Value co-creation in University-Industry collaboration. An exploratory analysis in digital research projects

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Abstract

Purpose of the paper: *The paper aims to investigate how academic and business actors co-create value when collaborating in digital research projects.*

Methodology*: Qualitative research was conducted according to a social constructionism approach. Thirty participants comprising Italian university researchers and industry practitioners took part in three focus groups.*

Findings*: The interplay among resources, interactions, and outcomes was analysed across individual, organisational, and institutional layers to provide a comprehensive understanding of the value co-creation process between university and industry. Some barriers to the co-creation of value also emerged.*

Research limitations: *The study had some limitations related to the generalisability of the research results. These limitations nonetheless represent potential avenues for future research.*

Practical implications: *The study contributes practically to the debate on value co-creation between university and industry in the context of digitalisation, highlighting some actions aimed at developing successful research collaborations and facilitating the transfer of knowledge between scientific and economic actors.*

Originality of the paper: *The entire value co-creation process was examined, as well as both sides of university-industry (U-I) collaboration, which were considered simultaneously. A conceptual framework consisting of building blocks and contextual layers is proposed drawing on the service-dominant (S-D) logic perspective.*

Key words: university-industry collaboration; value co-creation; S-D logic; R&D projects; digital platforms; focus group

1. Introduction

In a knowledge-based economy, University-Industry (U-I) collaboration has received significant attention from policymakers, practitioners, and scholars (Chryssou, 2020). These actors have emphasised the importance of knowledge transfer and commercialisation of academic research and have actively debated the evolution of the university's traditional mission (teaching and research) (Etzkowitz, 2016). In this vein, the exchange of knowledge by companies and universities under the circumstances of global competition, economic instability, and rapid technological advancements is recognised to play an increasingly vital role both in the

enhancement of their competitive advantage and in innovation and socio-economic development of national economies (Saad and Zawdie, 2011; Hemmert *et al.*, 2014).

Despite the growing interest in this topic, the state of knowledge remains quite fragmented and uncertain (Galán-Muros and Plewa, 2016). To begin, previous studies have not contributed to an explicit and specific conceptualisation of U-I collaboration in terms of what it is and what it involves, hindering its proper definition and management (Perkmann *et al.*, 2013). Moreover, the literature has mainly investigated university-business relations based on valorisation activities, emphasising patents and licenses. Conversely, potential forms of cooperation involving critical domains of higher education institutions, like research, are poorly explored (Kitagawa and Lightowler, 2013). In addition, prior works were often limited to the outcomes of U-I collaboration without considering the factors that affect them from a holistic perspective (Ha and Kwon, 2016). The adoption of a limited analysis perspective is also confirmed by both the scarce exploration of interaction channels used to collaborate and the unbalanced focus on the academic side of U-I collaboration (Franco *et al.*, 2015).

Drawing on these gaps, the paper aims to shed light on the variety of contextual elements, dynamics, mechanisms, practices, and resultant outcomes that frame knowledge exchanges between university and industry in the context of digital research projects. In this direction, U-I collaboration can be conceptualised as a collaborative innovation process in which the knowledge contributed by partners is able to create new and mutual value. Perspectives on co-creation in the U-I literature are limited, even though such perspectives can contribute to enhancing U-I collaborations. Toward this end, we provide a conceptual understanding and empirical evidence of U-I collaboration by building on the service-dominant (S-D) logic's notion of value as created through active and multi-actor interactions and via the integration of resources to define and deliver mutually valued outcomes (Prahalad and Ramaswamy, 2004; Perks *et al.*, 2012; Ramaswamy and Ozcan, 2014). According to this interpretative lens, the following research question was posed:

RQ: *How do university and industry co-create value when collaborating in digital research projects?*

To address the purpose of the paper, the interplay among resources, interactions, and outcomes that shapes the contextual elements affecting the value co-creation process was investigated. Focus group interviews were conducted with Italian industry practitioners and university researchers in the context of digital research projects, upon which a deep empirical analysis was performed. In doing so, we contribute to an in-depth understanding of U-I collaboration in two ways. First, our study complements previous research by broadening the research focus to the entire value co-creation process as well as to both sides of U-I collaboration, thereby accomplishing a comprehensive analysis of the phenomenon. Second, the insights gained from the investigation are relevant from a concrete point of view in terms of practical actions for developing successful research collaborations and facilitating the transfer of knowledge between economic and scientific actors.

