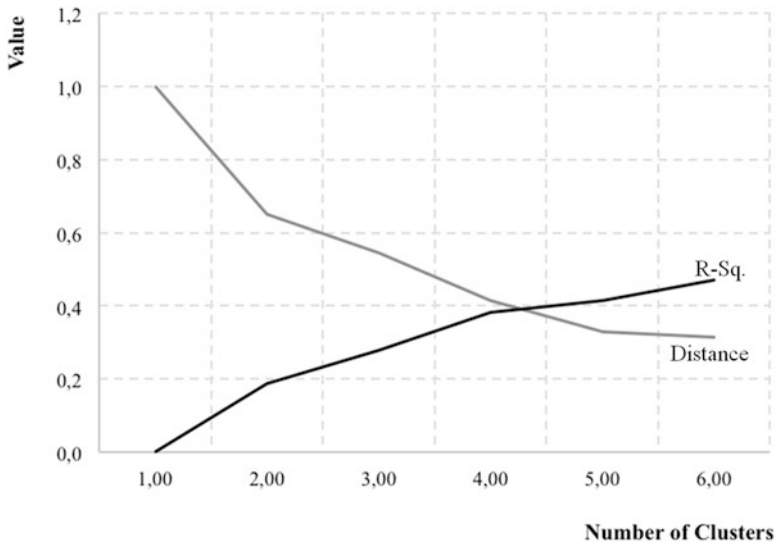

Fig. 7.5 Optimal number of clusters for Kickstarter platform

Kickstarter and 70 % of entrepreneurs are ready to choose again this crowdfunding platform for their future projects. Also, 50 % of entrepreneurs have done their projects within 11–20 days, which is really short and efficient time for gathering money form investors.

Cluster 2: Uncertain Entrepreneurs

Despite the fact that 90 % of entrepreneurs are satisfied with the tools provided by Kickstarter, 36 % of entrepreneurs do not want to choose again Kickstarter as a crowdfunding platform for their future projects, and also another 36 % of entrepreneurs connect their choices of crowdfunding platforms with future projects and they pay their attention to popularity of platforms. All these facts show the uncertainty of entrepreneurs in this cluster.

Cluster 3: Patient and Curious Entrepreneurs

The entrepreneurs of this cluster have the longest period for project implementation: 44 % of entrepreneurs have finished the collecting of money within 31–40 days. Despite the fact that 69 % of entrepreneurs are satisfied with provided tools by Kickstarter, 31 % of entrepreneurs want to change Kickstarter just for trying new platforms. This cluster is also distinguished by the disproportionate allocation of investments: 25 % of investments are less than $100,000 and 25 % of investments are more than $400,001.

Table 7.11 Results of cluster analysis for Kickstarter crowdfunding platform

Questions	Cluster 1 ($n=10$)	Cluster 2 ($n=11$)	Cluster 3 ($n=16$)	Cluster 4 ($n=21$)
Q1. Why did you choose Kickstarter?	It was easier to use Kickstarter platform than Indiegogo	It is more popular than Indiegogo	Kickstarter has more open information	It is more popular than Indiegogo
	(40 %)	(55 %)	(31 %)	(48 %)
Q2. What was the area of your project?	Technology	Technology	Technology	Small business
	(50 %)	(55 %)	(50 %)	(29 %)
				Environment
				(29 %)
Q3. Please select time period (days) of your project	11–20 days	21–30 days	31–40 days	11–20 days
	(50 %)	(55 %)	(44 %)	(38 %)
Q4. How much money ($) did you need for your project?	$100,001–$250,000	$400,001–$550,000	$250,001–$400,000	$250,001–$400,000
	(50 %)	(36 %)	(38 %)	(38 %)
Q5. How much money ($) did you get from investors of your project?	More than $550,000	$400,001–$550,000	$0–$100,000	$250,001–$400,000
	(50 %)	(36 %)	(25 %)	(28 %)
			$400,001–$550,000	
			(25 %)	
Q6. Does the tools of Kickstarter provide all necessary conditions?	Yes, it is completely enough	Yes, it is completely enough	Yes, it is completely enough	Yes, it is completely enough
	(50 %)	(45 %)	(69 %)	(57 %)
		Yes, but it needs to be improved		
		(45 %)		
Q7. Will you choose again Kickstarter?	Yes, despite difficulties	No, because I want to try new platforms	Yes, despite difficulties	Yes, because I am fully satisfied
	(70 %)	(36 %)	(31 %)	(33 %)
		It depends on the project	No, because I want to try new platforms	Yes, despite difficulties
		(36 %)	(31 %)	(33 %)

Cluster 4: Original and Loyal Entrepreneurs

The entrepreneurs of the first three clusters have done their projects in the technological area. Cluster 4 is quite different: 29 % of entrepreneurs have done their projects in the area of small business and another 29 % have done their projects in the environmental area. Generally, the entrepreneurs of this cluster are satisfied: for 57 % of them the tools of Kickstarter are completely enough

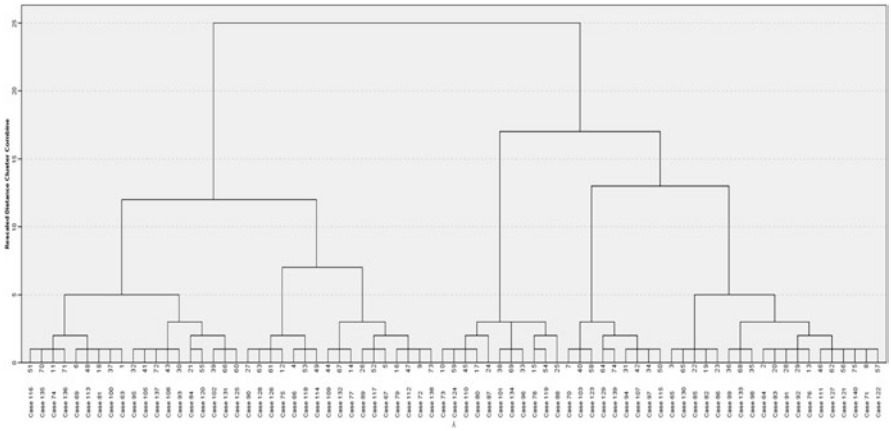

Fig. 7.6 Dendrogram using ward linkage, for users of Indiegogo platform

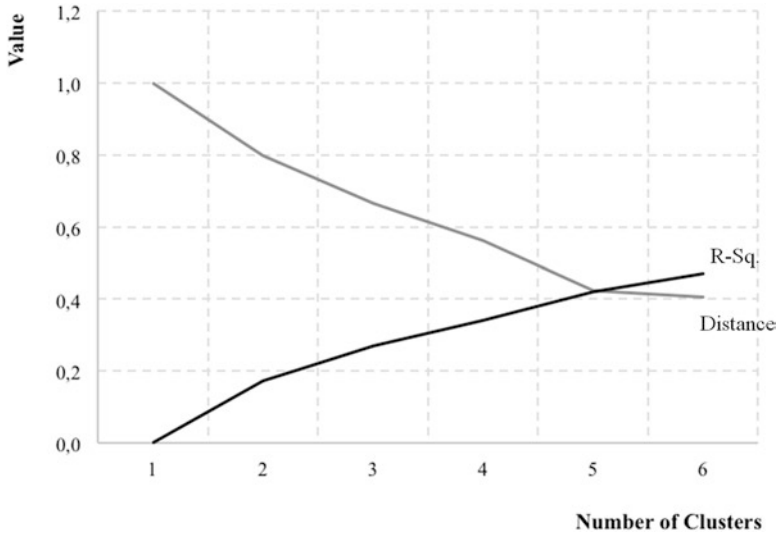

Fig. 7.7 Optimal number of clusters for Indiegogo platform

and 66 % of them are ready to choose again Kickstarter for their future projects.

Following the same philosophy analysis for Indiegogo platform the results of the cluster analysis indicate a five-cluster solution as it can inspect in the dendrogram (Fig. 7.6). Moreover, to validate optimal number of clusters the coefficient of determination (R-Sq.) and the relativised distance between clusters were used, and Fig. 7.7 evidently suggests the presence of five distinct clusters. A solution of four clusters was chosen, explaining 40 % of the total variance.

As shown in the previous figure, there are five clusters for Indiegogo crowdfunding platform. By using results of cluster analysis it is possible to decide the names for each cluster for this platform too.

For Indiegogo it uses the same philosophy it has used for Kickstarter and in this regard the following clusters were reached (Table 7.12). According to the results

Table 7.12 Results of cluster analysis for Indiegogo crowdfunding platform

Questions	Cluster 1 ($n=19$)	Cluster 2 ($n=19$)	Cluster 3 ($n=17$)	Cluster 4 ($n=9$)	Cluster 5 ($n=11$)
Q1. Why did you choose Indiegogo?	It was not working with "all-or-nothing" model	It was not working with "all-or-nothing" model	Information about Indiegogo is more open	Information about Indiegogo is more open	I found luckier entrepreneurs in Indiegogo
	(68 %)	(63 %)	(47 %)	(56 %)	(36 %)
Q2. What was the area of your project?	Small business	Technology	Environment	Food	Technology
	(32 %)	(47 %)	(41 %)	(56 %)	(82 %)
Q3. Please select time period (days) of your project	1–10 days	11–20 days	21–30 days	11–20 days	11–20 days
	(37 %)		(35 %)	(44 %)	
	11–20 days			21–30 days	
	(37 %)	(42 %)		(44 %)	(64 %)
Q4. How much money ($) did you need for your project?	$100,001–$250,000	$0–$100,000	$0–$100,000	$250,001–$400,000	$400,001–$550,000
	(37 %)	(42 %)	(35 %)	(33 %)	(36 %)
Q5. How much money ($) did you get from investors of your project?	$0–$100,000	$0–$100,000	$250,001–$400,000	$100,001–$250,000	$400,001–$550,000
	(37 %)	(32 %)	(29 %)	(44 %)	(55 %)
		$250,001–$400,000			
		(32 %)			
Q6. Does the tools of Indiegogo provide all necessary conditions?	Yes, it is completely enough	Yes, but it needs to be improved	Yes, it is completely enough	Yes, but it needs to be improved	No, it has a few gaps
	(42 %)	(47 %)	(42 %)	(78 %)	(55 %)
	Yes, but it needs to be improved				
	(42 %)				
Q7. Will you choose again Indiegogo?	Yes, despite difficulties	It depends on the project	Yes, despite difficulties	No, because I want to try new platforms	Yes, because I am fully satisfied
	(58 %)	(42 %)	(41 %)	(44 %)	(55 %)

presented in previous table for each question the following names for each cluster were identified and assigned.

Cluster 1: Satisfied Businessman

This cluster has 32 % entrepreneurs that want to start a small business. The entrepreneurs of this cluster have the highest level of satisfaction: 42 % of entrepreneurs think that the tools of Indiegogo provide all necessary conditions and for another 42 % of entrepreneurs they are enough, but need some improvement too. Mostly (68 %) the entrepreneurs of this cluster have chosen Indiegogo, because it does not work with "all-or-nothing" model.

Cluster 2: Small Entrepreneurship

Mostly, the entrepreneurs of this cluster have small projects that need a small amount of money: 42 % of them need investments between $0 and $100,000. But they have received all necessary investments and some of them have received more ($250,001–400,000) than was necessary. They are partly satisfied.

Cluster 3: Environmental Activities

The entrepreneurs of this cluster have activities in the area of environment. It has 41 % environmental projects and the longest time period (21–30 days) for finishing of crowdfunding projects. Mostly they are satisfied and most of them are ready to continue crowdfunding working processes with Indiegogo.

Cluster 4: Unsatisfied Entrepreneurs

The bulk of entrepreneurs in this cluster are not ready to choose Indiegogo as a crowdfunding platform for their future projects: 44 % of them want to try new platforms. Also, they have found a lot of groups: 78 % of them think that the tools of Indiegogo need to be improved. Generally, the large part (56 %) of entrepreneurs have crowdfunding projects in the area of food. It is important to mention that some entrepreneurs have received less money than they needed, but they have fully done their projects.

Cluster 5: Technological Entrepreneurs

This cluster has a lot of entrepreneurs in the area of technology: 82 % of entrepreneurs want to do technological crowdfunding projects. The majority (55 %) of entrepreneurs in this cluster have collected money from investors from $400,001 to $500,000. Also most of them (64 %) have finished their crowdfunding projects in a short period of time (11–20 days).

Next section will present success rate of Kickstarter platform. Data will be collected for 1-week period from the official website of Kickstarter.

Table 7.13 Success rate for Kickstarter crowdfunding platform

Date	Number of successful projects	Number of unsuccessful projects	Total number of projects	Success rate[a] (%)
20.04.2015	104,012	185,021	289,033	35.99
21.04.2015	104,103	185,115	289,218	35.99
22.04.2015	104,205	185,232	289,437	36.00
23.04.2015	104,275	185,319	289,594	36.01
24.04.2015	104,302	185,335	289,637	36.01
25.04.2015	104,354	185,487	289,841	36.00
26.04.2015	104,389	185,581	289,033	35.99

Source: https://www.kickstarter.com/help/stats

[a] $\text{Success rate} = \dfrac{\text{Number of successful projects}}{\text{Total number of projects}}$

7.4.4 *Success Rate of Kickstarter Crowdfunding Platform*

There are several researches and statistical websites that have information about success rate of crowdfunding platforms, including yearly results about success rate. For Kickstarter success rate in 2014 was 43.4 % and for Indiegogo it was 9.8 %. For 2015 success rate of Kickstarter was 44 % and for Indiegogo it was 33 % (Srikanth, 2015). It means that both platforms have improved their success rates.

For calculating success rate of crowdfunding platform, it is necessary to know the number of successful and unsuccessful projects. It is possible to do for Kickstarter crowdfunding platform, because it has all daily information about successful and unsuccessful projects. It is not possible for Indiegogo, because all information about successful and unsuccessful projects are closed and it is not possible to find daily data. For that reason, it will present success rate only for Kickstarter. Table 7.13 shows results about successful and unsuccessful projects and success rates for 1 week. All data is collected from official website of Kickstarter every day.

Table 7.13 shows that, in April 2016, the success rate for Kickstarter was around 36 %. It means that for this period comparing with 2015 success rate has decreased. This situation can change related with different components.

7.5 Conclusion, Limitations and Future Research Lines

Crowdfunding is a very efficient new phenomena for finding alternative funding for entrepreneurs that have projects that need investment. Crowdfunding has four main models: donation based, reward based, lending based and equity based. All these

models have grown during the last 5 years, but the highest growth was the lending-based crowdfunding model. All crowdfunding projects are executed on crowdfunding platforms. There are thousands of crowdfunding websites in the world, but the most popular are Kickstarter and Indiegogo. The main difference between these crowdfunding platforms is that, unlike Indiegogo, Kickstarter works with "all-or-nothing" model. Both of them have a lot of users all over the world, but the highest number of users are from the USA, Canada, the UK and other European countries. Crowdfunding platforms do not have any restriction related to the area of projects. It does not have any limitations for investors too. Everyone can invest money for all projects.

Generally, users of Kickstarter and Indiegogo crowdfunding platforms are young (less than 27 years old) entrepreneurs, but there are also some older (more than 28 years old) entrepreneurs. There are little differences between numbers of male and female project owners. This situation is for all areas and both platforms.

For entrepreneurs, Kickstarter is more popular and sometimes it is the single platform of their choice. Also, Kickstarter has more information available, which can be a basis for new entrepreneurs during the process of choosing the crowdfunding platform. Some entrepreneurs prefer Indiegogo because it does not work with "all-or-nothing" model. It makes them sure that they can use their collected money even if it is less than 100 %.

Most popular area of projects for Kickstarter and Indiegogo is technology, followed by arts for Kickstarter, which is in fourth place for Indiegogo. Second place for Indiegogo is the area of food, which is in fourth place for Kickstarter. These results mean that, with the exception of technological area, all other areas have different ratios for Kickstarter and Indiegogo.

Usually, most of the crowdfunding projects are done between 11 and 30 days for both platforms. There are really less number of projects that need more than 41 days for finishing investment collecting processes. It means that good and efficient presented projects can collect all necessary investment in a short period of time. The most important part is to create a short video, including all details about project, such as future opportunities and costs.

Generally, projects on the Kickstarter platform ask for more investment than on the Indiegogo. Also, the amount of investments is higher for Kickstarter's projects. Since Indiegogo does not require 100 % funding, sometimes entrepreneurs do not want to wait and they are ready to do their projects with less money than they were wanted before. This means that entrepreneurs, sometimes, demand more amount of money than actually needed.

Both platforms have high level of satisfaction (80.6 % for Kickstarter and 71.8 % for Indiegogo), which means that usually all necessary conditions provided by Kickstarter and Indiegogo are enough and useful for entrepreneurs. Despite this high level of satisfaction, only 50 % of Kickstarter's users are ready to choose again Kickstarter for their future projects and 55.2 % of Indiegogo's users are ready to choose again Indiegogo for their future projects. This means that both platforms need to find gaps in their services and improve them.

As a final remark, it is necessary to mention that Kickstarter, in opposition to Indiegogo, has all the important conditions for scientific researchers. Indiegogo

could also benefit from presenting more information and statistical data to help scientific researchers. It should be useful and helpful for future entrepreneurs too.

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Chapter 8
Geographies of Growth: Comparing Oxfordshire, a Core High-Tech Region in the UK, with an Emerging High-Tech Region—The Centro of Portugal

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Abstract This chapter reports on a comparative project comparing the evolution of the Oxfordshire high-tech economy with a newer and much smaller high-tech region, the Centro of Portugal. Previous research on Oxfordshire has been mainly qualitative. This new study using quantitative data allows insights into what makes regions distinctive, how the performance of regions with some similar and some different attributes differ, and what might contribute to or inhibit their potential growth trajectories. The conceptual framework for the study is drawn from the 'regional triple-helix spaces' (The triple helix: University–industry–government innovation in action. *Engineering,* Routledge, p. 164, 2008) and the regional innovation systems concept (Environ Plan A 30:1563–1584, 1998). The two regions compared are very different in stages of development. The nature of entrepreneurship and innovation in the two regions is explored as well is responses to the growth of that activity by the local triple-helix actors.

8.1 Introduction

This chapter focuses on two smaller entrepreneurial regions. The first one is Oxfordshire in the UK. The second one is the Centro region of Portugal. The nature of these two regions is very different in terms of innovation and entrepreneurship trajectories and also on economic terms. Oxfordshire is characterised by a long

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tradition of academic and research excellence. The Centro region is an emerging high-tech centre in Portugal.

The field of systems of innovation analysis at the regional level has grown in recent decades since Cooke's (1992) paper and the subsequent Cooke, Uranga, and Etxebarria's (1998) book. Various studies have shown that the innovation and entrepreneurship are significant for economic and social development of regions (Amorós, Fernández, & Tapia, 2011; Berger & Bristow, 2009; Buesa, Heijs, & Baumert, 2010; Kravchenko, Bobylev, Valieva, & Fedorov, 2013; Sleuwaegen & Boiardi, 2014). Recent variations include entrepreneurship ecosystems and entrepreneurial regions which are characterised by outstanding entrepreneurial visions (EU, 2013; Lawton Smith, Glasson, Romeo, Waters, & Chadwick, 2013; Lawton Smith & Romeo, 2012). Such regions develop as a consequence of the intersection of multiple time- and place-specific factors, including the relative importance of different kinds of organisations in different places working together to facilitate innovation.

Regional innovation systems approaches articulate these interactions geographically. Thus, other significant alternative focus is the importance for economic growth of local-regional innovation networking (Cooke, 2005). However, the emergence of university-industry-government innovation interactions—the triple helix—can be identified as a key factor in regional development (Etzkowitz & Klofsten, 2005). In other words, RIS and triple helix are not in opposition, considering both approaches, innovation as a factor of regional competitiveness (Cooke, 2005; Etzkowitz, 2008; Kautonen, 2012; Marques, Caraça, & Diz, 2006). However, in the latter, universities are placed in a central position in the analysis, a position we adopt here (Etzkowitz, Webster, Gebhardt, & Terra, 2000). However, it is not claimed by Etzkowitz (2008) that they are always the dominant local actor, although they can take the lead in regional innovation policy where there is no strong regional government.

The regional scale is also an important scale of policy delivery. The EU finds that 'growth is increasingly related to the capacity of regional economies to change and innovate'. The Regional Innovation Scoreboard (RIS) is designed to help and understand innovation in the regional context and provides some statistical facts on regions' innovation performance by NUTS regions. This allows for comparisons between similar units, but has limitations for comparing subunits as the political systems and resulting borders will also vary. In the case of these two places, they are both in countries without strong regional authorities and universities are key organisations in the local economies.

