Co-patenting, co-ownership, and co-ideation as drivers for university business innovation: the case of public universities in Spain

Received 3 March 2022
Revised 25 April 2022
Accepted 5 May 2022

María José Quero
Department of Business and Management, University of Malaga, Malaga, Spain
Montserrat Díaz-Méndez
Department of Bussines Administration, Universidad de Extremadura–Campus Badajoz, Badajoz, Spain
Rafael Ventura
Department of Business and Management, University of Malaga, Malaga, Spain, and
Evert Gummesson
School of Business, Stockholm University, Stockholm, Sweden

Abstract

Purpose – This paper explores whether, in the context of university–industry (U–I) collaboration, new innovation strategies can be developed through actors' interactions, the exchange of resources and the co-creation of value for and within the system. In the context of the U–I relationship, the innovation perspective can highlight the need to develop strategies that elicit new formulas of value co-creation, which then facilitate innovation as a result of actor collaboration.

Design/methodology/approach – A total of 45 public universities in Spain, representing 95% of the total, participated in qualitative research. Personal in-depth interviews with technology transfer officers (TTOs) were conducted by an external firm; in a second phase, two of the researchers conducted eight interviews with the directors of TTOs in those universities with higher rates of transfer.

Findings – Findings reveal that enterprises with a technological focus are strengthening their relationships with universities and attempting to build a university business ecosystem by designing strategies for value co-creation such as co-ownership, co-patenting, and co-invention.

Research limitations/implications – The empirical research is conducted in Spain, and results should be interpreted according to this context. Future research should examine new contexts (other countries) to improve the robustness of the data and enrich the results, thus enabling generalization of the management consequences.

Originality/value – The results provide a means to design strategies under a new collaborative and innovating logic. The theoretical framework contributes to theory, with implications for management.

Keywords Innovating, Service-dominant logic, Value co-creation, Co-patenting, Co-ownership, Co-ideation, University business ecosystem

Paper type Research paper

The authors thank Gorka Artola, Ivan Martínez, Manel Arrufat, Xavier Vallvé, Jesús Banqueri, Antonio Peñafiel and Marina Rosales and all the universities in the sample for sharing their experience and knowledge in the development of the present research.

The TQM Journal
Vol. 34 No. 7, 2022
pp. 115-133
Emerald Publishing Limited
1754-2731
DOI 10.1108/TQM-03-2022-0087

Introduction

There is growing interest in the process by which universities obtain value from research and technology transfer (Polese *et al.*, 2021; Galan-Muros and Davey, 2019; Perkmann *et al.*, 2013; Baldini, 2010; Gomez Gras *et al.*, 2008; Lockett and Wright, 2005). This process is usually linked to innovation; generally, the strategy involves the organizational development of institutional policies that encourage scholars and other university staff to participate, with both academics and graduates benefiting from the results (Rizzo, 2015; Friedman and Silberman, 2003). Scandura (2016, p. 1907) highlights the relevance of the university in this process: "The exchange of knowledge between academia and industry is therefore an essential mechanism to bring science to the market and foster innovation and economic growth." In the most recent report on the Science, Research and Innovation Performance (European Commission, 2018, p. 4), the European Commissioner for Research, Science and Innovation states that "Europe currently benefits from distinctive strengths, but also faces weaknesses that we need to address. Europe is the world's largest producer of high quality scientific knowledge, and yet its innovation performance remains far below its potential. (. . .) Europe generates many exciting start-ups but has been largely left behind in the development of major new digital platforms, and lacks those transformational entrepreneurs that have disrupted entire industries at a global scale."

Muschio *et al.* (2016, p. 1386) contend that "university policies can play a crucial role in influencing spinoff creation" while Hayter *et al.* (2018, p. 1039) consider, in the same sense, that an "ecosystems perspective has not been fully leveraged to influence policy decisions." Based on the extant research, we find service-dominant logic (SDL) (Vargo and Lusch, 2017) to be a useful framework with which to bring an ecosystem perspective to the U–I context in terms of enabling an improved approach to the network of actors in which the university develops its value co-creation process (Polese *et al.*, 2021; Ramaswamy, 2020; Obstfeld *et al.*, 2020; Conlé *et al.*, 2021). Therefore, in the present paper, we aim to explore whether, in the context of the U–I relationship, it is possible to develop an ecosystem in which the constituent actors generate resources and co-create value for and within the system, thus contributing to an improvement of the innovation process in both the U–I relationship and within their social networks. Specifically, we develop a university business ecosystem model based on achieving innovation through collaboration to improve technology transfer in universities (Di Berardino and Corsi, 2018; Arqué -Castells *et al.*, 2016; Capellari and De Stefano, 2014). Our model identifies the criteria that can be used to assess whether a university can be considered to behave as an ecosystem and how it develops value co-creation strategies to reach system equilibrium (Gummesson, 2008b; Polese *et al.*, 2017), rooted in the collaborative relationships among actors that Siltaloppi and Vargo (2017) classify as "coalition" relationships, thus laying the foundations of a collaborative innovation strategy in the university business ecosystem.

The SDL (Vargo and Lusch, 2004, 2008, 2014, 2016, 2017) and its service ecosystem perspective (Vargo *et al.*, 2016; Vargo and Lusch, 2014; Akaka *et al.*, 2012; Chandler and Vargo, 2011) provide the theoretical basis of this research. Specifically, the present paper builds on FP6/axiom 2 ("value creation is interactional") and FP9/axiom 3 ("all economic and social actors are resource integrators"; "the context of value creation is networks of resource integrators") as established by Vargo and Lusch (2014, p. 240). The work also represents an empirical contribution to the theory of triads developed by Siltaloppi and Vargo (2017). We analyze whether new forms of value co-creation can arise in the context of managing the university as an ecosystem. Hitherto, the SDL perspective has not been developed in the U–I context. The service ecosystem perspective that provides the context for the SDL in this case improves the quality of resource exchange and innovation as a result of ecosystem planning that facilitates innovation through value co-creation due to actor interaction (Chandler *et al.*, 2019; Fehrer *et al.*, 2020). The theoretical and empirical approach used here results in three new types of value co-creation in the U–I context, namely co-patenting, co-ownership, and co-invention.

The empirical approach frames the midrange theory, which is "context specific (. . .) and provides frameworks that can be used to undertake empirical observation and models to guide managerial practices" (Brodie and Peters, 2020, p. 2). This perspective enables the theory–practice gap to be bridged (Vargo and Lusch, 2017; Gummesson, 2017; Nenonen *et al.*, 2017; Fendt *et al.*, 2008), and frames the theoretical–empirical approach adopted in our work.

The remainder of the paper is organized as follows. First, we review the relevant literature on "innovating," innovation, and value co-creation in university business ecosystems. Preliminary research using recent publications in marketing, service innovation (SI), and other related studies obtained through the EBSCO, JSTOR, and ABI Inform databases enabled us to conduct a systematic review of the literature. Second, the gap between innovation (innovating) in a service ecosystem and value co-creation through co-invention, co-patenting, and co-ownership is explained. Third, the empirical approach and theoretical model are described, and the results of our qualitative research are analyzed. We conclude by discussing the implications for theory and practice, conclusion and outline several suggestions for future research.