The remainder of the paper is structured as follows. The theoretical background on U-I collaboration and the value co-creation process is established in the second section, in which a conceptual framework is proposed drawing on the relevant literature. A description of the research method follows. Findings related to how university and industry co-create value when collaborating in digital research projects are then discussed. Finally, theoretical and managerial implications, as well as directions for future research, are outlined.

2. Theoretical background

2.1 U-I collaboration

U-I interactions are commonly considered as *'a method of social cooperation, or a voluntary effort made by industrial entities and educational and research institutions to solve problems or issues of common interest cooperatively'* (Ha and Kwon, 2016, p. 2). The paper approaches U-I collaboration in the broad sense of any kind of formal or informal cooperative agreement initiated voluntarily for achieving common goals with a strong emphasis on the joint creation of value for mutual benefit.

U-I interactions include different cooperative activities, all of which are associated with one of the key missions of university (i.e., education, research and valorization). Regarding research activities studied herein, universities provide specific expertise or research results to businesses in return for money or practical experience for academics. Specifically, the temporary movement of teaching staff and researchers from universities to businesses, as well as that of employees, managers, and researchers from businesses to universities, represent relevant U-I research activities. These activities also comprise joint R&D activities, contract research, R&D consulting, cooperation in innovation, joint publications with firm scientists/researchers, joint supervision of theses (bachelor's, master's, PhD), or research projects conducted in cooperation with businesses (Cohen *et al.*, 2002; Galán-Muros and Plewa, 2016).

We focus on the specific case of R&D projects in the digital arena as a promising area for U-I collaboration for at least two reasons. First, the interdisciplinary nature of digital research allows for the development of partnerships that transcend established subjects and can refer to multiple fields of inquiry (Bharadwaj *et al.*, 2013). Second, digital research goes beyond the traditional role of the university as a provider of knowledge and that of industry as a provider of funding and materials as both entities are enabled to transfer knowledge that supports innovation (Bozeman *et al.*, 2013).

2.2 Value co-creation dynamics between U-I

To explore value co-creation in digital R&D projects, the S-D logic was embraced. According to this interpretative lens, value co-creation is a complex process of resource integration activities that takes place in many interactions within and among multiple actors rather than in dyadic

relationships (Vargo and Lusch, 2016). In particular, resource integration occurs when actors' resources are combined for mutual benefit according to their expectations, needs, and capacities, especially skills and knowledge (Gummesson and Mele, 2010).

The following sub-sections describe the building blocks and contextual layers of the value co-creation process between U-I (Fig. 1).

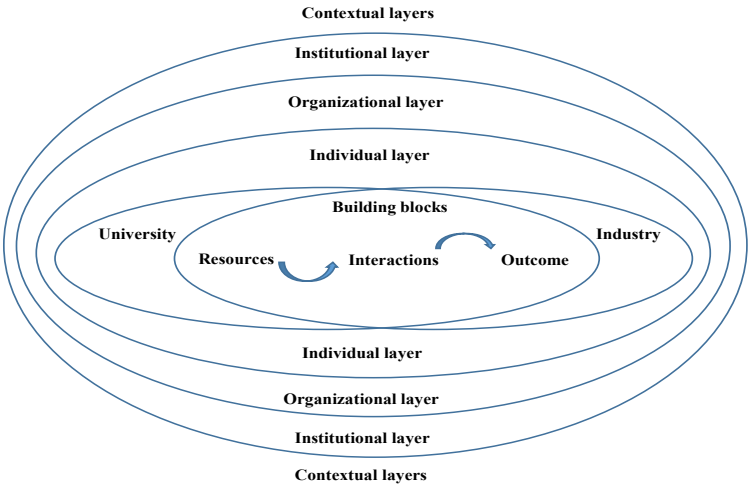
2.2.1 Building blocks of the value co-creation process

University and business are equipped with similar or different resources classified as tangible and static (operand resources) or processional and dynamic (operant resources) (Edvardsson *et al.*, 2011; Vargo and Lusch, 2011). In R&D collaboration, in particular, key resources are operant, such as human capital, which consists of knowledge, competences, capabilities, skills, experience, and relationships shared by actors, although operand resources, such as materials and funding, can also contribute to project execution (Bozeman *et al.*, 2013; Perkmann *et al.*, 2013).