The rationale for the comparison of the two places therefore lies in their positions as leading high-tech economies in their own countries and in the strength of the universities. Oxfordshire is one of the UK's leading high-tech economies. It has two universities and a number of public and private sector research laboratories. The Centro region of Portugal is the second most innovative region of the country. The region has three universities (University of Aveiro, University of Coimbra, and University of Beira Interior) and polytechnic institutes (in main cities: Viseu, Guarda, Castelo Branco, Coimbra, Leiria, and Tomar). The two regions have very

similar sectoral compositions including biomedical sciences, energy, ICT&E, creative industries, and an advanced infrastructure of science parks and incubators. However, they differ particularly in the importance of EU policy. Portugal receives much more EU funding as the whole country falls under eligible areas in the EU under the Convergence Objective and the European Competitiveness and Employment Objective. Moreover, Horizon 2020 has had a far greater impact on policy formation and practice than in Oxfordshire where national government has been the driving force.

This chapter is based on joint work between authors in the two countries. It aims to compare the innovation and entrepreneurial trajectories of two very different regions using the regional variant 'regional triple-helix spaces' (Etzkowitz, 2008) of the triple helix model of university-industry-government interaction (Etzkowitz & Leydesdorff, 1995) as well as regional innovation systems as the bases for the conceptual framework. It addresses two research questions: To what extent can both be seen as successful regions? What factors have led to their growth and to the differences between them? The evaluation is conducted through a detailed innovation and entrepreneurial profile of the two regions. The two profiles are then compared using a set of quantitative and qualitative metrics. Finally, some conclusions are drawn about the importance of geopolitical contexts in the concept of entrepreneurial regions.

8.2 Regions in Transition

Successful regions start to develop at different times from varying initial conditions and assets (latent or active, Feldman & Francis, 2006). Over time, under certain conditions, such as a rise in entrepreneurial activity supported by the private or government sector intervention, resources come into play providing possibilities for particular pathways of industrial development. The mix of different initial conditions, the ability of existing and new firms to adapt to the external competitive environment, and the role of public support mean that growth trajectories vary from region to region.

Hence there are interesting research questions concerning what it is about a region (or a locality) that makes these differences come about. In particular, here the focus is on the role of public policy, using acting in conjunction with the private sector and other non-state bodies in supporting economic development, particularly innovation-led economic development. Here the focus is on which organisations interact with others, what forms the interconnections take, and to what extent they can be considered as systems. For policy-makers, the challenge is to achieve the right policy mix, with appropriate actors involved, based on the diagnosis of the functioning of their local ecosystems (Berkes & Ross, 2013; Ho & Pollack, 2014; Puissant & Lacour, 2011).

Geographical scale is an important consideration in both the conceptualisation of the basis for policy intervention and which actors should be involved. The definition of regional innovation systems illustrates this point of interest in regional innovation

systems, effectiveness of different varieties/types, and relationship between regional innovation systems and regional competitive advantage.

The central strand of the RIS approach 'is an emphasis on economic and social interactions between agents, spanning the public and private sectors to engender and diffuse innovation within regions embedded in wider national and global systems' Asheim, Lawton Smith, & Oughton, 2011). Often policy is directed at local clusters of firms, which form part of a bigger regional (national and international) innovation system. Clusters may be seen as 'a concentration of "inter-dependent" firms within the same or adjacent [or integrated] industrial sectors in a small geographic area' (Asheim & Coenen, 2005, p. 1174). However, an RIS consists of 'interacting knowledge generation and exploitation subsystems linked to global, national and other regional systems' that may stretch across several sectors in the regional economy (Asheim & Coenen, 2005 p. 1174). Hence, RIS is a more generic concept than clusters and provides a more comprehensive policy framework: clusters are important, but so too are a range of other factors, agents, and institutions that combine to promote and diffuse innovation within a region (Asheim et al., 2011)—but present different challenges in the way or resources and competences to manage.

A similar set of issues relates to Etzkowitz's (2008) three-stage regional triple-helix space model. In this he proposes stages in a region's development, from nationally/internationally active but regionally inactive assets such as universities, government labs, and large companies (anchor firms, Feldman, 2003) (knowledge space); through a cumulative pattern of entrepreneurship with results from recognition of technological-market opportunities by clever people (consensus space); to a fully functioning entrepreneurial environment which includes either formal (state) systems of governance or more self-organised systems involving non-state actors (innovation space, see also Garnsey, 1998).

Anchor firms (large firms and other organisations), as suppliers of skills and purchasers of goods and services, are key assets in successful regions. Under certain conditions, they produce knowledge spillovers and thereby contribute to regional resources that benefit smaller firms and increase overall innovative output in a successful entrepreneurial region. Universities can also be anchor institutions. However, there also needs to be the capacity for local firms to valorise what universities have to offer.

Indeed, two factors relating to the local impact of universities seem to be particularly important: the industrial structure and the labour market. Agrawal and Cockburn (2003) find that regional economies appear to vary markedly in their ability to convert local academic research into local commercial innovation. The presence of a large, local, R&D-intensive firm—an anchor tenant—was found to enhance the regional innovation system such that local university research is more likely to be absorbed by and to stimulate local industrial R&D. Universities and other colleges of education play a key role in supplying skilled people to the local labour market, and hence to city and regional dynamism where there is a demand from entrepreneurial firms and the public sector (Faggian, McCann, & Sheppard, 2009). Thus, the larger

the concentration of the highly skilled, the greater the capacity of high-technology firms to absorb new information from internal and external sources.

Here, following the RIS and regional triple-helix space framework, we are interested in the local interplay of entrepreneurship, social relationships, and organisational strategies with mechanisms of agency in the form of collective action that shapes the dynamism and identity of regions. In particular, given the innovation agenda in public policy we would expect to see a more active role of the research base (universities and research laboratories) in stimulating and supporting entrepreneurship, including entrepreneurship education, the establishment of such entities as incubators and science parks, and public policy focused on entrepreneurship and innovation. We are also interested in the labour market and the presence of large firms in relation to industrial trajectories. It is these we will examine in reviewing the growth of the two case study regions.

8.3 Research Methodology

8.3.1 Introduction and Context

The chapter is based on a comparative analysis of two streams of research conducted from the two teams, one located in the UK and the other located in Portugal. Both teams have built their research on existing works and sources, enriching them with appropriate updates of data, primarily, through primary research. The comparative approach is guided by the regional triple-helix model. The two regions are compared through the analysis of four dimensions: the role of academia, the role of the public sector, the role of the industry, and the networking ability within the three helices.

The context to this discussion is European Union policies towards innovation-led regional development, as well as national and local government policy agenda. The Europe 2020 Strategy is a 10-year plan (2010–2020) of the European Union aimed at growth. It claims to be more intelligent, sustainable, and inclusive. The implementation plan is based on a set of five key objectives in the areas of employment, education, research and innovation, social inclusion and poverty reduction, and climate and energy, to be achieved by 2020 (European Commission, 2014).

Regulation (EU) No. 1291/2013 of the European Parliament and of the Council establishing Horizon 2020—the Framework Programme for Research and Innovation (2014–2020) aims to support research and innovation activities, strengthen the scientific and technological base in the EU, promote its benefits to society, and improve the operation of economic and industrial potential of policies of innovation, research, and technological development. In order to operationalise this goal three priorities were identified: scientific excellence, industry leadership, and social challenges. Each member state, in accordance with a set of recommendations of the EU, adopted its own national and regional objectives in each of these areas of intervention.

	Portugal	Centro	%
Municipalities	308	100	32,5
Area (Km2)	92.212	28.199	30,6
Population, 2011	10.562.178	2.327.755	22,0
GDP 2011 (EUR million)	171.040	31.787	18,6
Exports of goods, 2012 (EUR million)	45.347	8.578	18,9

Fig. 8.1 The Centro region of Portugal. *Source*: Elaborated from CCDRC (2014c)

8.3.2 Portugal and the Centro Region

The Partnership Agreement 'Portugal 2020' proposed to the European Commission adopts the principles of programming for 2020 and establishes the policy of economic, social, environmental, and regional development, in order to stimulate growth and job creation. The Partnership 2014–2020 defines interventions, investments, and funding priorities, which are conducive to promoting smart, sustainable, and inclusive growth (Governo de Portugal, 2014).

8.3.2.1 Characterisation and Governance

The Centro region of Portugal is spread over 28,000 km^2 and has about 2.4 m inhabitants, which accounts for approximately 31 % of total area and 22 % of the population in the country. Located in the central part of the Portugal, the Centro region has a strategic position since it is located between the two major national urban centres: Lisbon and Porto. It is characterised by its low population density, resulting in desertification of areas 'inland' (except in urban centres located there), contrasting with the 'coastal' area, whichever is more populous and urbanised (see Fig. 8.1).

Portugal is not a regionalised country, except for the autonomous regions of Azores and Madeira. For the five regions of the continent (Norte, Centro, Lisboa, Alentejo, and Algarve) there are members of the central government with responsibility for regional development and there are regional administrations—the Committees for Coordination and Regional Development (CCDR) which are government bodies' decentralised centre with administrative and financial autonomy.

The Centro regional economy is highly diversified, including sectors with low levels of industrial technology (e.g. ceramic, glass, cement, forest industries—wood, pulp, paper, and agro-food), as well as some areas of medium and high technology, such as healthcare, biotechnology, telecommunications, new materials (particularly the mould industry), ICT, and renewable energy. There is a strong regional potential from indigenous resources for the production of renewable energy using water, wind, solar, geothermal, biomass and biogas, and bio fuels.

8.3.2.2 Regional Development Policy

The Europe 2020 strategy led to a plan for the Centro region, the Regional Plan of Action—CRER 2020. The Regional Plan of Action 2014–2020 identifies six key priorities for the next EU funding cycle: enhancing value creation; organising a polycentric network of medium-sized cities; generating, capturing, and retaining talent; strengthening territorial cohesion; ensuring dynamism and sustainability of the existing infrastructure; and strengthening institutional capacity building. These are key elements of a regional innovation system (Cooke, 2005; Cooke et al., 1998).

These dynamics are based on five priority areas: axis (1) internationalisation of the regional economy; axis (2) enhancing human potential and institutional capacity building; axis (3) strengthening the social and territorial cohesion; axis (4) strengthening the attractiveness and quality of life in regional territories; and axis (5) ensuring the sustainable use of resources and decarbonisation (CCDRC, 2014d). The regional smart specialisation strategy (RIS3 Centro) was developed based on the following strategic priorities: agriculture and forestry; sea-related economic activities; tourism; ICT—information and communication technologies; materials; biotechnology; and health and wellness (CCDRC, 2014d).

8.3.2.3 Regional Development Policy

The Centro region has an interesting structure for supporting productive activities and innovation together, an infrastructure supporting the transfer of knowledge as well as the presence of an entrepreneurial economy mainly composed of micro and small companies (CCDRC, 2014b). The Potential Research, Development and Innovation (RDI) in the Centro region is reflected in the presence of nine higher education institutions (HEI), three of which are universities (University of Aveiro, University of Coimbra, and University of Beira Interior) and six polytechnics located in main cities (Viseu, Guarda, Castelo Branco, Coimbra, Tomar, and Leiria), a total of 86,000 students.

The region also has important business incubator networks; three technological centres (Centimfe—Technological Centre of Mould Industry, Special Tooling and Plastics; Cenfim—Vocational Training Centre of Metallurgical and Metalworking Industry; and CTCV—Ceramics and Glass Technology Centre); seven science and technology parks; eight clusters and poles of competitiveness (energy; engineering and tooling; forest-based industries; industries refining, petrochemical and industrial chemistry; health, tourism 2015; information technology, communications, and electronics; sustainable habitat; and Centro agribusiness); 73,000 companies, 47 of which gazelle companies; and eight PROVERE programmes (programmes of collective efficiency strategies applied to valuing local products and supporting the development of rural environments) (CCDRC, 2014b; Compete, 2009a, 2009b; Tecparques, 2008).

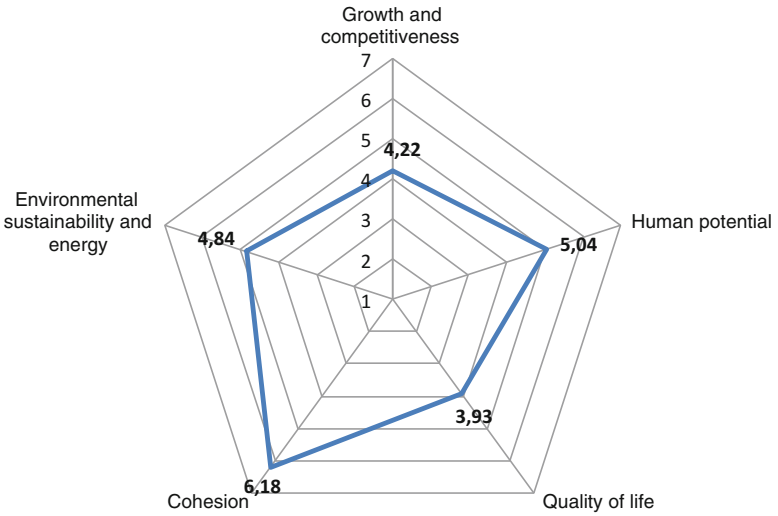

Fig. 8.2 Barometer of the Centro region of Portugal. *Source*: CCDRC (2014a)

8.3.2.4 Centro Region Compared to Other Regions NUTS II of Portugal

The transition from the "knowledge space" to an "innovation space" is consensual in the context of the dynamics necessary for sustainable development of the regions (Etzkowitz, 2008; Leydesdorff, 2000).

Rather different to Oxfordshire, the region has developed a set of indicators to evaluate the performance of public policy interventions. The CCDRC developed a barometer which aims to monitor the progress of the Centro region, in alignment with 'CRER 2020' strategy reflected in the Regional Action Plan.

Integrating a set of 25 indicators, the barometer reflects the position relative to the level in five dimensions: growth and competitiveness; human potential; quality of life; cohesion; and environmental and energy sustainability (CCDRC, 2014a).

Compared to other Portuguese regions, it appears that in the Centro region there is a need to significantly improve some indicators concerning quality of life, growth and competitiveness, and environmental sustainability and energy.

Hence there are weaknesses in the regional innovation system, particularly that it can be proposed in the regional triple-helix space as growth and competitiveness (based on innovation) appear to be relatively low. However, there is human potential to underpin growth (see Fig. 8.2).

Comparing the Centro region with other six regions of Portugal (Norte, Lisboa, Alentejo, Algarve, Azores, and Madeira), we found the main competitive advantages: unemployment rate, results of national school tests, early school leavers, beneficiaries of social insertion, and income per capita.

The region also presents some strengths: youth unemployment rate, lifelong learning, good exports in GDP, RIS, Ph.D.s per capita, net creation companies, and renewable in electricity consumption energy. However, the main weaknesses

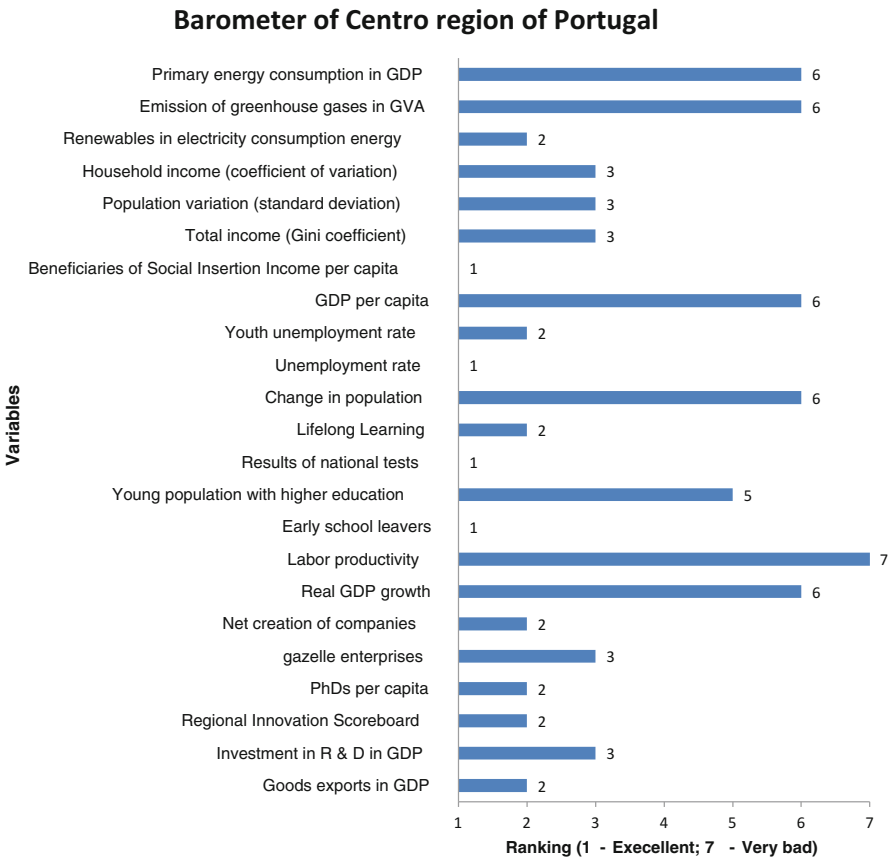

Fig. 8.3 Comparison of the Centro region with other regions of Portugal. *Source*: Elaborated from CCDRC (2014a)

identified in relation to other national regions and those that need to be overcome are labour productivity, real GDP growth, GDP per capita, emission of greenhouse gases, and primary energy consumption in GDP (see Fig. 8.3).

8.3.2.5 InovC: An Innovation Ecosystem Located in the Centro Region of Portugal

The INOVC programme is a strategic regional innovation system-based programme that aims to develop an innovation ecosystem, in which universities are key organisations. It is located in the Centro region of Portugal and includes a strategic team of ten nuclear innovation stakeholders (universities, polytechnic institutes, incubators, and technology parks). It has the involvement of more than 300 regional innovation and entrepreneurship agents (municipalities, companies, regional development

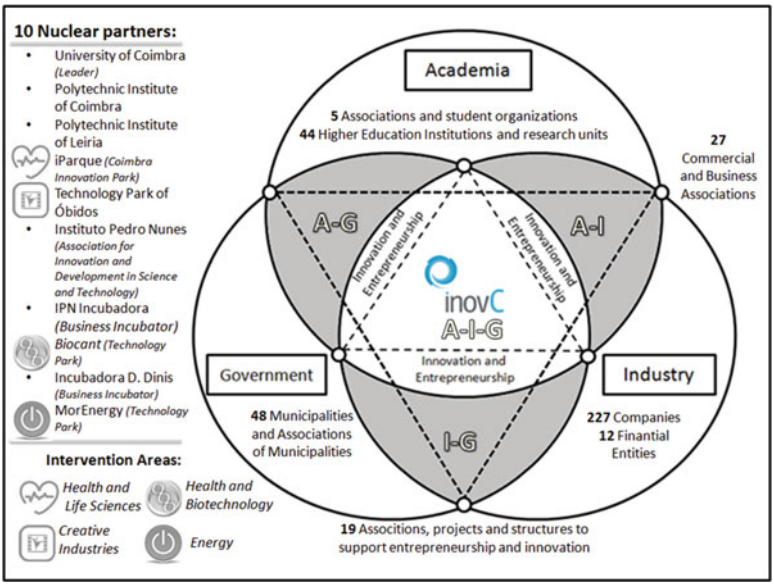

Fig. 8.4 INOVC triple-helix model. *Source*: Elaborated from Figueira et al. (2012a, 2012b); Figueira, Coimbra, De Gonçalves, and Costa (2012b); INOVC (2014)

agents, living labs, public entities, financial entities, students union, etc.). Its structure is based on the triple-helix model (Costa, Coimbra, De, Madeira, & Gonçalves, 2012; Figueira, Coimbra, De Gonçalves, & Costa, 2012a) (see Fig. 8.4).

The INOVC can be described as a programme founded on the triple-helix model, presenting at regional level strong relationships between the domains of universities, industry, and government (e.g. state or local), in order to develop joint activities. The vision is to transform the Centro region with respect to an international benchmark of knowledge creation, innovation, and entrepreneurship, in the areas of life sciences, energy, information technology and communication electronics, and creative industries. The ultimate goal involves consolidating the position of the Centro region, as the second most innovative region of Portugal, and positioning it among the 100 most innovative regions in Europe in 2017, according to the RIS (Figueira, Coimbra, De Gonçalves, & Costa, 2012a, 2012b).

The INOVC involves the participation of more than 380 complementary partners of very diverse nature (research centres, economic and financial companies, municipalities, universities, institutes polytechnics, trade associations). The partners aim primarily to support initiatives related to the Innovation Ecosystem of the Centro Region of Portugal for mutual benefit. The coordinator of the Division of Innovation and Transfer of Knowledge, Mr. Jorge Figueira (JF), University of Coimbra, the unit that drives and manages the programme INOVC, said that 'the investment to be made, corresponding to a volume of ERDF funding of €22,5 M, related mostly to the construction of seven infrastructure projects essential to the pursuit of good performance that the region has played, complemented by a set of three innovative

projects, contemplating various initiatives to stimulate innovation and entrepreneurship for the different stages of development, of entrepreneurial projects, ensuring its territorial deployment through local and regional'.