Innovating in service ecosystems through the SDL

The study of innovation has a long tradition; therefore, multiple perspectives have arisen from different fields of knowledge. Our own perspective is part of a research flow that emphasizes collaborative innovation in line with the perspective of open innovation and the flow of ideas between organizations and among other actors (Ciasullo *et al.*, 2020; Chesbrough and Bogers, 2014; Chesborough, 2020). From the SDL perspective, Vargo *et al.* (2015, p. 63) note that innovation has been emphasized as the "combinatorial evolution of new useful knowledge." The introduction of the concept of "innovating" (Russo-Spena *et al.*, 2017a, p. 3) added a new, dynamic perspective that addressed the lack of dynamism suggested by the traditional concept of innovation, highlighting that "innovating is an action that is happening, not only the result of an action." This perspective most closely reflects our conceptualization of the innovation that applies in the context of the university business ecosystem. Capellari and De Stefano (2014, p. 313) refer to the "third mission" of universities as "the application of knowledge outside the academic environment [which] is a topic of growing importance in the agendas of both (R&D) policymakers and university administrators."

When developing an SDL and ecosystem perspective for the university context, it is important to consider the diverse types of structures, processes, and actors involved, and how universities have integrated their roles in the business context. While the literature confirms the importance of heterogeneous processes of institutionalization (Geuna and Rossi, 2011), the SDL approach provides the tools to identify the theoretical requirements for consideration as an ecosystem. Networks can be identified as service ecosystems or value networks when they are sustained by reciprocal service provision between multiple actors, in dyads, triads, and networks interconnected by multiple resources (Ciasullo *et al.*, 2021; Manna *et al.*, 2018; Chandler and Vargo, 2011; Lusch *et al.*, 2010). Economic and social actors create value either in networks or through what is known indistinctly as "service ecosystems" (Vargo and Lusch, 2011) or "service systems" (Maglio and Spohrer, 2008). In the sense described by Vargo and Lusch (2011, p. 185): "A service ecosystem is a spontaneously sensing and responding spatial and temporal structure of largely loosely coupled, value-proposing social and economic actors interacting through institutions, technology and language to (1) co-produce service offerings, (2) engage in service provision and (3) co-create value."

Value co-creation between actors in service ecosystems occurs primarily at three levels. Adapted to the university context these are:

(1) Micro context: At this level, there is a direct service-for-service exchange. It is the traditional dyad that Gummesson (2008a, p. 45) refers to as "the classic dyad,"

a two-party relationship in which direct service-for-service exchange takes place (Chandler and Vargo, 2011; Madhavaran and Hunt, 2008; Barney, 2001). From a broad perspective, the literature on Higher Education considers this to be the exchange of a university's resources with industry, and the development of U–I linkages.

(2) Meso context: At this level, there is an indirect service-for-service exchange through a triad. In addition to the direct service received, there is an interaction between actors receiving the service from the same provider (Chandler and Vargo, 2011; Gummesson, 2006). In our case, the university (actor 1, A1) interacts with research groups (A2) and/or individual researchers (A3) to develop technology transfer with a third actor (A4).

(3) Macro context: Here, the service becomes complex, in that it includes direct and indirect services, creating a network Gummesson (2006, 2008b). In this network, actors, dyads, and triads create synergy among multiple simultaneous direct and indirect service-for-service exchanges (Achrol and Kotler, 1999, 2012; Chandler and Vargo, 2011). Different kinds of actors with different interests co-create value in order to see their projects delivered.

Service innovation: Co-invention, co-patenting, and co-ownership

There are many and varied definitions of SI in the literature (Russo-Spena *et al.*, 2017b). For our purpose, the three perspectives on the concept identified by Witell *et al.* (2016) are quite comprehensive, namely the assimilation, demarcation, and synthesis perspectives, the latter of which is closest to the SDL approach in that it involves several actors in the process of achieving innovation. In this sense, Michel *et al.* (2008, p. 50) define SI as "finding new ways of co-solving customer problems."

The synthesis perspective is best suited to our view of *innovating in service ecosystems*, which we define as *the continuous evolution of all actors in an ecosystem to find new ways of co-solving each other's problems and innovating for the benefit of the system*. From this perspective, SI is understood as a social construction to include the collective nature of SI (Fehrer *et al.*, 2020; Manna *et al.*, 2018; Mele *et al.*, 2018), and innovation is conceptualized as "innovating" to add an active and continuous perspective of change (Russo-Spena *et al.*, 2017b).

Transferred to the university context, this development leads us to the concept of the third mission of the university, which is closely linked to the concept of innovation. However, there is no accepted consensus on what this so-called third mission encompasses. According to the European Universities Association (2020), an increased focus on innovation as a key driver for society is influencing the mission of every university. It refers to the third mission as "service to society," and highlights the role of co-creation in research in achieving its goals. It can be understood as the application of knowledge outside the academic environment and already encompasses a wide spectrum of activities such as consulting, contract research, entrepreneurship, university patenting (Mugia, 2018; Fisch *et al.*, 2015; Geuna and Nesta, 2006), and different ways of driving knowledge into market innovation and co-innovation (co-invention, co-patenting, and co-ownership). The terms co-invention, co-patenting, and co-ownership have been used widely in the literature on innovation but have not been linked to a solid theoretical approach such as SDL, which could be used to improve strategic planning in their conceptualization and management. The prefix "co-" is used to refer to the collaborative nature of the process between actors, which is considered to be a novel research area in need of scholarly advance (Belderbos *et al.*, 2014; Capellari and De Stefano, 2014). The SDL perspective can offer both the tools and the necessary theoretical approach to identify how value is co-created between universities and industry through these three formulas of value co-creation, as defined in relation to universities in Table 1.

There is currently a lack of academic research on how these formulas of value co-creation can be integrated into the transition from closed economies (based on closed R&D and closed innovation) to open economies, in which universities are embedded (Polese *et al.*, 2021). The recent Covid-19 crisis has accelerated the transition toward open systems and, as Chesborough (2020, p. 412) posits: "Good ideas can come from anywhere, making openness an imperative in these times of crisis. Opening up will speed up your internal innovation process, and allow you to take advantage of the knowledge (outside in), even as you allow others to exploit your knowledge in their business (inside out)." The SDL and the university business ecosystem perspective provide the theoretical framework to support the process.

The university business ecosystem

The literature has not established any significant difference between a service system and a service ecosystem, and defines the two concepts in the same way (Wieland *et al.*, 2012; Díaz-Méndez *et al.*, 2017). Thus, a service (eco)system can be understood as "an open system (1) capable of improving the state of another system through sharing or applying its resources (i.e. the other system determines and agrees that the interaction has value); and (2) capable of improving its own state by acquiring external resources (i.e. the system itself sees value in its interaction with other systems)" (Maglio *et al.*, 2009, p. 403). This concept can be applied readily in a university, where living components (actors) all co-exist within a university service ecosystem (Lusch and Wu, 2012; Díaz-Méndez and Gummesson, 2012; Berbegal-Mirabent and Ribeiro-Soriano, 2015; Díaz-Méndez *et al.*, 2017), with multiple non-living components that affect the interaction of these actors in different ways, including, among others, university economic resources, laws and regulations, culture, selection, and recruitment methods, institutional agreements, and university management orientation. These and other components together with the relationships among them determine an ecosystem. The concept introduced herein is that the *university business ecosystem refers to the service ecosystem involving all actors, resources, and relationships that take place between the university and industry, oriented toward the co-creation of a service embedded in a continuously innovating process*.