In U-I interactions, actors exchange resources and integrate them in the context of their reality (Prahalad and Ramaswamy, 2004; Vargo and Lusch, 2008) by means of platforms. In this regard, U-I interaction depends on the collaboration formats established. There is a wide range of formats (e.g., simple, ad-hoc exchanges of advice, formal interactions) that are different in size (i.e., number of people involved) and scope, but their aim to produce knowledge is their common trait (Perkmann *et al.*, 2013; Bozeman *et al.*, 2013). U-I interactions can be facilitated by physical and virtual platforms conceptualised as a series of touch points that let actors connect with each other to share information, transfer knowledge, enhance engagement, monitor the incremental progress of the project, and measure collaboration success. In other words, platforms help to develop multi-actor relationships that contribute to overcoming barriers in U-I collaboration related to differences between actors in terms of motivations, internal bureaucracy, languages, time horizons, and daily activities (Siegel *et al.*, 2003; Bruneel *et al.*, 2010; Muscio and Pozzali, 2012). In practice, it happens that university fails to effectively communicate research results to industry, while business representatives fail to recognise the importance of research outputs. Thus, platforms act as a bridge between academic and industrial actors in order to make interactions happen. In any event, actors' cognitive alignment on project aims is a fundamental prerequisite for valuable U-I collaboration, despite the intermediary role of platforms.

University and business engage in resource exchange and integration to achieve a specific outcome from value co-creation in digital R&D projects. On the one hand, the demonstration of the impact of academic research and the identification of alternative funding sources to undertake research represent the most urgent benefits sought by university (Du *et al.*, 2014). On the other hand, industry is motivated by the prospect of having access to leading-edge research, which is essential for improving its competitive advantage (Lambert and Enz, 2012).

Fig. 1: Value co-creation between U-I in digital research projects



Source: our elaboration

2.2.2 Contextual layers of the value co-creation process

Context, as a set of actors and the mutual links between them (Chandel and Vargo, 2011), surrounds and affects the building blocks of the value co-creation process within U-I collaborations.

Focusing on research projects, context comprises individual collaborators at the individual layer, collaborators' organisational home at the organisational layer, and policy and market at the institutional layer (Bozeman *et al.*, 2013). With regard to the individual layer, collaborators play simultaneous roles ranging from resource integrators and boundary spanners among projects, organisational homes, and wider industry or academic settings (Corsaro *et al.*, 2012). Collaborators' involvement in R&D projects and their collaborative behavior depend not only on previous interactions with the actors and experiences with projects but also on expectations created by the organisational home's norms and values (Edvardsson *et al.*, 2011).

Regarding the organisational layer, university acts as a knowledge broker between companies relying on established mechanisms to transmit a wide knowledge base (Agrawal and Henderson, 2002; Henard and McFadyen, 2006). Conversely, the knowledge base of industry is limited to the markets served, and thus companies are reluctant to share it with other players (Un *et al.*, 2010; Du *et al.*, 2014). These different academic and managerial logics can trigger conflicting pressures between actors, so a successful collaboration risks being compromised (Edmondson *et al.*, 2012).

With regard to the institutional layer, scientific and business actors' efforts invested in a research project are influenced by national policies and attitudes toward innovation in terms of funding allocation, level, and rate of innovation (Janssen *et al.*, 2004; Perkmann *et al.*, 2013). Societal

values also affect the focus of projects and the selection of actors (Ngugi *et al.*, 2010).