In order to articulate the required actions, the stakeholders in the innovation process in the region proposed a joint strategy, which aims at efficient management of the entire pipeline of innovation, involving all actors and territories (Figueira et al., 2012b). According to JF 'the innovation pipeline is a series of value-added steps, beginning with getting research results with commercial potential and may generate large companies and rapid growth, generating high quality jobs and high capacity for Research, Development and Innovation (RDI)'. During this process of evolution, projects were to follow the pipeline of innovation, which corresponds to different phases of the maturation: business idea; proposal of value; business plan; start-up/licensing; teen firm; adult firm; and mature firm.

Throughout the processes of ongoing innovation in the pipeline, it is necessary to have pumping systems created similar to a water pipe, to ensure that a flow rate of innovation is energised and feeds the ecosystem through various processing steps which include ignition; check/testing; validation; creation; acceleration; consolidation; and development. The transverse elements throughout the innovation pipeline include sensitisation and training in innovation and entrepreneurship; project management; integrated ecosystem management and the innovation pipeline; monitoring and control objectives, targets, and indicators; and participation in international projects and partnerships. Strategic level KPI indicators were selected taking into account the best way to monitor the success of the innovation ecosystem (Table **8.1**).

Table 8.1 INOVC scoreboard

	Target achieved				Objectives	
Activities	2008	2010	2011	2012	2017	2022
# of invention disclosures	43	34	55	89	90	110
# of grants funding ignition	0	12	12	23	15	30
# of patent requests and patents	37	37	55	92	70	90
# of applications for tenders for business ideas	–	294	514	–	70	100
Total number of value propositions developed	80	20	59	–	300	300
Total number of new business plans developed		52	95	–	50	60
# of new companies created	20	30	37	–	75	75
# of technology-based companies created (spin-off)	13	9	22	–	20	20
# of licence industrial properties	4	9	3	–	10	10
Occupancy rate for spaces (%)		58 %	58 %	–	80 %	95 %
# of technologically based companies >250 employees	1	1	1	–	5	5
# of internationalised companies	1	19	28	–	5	5
Survival rate of incubated companies	80 %	88 %	80 %	–	70 %	75 %
# of skilled jobs created		515		–	1000	1300
Turnover (M€)	70	88	77	–	200	300
Volume percentage of exports (M€)	35 %	23 %	41 %	–	50 %	60 %

Source: Elaborated from Costa et al. (2012); Figueira, Coimbra, De Gonçalves, and Costa (2012a, 2012b); INOVC (2014)

The matrix of the respective correlations with projects to develop as well as their contribution to the battery of indicators were weighted to calculate the ranking of the EU RIS. In accordance with the goals and objectives outlined, there are a total of 90 invention disclosures in 2012, 23 grants funding ignition, and 92 patents. It is anticipated that by 2017 a total of 75 new companies, 20 technology-based companies (spin-offs), 1000 skilled jobs, €200 m of turnover, and 50 % of export volume will be created.

8.3.3 Oxfordshire: A History of Entrepreneurship

The city of Oxford is one of Britain's heritage cities. It is most famous for the University of Oxford. It is located some 50 miles north west of London and has a population of 143,000 people. The city region as a whole, the county Oxfordshire, has a population of 598,000. Although it is the most rural county in the South East of England, it has become one of the most innovative and enterprising economies in the UK. It has an extremely strong 'knowledge space'. It has two universities (Oxford, Oxford Brookes) and some ten research laboratories, including atomic energy (Culham) and the Rutherford Appleton Laboratory (RAL). RAL has a broad science portfolio and works with the academic and industrial communities in materials science, space and ground-based astronomy technologies, laser science, microelectronics, wafer-scale manufacturing, particle and nuclear physics, alternative energy production, and radio communications and radar. It is funded by the Science and Technology Facilities Council which is an independent, non-departmental public body of the UK Government's Department for Business, Innovation and Skills (BIS).

Oxfordshire has considerable strengths in its labour market, its large high-tech firms, many of which originated in Oxford University, and its resilience in terms of high rates of firm survival. Oxfordshire has one of the most highly skilled workforces in England and Wales, having a higher proportion of graduates than any other English county (University of Oxford/Science Oxford, 2013). This is associated with growth in both the the high-tech economy and the public sector, particularly higher education, which accounts for one in five jobs in the city of Oxford. Oxfordshire's workforce also has a very high percentage of people with professional skills.

8.3.3.1 Early Stages

The Segal Quince (1985) report 'The Cambridge Phenomenon' was the first to focus on entrepreneurship in a university town, and provided a useful benchmark of entrepreneurship in Oxfordshire's high-tech economy, although it seriously underestimated the number of high-tech firms in Oxfordshire (Lawton Smith, 1990).

In fact both counties have followed similar trajectories in the rate of growth in both the number of firms and employment (Garnsey & Lawton Smith, 1998; Lawton Smith & Romeo, 2012; Oxford University/Science Oxford, 2013).

Oxfordshire's high-tech roots can be dated to the 1940s and 1950s. The first recorded high-tech firm, Penlon, was established in 1943, a medical equipment firm, originally the Longworth Scientific Instrument Co. Ltd. It was a spin-off from Oxford University's Department of Anaesthetics. This was followed by two other university spin-offs: in 1953 by Littlemore Scientific Engineering Ltd and in 1959 by Oxford Instruments. It was in the late 1970s that the high-tech economy began to take root and contribute to the changing industrial structure of the economy which had begun to change rapidly a decade earlier. In the 1960s the dominant sector was the automotive industry with some 28,000 employees. By the late 1970s, employment in the automotive sector had fallen to 5000 but was still the largest sector in the county. The number of high-tech firms and employment was estimated at 50 firms employing 7731 in 1979 (Lawton Smith, 1990).

Growth in the number of start-ups (university and non-university related) was slow until the mid-1980s. Lawton Smith (1990) identified 182 R&D-intensive advanced technology firms in existence in 1987. The criterion used was that firms were undertaking research and development (R&D) in one or more of science, computer science, and engineering. Collectively these firms employed 10,659 people. The majority had been formed in the late 1970s and early 1980s. Those that were active in 1979 employed nearly 8000 people. Of the 182, the majority were in manufacturing (125), followed by R&D/consultancy (32) and software (25). The rise in the number of high-tech firms and early sectoral specialisation reflect national trends and local conditions. Between 1979 and 1986 UK manufacturing as a whole was in steep decline. However, larger manufacturing firms such as Oxford Instruments (scientific and industrial instruments) and Research Machines (computers used in education) became established. The concentration of R&D consultancy firms reflected the strength of the science base in the universities and government laboratories.

8.3.3.2 Increasing Maturity

Over time the service sector has come to dwarf that of manufacturing in numbers of both firms and employees. In the mid-1990s the sector with most businesses was computer services, with almost half of all the high-tech companies in the county (635 firms, 45 % of companies) which has twice as many companies as technical consultancy and technical testing (22.5 %) which is also an important high-tech services sector. Certain sectors, although they are important employers, consist of only a small number of companies. For example the motorsport and automotive engineering/design sector accounts for less than 2 % of the county's high-tech firms but 7 % of its high-tech jobs. The emerging biotech sector had 73 firms but only comprised of 5.2 % of the county's high-tech firms (OEO, 2014).

More recent data shows that entrepreneurship in the Oxfordshire economy continues to accelerate. In the absence of local data, the Office of National Statistics data show that in 2005 Oxfordshire had some 3500 high-tech firms employing 45,000 people, around 14 % of the county's workforce in 12 % of the businesses in Oxfordshire (Glasson et al., 2006). Using these figures, the county had the third largest high-tech employment among UK counties (high-tech as a percentage of total employment). The county is characterised by 'diverse specialisation' with high-tech services, including software consultancies and biotechnology being the largest employers. The larger businesses were in high-tech manufacturing, including pharmaceuticals, medical instruments, and computers.

On a majority of indicators, the Oxfordshire high-tech economy outperforms that of the whole of England. Definitions of high-tech vary and give different emphases to particular activities and potentially understate or overstate the importance of particular activities. Using the Eurostat definition of high-tech, some 20,000 employees are employed in high-tech sectors in Oxfordshire. This represents 6.2 % of all employees in the county, compared with an average for England of 5.1 %. Using the wider Eurostat definition, however, the total number of high-tech employees in Oxfordshire has more than doubled to 43,000 in 1500 firms. This represents 13.4 % of total employees, compared with the England average of 9.8 %. The difference reflects the inclusion of sectors such as publishing, medical instruments, and the automobile industry in the wider definition.

Oxfordshire's largest high-tech sectors (wider definition) by employee numbers include computer, electronic and optical products (3500 employees), motor vehicle manufacture (3500), publishing activities (5500), computer-related activities (8200), engineering and technical consultancy (7100), and scientific research and development (5700) (Oxford University/Science Oxford, 2013, data appendices). By way of comparison, Table 8.2 shows employment in Oxfordshire's high-tech economy and that in Cambridgeshire and the broader Thames Valley.

Table 8.2 Employees in high-tech sectors (Eurostat definition), Oxfordshire & Comparators, 2011

Number of employees	Oxfordshire	Cambridge	Thames Valley	England
High-tech manufacturing	4.000	8.100	7.600	213.000
High-tech SI services	16.000	22.600	95.300	950.600
Total: Eurostat high-tech sectors	*20.000*	*30.700*	*102.900*	*1.163.600*
Total employees (all sectors)	320.600	351.300	783.900	22.929.600
As % of total employees	*Oxfordshire*	*Cambridge*	*Thames Valley*	*England*
High-tech manufacturing	1.2	2.3	1.0	0.9
High-tech SI services	5.0	6.4	12.2	4.1
Total: Eurostat high-tech sectors	*6.2*	*8.7*	*13.2*	*5.0*

Source: ONS, Business Register and Employment Survey (NOMIS). High-tech manufacturing: 2007 SIC 21, 26, 30.3. High-tech knowledge-intensive services: 2007 SIC 59-63, 72. Figures for total employees exclude farm-based agriculture (2007 SIC 01000). All figures are rounded to the nearest hundred employees (in Oxford University/Science Oxford, 2013)

Table 8.3 Key performance indicators in Oxfordshire—2010–2013

Indicators	Data	Year
Total number of companies	33.500	2011
High-tech companies ratio (total high-tech/total companies)	3.6 %	2011
Total number of high-tech companies	1.200	2011
Total number of high-tech companies—biomedical	184	2012
Total number of high-tech companies—high-tech manufacturing	360	2011
Total number of high-tech companies—knowledge-intensive services	840	2011
Total number of employees	320.600	2011
Total number of employees in high-tech companies	43.000	2011
Total number of employees in high-tech biomedical	12.499	2011
Total number of employees in high-tech manufacturing	13.000	2011
Total number of employees in high-tech knowledge-intensive services	30.000	2011
High-tech employees ratio (total employee high-tech/total employee)	13.4 %	2011
Total number of alive academic spin-offs in the high-tech sector	235	2012
High-tech academic spin-off ratio (number spin-off/total high-tech company)	19.6 %	2011–2012
Total number of spin-offs formed in the last 3 years	11	2011–2013
Total turnover of high-tech companies	14	2011
Number of science and technology parks	10	2012
Number of accelerator programmes/incubators/technology transfer offices	>15	2012
Number of universities and furtherer education institutes	27	2012
Number of R&D personnel	15.942	2011
R&D personnel ratio (number of R&D personnel/total employees)	5.0 %	2011
R&D personnel ratio 2 (number of R&D personnel/total high-tech employees)	37.1 %	2011
Number of Master's and Ph.D. science, business, technical, and medical students (University of Oxford)	3.000	2012
Assessment of business networks (formal)	66	2011
R&D expenditure in the region	1.364	2011

Source: Own elaboration

8.3.3.3 Entrepreneurship and Innovation in Oxfordshire During the Period 2010–2013

The Oxfordshire high-tech economy suffered slightly under the global economic crisis to start again rising in financial terms, but, more importantly, in innovation terms during the period 2010–2013. Table 8.3 shows the most recent data collected through extensive primary research.

The ratio of high-tech companies to the number of companies is 3.6 %. These companies are strongly R&D centric with almost 40 % of employees involved in research and development activities. The commercial contribution of academia continues to rise: 11 new academic spin-offs during the period June 2011–March 2013.

The total number of UK academic spin-offs was 235 at the end of 2012, 19.6 % of the total number of UK academic spin-offs. Thus in this respect, 'the knowledge space' is directly contributing to local economic development.

Public and private investment has also contributed to the development of the innovation infrastructure in the form of science parks (e.g. Oxford University's own science park at Begbroke) and joint public-private partnerships at the Harwell Science and Innovation campus. In those cases, university, research organisations, and private companies have been central in their provision and are initiatives in which the synergic dynamics of the three helices show strong effects. These initiatives have also contributed to the consolidation of specific technology and science hubs in Oxfordshire such as the biomedical one. Oxfordshire is one of the UK's four leading locations for biotechnology, the others being Cambridgeshire, London, and the Edinburgh/Dundee area of Scotland. Studies by OBN have found that the number of bioscience firms is increasing. OBN (2011) estimated that there are around 163 biotech firms in the county, up 14 % since the start of 2008. Of the new ones, the majority (86 %) were local start-ups or spin-offs and four were either new branches of larger companies or companies which had moved into the county. The trend has been for more start-ups and fewer relocations or new branches. The EU-funded HealthTIES project assessed the size of the biomedical sector in Oxfordshire and found that at the end of 2012 there were 182 companies employing approximately 13,000 people.

8.4 Comparing Regions via the Regional Innovation Systems and Regional Triple-Helix Models

Over time, both regions have become recognised as nationally important centres of high-tech activity. In Oxfordshire's case its high-tech economy is also a global brand and many of its firms are technology leaders. In other hand, the Centro region of Portugal presents some indicators that can make a business area of success. Oxfordshire has outstanding assets to support high-tech economic growth—its knowledge space—universities and research laboratories.

As a regional innovation system, the Oxfordshire strategic plan sets out the ambition for Oxfordshire to 2030, aiming to promote accelerated economic growth through its knowledge space—science and knowledge (Oxfordshire LEP, 2014). The Regional Development Strategy proposal for the Centre of Portugal is based on a collective ambition for territorial marketing, concentration of development around core priorities, through a commitment to focus on differentiating areas, and smart specialisation (CCDRC, 2014b).

A key difference between the two regions is that Portugal is a 'lagging region' in EU terms and its economic policy has long been connected to EU agendas and funding. In contrast Oxfordshire's research institutions (Oxford University in particular) have been mainly in receipt of EU funds for research or applied research such as the 2012 projects for local renewable energy and energy efficiency. Based on growth and innovation in the region of Oxfordshire, this section is intended to compare

good practices between this region and the Centro region of Portugal, to allow clear paths of maturity and progress for the Portuguese region. It followed the basic interaction model of the triple-helix model in its regional form (Etzkowitz, 2008) in the comparison of the dynamics between the two regions.

8.4.1 Academia: The Goal of Excellence

The University of Oxford is among the best universities in the world, currently ranking second in the Times Higher Education World University Rankings. Oxford Brookes is one of the best performing new UK universities (University of Oxford, 2013).

The Centro region of Portugal has some of the best universities in the country, highlighting the University of Coimbra, founded in 1220, the oldest Portuguese university and one of the oldest in the world. The University of Aveiro is considered among the top 100 of the world's youngest, according to the Times Higher Education (THE). The University of Beira Interior is one of the youngest Portuguese universities, founded in 1986, with about 7000 students, developing an important effort in attracting foreign students.

According to the Basic Law on Higher Education in Portugal, the higher polytechnic education is driven by a constant perspective of applied research and development. Their presence in major cities brings significant economic and social impact for the development of regions (Cunha et al., 2013). In total, Oxfordshire has nearly 44,000 students attending its two universities, and the Centro region of Portugal has about 70,000 students, distributed by its three universities and five polytechnics (see Table 8.4).

Table 8.4 Universities and polytechnic institutes in Oxfordshire and the Centro region

	University (higher education institutions)	World university rankings[a]	Total students
Oxfordshire, UK	The University of Oxford	2 (2013/2014)	25.595
	Oxford Brookes University		18.425
Centro, Portugal	University of Aveiro	351–400 (2012/2013)	13.664
	University of Coimbra	301–350 (2011/2012)	24.087
	University of Beira Interior		6.803
	Polytechnic Institute of Viseu		5.512
	Polytechnic Institute of Guarda		2.645
	Polytechnic Institute of Castelo Branco		4.206
	Polytechnic Institute of Coimbra and Nursing School of Coimbra		12.158
	Polytechnic Institute of Leiria		10.671
	Polytechnic Institute of Tomar		2.734

Source: DGES (2014); Times Higher Education (2014)
[a]Times Higher Education World University Rankings

8.4.2 Governance Model for Regional Competitiveness

In the UK, Oxfordshire was one of 39 competitors recently selected by the government to establish local enterprise partnerships (LEPs) to promote business growth at regional level. The Oxfordshire Local Enterprise Partnership is a voluntary body made up of representatives from business, academia, and the wider public sector that will support and champion nationally recognised areas for growth around Bicester, Oxford, and Science Vale UK (Oxfordshire LEP, 2014).

The model of competitive development set for Oxfordshire is based on the original interactions of triple helix (A-I-G), following the evolution of the model from a fourth helix—civil society (Carayannis et al., 2012; Etzkowitz, 2003, 2008; Etzkowitz et al., 2000; Lawton Smith & Bagchi-Sen, 2010; Leydesdorff, 2000, 2011). The Oxford Strategic Economic Plan includes these ambitions: invest in an ambitious network of new innovation and incubation centres, invest in growth hubs to help SME to growth through supporting innovation, enable new transport schemes to support developments, deliver over 500 new apprenticeships to young people, and invest heavily in creating new jobs (Oxfordshire LEP, 2014).

However, unlike in the case study region in Portugal, the 'regional innovation system' is much more fragmented, much less coordinated and on a much smaller scale of operation. It is not driven by EU policy. It is much more of an 'entrepreneurial region' based on a continuing upward trend in the number of new technology-based firms (Lawton Smith et al., 2013) with an entrepreneurial vision but rather less in coordinated action.

The Centro region of Portugal, the second most innovative region of the country, is classified as 'Innovation Follower', compared to the South East region in the UK, which includes Oxfordshire, classified as 'Innovation Leader' (European Commission, 2012). Districts located in the coast area (Aveiro, Coimbra, and Leiria) are the ones with counties ranked at the level of 'competitiveness'. The districts of the interior (Viseu, Guarda, and Castelo Branco) have their municipalities classified as 'transition' and cohesion. So the future of regional development in the Centro region of Portugal for 2014–2020 will have as a priority the issue of regional cohesion (CCDRC, 2014b, 2014c) in line with EU Cohesion Policy. The Plan of Action of the Central Portugal RIS3 defines a roadmap for investment in research and innovation in the next programming period, aided by a model of regional governance based on the interaction of the triple-helix spheres (CCDRC, 2014d).

The Portuguese model of regional competitiveness (Fig. 8.6) is focused on the model of the quadruple helix (Colapinto & Porlezza, 2011; Leydesdorff, 2011), led by the regional coordinating body (CCDRC), and involving the representation of all regional actors (CCDRC, 2014b, 2014d). It consists of a coordinating council (responsible for strategic decision), and a regional expanded council (which also was the basis for the development of Regional Innovation System), still having a strategic advisory group, which seeks to support the management team and the respective working groups (CCDRC, 2014d) (see Fig. 8.5).

8.4.3 *Networking Capacity and Innovation Output*

The strength of the Oxfordshire economy is its diversity. The region has one of the best universities in the world, and investment in high-tech sectors (bioscience/tech medical/pharmaceuticals, physics-related cryogenics, magnets, and instruments; engineering and electronics; and ICT) (Oxfordshire County Council, 2012a, 2012b; Oxfordshire LEP, 2014).

The Centro region is classified by RIS as Innovation Follower, highlighting the presence of two universities included in the Times Higher Education World University Rankings (University of Coimbra and University of Aveiro). The University Hospitals of Coimbra is a national and international reference in the fields of education, research, scientific knowledge, and innovation (CCDRC, 2014b) (see Fig. 8.6).