Using the SDL perspective as a theoretical approach for ecosystems, we have identified five main actors involved in U–I collaborations: the university (actor 1, A1), research groups (actor 2, A2), individual researchers (actor 3, A3), the organization that is the recipient and co-developer

Concept	Literature	Perspective on the study with universities
Co-invention	Capellari and De Stefano (2014) Leydesdorff and Meyer (2007)	"Co-invention networks allow the analysis of the channels through which knowledge flows from science to industry and relational data retrieved from patents can represent the collaboration patterns between the two realms" (Capellari and De Stefano, 2014, p. 314)
Co-patenting	Belderbos *et al.* (2014, p. 841) Mugia (2018) Geuna and Nesta (2006) Briggs (2015) Funk (2013) Fisch *et al.* (2015) Su *et al.* (2015)	"Co-patents are inventions whose property rights are shared among a university and other applicant organizations involved in their development" (Mugia, 2018, p. 3)
Co-ownership	Belderbos *et al.* (2014)	"Value-appropriation is an implication of co-patenting" (Belderbos *et al.*, 2014, p. 841)

Source(s): the authors

Table 1. Co-invention, co-patenting, and co-ownership in the literature

of the research and is in charge of commercialization or co-commercialization with the university (business, actor 4, A4), and the co-consumer/industry/individual (actor 5, A5).

At the micro level of the ecosystem, the university and industry behave separately, exchanging value with their respective clients/users/actors. In building on the meso level, different structures arise to integrate the triad (three-actor relationship). At this level, the recent literature (Siltaloppi and Vargo, 2017) suggests different alternative means to structure the relationship between the five actors. Thus, three conditions must be met for this to be regarded as a service business ecosystem:

(1) Co-production of service offerings: A1, A2, A3, A4, and A5 engage in a joint project where each actor has a stake in the production process.

(2) Engagement in service provision: A1 (the university) provides resources related to competence and research (together with A2 and A3) and A5 builds on commercial knowledge (business).

(3) Co-creation of value: according to the literature, in U–I transfer, we can identify at least nine formulas of value co-creation. Seven types are developed from the theory: co-ideation (Russo Spena and Mele, 2012), co-valuation of ideas (Russo Spena and Mele, 2012), co-design (Russo Spena and Mele, 2012), co-testing (Russo Spena and Mele, 2012), co-launch (Russo Spena and Mele, 2012), co-investment (Quero and Ventura, 2015; Ordiani *et al.*, 2011), and co-consumption/"presumption" (Payne *et al.*, 2008; Grönroos and Ravald, 2011); to these, we add three specific formulas of value co-creation, which are the main challenge in the U–I context: co-ownership (Belderbos *et al.*, 2014), co-patenting (Belderbos *et al.*, 2014; Mugia, 2018; Fisch *et al.*, 2015; Geuna and Nesta, 2006; Briggs, 2015; Funk, 2013; Su *et al.*, 2015), and co-invention (Capellari and De Stefano, 2014; Leydesdorff and Meyer, 2007).

Starting from these theoretical premises, in the university business ecosystem model (Figure 1) we propose co-invention, co-patenting, and co-ownership as the three formulas of value co-creation that share the core value co-creation process in U–I innovation. When, at the meso level, the relationship among actors follows the structure of a cooperation triad, there is

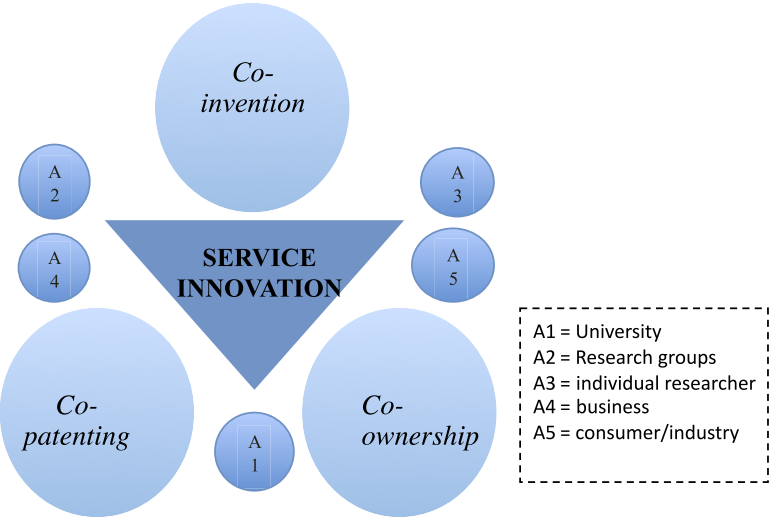

Figure 1.
University business ecosystem

an easy transition to develop networks in which problems are co-solved by actors, and SI is facilitated (synthesis perspective, Witell *et al.*, 2016; Michel *et al.*, 2008 and open innovation perspective, Chesborough, 2020).

From this perspective, a more accurate definition of the university business ecosystem considers it as an open group of actors in the university context who exchange active resources, co-creating value to co-produce innovating in service offerings that allow for the engagement of service provision. Although all universities have the potential to build an ecosystem, we nevertheless find in the literature that the third mission of universities "is a topic of growing importance in the agendas of both research and development (R&D) policymakers and university administrators" (Capellari and De Stefano, 2014, p. 313), which implies that it remains an important and unfinished task for most of them.

In Figure 2 we conceptualize two main triads in the U–I context, namely the internal triad, where universities organize and institutionalize internal relationships between the university, research groups, and individual researchers, and the external triad where the relationship between university, business, and customer (whether industrial or final) is structured. It is in this context that co-patenting and co-ownership arise with different regulations (institutions) among universities. In Figure 3 the University-industry co-invention triad is conceptualized as the collaborative relationship between Business, Research Group and the individual researcher.

In the process of developing the third mission of universities, the literature refers to co-invention as a highly desirable resource sought by businesses when contacting

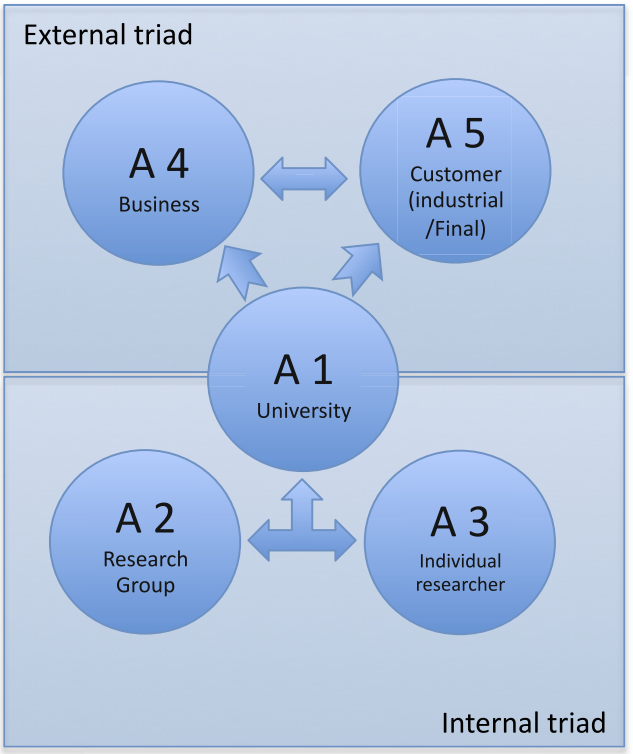

Figure 2.
University Indstry co-patenting and co-ownership triads

universities. Capellari and De Stefano (2014, p. 314) refer to this process as the "co-invention network," and highlight the importance of the analysis of the channels through which knowledge flows from science to industry, noting that the patterns of collaboration between the two realms can be represented through patents. With respect to the individual researcher, Lissoni (2010) refers to these as "academic inventors," and suggests that their resources and aims also differ from those of the research group as a whole ("academic patenting").