3. Method

To understand how university and industry co-create value when collaborating in digital research projects, qualitative research was conducted that adopted a social constructionism approach. This was deemed appropriate for two reasons. First, social constructionism emphasises that knowledge is constructed through interactions between actors within a social situation (Bauersfeld, 1995; Denzin and Lincoln, 2012). Second, the approach provides in-depth insights missing from other studies on this topic (Un *et al.*, 2010; Du *et al.*, 2014).

3.1 Data collection

Data were collected through focus groups aimed at generating critical information on each individual through the interaction of group members (Frisina, 2010). In this sense, focus groups foster interactional dynamics suitable for a social constructionism-based reading (Potter, 1996).

The focus groups involved 30 participants from a heterogeneous set of Italian professionals identified through LinkedIn profiles. In particular, diverse participants belonging to both university and industry contexts were selected. From the university side, we contacted technology transfer professionals and academics at various career levels from established and new, public and private, traditional and telematics universities. From the industry side, entrepreneurs and managers from public/private organisations were identified. All participants were experts with at least five years of R&D experience in digital research. In order to permit active participation from all group members, participants were subdivided into full groups-that is, groups of 8 to 12 individuals (Marbach, 2010). Thus, three groups, including 10 individuals, were formed, comprising an equal number of industry and university participants who did not belong to the same institutions to avoid inhibiting interactions.

The focus groups were developed over a three-month period, after preliminary testing with questions and stimuli and a previous examination of the suitability of one topic as compared to another (pilot focus group) (Kitzinger and Barbour, 1999). Group discussions of 90 to 120 minutes were performed via Skype in the presence of a moderator and an observer. A total of 12 group discussion sessions were conducted, four per group. Of these, the first three sessions were organised by discussion topics, each of which was debated separately. These sessions covered pre-established questions and sequence data but were amenable to modifications in light of the ongoing dynamics of the groups (semi-structured focus group) (Zammuner, 2003). To begin, participants were asked to discuss the operant and operand resources needed for successful R&D projects. Next, interactions that best support R&D collaboration were also explored, specifying types and platforms. Then, the discussions covered the

outcomes sought from collaborations. To conclude, contextual influences (e.g., organisational rules or ways of working) on the efforts invested in R&D projects were questioned. The final discussion session consisted of a debriefing in which the participants were encouraged to reflect on the conversations that had occurred.

The answers were audio- and video-recorded, and notes were simultaneously taken by hand. To minimise the development of abnormal stress responses, the debriefing sessions were not recorded.

Regarding the institutional layers, a multitude of elements were considered, such as non-governmental organisations (NGOs), government institutions, investment funds, technology transfer offices (TTOs), collective research centres, regional development agencies, incubators, digital accelerators and science/technology/research parks, innovative start-ups, spin-offs, technological districts, online communities and social media platforms, patents, learning technologies laboratories, and virtual laboratories. The institutional layers were identified by asking to participants to discuss if-and if so, how-these elements influence R&D collaborations. In particular, feedback from the university side allowed us to investigate the orientation toward academic entrepreneurship.

3.2 Data analysis

Data analysis was performed using a thematic analysis (Braun and Clarke, 2006; Bryman, 2012). First, the interviews were transcribed line by line and anonymised, thereby ensuring the privacy of the participants and the protection of the strategic interests of their organisations. The research team was involved in specific tasks: two researchers separately coded the transcripts; a third researcher sampled the combined codes to check consistency and saturation of pattern matching as well as to ensure internal validity (Fereday and Muir-Cochrane, 2008).

At the operational level, Krippendorff's (2004) systematic approach was used to carry out the coding process. Thus, data were inductively interrogated to identify emerging themes, which were then classified into the building blocks ('resources', 'interactions', and 'outcome' as labels) and contextual layers of the value co-creation process ('individual layer', 'organisational layer', and 'institutional layer' as labels) according to participant type ('academic' or 'practitioner' as labels).