Both regions have strong labour markets. The overlapping high-tech core of Oxfordshire is formed from the biotechnology and medical sciences (notwithstanding that the University of Oxford occupies the first position in the Top 100 Ranking

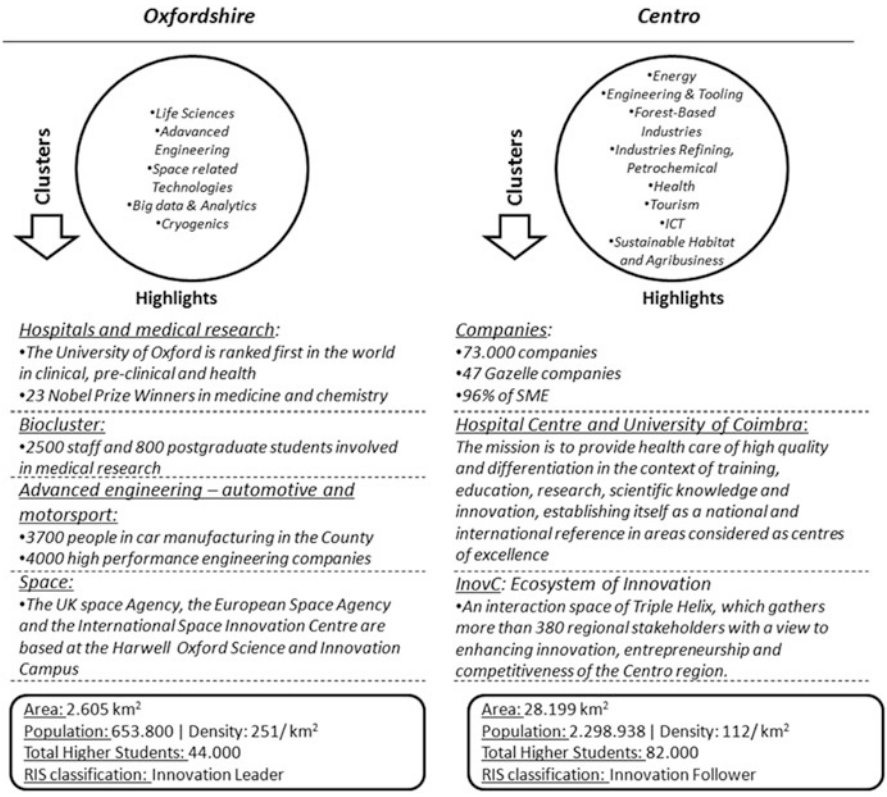

Fig. 8.6 Benchmarking between Oxfordshire and the Centro region. *Source*: Elaborated from CCDRC (2014b, 2014d); Oxfordshire LEP (2014)

Universities for Clinical, Pre-clinical and Health of the World University rankings), the related physics, engineering and electronics, and ICT. The Centro region is assumed to be an industrialised region, especially in the coastal zone. However, the technological base encompasses energy, engineering, and tooling sectors (the sector of moulds in plastic injection component puts the country as the eighth largest exporter in the world), forest-based industries (sector which exports about 90 % of all production), refining and petrochemical industries, health (supported by dynamic research at the University of Coimbra and also the University of Aveiro, in the areas of biotechnology), tourism and sustainable habitat, ICT, and agribusiness (located in the inner zone). Oxfordshire is notable for its high number of formal networks (Lawton Smith & Romeo, 2012).

The unemployment rate is much lower in Oxfordshire (about 6 % against 11 % in the Centro region). However, the focus on the qualifications of the work force is also strong in the Centro region (the proportion of tertiary graduates in science and technology per 1000 inhabitants is 23 %). Like Oxfordshire, the birth rate enterprises is high, 11 % per annum, and survival rate of businesses (2 years) is 53 %. Entrepreneurship boosts regional competitiveness, alongside strong connection by firms to the universities (Audretsch & Belitski, 2013; Lawton Smith & Bagchi-Sen, 2012; Ženka et al., 2012).

8.5 Conclusions and Policy Implications

This chapter set out to examine how two very different regions are evolving as centres of entrepreneurship, and to consider their economic growth trajectories in answering two research questions. The first was to what extent can both be seen as successful entrepreneurial regions? The second was what factors have led to their growth and to the differences between them? The regional triple-helix model and the regional innovation systems concept were used as a framework that allows identification of the importance of geo-political contexts in shaping regional diversities and specificities. Although the initial methodology was to develop a set of indicators that would allow direct comparisons, it was found to be impossible to do so in a way that allowed the ranking of regions. Therefore it was decided that more qualitative approaches would allow for better understanding of economic growth trajectories.

Although starting from very different periods of time, both regions have become recognised as nationally important centres of entrepreneurship. In Oxfordshire's case its high-tech economy is also a global brand and many of its firms are technology leaders. However, the Centro region of Portugal has on many indicators pathways to becoming a successful entrepreneurial region. Both regions are notable for their strong research bases but both have limitations as well as strengths in the application of those resources into fully functioning regional triple-helix spaces (Etzkowitz, 2008). The Centro region has a much stronger claim to have a regional innovation system than Oxfordshire. It has a clear strategy and a management system in place. In Oxfordshire public–private partnerships have done more to foster clusters of

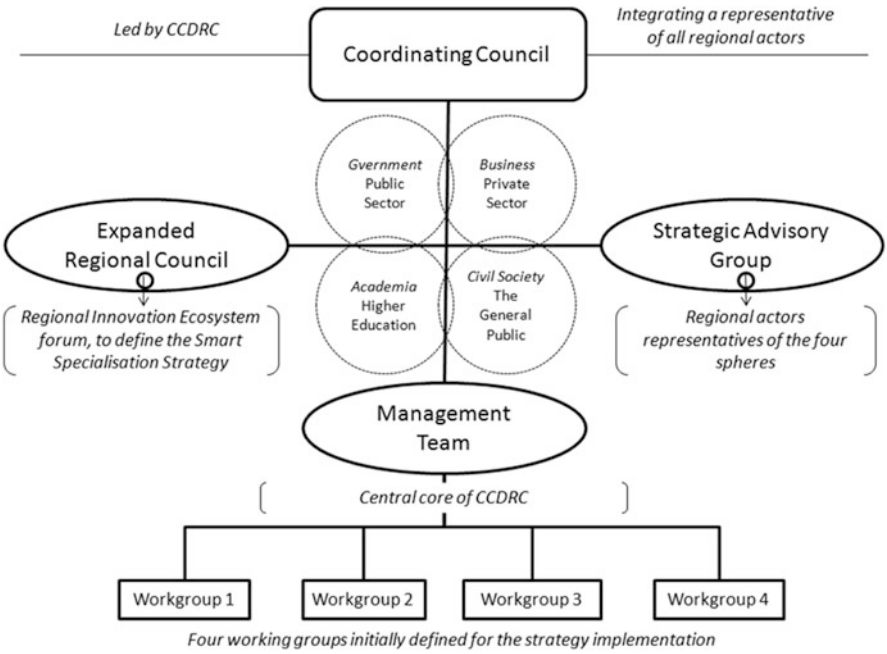

Fig. 8.5 Model of competitiveness for the Centro region of Portugal. *Source*: Elaborated from CCDRC (2014b, 2014c)

activity rather than creating a coherent system. For all that, it is a successful entrepreneurial region. However, local policy based on regional intelligence which provides an understanding of strengths and weaknesses has identified where and how the county could be stronger—and that in creating a better functioning 'innovation space' (Etzkowitz, 2008).

The implication is that each region should bet on its strengths in their local resources, to assert new patterns of regional competitiveness. The Centro does not need to follow the exact trajectory of Oxfordshire. What can be common is the need to find a path of excellence for the Academia and Research, betting on the model of the triple/quadruple helix to make the transfer of knowledge and technology, always keeping in mind the innovation and sophistication of business and foundations of regional development. Portugal still has to solve a problem of internal cohesion. The Horizon 2020 programme and RIS3 can be a great development opportunity for the Centro region, much more so than for Oxfordshire whose technological trajectory and entrepreneurial base owe much to the presence of so much high-quality public sector science and the associated highly skilled labour market.

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Chapter 9
Hedonic and Utilitarian Effects of the Adoption and Use of Social Commerce

Ángela Plaza-Lora and Ángel Francisco Villarejo-Ramos

Abstract The aim of this research is to contribute to the field of study which explores the consumer behaviour model in social commerce, introducing the social commerce concept as a new commercial formula.

To study the acceptance and use of social commerce by consumers, we have proposed the social commerce acceptance model. This brings together several models of technology acceptance, including the technology acceptance model, its successor technology acceptance model 2 and the unified theory of acceptance and use of technology (UTAUT). It also includes hedonic and utilitarian values which will help us identify the key variables influencing the intention to use social commerce.

To carry out this research, we distributed a survey answered by 486 individuals. The results obtained confirm satisfactory results for the relationships proposed, highlighting the influence of hedonic and utilitarian values on attitude and perceived usefulness.

9.1 Introduction

Almost 22 years after the commercial launch of the Internet, it has become one of the most important distribution channels and an infinite source of customer information (Constantinides, Lorenzo, & Gómez, 2008). In recent years the rise of Web 2.0 and the advent of e-commerce as an online sales platform have been changing the way we understand marketing now. The attention of practitioners and scholars has been attracted as a result.

The convergence of Web 2.0 social media applications and the increasing presence of the e-commerce platform have led to a new commercial formula known as social commerce. The popularity of social commerce is increasing by 43 % per year and with this new commercial trend 88 % of companies expect to invest in social commerce in the near future (Constantinides et al., 2008). It is even more influential

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than websites or CRM (Hajli, 2012a, 2012b). Online-based companies like Google or Amazon, or social networking sites such as Facebook or LinkedIn, have increased their service portfolios in order to implement social commerce as a commercial formula in their websites (Lee, 2014). It is very important for a modern business to have social strategies. Hence, social commerce is changing the marketing strategies of almost every sector in the market, and these changes may influence their businesses (Stephen & Toubia, 2010).

The exploitation of the information collected from collaborative users and potential users on social commerce websites and platforms will be vital in order to maximise WOM advertising which, as has been proved, is less costly than traditional advertising (Liébana-Cabanillas & Villarejo-Ramos, forthcoming). But not only it is important for firms to adapt their businesses to social commerce in order to maximise WOM, it has also been proved that potential consumers trust other people's recommendations more than those made by a website's recommender system (Hajli, Hajli, & Khani, 2013). As the world is becoming social organisations need to adapt to this changing pattern.

Due to social commerce being a fairly new innovation, it has become necessary for organisations and researchers to really understand what the crucial variables are and what makes consumers choose this platform.

Our investigation is structured into six different sections. After the introduction, Sect. 9.2 analyses the foundations of social commerce and how these foundations have evolved in order to converge into social commerce. In the third section we establish the theoretical background and the hypotheses proposed to validate the behavioural model. Section 9.4 describes the methodology used in the investigation and the analysis of the results obtained. Finally, in the fifth section we expose the conclusions, the practical implications and the limitations of this work that will be useful to take into account in future research.

9.2 Contextualisation of Social Commerce as a New Trend in Commercial Formulas

Nowadays, the vast majority of the global population lives in a digital world. The Internet has become a part of our lives and it is not difficult to find that a large part of our daily activities can be done online. The numerous innovations on the Internet and the appearance of Web 2.0 have represented an important milestone in the development of this technology.

One of these abovementioned innovations is electronic business, which is changing the way enterprises behave in the modern economy. The new electronic business model allows content, community and commerce to converge (Hughes & Breytenbach, 2013), and trade on the Internet has become one of the most important tools for companies (Liébana-Cabanillas & Villarejo-Ramos, 2014). This change implies a revolution not only in consumers' buying habits but also in consumer-business relationships (Sharma & Sheth, 2004).

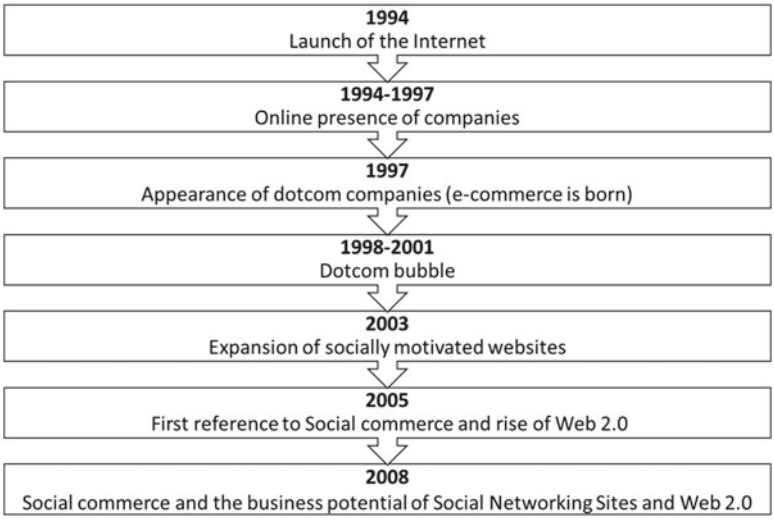

Fig. 9.1 The evolution of e-commerce to social commerce (adapted from Hughes & Beukes, 2012)

Web 2.0 has meant a behavioural change in Internet users. They have gone from email and search engines to information development, information upload and information sharing (Wattanasupachoke, 2011). This shift has been mainly caused by the way people interact online, and it is closely related to the rise of social networking sites that has allowed the interconnectivity of users (Hajli, 2012a, 2012b; Hajli et al., 2013) and social media. A clear example of this is that as of June 2015, the monthly active users of Facebook reached 1.49 billion. Given that social media have enabled users to be more active online, they have become hyper-informed consumers (Hajli et al., 2013) The influence of social networks and social media on people's daily lives is one of the most powerful reasons why businesses and organisations need to adapt their strategies to these changes in order to create competitive advantages (Wattanasupachoke, 2011). Now that information is very accessible for customers, they can influence the market (Hajli et al., 2013).

Web 2.0 sites have altered the way users interact with the Internet. While in what was known as Web 1.0 users were only allowed to view the content in the websites, Web 2.0 has allowed and allows users to interact and collaborate with other users while creating user-generated content in a virtual community (Wikipedia). The essential features of Web 2.0 and some examples of Web 2.0 sites are shown in Fig. 9.1.

Along with Web 2.0 we have also highlighted the current importance of trading on the Internet. This concept was broadly materialised in what is known as e-commerce. E-commerce has been conceptualised differently by numerous scholars. For Bontis and De Castro (2000) it can be summarised "as the buying and selling of goods and services via electronic means such as the Internet". For Kuthiala (2003)

e-commerce is "a new way of conducting, managing and executing business transactions using modern information technology".

As we have mentioned before, e-commerce has become an essential tool for companies in order to be competitive in the present environment. Among the advantages of e-commerce we highlight continuous accessibility, direct contact between customers and producers, open markets, cost reductions, time savings, immediacy of interaction and personalisation and globalisation of markets (Armesh, Saljoughi, & Kord, 2010). According to Kim and Srivastava (2007), one of the major changes in e-commerce was the implementation of recommender systems in order to provide the customer with personalised recommendations based on previous purchases and the customer's profile and interests. Yet although this performed well at first, e-commerce websites found that customers were far more likely to accept recommendations from people rather than from a system. This discovery marked a turning point in the way Internet trade was conceived.

We have already seen how the emergence of Web 2.0 revolutionised the way Internet was seen. In order to clearly conceptualise social commerce as we understand it, it has become very necessary to have an overview of the evolution of e-commerce to fully understand the development of social commerce.

The Internet was launched in 1994, and between then and 1997 organisations started to be present there. The online shopping formula was almost imperceptible as most of the companies only used their physical stores to sell their products and/or services. During these years, the Internet started to grow rapidly due to an increased interest in it. This landmark made some companies foresee online sales as a new business model which would allow them to have a competitive advantage over their competitors. This is when e-commerce was born. In the late 1990s and the early 2000s the first entirely Internet-based companies began to appear, such as *eBay* and *Amazon*. The ease with they reached consumers in different markets and countries resulted in greater pressure for traditional companies to increase their online presence. The Internet was seen as an important commercial platform that had a decisive role in strategic businesses plans (Constantinides et al., 2008).

Speculation in the stock market led to the Dot-com Bubble from 1998 to 2001. This burst in 2000 resulted in a decrease of the number of online companies, but this did not have any effect on consumer behaviour regarding online purchases. It was from 2003 when sites like *MySpace* or *Facebook* emerged. Initially, the commercial potential of these sites was seen as insignificant by online companies' owners. The first reference to social commerce appeared in 2005 (Curty & Zhang, 2011), coinciding with the increasing use of social networking sites and the rise of Web 2.0.

The customer-generated content which Web 2.0 allowed became the main source for proactive businesses to gain information about users in order to increase customer loyalty (Constantinides et al., 2008). This factor, and the potential of social networking sites to attract capital, was the trigger to officially coin the term social commerce in 2008. In fact, in less than a year, from 2007 to 2008, the Financial Times reported that visiting shopping websites with social functionalities grew by more than 500% (Liang & Turban, 2011). Since then, the growing popularity of social commerce has reached

43 % per year and nearly 88 % of businesses expect to expand their investment in social commerce in the future (Constantinides et al., 2008).

In line with the evolution of e-commerce and the Internet, the convergence of Web 2.0 features and e-commerce characteristics and advantages has brought a new type of Internet trading which is known as social commerce.

Due to social commerce, also known as s-commerce, being a recent innovation, a unified concept of it does not yet exist. Whereas some scholars define it as a type of e-commerce that combines sales with customer social interaction in a social media environment (Hajli et al., 2013; Liang & Turban, 2011; Lee, 2014), other authors have put forward a concept for social commerce which is narrowed down to the seller perspective. This is the case of Stephen and Toubia (2010) who believe that social commerce "is an emerging trend in which sellers are connected in online social networks, and where sellers are individuals instead of firms". This perspective is connected with the research line in which social commerce is divided into two perspectives, the seller's and the consumer's, and in which there are two individual concepts: social commerce (the seller's perspective) and social shopping (the consumer's perspective) (Stephen & Toubia, 2010).

Nevertheless, other authors consider both terms—social commerce and social shopping—as analogous (Liao & Chu, 2013; Sun, 2011). In our case, we will not consider social commerce and social shopping as the same. This is because we have found evidence in research in which social shopping is defined as "the enjoyment of shopping with friends and family, socialising while shopping, and bonding with others while shopping" (Hassouneh & Brengman, 2011; Lee, Kim, & Lee, 2013; Ozen & Engizek, 2014). Here socialisation and enjoyment are the key of the concept, and there is no evidence of interactive social relationships within it which leads us to think that social shopping is related with Web 2.0 or e-commerce whatsoever.

The diversity of definitions that we have already highlighted is not only caused by the seller's and the customer's perspectives but also by the involvement of multiple disciplines. When conceptualising social commerce, disciplines such as marketing, computer science, sociology and psychology have defined a concept for it (Huang & Benyoucef, 2013). In marketing, according to Constantinides and Fountain (2008), social commerce is "a noticeable trend in online marketplaces where businesses leverage social media or Web 2.0 as a direct marketing tool to support customers' decision making processes and buying behaviour". From the computer science perspective, social commerce has been described as an application which combines Web 2.0 technologies, interactive platforms, social media and communities in a commercial environment (Lee, De Wester, & Park, 2008). For sociology, social commerce is based on the impact of the social influence used by Web-based social communities from e-commerce companies (Kim & Srivastava, 2007). Finally, social commerce viewed from the psychological perspective is the influence that information collected in a networked community has on people when they perform online purchases (Marsden, 2009).

Taking into account all the considerations set out, we believe that social commerce has a wider scope in which sellers' and consumers' perspectives meet in

order to develop a global concept which explains social commerce. We hence think that social commerce combines both business-to-consumer and consumer-to-consumer approaches (Curty & Zhang, 2011). Bearing in mind these approaches, we propose the following definition for social commerce: social commerce is an Internet trading innovation in which consumers interact with each other and make contributions in order to facilitate the online buying and selling of products and/or services, allowing the consumer to make informed purchases by exchanging information with other users through reviews, ratings and comments of the products or services, thus enabling the development of synergies between customers, organisations and social networks.

As we have seen, social commerce has the potential to change the marketing strategies of companies (Lee, 2014), and consequently it has become vital for organisations in this digital era to adapt their business models to it (Hajli et al., 2013). The influence of social commerce on market trends in the coming years will be very significant. Due to this rapidly growing online paradigm, we have found a need to understand the crucial variables that influence the adoption and usage of social commerce.

9.3 Theoretical Background and Hypotheses

The aim of this work is to look for a convincing technology adoption model to explain the intention to use social commerce among users. We propose the social commerce acceptance model (SCommAM). This is based on the classical technology acceptance model (TAM) posited by Davis (1989), although it also integrates other factors from the unified theory of acceptance and use of technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003) and the TAM extension, TAM2 (Venkatesh & Davis, 2000), as well as other theories (Lu, Yao, & Yu, 2005; Yang & Lee, 2010; Zhang et al., 2011) which will help us understand the acceptance of social commerce.

9.3.1 The Social Commerce Acceptance Model

The research model which we propose unifies some of the essential constructs in TAM, TAM2 and UTAUT as a starting point for our research and extends this with additional constructs that are important to social commerce acceptance.