Method

A total of 45 public universities in Spain, representing 95% of public universities, took part in qualitative research (see Appendix 1 for a list of the universities). Personal in-depth interviews with technology transfer officers (TTOs) were conducted by an external enterprise (Grupo Item http://www.grupoitems.com/index.html). The interviews were transcribed and analyzed by the research group. The research protocol was as follows: first, the TTOs of public universities in Spain were interviewed; a total of 45 in-depth interviews were conducted, with each lasting between 30 and 45 min. Second, using primary data obtained from the Spanish Office of Patents and Trademarks (2018), we were able to select those universities that showed higher levels of activity in business creation. In the third stage, those responsible for this process in every university (Appendix 2) were invited to a personal interview conducted via Skype/telephone in order to improve the qualitative information on those who were getting the best results in the HE-university context in Spain. These interviews lasted between 70 and 90 min. Data codification and analysis were undertaken using NVivo 11.

Results

The in-depth interviews developed with each responsible TTO provided two distinct profiles of universities, those with a high level of business activity and others in which the enterprise creation rate was higher. The present research involved a search for university models that best met the requirements for a university business ecosystem, and we decided to focus on those which, according to our results and the National Register of Public Universities Co-patenting (Spanish Office of Patents and Trademarks, 2018), were in the first category (Polytechnic University of Madrid, 583 patents and University of Granada, with 248 patents). Universities were classified according to the data extracted from the global sample, which allowed us to identify three types depending on the number of businesses that had been created through or with university participation in terms of "high," "medium," and "low business activity." The university as co-owner or co-partner ranks from 5% to 10% of

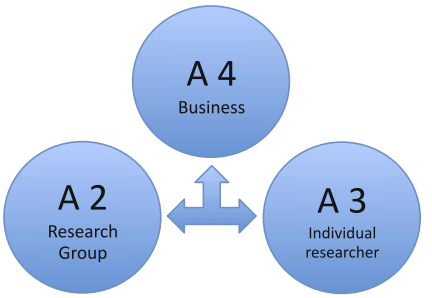

Figure 3.
University Indstry
co-invention triad

participation in 95% of the cases. Table 2 provides relevant information on these three profiles.

The theoretical approach to the university business ecosystem led to the research being directed toward the analysis of those universities with high levels of business activity: Polytechnic University of Catalonia, Polytechnic University of Madrid, University of Granada, University of País Vasco, Autonomous University of Barcelona, University of Sevilla, and University of Málaga. We contacted them during the second stage of the research to propose a telephone interview.

In the second stage, we sought to integrate the experts' perspective on the theoretical model of the "university business ecosystem" to consider how it could help universities in their transition from a closed to an open economy. Table 3 shows a selection of relevant quotes from the experts' views of the reality of universities that act as open ecosystems or closed companies, and Table 4 contains the most illustrative quotes on the experts' view of how value co-creation takes place in a university business ecosystem to generate innovation.

The analysis of the information gathered through the expert panel and secondary sources points to some significant conclusions:

(1) Universities are broadly aware of the need to become ecosystems. All the experts agree on this point. Selected quotations in Table 3 relate to this concern. Actor B is

Type of university according to business activity	No.	Average business creation (accumulated 2018)	Average co-patenting (accumulated 2018)	Co-owning %
High (>30)	7	112.6	348	5–10
Medium (14–30)	12	24.7	155.8	5–10
Low (<15)	26	6.7	85.4	5–10

Source(s): Primary data from the research, except for average co-patenting (Spanish Office of Patents and Trademarks, 2018)

Table 2. Types of universities according to their business activity

Actor	Question/Quote
	Would you say universities behave like an ecosystem in generating innovation through their relationships with surrounding actors? Or do they still behave like closed businesses in generating innovation and transferring innovation? Comment on actors in the process and the model developed in Figure 1
Expert A	"We are developing an active role trying [to make the University] act as a real ecosystem. For us, the spinoffs are a way to [get] technology transfer to the market and the society" (. . .) "The more actors in the process, the more possibility for success (. . .) We [are] clear that, not only actors 1 to 5 have to be on the process, but also other networks, relationships with other universities, etc. This is what makes a process successful and strong"
Expert B	"I absolutely agree we have to become an ecosystem" (. . .) "In general, effective collaboration among actors in the ecosystem should be improved (. . .) the same at the micro level (encouraging, motivating for researchers, etc.) to the macro (joint institutionalized programs: corporate–investment–startups–university)"
Expert D	"Yes I do believe this, as a matter of fact, I believe that close innovation should be the exception. Innovation and technology transfer from the university is such an extremely difficult task that the diversity implied in open innovation makes it more likely to succeed than the closed one"
Expert F	"Of course, the open economy perspective should be integrated in the University. I think we are working [in] this way" (. . .) "Also, latest initiatives in the TTOs are more focused [on] establishing informal relationships between researchers and companies before the research project arises"

Table 3. Relevant quotes addressing the performance of the university as an ecosystem

Table 4.
Relevant quotes addressing value co-creation and innovation generation in universities

Actor	Question/Quote
	When performing as an ecosystem, how is value co-created to better generate innovation? Explain how co-patenting, co-ownership, and co-ideation relate to each other
Expert A	"For us, these three concepts are absolutely related to one another and have to be managed together" (. . .) "Co-patenting and co-ownership are the result of a collaborative work among institutions" (. . .) "Increasingly (in much more than 50% of cases), innovation generation is linked to co-patenting and co-ownership"
Expert B	"I think all these three concepts are interrelated and must be jointly and strategically managed in order to reach common objectives for all the actors in an innovation environment, oriented to the market"
Expert D	"Co-patenting and co-ownership are very common in the university innovation context" (. . .) "The challenge is to establish a fair and stimulating value to both the contributions of each part in the co-development of 'something' and to the rights for the exploitation of [that] 'thing'"
Expert F	"In our university (and I think in most Spanish ones), the co-ownership is usually managed by technical staff (from TTO) before the collaborative (university–industry) research relationship starts. In these cases, co-ownership and consequently co-patenting are negotiated over economic aspects and legal restrictions"

very explicit: "I absolutely agree we have to become an ecosystem (. . .) In general, effective collaboration among actors in the ecosystem should be improved (. . .) the same at the micro level (encouraging, motivating for researchers, etc.) and the macro (joint institutionalized programs: corporate–investment–start-ups–university)."

(2) Co-patenting and co-owning, as used in practice by public universities, show a clear closed-economy perspective. According to data obtained from the Spanish Ministry of Energy, Tourism and Digital Agenda (2018), co-patenting is the process of protecting rights in relation to the results of innovation; however, less than 35% of universities with high business activity actually become businesses. Co-owning is also a standardized process, which ranks between 5% (which is the mode) and a maximum of 10% in all cases bar one (which has a participation of 1%).