4. Results

4.1 The building block of resources across the contextual layers

All participants reported the need for research funding as an operand resource to foster U-I collaborations. Different funding sources were mentioned: The industry side typically sought internal financial support, while the university side tended to use third sources represented by industry partners or institutional layers, such as research councils and commercial partners. For instance:

'Identifying the financial sources of each project is a must. In Italy, few public funds sustain research activities. Thus, the role of private sponsors is vital for R&D collaborations'. [Participant 22, Academic]

'There is an established awareness that we can rely mainly on our financial strength to innovate'. [Participant 13, Practitioner]

'We do not exclude the interesting possibility for turning to business angels or other companies when we are not able to finance an innovative project with our own financial strength'. [Participant 3, Practitioner]

Hence, the participants increasingly recognised the unique opportunity provided by joint projects to access operant resources, such as different and complementary skills. On the one hand, business can increase expertise in new fields, accessing cutting-edge scientific knowledge to create new, advanced offerings and/or improve existing ones. Moreover, through access to university facilities, industry can improve recruitment efforts, involving scientists, skilled students, and graduates in its staff. On the other hand, the university can get to know the industry in depth and its problems, business expertise, and business sector R&D facilities to more effectively orient scientific research toward transferring knowledge to economic actors. In this regard, the university can adopt digital technologies (i.e., spin-offs, virtual labs, university website, social platforms, apps, etc.) and digital resources that play a critical role in developing entrepreneurial actions that attract new business relationships. For example:

'Our university carefully considers digital technologies, and many innovation and technology investments have been made and will be made to open new channels and connections to firms and markets. We count on digital platforms that create an increased network effect being open and viral'. [Participant 20, Academic]

Thus, a range of digital resources necessary for creating new modes or improving existing modes to communicate each other's work were identified. In the absence of digital technological infrastructures, the communication flow between U-I is not sufficiently fluid because scientific research is typically published in journals that are rarely accessible to managers, who mainly use free resources on the Internet. Moreover, academia may ignore valuable industry-based research due to the lack of quality signals equivalent to the academic peer-review system.

Participants also stressed the need for advanced technical and technological capabilities. Specifically, collaborations on digital research projects require expertise associated with digitalisation and consisting of the ability to sense, capture, and interpret data. Unsurprisingly, some universities have enriched their offerings with digital entrepreneurial courses at different levels of education (bachelor's courses, professional courses, master's courses, PhD programs, summer and winter schools). For example:

'Our university has created a doctoral school in Data Science to create experts in the management of big data and to use advanced data analysis and machine learning methods in many industrial fields' [Participant 2, Academic]

'Nowadays, the lack of critical skills does not make an unfeasible project. Selecting the most adequate partners on the basis of their capabilities'

relevance allows finding knowledge required to embark on any project'. [Participant 21, Practitioner]

'Communication skills are critical for the development and success of U-I collaborations. Unfortunately, researchers lack training in communicating research findings outside of academic circles'. [Participant 28, Academic]

'To really capitalise on R&D projects, we need people able to transform the data available on where the industry is going into valuable insights and actionable directives for university and industry'. [Participant 9, Academic]

Resource exchange and integration within U-I collaborations are affected by individual mindsets that support innovation and knowledge transfer, as well as by an organisational context in which experimentation and risk taking are encouraged. For instance:

'My main characteristic is being willing to learn from others. Being able to listen, I ask for advice, absorbing what helps my business to make money'. [Participant 18, Practitioner]

'Having space and time to think, people will express their creativity and new ideas will be developed. Organisations should not forget or underestimate this aspect to pursue innovative projects'. [Participant 4, Academic]

4.2 The building block of interactions across the contextual layers

A successful value co-creation process depends on the building stage of U-I collaborations, which is characterised by moving from generic ideas to definite project goals in response to the specific needs of both actors and society. Indeed, the participants reported the importance of achieving a balanced match between innovative thinking and pragmatism. For instance:

'When university and industry interact, the innovative potential is very high. Anyway, the flow of ideas needs to be controlled. This means that the entrepreneurial ideas and the opportunity for translating them into useful and achievable research projects must achieve a compromise. If this occurs, a well-specified work project can also focus on unconventional ideas that often open the way to more radical innovations'. [Participant 15, Academic]