It retains the major variables of TAM: perceived usefulness, perceived ease of use, attitude and behavioural intention. It also considers the social influence of TAM2 and UTAUT as subjective norms and the direct effect that this has on perceived usefulness and behavioural intention, as well as the moderator effect of gender and age proposed in UTAUT. But we have also considered other constructs which we believe are extremely important in order to understand not only the acceptance of social commerce but also the reason to use social commerce itself. To comprehend this we

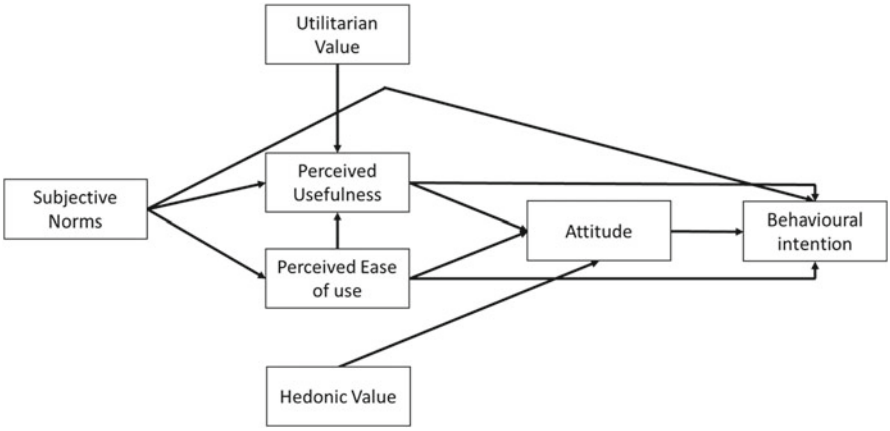

Fig. 9.2 Social commerce acceptance model (SCommAM)

have included in our research model two additional variables—hedonic value and utilitarian value—to study their effect on attitude and perceived usefulness, and also the moderator effect of gender on both relationships. This will help us understand the way people use social commerce and the reason why they use it.

The SCommAM (Fig. 9.2) proposed is shown here.

9.3.2 Research Hypotheses

Subjective norms significantly affect the user's beliefs regarding social commerce (Cheng, 2011). Other people's, peers' or referents' opinions could play an important part in the adoption process of technologies like social commerce, which are in their early stages of development or diffusion (Gao & Bai, 2014a, 2014b). This is one of the reasons why Davis (1989) highlighted the role of subjective norms within IT acceptance and usage behaviour.

Subjective norms are a direct determinant of the behavioural intention to use social commerce and this construct has been used in a large number of studies (Amin, 2008; Kleijnen, Wetzels, & De Ruyter, 2004; Nysveen, 2005; Venkatesh, Thong, & Xu, 2012). It has also been proved to be vital in developing the intention to use a new technology, such as social commerce (Nasri & Charfeddine, 2012; Sabir, Ahmad, Noor, & Rehman, 2013). We therefore hypothesise as follows:

Hypothesis 1A: Subjective norms will have a positive direct effect on the intention to use s-commerce.

Subjective norms could influence the person's assessment of social commerce in terms of its usefulness (Lu et al., 2005). Hence, based on these previous findings, we propose the fiollowing:

Hypothesis 1B: Subjective norms will have a positive direct effect on the perceived usefulness of s-commerce.

If people think that social commerce is a difficult and unfriendly technology, their perception of it will be negative and on account of this they will probably not use it. But if this negative point of view is countered by their referents, the probability of these people using social commerce will be higher. Based on this and previous studies (Bhatti, 2007; Lu et al., 2005), we postulate the following:

Hypothesis 1C: Subjective norms will have a positive direct effect on the perceived ease of use of s-commerce.

Perceived ease of use refers to the perception of a person regarding the usage easiness and the level of effort to use a certain system (Davis, 1989). As reported by Davis (1989), the variable perceived ease of use is very important in the acceptance of an IT system because it is "the basis of a system use". As stated by Lu et al. (2005), the degree of easiness perceived by customers is recognised to be an important determinant for using a system. In the case of social commerce, users need to feel that social commerce is easy to use in order to see its utility. If they do not perceive this usefulness they will use other types of Internet commerce, like e-commerce or mobile commerce. Therefore we expect to see a significant positive effect between perceived ease of use and perceived usefulness:

Hypothesis 2A: Perceived ease of use positively affects usefulness in the use of s-commerce.

Perceived ease of use has a positive impact on the user's attitude towards the system as well directly and indirectly through its effect on perceived usefulness (Lu et al., 2005). If people find that the usage of a system, i.e. social commerce, is not difficult, their attitude towards the use of social commerce will be positive. The effect will then be double, because not only will the people have a positive attitude towards social commerce as it is easy to use but also this ease of use will influence their perception of utility. As a result, this will also positively influence their attitude towards social commerce. In accordance with these findings we posit the following:

Hypothesis 2B: Perceived ease of use positively affects the attitude towards using s-commerce.

The easiness of a system will affect the intention to use the system itself because if the system is too difficult to use the person will reject it (Davis, 1989). Perceived ease of use has been proved to be an effective predictor of behavioural intention in a variety of technologies in which TAM has been used: email, e-commerce, e-books and intranet (Williams, Slade, & Dwivedi, 2014). Hence, we hypothesise as follows:

Hypothesis 2C: Perceived ease of use has a positive direct effect in the behavioural intention to use of s-commerce.

According to Gao and Bai (2014a, 2014b), users will only adopt a new technology if the use of this technology provides the user with an advantage compared to similar technologies, and this is reflected in the perceived usefulness construct. If the subject is able to perceive these advantages from social commerce, the attitude towards social commerce and the intention to use it will be higher. In fact, scholars have been able to determine the effects of this construct on the person's intention to

use new technologies such as e-commerce, mobile commerce and social networks (Noh, Lee, Kim, & Garrison, 2013). In line with these findings we propose the following:

Hypothesis 3A: Perceived usefulness has a positive direct effect on the attitude towards using s-commerce.

Hypothesis 3B: Perceived usefulness has a positive direct effect on the behavioural intention to use s-commerce.

The attitude towards social commerce will be the propensity towards the usage of social commerce and the disposition towards the use of social commerce to purchase on the Internet (Hernández-García, Iglesias-Pradas, Chaparro-Peláez, & Pascual-Miguel, 2011). This attitude could be positive or negative (Nasri & Charfeddine, 2012), and it will apply to both users and non-users of social commerce. If the attitude is positive and therefore the users have a positive attitude towards social commerce, their behavioural intention to use it will be greater and they will be more motivated to use social commerce (Lévy Mangin, Bourgault, & Moriano León, 2012). Numerous research works related to Internet-based services—online banking (Lévy Mangin et al., 2012), social networks (Sabir et al., 2013), Internet Of Things and mobile social commerce (Gao & Bai, 2014a, 2014b) and mobile commerce (Fong & Wong, 2015)—consider that attitude is the antecedent of behavioural intention to use and it has been confirmed to have a positive direct effect on the behavioural intention to use a system (Nasri & Charfeddine, 2012; Davis & Venkatesh, 1996; Wang & Chou, 2014). We hence hypothesise as follows:

Hypothesis 4: Attitude towards using s-commerce has a positive direct effect on the intention to use it.

Numerous studies have identified two types of system values: hedonic and utilitarian (Holsapple, 2007; Van der Heijden, 2004; Wakefield & Whitten, 2006). Whereas hedonic systems are related to entertainment and are oriented to pleasure, utilitarian systems are more instrumental and related to productivity (Kim & Hwang, 2012). The personalisation of some features within Internet-based services like e-commerce, mobile commerce or social commerce has made these systems more hedonic, complementing their utilitarian value (usefulness, accomplishment) (Dlodlo, 2014). This means that the systems are both useful and enjoyable (Malik, Kumra, & Srivastava, 2013). For these reasons, when investigating the usage and adoption of social commerce we have to take these values into account because the usage tendencies of social commerce may be influenced by its hedonic or utilitarian values, and these can be significant predictors of a new technology adoption (Childers, Carr, Peck, & Carson, 2001). In agreement with these findings we postulate the following hypotheses:

Hypothesis 5A: Utilitarian value has a positive effect on the perceived usefulness of s-commerce.

Hypothesis 5B: Hedonic value has a positive effect on the attitude towards using s-commerce.

9.4 Research Methodology and Data Collection

As our main goal is to analyse the adoption and usage of social commerce among the population, we have chosen as our target population for this research a set of people who may or may not have used social commerce and may or may not have experience with social networks or online shopping. The age range of the target population is from 18 onward.

For the data collection we use two identical methods—an online questionnaire and a paper questionnaire—based on the previous investigations of a variety of scholars.

Both these questionnaires were preceded by an explanatory paragraph in which we explained in detail to the people surveyed what social commerce is. By doing so, our aim was to create a clear concept of social commerce in the population who take part in the survey. Both surveys consist of two sections. The first section is a set of questions which helped us analyse the respondents' socio-demographic profiles and also gave us information regarding their level of experience with social networks and online shopping, as well as in the usage of social commerce and its frequency of use. The second section was formed by a group of questions matching the constructs proposed in our model.

After removing invalid questionnaires, the sample obtained is composed of 486 surveys.

The profile of the participants in the sample appears in Table 9.1, which shows that 64 % of those surveyed were women and 36 % were men.

9.4.1 Reliability and Validity of the Scales

The internal consistency reliability of every element is determined by the correlations between the indicator and the latent variable. It is appropriate for the composite reliability to be 0.7 or more, although a value of 0.6 or higher is acceptable (Bagozzi & Yi, 1988).

The convergent validity for every indicator should be 0.5 or higher (Bagozzi & Yi, 1988). This validity will let us know if the elements of a determinate scale converge in only one construct (Sanzo, Santos, Vázquez, & Álvarez, 2003), establishing that the variance of every construct is better explained by its measurements than by the error.

Finally, the discriminant validity will be determined if the construct is better correlated with itself than with the rest of the constructs. In this case, Fornell and Larcker (1981) suggest that the square root of the average variance extracted (AVE) of each latent variable should be greater than the correlations between the other latent variables and can be used as a criterion to measure the discriminant validity (Table 9.2).

As we can see in the table above, all the coefficients of the items with the scale's total are correct and are greater than the minimum value indicated (0.6/0.7).

Table 9.1 Demographic and technological information of the participants

	Percentage (%)
Gender	
Male	64
Female	36
Total	100
Age	
18–25	32.8
26–35	16.3
36–45	18.4
46–55	24.4
56–65	6.5
Over 65	1.6
Total	100
Social network users	
Yes	88.27
No	11.73
Total	100
E-commerce users	
Yes	84.36
No	15.64
Total	100
Social commerce users	
Yes	50.49
No	49.51
Total	100

The same applies to the constructs' composite reliability. It can be seen that all of the indicators have composite reliability values that are greater than the minimum acceptable level of 0.7. These results prove that the model's internal consistency reliability is correct.

As each construct's composite reliability and Cronbach's alpha are greater than the acceptable threshold of 0.7, the discriminant validity is correct. For each construct examined, Cronbach's alpha is over 0.7. These results confirm that the items are internally consistent for each construct (Nunally, 1978). The composite reliability is also greater than 0.7 for each construct, proving that every item within the variables is reliable (Bagozzi & Yi, 1988). The results obtained for each AVE are above the minimum threshold of 0.5. These results show us that more than 50% of the indicator's variance is being taken into account (Real, Leal, & Roldán, 2006). With all the results collected we hence conclude that there is a globally convergent validity and an internal consistency between the different measurement scales proposed.

To verify the hypotheses we used the *bootstrap* resampling model (4999 samples) (Henseler, Hubbona, & Ash Ray, forthcoming) in order to obtain the standard errors and the *t*-values.

Table 9.2 Convergent validity and reliability of the internal consistency

Variable	Item	Item correlation with the scale	Cronbach's alpha	CR	AVE
Subjective norms	SN1	0.854	0.940	0.940	0.796
	SN2	0.836			
	SN3	0.924			
	SN4	0.949			
Perceived ease of use	PEOU1	0.858	0.897	0.898	0.687
	PEOU2	0.807			
	PEOU3	0.870			
	PEOU4	0.778			
Perceived usefulness	PU1	0.856	0.918	0.919	0.739
	PU2	0.888			
	PU3	0.883			
	PU4	0.808			
Attitude	ATT1	0.958	0.943	0.942	0.802
	ATT2	0.893			
	ATT3	0.906			
	ATT4	0.820			
Behavioural intention to use	BI1	0.946	0.931	0.932	0.820
	BI2	0.923			
	BI3	0.845			
Hedonic value	HV1	0.833	0.935	0.935	0.783
	HV2	0.885			
	HV3	0.928			
	HV4	0.892			
Utilitarian value	UV1	0.875	0.907	0.907	0.764
	UV2	0.881			
	UV3	0.866			

Standard errors represent the standard deviation of a statistic's distribution sampling. The *t*-values show the significance level of the relationship established (for a statistical confidence level of 95 %, the *t*-value required is 1.64791345; for a statistical confidence level of 99 % the *t*-value required is 2.333843952 and for a level of 99.9 % the value required is 3.10; all the results above the required value will have a significant relationship).

The purpose of this system is to obtain the statistical significance of the β coefficients (Chin, 1998). The verification of the conceptual model is shown in Fig. 9.3.

The results obtained show that all the hypotheses were found to be significant except for hypothesis 1C. The relationship between subjective norms and perceived usefulness is not significant. We believe that this finding is caused by the definition proposed of subjective norms. Given that we have based our acceptance model on TAM, TAM2 and UTAUT, we have only considered subjective norms as a variable to measure the influence of social norms on the usage of s-commerce. Nevertheless, in

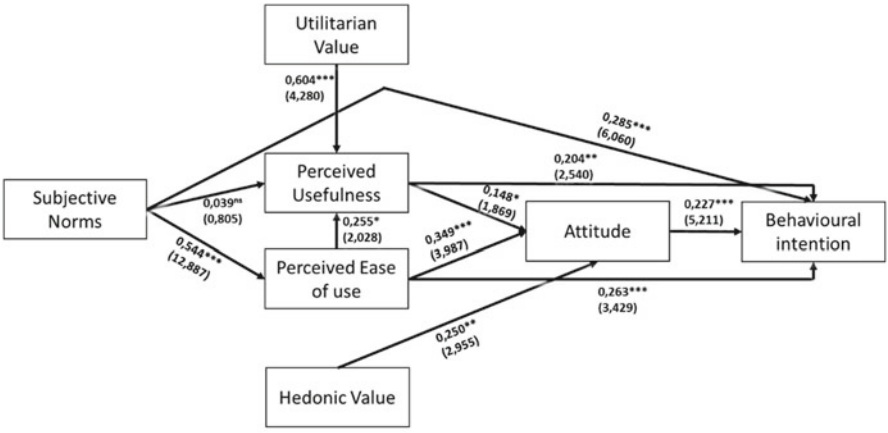

Fig. 9.3 The verification of the SCommAM model. *Note*: Significance levels: ***$p<0.001$, **$p<0.01$, *$p<0.05$, ns: not significant

the TAM2 model, subjective norms go hand in hand with two more variables—image and voluntariness—in what Venkatesh and Davis (2000) called social influences. The same happens with the UTAUT (Venkatesh et al., 2003), in which the influence of others on the individual is called social influence and is made up of subjective norms, image and social factors.

With respect to hypotheses 1A and 1B, when adopting social commerce the influence of subjective norms on this adoption is directly and positively related with the behavioural intention to use social commerce. This relationship and its effect have been corroborated in other papers (Chong, Chan, & Ooi, 2012; Gao & Bai, 2014a, 2014b; Nasri & Charfeddine, 2012; Venkatesh et al., 2012; Venkatesh & Davis, 2000).

Subjective norms directly and positively influence the user's perceived ease of use of social commerce. This finding is supported by Lu et al. (2005) or Bhatti (2007), among others.

The perceived ease of use of the user of social commerce influences the perception of its usefulness. This is because if users perceive that social commerce is easy to use, they will find it more useful than other online purchasing tools (Davis, 1989; Lim & Ting, 2014; Venkatesh & Davis, 2000).

The attitude towards social commerce is directly and positively influenced by perceived ease of use. Accordingly, if social commerce is easy to use and perceived as such, the attitude towards the use of social commerce will be positive, corroborating the numerous arguments made during this research.

When evaluating social commerce adoption, the perception of the ease of use of these platforms directly and positively influences the intention to use them. This confirms what other scholars have previously justified in their research (Bhatti, 2007; Davis, 1989; Gao & Bai, 2014a, 2014b).

Table 9.3 Result of the structural model estimation

Hypothesis	Sign	β	T-values	Valuation
H1A: SN → BI	+	0.285***	6.060	Accepted
H1B: SN → PU	+	0.544***	12.887	Accepted
H1C: SN → PEOU	+	0.039^{ns}	0.805	Not accepted
H2A: PEOU → PU	+	0.255*	2.028	Accepted
H2B: PEOU → ATT	+	0.349***	3.987	Accepted
H2C: PEOU → BI	+	0.263***	3.429	Accepted
H3A: PU → ATT	+	0.148*	1.869	Accepted
H3B: PU → BI	+	0.204**	2.540	Accepted
H4: ATT → BI	+	0.227***	5.211	Accepted
H5A: UV → PU	+	0.604***	4.280	Accepted
H5B: HV → ATT	+	0.250**	2.955	Accepted

Note: Significance levels: ***$p < 0.001$, **$p < 0.,01$, *$p < 005$, ns: not significant (based on $t(4999)$, two-tailed test)

Perceived usefulness has a direct and positive influence on the attitude towards the use of social commerce. This has been corroborated in prior research mentioned in this investigation (Davis, 1989; Noh et al., 2013). It has also been proved in this research that the perception of the usefulness of social commerce positively affects the intention to use social commerce websites or platforms (Bhatti, 2007; Venkatesh et al., 2003).

The user's attitude towards the use of social commerce is an influence on the intention to use social commerce. The more positive the attitude towards social commerce is, the greater the intention to use it will be (Hernández-García et al., 2011; Lévy Mangin et al., 2012; Sánchez et al., 2013).

Worthy of mention are the significant relationships of the hedonic value and the utilitarian value with the key variables of the TAM attitude and perceived usefulness, respectively. Although SCommAM is a model unifying other TAM, neither hedonic nor utilitarian values were considered in these models, so this has been a positive discovery which leads us to think that the patterns in behaviour when adopting new innovations are continuously evolving (Table 9.3).

9.5 Conclusions and Future Research Directions

The main objective of this research was to go more deeply into this new commercial formula which is called social commerce. As we have previously stated in this investigation, the great importance of the Internet and everything that surrounds it nowadays has made it essential to become a part of it and to achieve what is necessary to be always aware of the new trends and innovations in this sector. Furthermore, Web 2.0 has helped Internet to become social and this is an inexhaustible source of opportunities that companies must know how to exploit.

The acceptance and usage of social commerce is our starting point. The variables that explain this usage and acceptance will be, as we have already stated, crucial to understanding if this Internet commerce formula will be used and accepted by consumers.

The appearance of new commercial formulas, like social commerce, which allow people to participate and engage in their purchases while shopping online has the potential of changing marketing strategies (Lee, 2014) and of increasing e-WOM (Liébana-Cabanillas & Villarejo-Ramos, forthcoming). These features of social commerce lead us to think that it will be a motivating power for business innovations (Hajli, 2012a, 2012b). For these reasons we consider that social commerce needs to be explained in e-business courses, as is done with e-commerce.

Social commerce is a recent knowledge area which the scientific community needs to pay attention to due to its commercial potential online. Our proposal is to keep researching in this new path that has been opened in order to make the most of the knowledge extracted from these works and apply it to the field of marketing to maximise the potential of business marketing strategies.

We have based our investigation on three technology acceptance models—TAM, TAM2 and UTAUT—and we have also added to the equation two variables which are strongly related with technology and its features: hedonic and utilitarian values. Our results have proved that the structural model works, giving us the idea of what the factors influencing the use of social commerce are.

Innovations such as social commerce introduce into the market new ways of competitiveness among organisations and new ways of gaining competitive advantages in hypercompetitive markets, such as the Internet.

The implementation of social commerce websites would help organisations increase their sources of information as the user becomes an additional source. All the comments, reviews and interactions made on the website can be crucial when making future decisions regarding new products or services. So, it has become necessary to recreate an environment in websites which allows these features (ratings, reviews, comments on the products, recommendations of others users, etc.).

The following are the limitations found in this investigation. They lead us to posit very useful action lines for future research:

1. It has to be considered that the field of study contemplated in this research is very new and therefore it is difficult to find information. We believe that some of the relationships measured in this work are weak or not significant due to the lack of scholars' references.
2. With respect to the subjective norms—perceived usefulness relationship, although the hypotheses posited have been previously validated by other researchers, the results in our investigation showed a relation between them which was not significant. Consequently, we believe that further research is needed regarding this relationship, and that it would be positive to transform subjective norms into social influence and consider other variables as a part of it, such as image or social factors (Venkatesh et al., 2003; Venkatesh & Davis, 2000).

3. As we have obtained positive results in the relationships of hedonic and utilitarian values, it would be beneficial to investigate the moderating effects of gender on these relationships in order to know if the people's gender influences their vision of social commerce in terms of hedonism and utilitarianism. To do so, the percentages of the sample's respondents should be balanced as closely as possible between men and women.
4. For future research and in order to check if there are significant differences among those who have already used social commerce and those who have not, we propose creating two models: an expectations model to study how the models behave for a sample of non-users and an experience model to study the performance of the model for experienced users. These two models will help us to identify the differences among the variables and which of them are key to adopting social commerce in each case.