(3) In the context of Spanish public universities, those with higher patenting/start-up creation are absolutely conscious of the need to change the model (see Table 4). In this respect, expert A uses a clear SDL ecosystem approach to reality, while others like expert F are "conscious of the need to work in this direction." Furthermore, expert A explains how "developing this process alone is hard, and the shortage of universities with this perspective damages the system."

(4) Those universities with a higher level of development of the service ecosystem perspective were not able to distinguish the concepts of "co-patenting," "co-owning," and "co-creation." Expert A comments that: "For us these three concepts are absolutely related to one another and have to be managed together" (. . .) "For us, co-patenting and co-ownership are the result of collaborative work among institutions" (. . .) "Increasingly (in much more than 50% of the cases), generation of innovation is linked to co-patenting and co-ownership (. . .)."

Theoretical contribution

The present paper builds on the SDL perspective to improve understanding of the much desired "university third mission." The research was guided by our approach to the university as an actor in the university business ecosystem and the process of transitioning from a closed to an open economy in order to identify the conditions

required for a service ecosystem structure to arise. Following Vargo and Lusch (2011) and Chandler and Vargo (2011), the requisites are that the structure (1) co-produces service offerings, (2) engages in service provision, and (3) co-creates value. In the second stage of the research, we considered a brief analysis of different conceptualizations of SI and found that the "synthesis perspective" matches the SDL and the ecosystem approach, because it relies on actors' co-creation relationships to solve problems. This active perspective of innovation led us to adopt Russo-Spena *et al.*'s (2017b) idea of "innovating" to bring about an active and continuous process of change, which is more appropriate for an open-economy perspective. The continuous evolution of actors refers to the natural phenomenon of learning through experience toward new service developments with the collaboration and interaction of actors, adding the dynamic perspective proposed by Russo-Spena *et al.* (2017b) and highlighting the need to consider the interplay among actors in the process described by Fehrer *et al.* (2020).

The concept of *innovating in service ecosystems* in the university context allows us to build on ecosystem theory by adding three types of co-creation to those developed elsewhere in the literature (Russo-Spena and Mele, 2012; Quero and Ventura, 2015). We offer three additional specific co-creation formulas to the SDL literature, which arise in the process of university technology transfer: co-invention, co-patenting, and co-ownership. Several authors have offered general case studies and heterogeneous contributions to these processes (Mugia, 2018; Belderbos *et al.*, 2014; Arqué -Castells *et al.*, 2016; Geuna and Rossi, 2011). However, there is a lack of theoretical models that frame the university as a service ecosystem from the SDL and ecosystem innovation perspective.

This theoretical approach led us to conceptualize the "university business ecosystem." The theoretical model that supports this conceptualization allowed us to identify five actors whose relationships are structured in triads at the core of the university business ecosystem. Following Siltaloppi and Vargo (2017), in the context of a university business ecosystem, we find an internal triad, an external triad (where co-patenting and co-ownership cooperation relationships are framed), and a co-invention triad (where innovation arises and is transferred from the university (academic inventors/research groups)).

The "on demand" evolution of the theory taking place in the U–I process points to the need for future research on the process in which universities are actually engaged: the transition from closed to open economies. Only a small part of this process is evident when knowledge is transferred to society in the form of a business structure, facilitating the process of technology transfer for the benefit of all actors: universities, researchers, businesses, and ultimately, society. New contributions are required to identify new structures, influencing actors or triad structures in this process, and these would improve the theoretical models developed. Furthermore, new formulas or typologies of co-ownership, co-patenting, or co-innovation would improve the understanding of the process as a whole.

In summary, our theoretical approach is made up of three theoretical contributions:

(1) Conceptualization of the "university business ecosystem" (FP9/axiom 5).

(2) Formulas of value co-creation specific to the university business ecosystem: co-ownership, co-patenting, and co-invention, configured as coalition triads (Siltaloppi and Vargo, 2017) to improve the design of co-creation types (FP6/axiom 3).

The contribution is framed on the midrange theory, just as the models developed and the value co-creation formulas added to the SDL literature are framed on the U–I relationship context, which presumes that a contribution is also made to the theory–practice gap (Vargo and Lusch, 2017; Gummesson, 2017; Nenonen *et al.*, 2017; Fendt *et al.*, 2008), focusing on best practices in the context of Spanish universities.

Managerial contribution

Universities face an important challenge in terms of their increasingly interconnected and open economic systems. As Etzkowitz (2017, p. 122) notes, "As the university expands its role in society, its image as an 'ivory tower' fades and a new image is projected of a font of technological innovation and economic development." In this sense, the literature increasingly demands new theoretical frames that can help to manage and plan the new context. Galá n-Muros and Davey (2019) and Borrás and Edquist (2013) suggest that policymakers need to combine different policy instruments from different fields to reach success in innovation, suggesting that the ecosystem perspective is the most appropriate approach. Kliewe *et al.* (2019, p. 4) refer to "third generation universities" as those that "focus on research with economic and regional contribution. Their objective is to support student and academic entrepreneurship and one possible instrument to achieve this is the intense collaboration with business and non-profit organizations." In this context, our contribution has very practical implications for management, combining a theoretical model with an empirical approach.

The SDL approach adopted in the present research offers the solid theoretical basis needed to support new conceptualizations and structures, which fits with the reality faced by third-generation universities. Being far more open and collaborative than they used to be, we develop three practical tools: (1) Universities must face the need to involve actors in their innovating process. This dynamic perspective of innovation is needed to guide their behavior in an increasingly open context in which interplay between actors is responsible for change and evolution (Chesborough, 2020; Fehrer *et al.*, 2020); (2) The university business ecosystem model, which introduces the perspective of the university as a group of actors that engage in service exchange and co-create value in an open context with active resources, opening up new strategies to manage relationships at every layer of the ecosystem (micro, meso, macro, and meta); (3) The SDL ecosystem perspective brings formulas of value co-creation to value co-creation in the U–I context: co-ideation, co-patenting, and co-ownership. These formulas have great potential for improving the exchange of actor resources. It is of particular interest how these value co-creation formulas are managed to improve value for both university and industry, as well as for all the actors in the system. Following Siltaloppi and Vargo (2017), they must be managed as coalition triads, where the three-actor system is considered as a whole, and in which the logic and processes by which actors form and balance relationships in a triad must be planned carefully, including the relationships among them. The three triads identified are:

(1) Internal triad: university, research group, and individual researcher.

(2) External triad: university, business, and customer (whether industrial or final).

(3) Co-invention triad: business, research group, and individual researcher.

The design of collaborative strategies in these relationships will result in benefits for the system as a whole (over and above the benefits gained by each individual actor) and will facilitate the management of third-generation universities (Kliewe *et al.*, 2019), in which actors take part in the innovating process, behaving as parts of a university business ecosystem.

Conclusions

This research has proposed using the theoretical frame provided by the SDL to configure a theoretical approach to the U–I relationship context. The conceptualization of the university business ecosystem, where the university is one more actor, provides the university with a theoretical perspective that offers new insights into how to perceive actors' relationships and how innovation emerges from these relationships as a result of actors' interaction, in

coherence with the third-generation universities, which employ open innovation models to connect actors and share spaces, thereby facilitating ecosystem evolution driven by its own actors. The SDL perspective allows us to analyze whether new forms of value co-creation (co-patenting, co-ownership, and co-ideation) can emerge in the context of managing the university as an ecosystem, improving the quantity and quality of resources exchanged simultaneously.

Limitations and future research

The empirical approach has been developed in the very specific context of the Spanish university. This represents a limitation, which may be addressed through future collaboration with other international universities.

The concept of the university business ecosystem opens new lines for future research:

(1) How to re-design co-owning and co-patenting structures to better meet the demand of innovation through value co-creation and service engagement involving the service ecosystem conceptualization (Chandler and Vargo, 2011).

(2) How to get actors more involved in order to make them a more active part of the production process in the university context (co-produce).

(3) The transition from a closed to an open economy requires an in-depth process of institutional change that must follow from FP11/axiom 4.

(4) We have focused on the business side of the university as one of the results of technology transfer (the university's third mission), but many other dimensions should also be included under the same open innovation perspective.

(5) Other conceptualizations such as a "Viable Systems Approach" could improve the approach to the "university business ecosystem" and shed light on how to develop the process.

References

Achrol, R.S. and Kotler, P. (1999), "Marketing in the network economy", *Journal of Marketing*, Vol. 63 No. 2, pp. 146-163.

Achrol, R.S. and Kotler, P. (2012), "Frontiers of the marketing paradigm in the third millennium", *Journal of the Academy of Marketing Science*, Vol. 40 No. 1, pp. 35-52.

Akaka, M.A., Vargo, S.L. and Lusch, R.F. (2012), "An exploration of networks in value cocreation: a service-ecosystems view", in Vargo, S.L. and Lusch, R.F. (Eds), *Special Issue – toward a Better Understanding of the Role of Value in Markets and Marketing. Review of Marketing Research*, Emerald Group Publishing, Bingley, Vol. 9, pp. 13-50.

Arqué-Castells, P., Cartaxo, R.M., García-Quevedo, J. and Godinho, M. (2016), "Royalty sharing, effort and invention in universities: evidence from Portugal and Spain", *Research Policy*, Vol. 45, pp. 1858-1872.

Baldini, N. (2010), "University spinoffs and their enviroments", *Technology Analysis and Strategic Management*, Vol. 22 No. 8, pp. 859-876.

Barney, J. (2001), "Resource-based theories of competitive advantage: a ten years retrospective on a resource-based view", *Journal of Management*, Vol. 27 No. 6, pp. 643-650.

Belderbos, R., Cassiman, B., Faems, D., Leten, B. and Looy, B. (2014), "Co-ownership of intellectual property: exploring the value-appropriation and value-creation implications of co-patenting with different partners", *Research Policy*, Vol. 43, pp. 841-852.

Berbegal-Mirabent, J. and Ribeiro-Soriano, D.E. (2015), "Behind league tables and ranking systems a critical perspective of how university quality is measured", *Journal of Service Theory and Practice*, Vol. 25 No. 3, pp. 242-266.

Borrás, S. and Edquist, C. (2013), "The choice of innovation policy instruments", *Technological Forecasting and Social Change*, Vol. 80 No. 8, pp. 1513-1522.

Briggs, K. (2015), "Co-owner relationships conductive to high quality co-patents", *Research Policy*, Vol. 44 No. 8, pp. 1566-1573.

Brodie, R.J. and Peters, L.D. (2020), "New directions for service research: refreshing the process of theorizing to increase contribution", *Journal of Services Marketing*, Vol. 34 No. 3, pp. 415-418.

Capellari, S. and De Stefano, D. (2014), "University-owned and university-invented patents: a network analysis on two Italian universities", *Scientometrics*, Vol. 99 No. 2, pp. 313-329.

Chandler, J.D. and Vargo, S.L. (2011), "Contextualization and value-in-context", *Marketing Theory*, Vol. 11 No. 1, pp. 35-49.

Chandler, J.D., Danatzis, I., Wernicke, C., Akaka, M.A. and Reynolds, D. (2019), "How does innovation emerge in a service ecosystem?", *Journal of Service Research*, Vol. 22 No. 1, pp. 75-89.

Chesborough, H. (2020), "To recover faster from Covid-19, open up: managerial implications from an open innovation perspective", *Industrial Marketing Management*, Vol. 88, pp. 410-413.

Chesbrough, H. and Bogers, M. (2014), "Explicating open innovation: clarifying an emerging paradigm for understanding innovation", in Chesbrough, H., Vanhaverbeke, W. and West, J. (Eds), *New Frontiers in Open Innovation*, Oxford University Press, Oxford, pp. 3-28.

Ciasullo, M.V., Troisi, O., Grimaldi, M. and Leone, D. (2020), "Multi-level governance for sustainable innovation in smart communities: an ecosystems approach", Vol. 16 No. 4, pp. 1167-1195.

Ciasullo, M.V., Polese, F., Montera, R. and Carrubo, L. (2021), "A digital servitization framework for viable manufacturing companies", *Journal of Business and Industrial Marketing*, Vol. 36 No. 13, pp. 142-160.

Conlé, M., Kroll, H., Storz, C. and ten Brink, T. (2021), "University satellite institutes as exogenous facilitators of technology transfer ecosystem development", *The Journal of Technology Transfer*, pp. 1-34, doi: 10.1007/s10961-021-09909-7.

Di Berardino, D. and Corsi, C. (2018), "A quality evaluation approach to disclosing third mission activities and intellectual capital in Italian university", *Journal of Intellectual Capital*, Vol. 19 No. 1, pp. 178-201.

Díaz-Méndez, M. and Gummesson, E. (2012), "Value co-creation and university teaching quality: consequences for the European higher education area (EHEA)", *Journal of Service Management*, Vol. 23 No. 4, pp. 571-592.

Díaz-Méndez, M., Saren, M. and Gummesson, E. (2017), "Considering pollution in the higher education (HE) service ecosystem: the role of students' evaluation surveys", *The TQM Journal*, Vol. 29 No. 6, pp. 767-782.

Etzkowitz, H. (2017), "Innovation Lodestar: the entrepreneurial university in a stellar knowledge firmament", *Technological Forecasting and Social Change*, Vol. 123, pp. 122-129.

European Commission (2018), "Science, research and innovation performance of the EU 2018", available at: https://publications.europa.eu/en/publication-detail/-/publication/ef06f08e-2b53-11e9-8d04-01aa75ed71a1/ (accessed 25 January 2022).

European Universities Association (2020), available at: https://eua.eu/ (accessed 20 January 2022).

Fehrer, J.A., Conduit, J., Plewa, C., Li, L.P., Jaakkola, E. and Alexander, M. (2020), "Market shaping dynamics: interplay of actor engagement and institutional work", *Journal of Business and Industrial Marketing*, Vol. 35 No. 9, pp. 1425-1439.

Fendt, J., Kaminska-Labbé, R. and Sachs, W. (2008), "Producing and socializing relevant management knowledge: re-turn to pragmatism", *European Business Review*, Vol. 20 No. 6, pp. 471-491.

Fisch, C.O., Hassel, T.M., Sandner, P.G. and Block, J.H. (2015), "University patenting: a comparison of 300 leading universities worldwide", *The Journal of Technology Transfer*, Vol. 40 No. 2, pp. 318-345.

Friedman, J. and Silberman, J. (2003), "University technology transfer: do incentives, management and location matter?", *Journal of Technology Transfer*, Vol. 28 No. 1, pp. 17-30.

Funk, M. (2013), "Patent sharing by US universities: an examination of university co-patenting", *Economics of Innovation and New Technology*, Vol. 22 No. 4, pp. 373-391.