The sample did not have international respondents. This reduces the reliability of generalising the results. Future studies should take into account the need for a bigger sample including international respondents. This would enable the carrying out of cross-cultural research to study possible differences among nationalities on the acceptance and use of social commerce.

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Chapter 10
Knowledge Creation in Temporary Organizations

Roel Rutten

Abstract This chapter studies knowledge creation in temporary organizations (TOs) to address the relationship between TOs and their permanent environment. Knowledge creation is a process of interaction in an organizational context that must combine hierarchy/control and flexibility/autonomy elements. Based on a case study of twelve inter-organizational TOs, this chapter nuances the decoupling between TOs and their permanent environment as follows. TOs are managed independently but TO knowledge creation depends on continuous inputs from the permanent environment. TOs depend on informal hierarchy/control elements in the permanent environment. TO knowledge creation depends on both the willingness of TO members to create knowledge and the extent that the permanent environment enables them to create knowledge.

10.1 Introduction

Temporary organizations (TOs) are an increasingly popular organizational form for complex activities such as knowledge creation (Bakker, 2010). They are argued to be effective for complex tasks because they can perform them with minimal interference from the permanent environment. Knowledge creation is a critical task for many organizations because it is at the heart of innovation (Grabher, 2004; Hobday, 2000; Ludin & Söderholm, 1995). Knowledge creation is defined as interaction among individuals within an organizational context (Grant, 1996; Tsoukas, 2009) and it materializes into innovations such as new products, services, technologies and competences on the level of the organization (Amin & Cohendet, 2004; Nonaka & von Krogh, 2009). Since innovation more often than not requires knowledge from multiple organizations, knowledge creation is increasingly performed in inter-organizational relations (Muthusamy & White, 2005; Powell, 1998). However, knowledge creation in TOs where the permanent environment consists of multiple

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parent organizations (POs) complicates matters in two ways. First, the relationship between the TO and its permanent environment becomes more complicated when multiple POs have a stake in the TO. Second, TO knowledge creation cannot be effectively isolated from its permanent environment because TO members depend on continuous inputs from the PO in terms of knowledge and use of equipment. TO theory is conscious of the fact that TO knowledge creation presents a challenge in terms of retaining the newly created knowledge and it solves this problem by suggesting project-based organizations (PBOs) (Hobday, 2000; Principe & Tell, 2001; Williams, 2008). A PBO is an organizational form where tasks are organized in consecutive projects and where staff overlap and continuity solve the problem of cross-project knowledge transfer. However, PBOs insufficiently address this chapter's problem because (1) PBOs focus on transferring knowledge across projects but not on knowledge creation, and (2) PBOs generally assume just one PO. However, as knowledge creation in inter-organizational TOs often occurs with different partners, the cross-project continuity that benefits PBOs (Williams, 2008) is much less developed in inter-organizational TOs (Grabher, 2004).

Bakker's (2010) observation that the relationship between the TO and its permanent environment is a neglected area in the TO literature thus seems to particularly apply to knowledge creation in inter-organizational TOs. This chapter aims to address that gap in the literature from the above understanding of knowledge creation as a process of interaction among individuals within an organizational context (Amin & Cohendet, 2004; Nonaka & von Krogh, 2009; Tsoukas, 2009). In the case of TO knowledge creation, the organizational context has two "layers" as it pertains to knowledge creation between TO members and to knowledge creation between TO and PO members. Moreover, the organizational context is affected by the involvement of multiple POs. The organizational knowledge creation literature suggests that, for knowledge creation to be effective, the organizational context must combine hierarchy and control elements (to focus the knowledge creation) with flexibility and autonomy elements (to encourage creativity) (Amin & Cohendet, 2004; Butler, Price, Coates, & Pike, 1998; Johannessen, Olson, & Olaisen, 1997; Nonaka & von Krogh, 2009). This raises the following questions with regard to knowledge creation in inter-organizational TOs: (1) How do both "layers" provide for the combination of hierarchy/control and flexibility/autonomy elements? (2) How does the interaction between both "layers" affect knowledge creation? (3) How does the inter-organizational setting affect knowledge creation? Answering these questions results in a more nuanced understanding of how knowledge creation in inter-organizational TOs is related to the permanent environment. The answers will be developed from an explorative case study of 12 inter-organizational TOs in the Dutch Eindhoven region. They were created as part of a regional development policy that aimed to strengthen inter-organizational collaboration on innovation. Under this policy, 102 TOs were established and dissolved again on completion of their projects, after 2 years on average. Data were collected on 39 of the TOs as part of a policy evaluation study (Rutten & Oerlemans, 2009). For the present study, data for 12 of the 39 TOs could be used.

10.2 Temporary Organizations

TOs come in many different shapes and forms; they may be small and short-lived project teams or they may be corporations that exist for many years, for example to organize the Olympic Games (Bakker, 2010). Although this diversity has hampered theory development, TOs can be classified on the basis of four key concepts: time, task, team and context (Ludin & Söderholm, 1995; Bakker, 2010). *Time* is the most critical concept because it defines the very notion of TOs. The fact that TOs have an explicit understanding of their beginning and end points affects their activities in many ways, for example by invoking a sense of urgency. *Task* is the "raison d'être" for TOs; they are established to perform a specific and predefined task that would not otherwise be performed or be performed less effectively. Tasks require the allocation of material and economic resources to TOs and can be distinguished on two dimensions: routine versus complex tasks and unique versus repetitive tasks. A *team* is required to perform the task, which draws attention to individual TO members as human resources but also as agents who bring norms, values, habits, routines, conceptions, etc. into the TO that are not necessarily compatible (Bunderson & Boumgarden, 2010). While the permanent environment is critically important because it establishes TOs and allocates resources to TOs, individual TO members also shape TOs. *Context* connects the TO to its permanent environment, which consists of both the firm level and the wider social context, such as interpersonal networks and communities of practice. Research on the influence of the wider social context on TOs points at the importance of ongoing relations between participants; however, empirical findings suggest that TOs do not necessarily benefit from prior relations (Sorenson & Waguespack, 2006). Nor have inter-organizational TOs received substantial attention in the literature. For example, the challenges of retaining knowledge created in TOs have largely been discussed from the firm-level perspective of PBOs, in particular, their commitment to establishing organizational structures that facilitate face-to-face communication and their aversion of control-driven project management styles (Grabher, 2004; Williams, 2008).

The four concepts are very helpful to identify key issues for research (Bakker, 2010) and they have clearly identified that TOs should be approached from two angles: the individuals within the TO and the relation between the TO and its permanent environment (Grabher, 2004; Hobday, 2000; Ludin & Söderholm, 1995). However, it is equally clear from the literature that where TOs differ on these four concepts, they are subject to different dynamics, which complicates theory development (Principe & Tell, 2001; Whitley, 2006). This in turn argues for a more nuanced understanding of different kinds of TOs (Bakker, 2010), such as knowledge creation in inter-organizational TOs. This understanding should develop along the four concepts and their effect on how the TO works, in particular with regard to the relationship between the TO and its permanent environment (Grabher, 2002, 2004; Maskell, Bathelt, & Malmberg, 2006). The notion of "decoupling" or "isolation" provides a useful point of departure to that end (Ludin & Söderholm, 1995). It refers to the need for a substantial degree of separation between the TO and its permanent

environment. Decoupling legitimizes the TO in three important ways: it (1) identifies a starting point for the TO (time), it (2) defines the task that the TO has to perform and it (3) allocates individuals to the TO (team). Decoupling also separates the TO from its context which allows it to perform its task with minimal interference from the permanent environment. Decoupling is argued to benefit the effectiveness of TOs, though not necessarily their efficiency (Grabher, 2004; Ludin & Söderholm, 1995). Although decoupling is a very useful concept for a general understanding of TOs, theory development needs to be sensitive to the fact that different tasks may require different degrees of decoupling.

10.3 Organizational Knowledge Creation

The organizational knowledge creation literature increasingly understands knowledge creation from a cognitive perspective as a process of interaction between individuals within an organizational context (Amin & Cohendet, 2004; Nonaka & von Krogh, 2009; Tsoukas, 2009; Woiceshyn, 2000). Interaction in this case pertains to frequent and intensive communication between individuals in order to articulate tacit knowledge, such as skills, experiences, visions and beliefs, and to the transfer of documented, codified knowledge. Through the interaction of tacit and codified knowledge, individuals create new knowledge that is specific to their organizational context, e.g. team, department or TO. Through further knowledge creation with other members of the organization the knowledge materializes as new products, new technologies and new competences on the level of the organization (Grant, 1996; Muthusamy & White, 2005; Nohria & Gulati, 1997; Nonaka & von Krogh, 2009; Tsoukas, 2009). The organization is critically relevant as context of knowledge creation because it incentivizes, or hampers, individuals to create knowledge. Building on early insights from Burns and Stalker (1961), the organizational knowledge creation literature finds that organizational contexts emphasizing hierarchy and control are ineffective for knowledge creation (Amin & Cohendet, 2004; Johannessen et al., 1997; Nonaka & von Krogh, 2009). Although these contexts are efficient at disseminating codified knowledge, they hamper intensive and iterative communication between their members. In particular, these organizational contexts are weary of overlaps and redundancies which are essential for knowledge creation as they allow individuals to identify the right persons to communicate with and enable them to understand their knowledge (Butler et al., 1998; Johannessen et al., 1997; Nohria & Gulati, 1997; Nonaka & von Krogh, 2009; Tsoukas, 2009). On the other hand, and for different reasons, organizational contexts emphasizing flexibility and autonomy are conducive for knowledge creation neither. While they encourage communication among individuals, these contexts lack the goal-setting and coordination capabilities that knowledge creation requires. Knowledge creation aims to fulfil organizational goals and the allocation of resources to knowledge creation must be legitimized from a shared understanding of these goals, for which

flexibility and autonomy are ineffective (Amin & Cohendet, 2004; Bunderson & Boumgarden, 2010; Butler et al., 1998; Johannessen et al., 1997; Nonaka & von Krogh, 2009).

Knowledge creation thus requires an organizational context that combines hierarchy and control of individuals with flexibility and autonomy for individuals (Amin & Cohendet, 2004; Johannessen et al., 1997; Nonaka & von Krogh, 2009). Trying to balance both demands, organizations may overemphasize hierarchy and control, which constitutes an "error of tightness", or overemphasize flexibility and autonomy, which constitutes an "error of looseness" (Bunderson & Boumgarden, 2010; Butler et al., 1998). Errors of tightness compromise knowledge creation by impeding communication between individuals while errors of looseness compromise knowledge creation by failing to focus and legitimize it.

Studying knowledge creation in temporary organizations presents an important challenge with regard to the interaction between the TO and its permanent environment. This follows from the nature of knowledge creation as a process of ongoing interaction between individuals, and from the fact that organizational context in TOs consists of two "layers". The nature of knowledge creation necessitates continuous interaction between the TO and the PO for two reasons. In the first place, TO knowledge creation depends on inputs from the PO in terms of knowledge and use of equipment. Individuals will generally be assigned to the TO based on their expertise in one or a few areas, but for other knowledge they depend on their colleagues in the PO. Secondly, knowledge creation also takes place between the TO and the PO as this is how the PO acquires the knowledge from the TO. The need for a continuous interaction between the TO and the permanent environment presents the following challenges:

- Errors of tightness and errors of looseness can be made in both "layers" of organizational context, in the TO and in the relationship between TO and PO. This raises the questions of how both layers provide a combination of hierarchy/control and flexibility/autonomy elements, and how the interaction between both layers affects knowledge creation.
- Decoupling of the TO from its permanent environment becomes problematic because, on the one hand, it is necessary to allow the TO to focus on its task but, on the other hand, the need for continuous interaction between the TO and its permanent environment makes decoupling inconvenient. This raises the question of how and to what extent the TO is decoupled from its permanent environment.

In the case of inter-organizational TOs the relationship between the TO and its permanent environment is further complicated because the environment exists of multiple POs. POs may have various reasons to overemphasize hierarchy and control. First, knowledge creation is intensive in terms of resource input but uncertain in terms of outcomes. Knowledge creation does not necessarily produce useful technologies and competences and POs may try to use hierarchy and control to reduce uncertainty. Second, knowledge is non-exclusive which raises appropriability and opportunism concerns. In order to create knowledge, POs must share competitively sensitive, firm-specific knowledge that they do not want other POs to acquire but cannot prevent them from doing (Amin & Cohendet, 2004; Grant, 1996; Gulati & Nickerson, 2008).

Contracts that clearly specify the contributions and responsibilities of each PO can reduce the perceived risks but may leave the TO with insufficient flexibility and autonomy. On the other hand, mutual dependence and previous relations between POs may produce trust, which reduces uncertainty and risk in more subtle ways (Das & Teng, 2004; Grabher, 2004; Gulati & Nickerson, 2008; Klein Woolthuis, Hillebrand, & Nooteboom, 2005; Uzzi, 1997). However, inter-organizational trust between the POs does not automatically imply interpersonal trust between the TO members (Das & Teng, 2004; Klein Woolthuis et al., 2005).

10.4 Framework for Analysis

The case study in this chapter is designed around four variables. The dependent variable is *innovation*, the firm-level activity that turns knowledge creation by the TO into new products, new technologies and new competences. Since achieving these innovations is the aim of the TO, TO *knowledge creation* is assumed to explain innovation (Nonaka & von Krogh, 2009). As argued, TO knowledge creation is a process of communication between TO members and between TO and PO members. In turn, knowledge creation is affected by the balance of hierarchy/control and flexibility/autonomy elements in the organizational context (Bunderson & Boumgarden, 2010; Butler et al., 1998; Johannessen et al., 1997). Suggesting these elements as both ends of a continuum, the variable can be summarized as the level of *hierarchy* of the organizational context and it pertains to both the TO, as the organizational context of knowledge creation between TO members, and to the relationship between TO and PO members, as the organizational context for knowledge creation between TO and PO. As the hierarchy variable includes hierarchy/control and flexibility/autonomy elements, a moderate level of hierarchy is assumed to be most conducive for knowledge creation. The relationship between TO and PO is also affected by the involvement of multiple POs. The risks and uncertainties in inter-organizational relations have been captured as *confidence* by Das and Teng (1998). This concept explains that the degree in which firms are confident that their partners will work for mutual benefit rather than act opportunistically depends on a combination of trust and control (Das & Teng, 1998). Trust is interpreted in widely diverging ways in the literature but it generally refers to the fact that partners have to rely on each other's good intentions, at least to some degree. While trust is to some degree a leap of faith, control gives firms a means to effectuate good behaviour in their partners. Control, too, is understood in many different ways in the literature and may refer to both formal and informal modes of control, or to a combination of them. Confidence is a useful concept for inter-organizational TOs because the relations between TO members may be subject to different combinations of trust and control than relationships between TO and PO members. A high level of confidence is assumed to be most conducive for knowledge creation. This leads to the framework for analysis in Fig. 10.1.

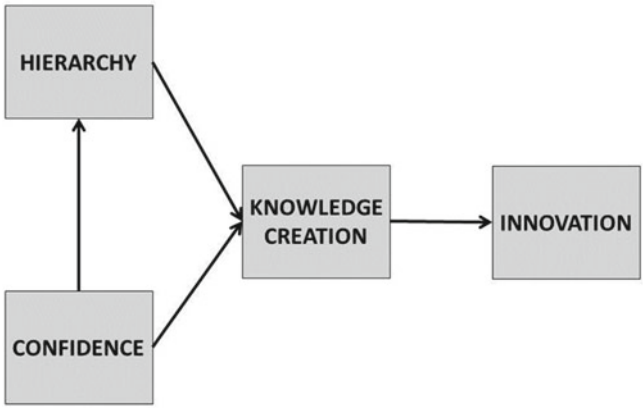

Fig. 10.1 Framework for analysis

For the relations between TO members and for the relations between TO and PO members, the following propositions follow from the conceptual model:

- P1: A moderate level of hierarchy is most conducive for knowledge creation.
- P2: A high level of confidence is most conducive for knowledge creation.
- P3: A high level of knowledge creation is most conducive for innovation.
- P4: A high level of confidence reduces the need for hierarchy.

Additionally, (P5) TO members assess confidence and set hierarchy independently from the POs.

To measure the variables a number of questions were selected from the evaluation study (Rutten & Oerlemans, 2009). As this questionnaire was based on similar variables, valid questions could easily be found. Different questions were selected for the relationship between TO members and for the relationship between TO and PO members, except for i*nnovation*, because it is an outcome of knowledge creation on the level of the firms (i.e. the POs). Questions for innovation measured whether the new product had actually been introduced on the market and to what extent the collaboration resulted in improved technological competences and new knowledge for the participating firms. Questions for *knowledge creation* between TO members measured the intensity of their communication in terms of the number of TO members that respondents had contact with, the extent to which respondents shared personal views, experiences and concepts, and the extent to which respondents brought in confidential information. Knowledge creation between TO and PO members was measured in terms of the access that TO members had to the knowledge in their own PO and in the other POs. The level of *confidence* between TO members was measured in terms of the kind (formal or informal) control they used and in terms of the extent TO members expected their partners to behave opportunistically. Confidence in the relationship between TO and PO members was measured in terms of the degree that the contribution of each PO was specified, which indicates control.

Confidence between TO and PO members was further measured in terms of the extent to which the objectives of the project were sufficiently clear in the project agreement, which indicates the level of trust. Unclear objectives may be argued to indicate that partners trusted each other to work for their mutual benefit. The level of *hierarchy* in the relations between TO members was measured in terms of their disposition to work flexibly. TO members' disposition to working flexibly indicates their preferring a low level of centralization and hierarchical decision-making in their relations. The level of hierarchy between TO members was further measured in terms of the extent that they worked on the basis of fixed rules. This may be argued to indicate the level of formalization in the relations between TO members. The level of hierarchy in the relations between TO and PO members was measured in terms of the extent that TOs could make their own decisions, which indicates the level of hierarchical or centralized decision-making by the POs. The level of hierarchy in the relations between TO and PO members was further measured as the extent to which communication between them followed formal lines of communication, which may be argued to indicate the level of formalization in their relations (see Table 10.1 for an overview of the measurements).

10.5 Empirical Background and Data Collection

The TOs in this study are small, inter-firm project organizations in the Dutch Eindhoven region. TOs were established by two to five manufacturing SMEs and sometimes a research centre or large firm was involved. The TOs aimed to strengthen PO competitiveness through knowledge creation for new product development. The TOs existed for 2 years on average, the time it took to develop the new product. Drawing members from various POs, the TOs functioned as small organizations. They had control over the resources allocated to them (mainly manpower and money) and they had their own command and control structures. All members were assigned to the TO on part-time basis and kept positions in their respective POs. TO members were usually senior engineers but several SMEs assigned their CEO. Even though the TOs were autonomous organizations, close PO linkages were thus maintained at all times (Rutten & Oerlemans, 2009).

The TOs were established as part of a regional innovation policy scheme to further inter-firm collaboration among manufacturing SMEs. POs paid 50–75 % of the cost of the TOs with the remainder being funded by regional and national governments and the EU. During its lifetime, from 1994 through 2005, the policy scheme established 102 TOs, which were all dissolved after completion of their projects. The data for this study were originally collected as part of a policy evaluation that found the scheme to be successful (Rutten & Oerlemans, 2009).

For the evaluation study, a matched sample of 39 TOs was selected from the total population of 102 so that the characteristics of the sample TOs matched those of the population in terms of outcomes, composition, financial volume and start date. Per rules of the policy scheme, all TOs conformed to the same key characteristics

Table 10.1 Measurements

Variables	Indicators	Measurements for the relations between TO and PO members	Measurements for the relations between TO members
Hierarchy	Decision-making	To what extent were you able to make your own decisions on planning the work and using resources?	To what extent were TO members disposed to working flexibly?
	Formalization	To what extent did communication follow formal lines of communication?	To what extent did you work on the basis of fixed rules and procedures?
Confidence	Control	To what extent were the contributions of the partners specified?	To what extent did you use formal and/or social control within the TO?
	Trust	To what extent were objectives in the project agreement sufficiently clear?	To what extent did you expect opportunism to motivate your partners?
Knowledge creation Between TO and PO	Access to knowledge in own organization	To what extent could you make use of the knowledge in your own firm?	
	Access to knowledge partners	To what extent could you make use of the knowledge in the partner firms?	
Knowledge creation Within TO	Reach of communication		With how many of the TO members did you have personal contacts?
	Depth of communication		To what extent were personal views, experiences and concepts shared in the TO?
	Openness of communication		To what extent did you bring confidential information in the TO?
Innovation	New products	Has the innovation been introduced on the market?	
	New competences	To what extent have the technological competences of your firm improved as a result of collaborating in the TO?	
	New knowledge	To what extent did collaboration in the TO result in new knowledge for your firm?	

such as size and objectives and used the same standard project agreement. All 103 POs in the selected TOs were approached and 94 (91.3%) responded (Rutten & Oerlemans, 2009). The data were collected by administering questionnaires that respondents completed during a face-to-face meeting with a student from Tilburg University, who explained questions when necessary. The questionnaire contained 101 questions and took about 90 min to complete. The majority of the questions were phrased as five-point Likert scales, but some questions also invited respondents to

give a brief explanation, which the student wrote down. The questionnaire thus yielded a limited amount of qualitative data in addition to the quantitative date.