Galán-Muros, V. and Davey, T. (2019), "The UBC ecosystem: putting together a comprehensive framework for university-business cooperation", *Journal of Technology Transfer*, Vol. 44, pp. 1311-1346.

Geuna, A. and Nesta, L.J.J. (2006), "University patenting and its effects on academic research: the emerging European evidence", *Research Policy*, Vol. 35 No. 6, pp. 790-807.

Geuna, A. and Rossi, F. (2011), "Changes to university IPR regulations in Europe and the impact on academic patenting", *Research Policy*, Vol. 40, pp. 1068-1076.

Gomez-Gras, J.M., Galiana, D.M., Mira, I., Jover, Verdú, A.J. and Sancho, J. (2008), "An empirical approach to the organizational determinants of spin-off creation in European universities", *International Entrepreneurship and Management Journal*, Vol. 4 No. 2, pp. 187-198.

Grönroos, C. and Ravald, A. (2011), "Service as business logic: implications for value creation and marketing", *Journal of Service Management*, Vol. 22 No. 1, pp. 5-22.

Gummesson, E. (2006), "Many to many marketing as grand theory: a Nordic school contribution", in Lusch, R. and Vargo, S. (Eds), *The Service-Dominant Logic of Marketing: Dialog, Debate and Directions*, ME Sharpe, New York, pp. 339-353.

Gummesson, E. (2008a), *Total Relationship Marketing*, Butterworth-Heinemann, Oxford.

Gummesson, E. (2008b), "Extending the service-dominant logic: from customer centricity to balanced centricity", *Journal of the Academy of Marketing Science*, Vol. 36, pp. 15-17.

Gummesson, E. (2017), *Case Theory in Business and Management. Reinventing Case Study Research*, SAGE Publishing, Stockholm.

Hayter, C.S., Nelson, A.J., Zayed, S. and OConnor, A. (2018), "Conceptualizing academic entrepreneurship ecosystems: a review, analysis and extension of the literature", *The Journal of Tecnology Transfer*, Vol. 43, pp. 1039-1082.

Kliewe, T., Kesting, T., Plewa, C. and Baaken, T. (2019), *Developing Engaged and Entrepreneurial Universities*, Springer, Singapore.

Leydesdorff, L. and Meyer, M. (2007), "The scientometrics of a triple Helix of university–industry–government relations (introduction to the topical issue)", *Scientometrics*, Vol. 70, pp. 207-222.

Lissoni, F. (2010), "Academic inventors as brokers", *Research Policy*, Vol. 39, pp. 843-857.

Lockett, A. and Wright, M. (2005), "Resources, capabilities, risk capital and the creation of university spin-out companies", *Research Policy*, Vol. 34, pp. 1043-1057.

Lusch, R. and Wu, C. (2012), "A service science perspective on higher education: linking service productivity theory and higher education reform", Center for American Progress, available at: https://www.semanticscholar.org/paper/A-Service-Science-Perspective-on-Higher-Education-Lusch-Wu/ab3629f33e19da8a5104f2acd0fb7c8d4161f8bc?sort=relevance&page=2 (accessed 10 February 2022).

Lusch, R.F., Vargo, S.L. and Tanniru, M. (2010), "Service, value network and learning", *Journal of the Academy of Marketing Science*, Vol. 38, pp. 19-31.

Madhavaran, S. and Hunt, S. (2008), "The service dominant logic and a hierarchy of operant resources: developing masterful operant resources and implications for marketing strategy", *Journal of the Academy of Marketing Science*, Vol. 36, pp. 67-82.

Maglio, P.P. and Spohrer, J. (2008), "Fundamentals of service science", *Journal of the Academy of Marketing Science*, Vol. 36, pp. 18-20.

Maglio, P.P., Vargo, S., Caswell, N. and Spohrer, J. (2009), "The service system is the basic abstraction of service science", *Information Systems and E-Business Management*, Vol. 7 No. 4, pp. 395-406.

Manna, R., Ciasullo, M.V., Cosimato, S. and Palumbo, R. (2018), "Interplaying ecosystems: a mega-level analysis of education and labour ecosystems", *The TQM Journal*, Vol. 30 No. 5, pp. 572-588.

Mele, C., Sebastiani, R. and Corsaro, D. (2018), "Service innovation as a social construction", *Marketing Theory*, Vol. 19 No. 5, pp. 259-279.

Michel, S., Brown, S.W. and Gallan, A.S. (2008), "Service logic innovations: how to innovate customers, not products", *California Management Review*, Vol. 50 No. 3, pp. 49-65.

Mugia, G. (2018), "The impact of collaboration diversity and joint experience on the reiteration of university co-patents", *Journal of Technology Transfer*, Vol. 46, pp. 1108-1143.

Muschio, A., Quaglione, D. and Ramaciotti, L. (2016), "The effects of university rules on spinoff creation: the case of academia in Italy", *Research Policy*, Vol. 45, pp. 1386-1396.

Nenonen, S., Brodie, R.J., Storbacka, K. and Peters, L.D. (2017), "Theorizing with managers: increasing academic knowledge as well as practical relevance", *European Journal of Marketing*, Vol. 51 Nos 7/8, pp. 1130-1152.

Obstfeld, D., Ventresca, M.J. and Fisher, G. (2020), "An assembly perspective of entrepreneurial projects: social networks in action", *Strategic Entrepreneurship Journal*, Vol. 14, pp. 1-29.

Ordiani, A., Miceli, L., Pizzeti, M. and Parasuraman, A. (2011), "Crowdfunding: transforming customers into investors through innovative service platforms", *Journal of Service Management*, Vol. 22 No. 4, pp. 443-470.

Payne, A.F., Storbacka, K. and Frow, P. (2008), "Managing the co-creation of value", *Journal of the Academy of Marketing Science*, Vol. 36, pp. 83-96.

Perkmann, M., Tartari, V., McKelvey, M., Autio, E., Broström, A., D'Este, P., Fini, R., Geuna, A., Grimaldi, R., Hughes, A., Krabel, S., Kitson, M., Llerena, P., Lissoni, F., Salter, A. and Sobrero, M. (2013), "Academic engagement and commercialisation: a review of the literature on university–industry relations", *Research Policy*, Vol. 42 No. 2, pp. 423-442.

Polese, F., Mele, C. and Gummesson, E. (2017), "Value co-creation as a complex adaptive process", *Journal of Service Theory and Practice*, Vol. 27 No. 5, pp. 926-929.

Polese, F., Ciasullo, M.V. and Montera, R. (2021), "Value co-creation in university-industry collaboration", *Sinergie Italian Journal of Management*, Vol. 39 No. 2, pp. 117-134.

Quero, M.J. and Ventura, R. (2015), "The role of balanced centricity in the Spanish creative industries adopting a crowd-funding organisational model", *Journal of Service Theory and Practice*, Vol. 25 No. 2, pp. 122-139.

Ramaswamy, V. (2020), "Leading the experience ecosystem revolution: innovating offerings as interactive platforms", *Strategy and Leadership*, Vol. 48 No. 3, pp. 3-9.

Rizzo, U. (2015), "Why do scientists create academic spin-offs? The influence of the context", *Journal of Technology Transfer*, Vol. 40 No. 2, pp. 198-226.

Russo-Spena, T. and Mele, C. (2012), "Five co-s" in innovating: a practice-based view", *Journal of Service Management*, Vol. 23 No. 2, pp. 527-553.

Russo-Spena, T., Colurcio, M. and Melia, M. (2017a), "Framing the new social–service innovation mindset", in Russo-Spena, T., Mele, C. and Nuutinen, M. (Eds), *Innovating in Practice*, Springer International, pp. 205-235.

Russo-Spena, T., Mele, C. and Nuutinen, M. (Eds) (2017b), *Innovating in Practice*, Springer International Publishing, pp. 205-235.

Scandura, A. (2016), "University–industry collaboration and firms' R&D effort", *Research Policy*, Vol. 45, pp. 1907-1922.

Siltaloppi, J. and Vargo, S.L. (2017), "Triads: a review and analytical framework", *Marketing Theory*, Vol. 17 No. 4, pp. 395-414.

Spanish Office of Patents and Trademarks (2018), *Solicitudes de patentes nacionales presentadas o participadas por universidades públicas, 2005-2017*, Ministerio de Industria, Comercio y Turismo, available at: http://www.oepm.es/en/index.html (accessed 9 December 2021).

Su, C.Y., Lin, B.W. and Chen, C.J. (2015), "Technological knowledge co-creation strategies in the world of open innovation", *Innovation*, Vol. 17 No. 4, pp. 485-507.

Vargo, S.L. and Lusch, R.F. (2004), "Evolving to a new dominant logic for marketing", *Journal of Marketing*, Vol. 68 No. 1, pp. 1-17.

Vargo, S.L. and Lusch, R.F. (2008), "Service-dominant logic: continuing the evolution", *Journal of the Academy of Marketing Science*, Vol. 36, pp. 1-10.

Vargo, S.L. and Lusch, R.F. (2011), "It's all B2B and beyond: toward a systems perspective of the market", *Industrial Marketing Management*, Vol. 40 No. 2, pp. 181-187.

Vargo, S.L. and Lusch, R.F. (2014), "Inversions of service dominant logic", *Marketing Theory*, Vol. 14 No. 3, pp. 239-248.

Vargo, S.L. and Lusch, R.F. (2016), "Institutions and axioms: an extension and update of service-dominant logic", *Journal of the Academy of Marketing Science*, Vol. 44 No. 1, pp. 5-23.

Vargo, S.L. and Lusch, R.F. (2017), "Service-dominant logic 2025", *International Journal of Research in Marketing*, Vol. 34, pp. 46-67.

Vargo, S.L., Wieland, H. and Akaka, M.A. (2015), "Innovation through institutionalization: a service ecosystem perspective", *Industrial Marketing Management*, Vol. 44, pp. 63-72.

Vargo, S.L., Wieland, H. and Akaka, M.A. (2016), "Innovation in service ecosystems", *Journal of Serviceology*, Vol. 1 No. 1, pp. 1-5.

Wieland, H., Polese, F., Vargo, S.L. and Lusch, R.F. (2012), "Toward a service (eco)systems perspective of value cocreation", *International Journal of Service Science, Management, Engineering and Technology*, Vol. 3 No. 3, pp. 2-25.

Witell, L., Snyder, H., Gustafsson, A., Fombelle, P. and Kristensson, P. (2016), "Defining service innovation: a review and synthesis", *Journal of Business Research*, Vol. 69 No. 8, pp. 2863-2872.

Further reading

Sterzi, V., Pezzoni, M. and Lissoni, F. (2019), "Patent management by universities: evidence from Italian academic inventions", *Industrial and Corporate Change*, Vol. 28 No. 2, pp. 309-330.

Appendix 1
Universities in the sample

University of Almería
Autonomous University of Madrid
University of Granada
University Miguel Hernández
University of the Basque Country
Polytechnic University of Madrid
University of Alcalá de Henares
University of Pompeu Fabra
University of A Coruña
University of Alicante
Autonomous University of Barcelona
University of Burgos
University Carlos III
University of Castilla La Mancha
Complutense University

University of Cádiz
University of Córdoba
University of Barcelona
Fundació Bosch
University of Lleida
University of Extremadura
University of Huelva
University of Islas Baleares
University Jaume I
University of La Laguna
University of La Rioja
University of Las Palmas
University of León
University of Murcia
University of Navarra
University of Pablo Olavide
Polytechnic University of Cartagena
Polytechnic University of Catalonia
Polytechnic University of Valencia
University Rey Juan Carlos
Univerisity Rovira
University of Santiago de Compostela
University of Zaragoza
University of Girona
University of Oviedo
University of Sevilla
University of Valencia
University of Vigo
National Distance Education University (UNED)
University of USAL
University of Valladolid

Appendix 2
Experts on qualitative research

Expert	Title/University
Gorka Artola	Chief Innovation and Tech-Transfer Officer University of the Basque Country
Ivan Martínez	Chief Innovation and Tech-Commercialization program Polytechnic University of Madrid
Manel Arrufat	Chief for Innovation Management Polytechnic University of Barcelona
Xavier Vallvé	Head of Tech Transfer Office Eurpean Patent Attorney Autonomous University of Barcelona
Jesús Banqueri	Chief Innovation and Tech-Transfer Officer University of Granada
Antonio Peñafiel	Chief of Tech-Transfer Office and Entrepreneurship University of Málaga
Marina Rosales	Chief of Tech-Transfer Office and Entrepreneurship University of Seville

About the authors

María José Quero (PhD) is a Senior Lecturer at the University of Málaga. Her research interests includes service dominant logic, ecosystems, value co-creation and arts marketing. She has published several books on marketing management on the arts sector and has had articles published on the *Marketing Theory*, *Marketing Intelligence and Planning*, *Journal of Service Theory and Practice*, *Canadian Journal of Administrative Sciences*, *Service Business* and *Journal of Business and Industrial Marketing*. María José Quero is the corresponding author and can be contacted at: mqg@uma.es

Montserrat Díaz-Méndez (PhD) is a senior lecturer at the University of Extremadura, Spain, and holds a PhD from the University of Navarra. She teaches and investigates on value co-creation, professional service, business ethics, and communication.

Rafael Ventura (PhD) is the vice president for Innovation and Entrepreneurship at the University of Málaga and Aassociate Professor in Business Administration. His research interests are in the areas of entrepreneurship, innovation in business models, social responsibility, economy of culture, and new organizational forms derived from the information technology and communication. He has had articles published on the Journal of Service Theory and Practice, Service Business, Marketing Theory, Marketing Intelligence and Planning and Canadian Journal of Administrative Sciences.

Evert Gummesson (PhD, Dr.h.c.) is an Emeritus Professor of marketing and management at the Stockholm Business School, Stockholm University, Sweden. His research interests are marketing as relationships, networks and interaction; service systems; and research methodology. He has over 400 publications registered, including articles, books and book chapters. His most recent book is called Case Theory in Business and Management: Revinventing Case Study Research (2017, SAGE, UK). The Chartered Institute of Marketing (CIM), UK, has listed him as one of the 50 most important contributors to marketing; he has received two awards from the American Marketing Association (AMA); and was the first recipient of the Service-Dominant (S-D) Logic Award and the Grönroos Award for Excellence in Service Research. He has been a co-founder and co-chair of several international conferences, most recently the Naples Forum on Service, and he serves on several Advisary Boards for journals. He also has 25 years of experience as a business practitioner.