For the present study, several questions were selected from the questionnaire (see above). TOs with missing values on any of these questions were eliminated from the sample. The TOs were then compared on the R&D expenditures of their POs, because a firm that performs substantially more R&D than its partners may assume a dominant role in the knowledge creation process. As TOs varied substantially on this dimension, two subsamples were created: one subsample consisting of TOs with a dominant R&D partner and one without a dominant R&D partner. Experience in similar innovation projects may also affect knowledge creation, as experienced organizations may organize this process differently. By far the most POs had little or no experience with similar innovation projects, participating in no more than five such projects over the last 5 years. Only a handful had participated in 50 or more similar innovation projects. Their TOs were eliminated from the sample. In 2 of the TOs some POs had more experience (8 and 25 similar projects and 20 similar projects, respectively) than others. However, since both TOs also had a PO with no previous experience, it may be argued that these TOs could not fully benefit from previous experiences.

Systematic differences did exist regarding the number of POs that had worked with one another previously. As prior ties may affect relationships between POs, two subsamples were created for this characteristic also: one subsample where more than 50 % of the POs had prior ties and one subsample where less than 50 % of the POs had prior ties. The costs of the projects varied between just under 200,000 Euros and just over 1.5 million Euros. As these differences may have to do with the costs of the technologies involved rather than with project complexity they were ignored. Differences in duration were also ignored as the differences between the shortest (1–1½ years) and longest (3–3½ years) running TOs are not likely to have affected the knowledge creation process.

The sample was thus reduced to 12 TOs and split between TOs with a dominant partner (5) and without a dominant partner (7), and between TOs where POs have worked with one another previously (5) and TOs where that is not the case (7). Of the 39 POs in these 12 clusters, 37 had participated in the data collection. The selected TOs are characterized in Table 10.2. The sample shows variation on both the innovation (product on market, dependent variable) and the characteristics of the TOs, with no selection occurring on either one.

10.6 Methodology

The methodology followed in this chapter is process tracing, an associative technique that aims to find causal relations between theoretical concepts (King, Keohane, & Verba, 1994; Ritchie, Spencer, & O'Connor, 2003; Rohlfing, 2012). Process tracing is an important causal inference tool in case study research (Collier, 2011) and helps to establish that "(1) a specific event or process took place, (2) a different event or process occurred after[wards] …, and (3) the former was the cause of the latter"

Table 10.2 Description of the TOs

TO	Composition	Dominant R&D partner	Experience similar projects	Same partners ≥50 %	Cost of project (€)	Duration (years)	Product on market
2	3 SME	Yes	Low	No	316.178	1½–2	Yes
4	4 SME	No	Low	Yes	438.225	1½–2	Yes
5	4 SME	Yes	Moderate	Yes	1.523.650	1½–2	Yes/no
7	2 SME	No	Low	No	409.666	3–3½	Yes
9	2 SME; 1 Large	No	Moderate	No	169.350	1–1½	Yes/no
11	3 SME	No	Low	Yes	873.867	2½–3	Yes
12	3 SME; 1 n/a	No	Low	Yes	849.165	1–1½	Yes
18	2 SME	Yes	Low	No	456.250	1½–2	Yes
20	2 SME	No	Low	Yes	249.892	1–1½	Yes
21	2 SME	Yes	Low	No	191.000	1–1½	Yes
23	4 SME; 1 large	Yes	Low	No	664.474	1–1½	Yes/no
24	4 SME	Yes	Low	No	829.987	1½–2	Yes[a]

[a]Product to be introduced on the market shortly after time of interview

(Mahoney, 2012, p. 571). The two principal tests of process tracing are prosaically referred to as *hoop test* and *smoking gun test* (Mahoney, 2012). In a hoop test, a specific causal process observation must be present to validate the proposition. Passing a hoop test is a necessary but not sufficient condition to establish causality. Failing a hoop test eliminates the proposition but passing it does not confirm the proposition. A smoking gun test claims that a proposition must be valid if a specific causal process observation is present. Passing a smoking gun test is a sufficient but not necessary condition to establish causality. Passing a smoking gun test supports a proposition but failing it does not eliminate the proposition (Mahoney, 2012). It may not be possible in practice to carry out a strong enough test, in which case process tracing becomes a *straw in the wind* test. Such a test confirms nor eliminates propositions decisively but increases or decreases their plausibility, depending on whether they pass or fail the test (Collier, 2011; Mahoney, 2012). Straw in the wind tests provide valuable benchmarks by giving an initial assessment of a proposition, as the following example demonstrates. If the dog that was supposed to guard the horse's stable did not bark, it suggests that someone known to the dog stole the horse (cf. Collier, 2011, p. 826).

Two patterns are developed for each of the 12 TOs in the sample: on the relations between TO members and on the relations between TO and PO members. The results are clustered into configurations of similar empirical patterns that may indicate underlying causal mechanisms. Subsequent analyses of the empirical findings will establish to what extent they support or contradict the propositions. This study is designed as a hoop test as the propositions reflect necessary but not sufficient conditions to establish causality on how POs affect the organizational context for knowledge creation in TOs.

10.7 Data Analysis

To analyse the data variable scores were calculated from the scores of individual respondents. For questions asked in the form of a five-point Likert scale, TO scores were calculated as averages of the respondents in each TO. In case not all respondents in a TO had answered a particular question, the average is calculated from the available scores. The TO scores were classified as "Very high" (1.0–1.8), "High" (1.9–2.6), "Moderate" (2.7–3.4), "Low" (3.4–4.2) and "Very low" (4.3–5.0). On the question to bringing in confidential information, two respondents answered "Very low". However, the qualitative data evidenced that this does not reflect a lack of willingness to share confidential information. Respondents answered that "all relevant knowledge has been applied", or that "we were prepared to do so [sharing confidential information] but it was not necessary". Consequently, these scores were eliminated. The question on the number of partners that an individual had personal contact with could be answered with "All", "Some", or "None". In most cases respondents in a TO gave identical answers, but in a few TOs some respondents answered "All" and others "Some". In these cases, the TO score was decided to be "Most", i.e. TO members had contact with most of their counterparts. In three TOs the answers on the question whether the innovation was realized were slightly puzzling, with some respondents answering "Yes" and others "No", and the qualitative data did not clarify this issue. The inconclusive answers were taken as indication that some disagreement existed on whether the TO had achieved its innovation objective and that this reflects a suboptimal knowledge creation outcome.

The analysis focused on identifying TOs with identical or similar empirical values as differences between such configurations may reflect different causal mechanisms that require a different theoretical explanation. Analysis of the knowledge creation between TO and PO members reveals four such configurations (Table 10.3). Configuration I.1 contains TOs 12, 20 and 24 and has an important characteristic that these TOs score "Moderate" on having PO contributions specified, which may indicate a substantial amount of inter-organizational trust. In view of the absence of hierarchy/control elements, Configuration I.1 is called the *loose organizational context*. Configuration I.2a includes TOs 2, 4, 18 and 21. Contributions of the POs are specified to a "High" degree in these TOs, which indicates a higher level of control compared to Configuration I.1; however, as in Configuration I.1, all TOs have favourable scores on the innovation variable. Configuration I.2b includes TOs 7 and 11 and differs from I.2a in that higher levels of hierarchy/control are achieved. TO 7 has a lower level of decision-making autonomy while TO 11 has a lower level of decision-making autonomy and less access to the knowledge of partner firms. On the other hand, the hierarchy/control is not so strict as to produce less favourable scores on innovation. Configurations I.2a and I.2b are thus called the *dual organizational context*. The remaining TOs (5, 9 and 23) form a configuration that seems inexplicable. Their innovation scores are decidedly unfavourable compared to the other TOs; however, their scores on the hierarchy, confidence and knowledge creation variables are similar to the other TOs. In other words, organizational contexts

Table 10.3 Knowledge creation between TO and PO members

TO#	Hierarchy		Confidence		Knowledge creation (TO-PO)		Innovation			Configuration
	Decision-making autonomy	Formal communication	Objectives clear	Contributions specified	Access to knowledge firm	Access to knowledge partners	New product	New competences	New knowledge	
2	High	Very low	High	High	High	High	Yes	Very high	High	I.2a
4	High	Low	High	High	High	High	Yes	High	High	I.2a
5	High	Very low	High	High	High	Moderate	No/yes	Low	Moderate	I.3
7	Very high	Moderate	High	High	Very high	Very high	Yes	High	High	I.2b
9	Very high	Moderate	High	Moderate	High	Moderate	No/yes	Moderate	Low	I.3
11	Moderate	Low	High	High	High	Moderate	Yes	High	High	I.2b
12	Very high	Low	Very high	Moderate	Very high	Very high	Yes	High	Very high	I.1
18	Very high	Very low	High	High	High	High	Yes	High	Very high	I.2a
20	Very high	Low	Very high	Moderate	High	High	Yes	High	High	I.1
21	Very high	Very low	Very high	High	High	Very high	Yes	High	High	I.2a
23	Very high	Moderate	Very high	Very high	Very high	High	No/yes	Moderate	Moderate	I.3
24	High	Low	High	Moderate	Very high	High	Yes	High	High	I.1

that produced favourable innovation scores in the first configurations lead to unfavourable innovation scores in this configuration. Consequently, Configuration I.3 is called the *outlier* configuration. In general, hierarchy/control elements do not play a substantial role in the relationships between TO and PO members and the differences in hierarchy/control are unrelated to differences in innovation.

Analysis of the knowledge creation between TO members also reveals four configurations (Table 10.4). Configuration II.1 contains TOs 12 and 18 and shows no hierarchy/control elements. Individuals in these TOs exclusively emphasize flexibility/autonomy in their interactions. Hence Configuration II.1 is called the *loose organizational context*. Configuration II.2a (TOs 4, 7, 11, 20 and 23) then is the *dual organizational context*. These TOs focus somewhat more on hierarchy/control elements in the form of a higher emphasis either on working on the basis of fixed rules and procedures or on a combination of formal and social control. Also Configuration II.2b shows a *dual organizational context*; in fact, the TOs in this configuration (TOs 2 and 24) emphasize hierarchy and control to a higher degree than the ones in Configuration II.2a. In addition to the extra hierarchy/control elements of Configuration II.2a, individuals in the TOs of Configuration II.2b have contacts with most, rather than all, of their partners. However, the additional hierarchy/control elements do not prevent these TOs from achieving equally favourable scores on innovation as the ones in Configurations II.1 and II.2a. Configuration II.3 (TOs 5, 9 and 23) is very interesting because it combines unfavourable scores on innovation with an emphasis on hierarchy/control elements that is notably stronger than in the other configurations. In TO 5, members expect their partners to be motivated by opportunism to a high degree. TO 9 is the only TO to have a high emphasis on working based on fixed rules and TO 23 is the only one where members use formal rather than social control. Furthermore, all three II.3 TOs have low scores on knowledge creation between TO members. In TO 5 members have contact with only some of their partners and they only moderately share personal views. The latter is also the case in TO 9 and in both TOs 9 and 23 members have contacts with most rather than all of their partners. This reluctance to create knowledge may be explained from these TOs emphasizing hierarchy/control elements to a higher degree than the other TOs and it may in turn explain the unfavourable innovation scores of these TOs. Hence, Configuration II.3 is called the *unwillingness* configuration.

An analysis of the TOs with and without the same partners and with and without a dominant R&D partner does not show substantial differences between these subsamples (Table 10.5). However, the three I.3/II.3 TOs each have one partner who is substantially larger than the others. TOs 9 and 23 both include a large company and TO 5 includes a company of 90 FTE, which is almost a large company, the cut-off being 100 FTE. This difference in size between the POs may explain the different configurations of these TOs (see below).

Another important find follows from comparing the two configurations for each TO (Table 10.6). Configurations I.1 and II.1 both reflect a loose organizational context while Configurations I.2a/II.2a and I.2b/II.2b introduce various hierarchy/control elements in the TO; however, the differences between I.1/II.1 and I.2a/II2.a and between I.2a/II.2a and I.2b/II.2b are gradual. Most importantly, this comparison

Table 10.4 Knowledge creation between TO members

TO#	Hierarchy		Confidence		Knowledge creation (TO)			Innovation			Configuration
	Disposed to flexible working	Working with fixed rules	Formal and/or social control	Opportunistic motives partners	Contact with how many partners	sharing personal views	Bringing in confidential information	New product	New competences	New knowledge	
2	High	Moderate	Social	Low	All	Very high	High	Yes	Very high	High	II.2b
4	Very high	Low	Both	Moderate	Most	High	High	Yes	High	High	II.2a
5	High	Very low	Both	High	Some	Moderate	Moderate	No/yes	Low	Moderate	II.3
7	Very high	Low	Both	Low	All	High	High	Yes	High	High	II.2a
9	High	High	Both	Very low	Most	Moderate	Moderate	No/yes	Moderate	Low	II.3
11	High	Moderate	Social	Moderate	All	High	High	Yes	High	High	II.2a
12	Very high	Low	Social	Very low	All	High	Very high	Yes	High	Very high	II.1
18	Very high	Very low	Social	Low	All	Very high	High	Yes	High	Very high	II.1
20	High	Low	Both	Moderate	All	High	Very high	Yes	High	High	II.2a
21	High	Moderate	Social	Low	All	Very high	Very high	Yes	High	High	II.2a
23	High	Moderate	Formal	Moderate	Most	High	Moderate	No/yes	Moderate	Moderate	II.3
24	High	Low	Both	Very low	Most	Very high	Very high	Yes	High	High	II.2b

Table 10.5 Subsample analysis

Same partners		Yes	No
Configuration	I.1 (loose)	12; 20	24
	I.2a/I.2b (dual)	4; 11	2; 7; 18; 21
	I.3 (unexplained)	5	9; 23
	II.1 (loose)	12	18
	II.2a/II.2b (dual)	4; 11; 20	2; 7; 21; 24
	II.3 (unwillingness)	5	9; 23
Dominant R&D partner		*Yes*	*No*
Configuration	I.1 (loose)	24	12; 20
	I.2a/I.2b (dual)	2; 18; 21	4; 7; 11
	I.3 (unexplained)	5; 23	9
	II.1 (loose)	18	12
	II.2a/II.2b (dual)	2; 21; 24	4; 7; 11; 20
	II.3 (unwillingness)	5; 23	9

Table 10.6 Comparing configurations

TO#	Configuration I	Configuration II	Comparison
2	I.2a (dual)	II.2b (dual)	Similar
4	I.2a (dual)	II.2a (dual)	Identical
5	I.3 (unexplained)	II.3 (unwillingness)	Explained
7	I.2b (dual)	II.2a (dual)	Similar
9	I.3 (unexplained)	II.3 (unwillingness)	Explained
11	I.2b (dual)	II.2a (dual)	Similar
12	I.1 (loose)	II.1 (loose)	Identical
18	I.2a (dual)	II.1 (loose)	Similar
20	I.1 (loose)	II.2a (dual)	Similar
21	I.2a (dual)	II.2a (dual)	Identical
23	I.3 (unexplained)	II.3 (unwillingness)	Explained
24	I.1 (loose)	II.2b (dual)	Comparable

offers an explanation of the I.3 (unexplained) configuration because all TOs in this configuration are also in the II.3 (unwillingness) configuration. This suggests that the failure of TOs 5, 9 and 23 to achieve their innovations is the result of unwillingness of the TO members to create knowledge. The unwillingness is evident from unfavourable scores on the knowledge creation variable in these TOs and from scores on the hierarchy or confidence variables that indicate higher levels of hierarchy/control than in other TOs. In other words, poor relations between TO members in these TOs compromised knowledge creation. On the other hand, relations between TO and PO members in these TOs, as well as the inter-organizational relations, were comparable to those in the remaining TOs which did achieve innovations. This implies that favourable relations between TO and PO members, and favourable inter-organizational relations, are a necessary but not sufficient condition for TO knowledge creation. TO knowledge creation also requires favourable relations between the TO members.

The third important find is that hierarchy/control elements are largely absent from both the relations between TO and PO members and the relations between TO members, with the exception of the I.3/II.3 TOs. This suggests that hierarchy/control elements from elsewhere must have provided the goal setting, focus and legitimization for the knowledge creation in the TOs. These three findings will be elaborated in the discussion.

10.8 Discussion

The findings suggest that knowledge creation between TO members depends on their *willingness* to do so. Individual TO members are autonomous agents who make their own decisions regarding the kind and number of hierarchy/control and flexibility/autonomy elements they apply to their interactions. The willingness of TO members to create knowledge follows from their commitment to the TO and from their perception of commitments and intentions of other TO members. Knowledge creation between TO and PO members, on the other hand, seems to depend on the extent to which the PO *enables* this knowledge creation. In this case the PO decides on the kind and number of hierarchy/control and flexibility/autonomy elements. The ability to create knowledge in the TO-PO relationship thus depends on the commitment of the PO (the organizational level) and, in the case of an inter-organizational TO, on the PO's perception of their partners' commitments and intentions. Since knowledge creation is an act of individuals, it is appropriate here to speak of the ability to create knowledge because the organizational level (the PO) decides the organizational context within which TO and PO members communicate to create knowledge. So from the perspective of individuals as agents of knowledge creation, willingness reflects the level of hierarchy/control in the relationship between TO members and ability reflects the level of hierarchy/control adopted by the POs for the relationship between TO and PO members. For reasons explained, both the knowledge creation between TO members and the knowledge creation between TO and PO members are essential in TO knowledge creation. In other words, there is no decoupling between the TO and its permanent environment with respect to knowledge creation. However, the levels of willingness and ability may differ in a TO. Importantly, the data suggest that a high level of ability will not lead to substantial knowledge creation in case of a low willingness of TO members to create knowledge. On the other hand, and stressing the importance of individuals as agents, a high level of willingness may compensate for a low level of ability and still allow the TO to create some knowledge. In case willingness and ability are both low (or high) the TO may be expected to achieve matching knowledge creation outcomes (Table 10.7). This implies that willingness and ability are both necessary but individually not sufficient conditions for TO knowledge creation.

The general absence of hierarchy/control elements in both the knowledge creation between TO members and the knowledge creation between TO and PO members raises the question of how the need for hierarchy/control was provided. The data suggest several sources of hierarchy/control elements: first, the contracts

Table 10.7 Willingness and ability

		Willingness	
		High	Low
Ability	*High*	High	Low
		Level of knowledge creation	Level of knowledge creation
	Low	Moderate	Low
		Level of knowledge creation	Level of knowledge creation

between the POs involved. However, these were standard contracts from the office coordinating the policy effort under which the TOs were formed and were not particularly detailed. The contracts expressed commitments rather than obligations, although underlying project plans were more specific on the obligations. Respondents reported that their commitments to the TO were generally very high. This points to "self-selection" as a second source of hierarchy/control. Only organizations participated that were genuinely interested, so organizations could be confident that their partners intended to work for mutual benefit, at least to a substantial degree. These are soft or social controls but controls nonetheless. Other social controls acted as a third source of hierarchy/control elements. Respondents were asked if the fact that all organizations came from the same region was advantageous in terms of having shared regional norms and values, shared regional customs, habits and routines, and a higher level of trust because of a shared cultural and institutional background. Respondents found this to be the case to a (very) high degree. Because of these social controls on the (inter-)organizational level and in the wider social contexts, i.e. the permanent environment (Bakker, 2010), the TOs could emphasize flexibility/autonomy elements without making an "error of looseness" (Butler et al., 1998). The limitations of social controls in the permanent environment are demonstrated by the three TOs that did not achieve innovation. Moreover, these TOs all had one substantially larger partner which suggests that smaller firms may have been reluctant to create knowledge as they perceived the relations between TO members and between TO and PO members more in terms of hierarchy/control than the large firms did. Again, this stresses the importance of individual TO members as autonomous decision-makers.

Turning to the propositions it follows that Proposition 1 is not confirmed because hierarchy/control elements are largely absent from the TOs and that hierarchy/control elements in the permanent environment prevent "errors of looseness". Proposition 2 is confirmed but the evidence suggests that confidence between POs does not necessarily imply confidence between TO members. Proposition 3 is confirmed because TO knowledge creation explains the innovation outcomes. Proposition 4 is not confirmed because the need for hierarchy in the TOs is affected by the hierarchy/control elements in the permanent environment. Proposition 5 is confirmed because the unwillingness of TO members to create knowledge nullified enabling conditions set by the POs.

The three questions on knowledge creation at the start of this chapter can now be answered as follows. The extent to which (1) balancing of hierarchy/control and

flexibility/autonomy elements in both "layers" is necessary depends on the degree in which the permanent environment of the TO provides hierarchy/control elements. Developing hierarchy/control elements in the relations between TO members and in the relations between TO and PO members takes time and effort, particularly in case of inter-organizational TOs, which goes at the expense of knowledge creation. It is therefore more efficient for TOs to rely on their permanent environment for hierarchy/control elements. In fact, hierarchy/control elements in the permanent environment may favour TO knowledge creation because they reduce the POs' needs to control it. In accordance with the theory, the resulting focus on flexibility/autonomy elements in the relations between TO members and those between TO and PO members is likely to have benefited creativity in the knowledge creation. The (2) interaction between both "layers" must be understood from the notion that knowledge creation is an act of individuals and that successful TO knowledge creation requires knowledge creation between TO members and knowledge creation between TO and PO members. Effective knowledge creation in both layers depends on avoiding "errors of looseness" and "errors of tightness", that is, on an effective combination of hierarchy/control and flexibility/autonomy elements. In the case of knowledge creation between TO members, the TO members themselves are largely responsible for achieving this combination; hence this knowledge creation depends on the TO members' willingness. In the case of knowledge creation between TO and PO members, the parent organizations decide on the combination of hierarchy/control and flexibility/autonomy elements; hence this knowledge creation depends on the degree to which the parent organizations enable individuals to create knowledge, i.e. the ability to create knowledge. Given that effective TO knowledge creation requires knowledge creation in both "layers", willingness and ability are both necessary but individually insufficient conditions for knowledge creation. Finally, the inter-organizational setting (3) in this case reduced the need for hierarchy/control elements in the TOs because TO knowledge creation benefited from soft controls in the wider social context.

10.9 Conclusion

The aim of this chapter was to develop a more nuanced understanding of the relationship between TOs and their permanent environment with regard to knowledge creation. To that end, the chapter connected the TO and organizational knowledge creation literatures from the perspective that knowledge creation is a process of interaction between individuals within an organizational context. TOs in this case are the organizational context but they exist of two "layers". This follows from the fact that TO knowledge creation takes place not only in the relations between TO members, but also in the relations between TO and PO members. Effective knowledge creation in both "layers" depends on combining hierarchy/control elements, to focus the knowledge creation, and flexibility/autonomy elements, to encourage creativity. In an explorative case study of knowledge creation 12 TOs in

the Dutch Eindhoven region emphasized the role of individual TO members as autonomous agents. Connecting to the four TO concepts (Bakker, 2010), the empirical findings on the relationship between TOs and their permanent environment may be summarized as follows. *Time* provides focus for the knowledge creation effort because it specifies a start and end point for the TO. Contracts in particular identify PO commitments and TO objectives. The *task* of knowledge creation is both unique and complex because knowledge creation is a resource-intensive and uncertain process. Furthermore, knowledge creation requires constant interaction between TO members and between TO and PO members. The *team* consists of individuals who were delegated to the TO because of their expertise but TO members remain active in their respective POs. The *context* has been critical in providing social control, which allowed TOs to focus on their tasks. In the case of knowledge creation in TOs, task and team are decoupled from the PO to a limited degree only. Close interactions continue to exist but task and team are clearly identified as not belonging to the "regular" organization. On the other hand, the provision of soft controls by the wider social context enables TOs to decouple from the POs in managerial terms.

Although the data enabled an exploratory analysis of the relationship between inter-organizational TOs and their permanent environment, they also impose a number of limitations on the chapter. First, it was not possible to include more variables in this secondary data analysis to achieve an even more fine-grained understanding. Second, the nature of the data as an ex-post-evaluation did not allow to capture the full dynamics of the relations between TO members and between TO and PO members during the lifetime of the TOs. Third, the limited number of cases posed restrictions on the generalizability of the findings. However, the chapter demonstrated the merit of focusing on knowledge creation in inter-organizational TOs as a specific kind of TO in terms of time, task, team and context, which makes the limitations into useful starting points for further research.

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Chapter 11
Collaborative Networks Between Corporate Universities, Customers, and SMEs: Integrating Strategy Towards Value Creation

Antonio Alonso-Gonzalez, Marta Peris-Ortiz, and Jordi Mauri-Castello

Abstract Corporate universities have become a new paradigm in the fields of education and business, but its applicability may be limited to large corporations and multinationals, due to the need for resources and infrastructure that their operation requires. However, networking, agreements, partnerships, and cooperation initiatives between corporate universities of these large corporations and small businesses, suppliers, and other actors are welcome as a way to generate common and integrating strategies across their value chains.

In many cases and in certain sectors, companies have already reached levels of maximum efficiency in their value chains, identifying this concept as the set of internal processes that are adding value to the company's products or services. That is the reason why it is necessary to extend this concept to the so-called value network, describing this concept as all internal and external processes that add value to the company's products or services and where appear external partners outside the company, such as SMEs, suppliers, funding entities, organizations, and government institutions, among other actors.

In this document the possibility of establishing collaborative networks between corporate universities of large companies and their SME partners is analyzed as a way to establish and empower a common and integrated strategy to improve the processes of these small business partners and redirect them towards meeting the objectives of the large corporation and upgrading the efficiency in the value network.

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11.1 Introduction

Numerous approaches have been used to potentiate and maximize cooperation and networks in small business strategy. In this chapter a completely different approach is introduced, focusing on the problem with a holistic point of view and addressing it as a whole, considering the effect that a corporate university could have not only as a process of its own company, but also as a structure that could reach external stakeholders, like customers and suppliers, the latter being in most cases small and medium enterprises (hereinafter SMEs).

From the origin of the term in the second half of the last century, the concept of corporate university has evolved always conditioned by new demands of an increasingly dynamic and changing market induced by the adoption of new technologies in a globalized world and consequently changing the focus, scope, and horizons of growth for any company. But the concept has been centered as an internal concept of the company, and its benefits redirected to its processes, resources, structures, human capital, and strategy.

Nowadays there are few large companies that do not have a corporate university in physical or virtual infrastructure and this fact is an acknowledgment to the importance that these companies have given to this process in terms of training, learning, and continuous improvement in its human capital, promoting and adapting the development of this structure not only at national level but also at multinational and global levels. It should also be noted that many of these structures have become autonomous, independent, and self-sustainable units within the organization itself, which not only provides intangible invaluable service to internal customers of the organization, but also offers interesting content to external providers as customers, suppliers, and other interested public, as a way to improve efficiency beyond the value chain and set a goal of excellence in the value network.

Corporate university concept, as part of the organizational structure of large corporations that can have relevance for value creation, has not been considered in the classical literature of knowledge management (Nonaka & Takeuchi, 1995; Nonaka & von Krogh, 2009), nor in the literature on cooperation (Chaddad & Cook, 2004; Lazzarini, Chaddad, & Cook, 2001) as an important factor of success in this terms. However, as shown in this work, it could be an important asset to link knowledge and value creation by the cooperation between SMEs and large companies (see Figs. 11.2 and 11.3).

This document has been divided into three different sections: In the Theoretical Background section an exploratory literature review has been conducted on the concepts of corporate university applied to the creation of collaborative networks with its direct partners: customers and suppliers. In the Methodology section a new model has been proposed that encompasses the concept of value network through the three actors described: SME, large company (owner of the corporate university process), and customer, describing the relations and effects that the corporate university could offer to the external stakeholders and analyzing the whole model proposed. Finally, in the Conclusions and Future Research section, the final discussion has been addressed regarding the selected literature and the proposal made, indicating future lines of research according to the results.

11.2 Theoretical Background

11.2.1 Collaborative Networks in SMEs

The existence and growth of SMEs, as well as the concept of entrepreneurship, have become increasingly important because of their potential to generate growth and create employment. Some disadvantages that may influence the market success of SMEs are size, inability to benefit from economies of scale and scope, informational asymmetry, and local focus. The solution to these common problems can be supported by combining SMEs' strengths through cooperation and networking. This developing of SMEs' networking initiatives is quite specific, and the role of local governments and their regional agencies in SME networks is dominant (Mijatovic, 2014). According to Harvie (2010), the opportunities for regional SMEs to participate in regional production networks are particularly interesting, it being crucial for governments and protagonists of further regional integration to identify the most conducive SMEs for production network participation. One way of ensuring that economic growth is through developing SME sector capacities to enable them to participate effectively in regional production networks.

A line of thought supported by some authors and researchers says that in the new knowledge-based economy, the establishment of collaborative networks is essential for the survival of SMEs. Cagnazzo, Tiacci, and Rossi (2014) state that SMEs have to make changes in the form of their organizations do business in order to evolve and adapt to a knowledge-based economy. These changes must include the creation of interorganizational cooperation. The most usual type of cooperation is an association between its own suppliers and clients or cooperation with other companies in the same sector or geographical region. Talebi and Emani (2014) defend that in network collaboration, sustainability is crucial to the development of innovation capacity.

It is necessary to highlight that SMEs are at disadvantage in participation in production networks compared with large firms. SMEs suffer disproportionately from external barriers like market imperfections and regulations. The probability of SMEs joining production networks (as direct exporters, indirect exporters, or overseas investors) is lower than that of large firms. Furthermore, justification exists for public policies to support the entry of SMEs in production networks, and such support should be geared to an enabling environment that opens access to markets, reduces bureaucratic impediments against SMEs, and provides appropriate SMEs' institutional support services (Wignaraja, 2013). In order to overcome these disadvantages, Hansen and Klewitz (2012) propose interorganizational networks consisting of a group of SMEs (and the public intermediary itself) that may then facilitate collaborative approaches of innovation and diffusion. Such collaboration is important for two reasons: it could help to overcome SMEs' resource constraints and it could respond to the need for diverse sources of knowledge inherent in sustainability-oriented innovation. It is of course also clear that SMEs only benefit from collaboration as long as the costs of networking do not exceed its benefits. Publicly intermediated networks for sustainability-oriented innovation are a promising field of research which would profit greatly from further conceptual and empirical studies.

The different ways of how these networks are settled are presented by Zeinalnezhad, Mukhtar, and Sahran (2010), explaining that internal networks or inter-firm cooperation can be divided into horizontal and vertical. The first type is a cooperation among SMEs occupying the same position in the value chain. Through such cooperation, enterprises can collectively achieve scale economies beyond the reach of individual enterprises and can obtain bulk-purchased inputs, achieve optimal scale in the use of machinery, and pool together their production capacities to satisfy large-scale orders. The second type is cooperation among SMEs along the value chain. With this, an enterprise can specialize in its core business and subcontract other related works to other enterprises in the cluster.

It is important to highlight that network and partnership processes, including internal and external networks and learning partners, could encompass and improve the learning culture, management commitment, and people processes (Wang, Sun, Li, & Qiao, 2008)

11.2.2 Corporate Universities as an Instrument to Establish Networks Between Stakeholders

It is possible to suggest that higher education is lagging behind in forming viable responses to the business-mounted challenge, other than retrenching the research university with a more or less conservative recourse to the classical humanities, identifying a need of transformation in the learning process, including an increased emphasis on processes and outcomes, customization rather than standardization, and cooperative rather than individualistic methods of teaching and learning (Progler, 2010).

All around the world there are over 3000 corporate universities and some experts suggest that in a few years, their number will exceed traditional universities (Viltard, 2013). Genzer (2006) describes corporate university as a vital process in any modern company, identified as an executive arm of the strategy in the short, medium, and long term within the organization. The difference between a training department and a corporate university could be explained by McAteer and Pino (2011), describing that a corporate university centers on strategic alignment with corporate goals, which includes measuring effectiveness based on total business outcomes and transitioning from learning provider to a business partner working collaboratively and with the support of senior leadership. The scope, flexibility, and structure of a corporate university are manifest directly and indirectly in a firm's growth and productivity. However, some authors like Masannat (2014) have identified that one of the problems of corporate universities is the need of methods to measure effectiveness of their programs and services, in order to determine the business impact and the potential need of improvement, due to the cost that these structures have on the company.

As in the case of traditional universities, some corporate universities have physical locations that could be identified as campus, but they do not use such infrastructure as places of learning, but as spaces where sharing best practices globally develop

skills in their employees at all levels where necessary, transmit knowledge and core competencies to achieve excellency in their current jobs, or prepare them for the future requirements of new jobs that the organization will need to cover (Meister, 1998). According to Progler (2010), organizationally, corporate universities are changing their hierarchical structures in favor of networks, while management tends to be performed by teams with rewards shifting from seniority to performance. Resources are moving away from physical assets into human capital, including ideas, while governance is shifting into collective responsibility and away from faculty autonomy. In this line of thought, Roth and Magee (2002) defend that companies are benefited from different alliances through their access to the specialized knowledge of the faculty. It is too costly for a corporation to hire or develop the depth of expertise that top research university people have. Through alliances they can share in cost of those faculty members and support research in areas of specific interest to them. Research conducted in corporate settings provides fresh perspectives, demonstrates the application of new ideas, and gives valuable feedback. Ryan (2013) also agrees with this idea of executive education partnerships and the opportunities of mutual benefit for universities and corporations.

Corporate universities must look for win-win relationships among their different stakeholders, whether internal or external, providing a formalized training to their employees, but getting direct feedback from current market requirements to enable more flexibility and improve their educational offer (Allen, 2002). It is also important to define target audiences and what are the range of products and services that the corporate university will offer to them (Almeida & Levy, 2011). Vizcaya-Piñeros and Uribe-Atehortúa (2014) also defend that the search of external partners could help corporate universities on their funding strategy and budget: initially the implementation of the corporate university process could be very expensive, so companies expect in the long run to be able to generate resources and become self-sustainable. This can be achieved by creating training programs, whose enrollment is assumed by domestic commercial customers, under the strategy of payment for services. Another way is to offer programs for external customers and suppliers. However, if the training programs meet the objectives of the business, the corporate university will pay for itself, thanks to increased profits and employee welfare.

11.3 Methodology

11.3.1 Customer, Large Company, and SME Value Network

The contribution of this chapter is the development of a model that interconnects the relationship between SMEs, large companies, and customers, taking into account the flow of their value chains, which are considered as an integrated process called value network. This value network concept starts from the SME value chain, which links with the large company value chain and finally finishes in the customer as final

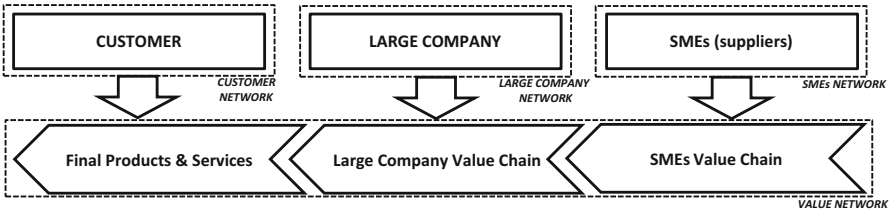

Fig. 11.1 Customer, large company, and SME value network model

products and services delivered. The concept of value network could be considered as the sum of parts described, but it is more than this, and it must be seen as a synergistic element that needs to be studied as a whole.

Previously in the document it was described how the concept of corporate university is associated with large companies who believe strongly in this process as a differentiator to reach competitive advantages related to excellency in human talent and strategic alignment at all levels. So the question is how to integrate this corporate university process not only to benefit the large company itself but also to create a network that could apply to the SME suppliers and also customers in order to maximize its impact. In Fig. 11.1 the three actors that are going to be modelled across value network are shown.

Therefore, the first step in the development of this model is to perform an approximate analysis of the role of the corporate university in a large company and how this process connects with the different elements, resources, and structures of the company.

11.3.2 Role of Corporate University

Corporate university in its most general form is a concept that has influence mainly in two different dimensions of the company: firstly in its processes and structures of control, governance, and other important aspects to consider (strategy, culture, and structure), and secondly in the internal public that are part of the organization (manager, employee, and other public to consider). It is important to highlight that corporate university is part of the large company network, this concept being understood and related to all internal processes at the same enterprise system, and sometimes it could be seen as an independent entity or department inside the company.

In Fig. 11.2 the role of corporate university process inside the large company network is shown.

As shown in Fig. 11.2, the corporate university process serves as a connector between internal resources, structures, and elements of the company, and therefore has a significant influence on how the value chain of this company can increase its added value. However, for the other two actors (customers and SMEs), it must be

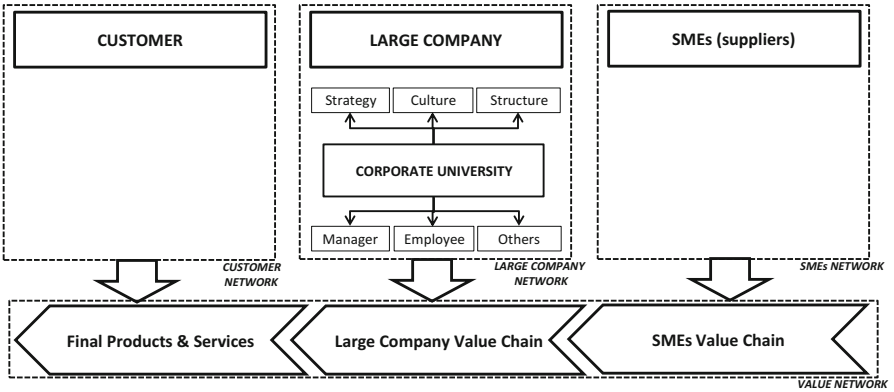

Fig. 11.2 Role of corporate university in large companies

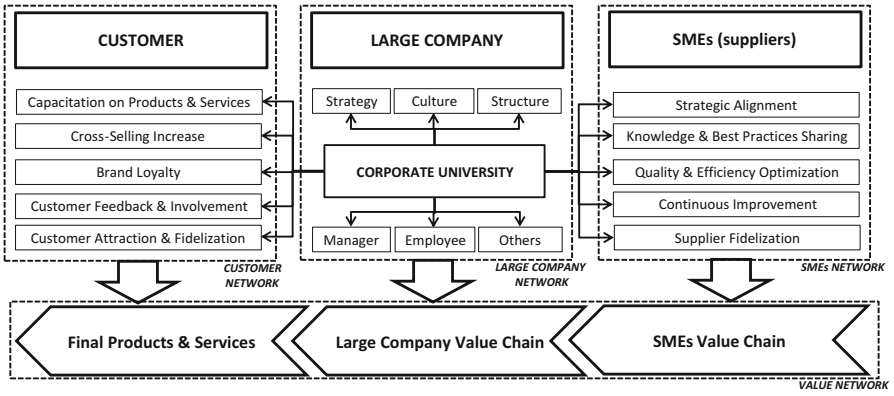

Fig. 11.3 Strategy integration, value creation, and other benefits derived from the corporate university value network

studied how corporate university process from this large company could have a direct influence and connection and how these external stakeholders could get benefits from this linkage and start working as a network.

11.3.3 Network Development, Strategy Integration, and Value Creation

If it could be possible to establish agreements, linkages, connections, and collaborative networks to offer to the customers and SMEs some of the products, services, and benefits that a corporate university usually gives to its own company, some interesting results could appear along both sides of the performers, as it is shown in Fig. 11.3.

As it is shown in the figure, the benefits derived from the creation of corporate university network applied towards its external partners, SMEs, and customers could give some important competitive advantages that should be taken into account. From the perspective of the customers, it could help them to understand better the portfolio of products and services delivered by the company, increasing cross-selling opportunities, brand loyalty, feedback, and involvement of customers on companies' processes and results, and consequently its attraction and fidelization towards products and brands. And regarding the SMEs, the implication on the creation of this network based on the corporate university extension from the large company could set strategic alignments of both companies to reach common goals and objectives, increasing the knowledge and best practices sharing between them, optimizing quality and efficiency in processes and resources, and implementing a vision towards continuous improvement, and to sum up, it could increase considerably the supplier's fidelization towards the large company.

11.4 Conclusions and Future Research

In this chapter, a new approach to cooperation and networks in small business strategy was provided, developing a new model based on improvements and benefits that could be applied to the value network conformed by SMEs, large companies, and customers. This could be possible in establishing a collaborative network through the corporate university process settled in the large company, which could offer its services to the SMEs and customers in order to increase certain parameters in their own business, aligning strategies and increasing loyalty, as well as improving the value added across their value chain in a synergetic way.

The document begins with a review of the state of the art, citing several authors that provide a robust theoretical framework to analyze and propose the model described, focusing the review on the concepts of corporate university, SMEs, and cooperation networks. It is important to highlight that the approach proposed in this research is innovative and it has not been detected in the review of the literature conducted in the document, and no similar research has been exposed or developed, with no identification registered of the use of corporate universities as engines of improvement regarding value network efficiency or strategic alignment.

Some other desired effects arising from the collaborative network related to the corporate university on SMEs and customers can be identified as capacitation on products and services, cross-selling, brand loyalty, and feedback and involvement from the point of view of the customer, and from the point of view of the SMEs and suppliers increase of knowledge and best practice sharing, quality and efficiency optimization, and continuous improvement. In both cases, loyalty could be increased towards the large company which owns the corporate university process.

As future research projects, further studies should be considered on collaborative networks focused on analyzing corporate university as a self-sufficient and sustainable process, obtaining funds and revenues of these services offered to SMEs and customers.

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Index

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