'A strong and new idea is the starting point for establishing relationships with the academic world. However, if this idea cannot be developed into a concrete research project with clear roles in the teams, then universities and businesses will not go anywhere'. [Participant 3, Practitioner]

'A research project is a very specific contribution to solve a big problem without losing creativity'. [Participant 10, Practitioner]

Another element critical to valuable U-I interactions is the development of trust among actors involved in the project. Participants reported their desire to establish trusting relationships that allow effective collaborations. In this regard, digital technology was recognised as an enabler of the continuous exchange of information, real-time communication, and the opportunity for jointly working on projects remotely without geographical limitations. These opportunities provided by digitalisation create the conditions needed to generate new knowledge, which in turn fosters innovations. Contextually, seamless information access and exchange between U-I nurtures transparent communication, in turn creating trust

between academic and business collaborators. For example:

'Digitalisation has caused positive effects that would have been impossible in the pre-digitalised state of research projects. Digital platforms have become essential for fostering interactions based on mutual trust, going beyond face-to-face meetings'. [Participant 20, Academic]

'Technology has become an indispensable ally that supports the actors to work together and create close ties leveraging connectivity'. [Participant 8, Practitioner]

Addressing their efforts in building trusting relationships, the participants emphasised a long-term vision: Trust cannot be imposed externally, nor can it be achieved rapidly, as it is the result of synergistic interactions based on the alignment of goals that are nurtured over time. Shared purposes through the harmonisation of differing expectations facilitate U-I collaborations (Bekkers and Bodas Freitas, 2008; Bruneel *et al.*, 2010) as the potential for misalignment and conflicts between parties diminishes (Lee, 2011). This requires a genuine interest in interacting and an understanding of the interests of all actors involved in the project, thereby easing the development and maintenance of mutually beneficial partnerships. For instance:

'Previous failed experiences have taught us that simple connections with industrial players do not automatically lead to joint projects. Shared purposes and strong commitment to cultivating relationships with reliable people are required to embark on future collaborations'. [Participant 27, Academic]

However, the means and motives for developing and maintaining relationships are affected by the subjective preferences of the collaborating actors, legal barriers to co-creation in terms of intellectual property (IP) protection and the bureaucracy of institutional bodies, and cultural barriers linked to different time horizons of working. For example:

'Being a lecturer at a small provincial university, I prefer collaborating with multinationals who have a high reputation in the field of research projects'. [Participant 2, Academic]

'Bureaucratic red tape and frequent delays created by IP offices discourage us from starting and continuing projects with universities'. [Participant 25, Practitioner]

'While academics are less accustomed to working in a time-critical environment, businesses must quickly adapt after changing customer needs to remain competitive. In other words, it is very difficult to collaborate across different sectors and disciplines'. [Participant 30, Practitioner]

4.3 The building block of outcomes across the contextual layers

Many beneficial outcomes arise from value co-creation in digital R&D projects. In particular, specific tangible and intangible benefits emerge for each actor involved in research collaborations. From the university side, benefits include the income generated from the collaboration and from any resulting or follow-up projects, including income from the commercial exploitation of any IP, as well as the number of publications arising from the research. By interacting with industry, university can also obtain intangible benefits, such as new teaching materials and the identification

of research avenues and priorities suggested by business actors. Thus, university can demonstrate the impact of scientific research on not just an exclusively academic audience, easily attracting major research funding. From the industry side, tangible benefits include an appropriate return on investment (RoI) through the value created from the innovation generated or from other success measures, like additional profit. Intangible benefits are related to the opportunity for accessing specialist academic expertise at little or no cost. For example:

'U-I projects are an effective way to validate theoretical concepts in real industrial settings. In doing so, we can teach with case studies and address our concerns for demonstrating the managerial and social implications of academic works and financing our research efforts'. [Participant 24, Academic]

'*Partnerships with university allow us to access a wider knowledge base without huge investments. If this knowledge is well leveraged, it leads to market innovations, enhanced competitiveness, and better performance for my business*'. [Participant 26, Practitioner]

Mutual benefits for all participants arise from subjective approaches to problems based on the complementary perspectives of actors. Researchers indeed benefit from industry's practical view, while business players benefit from university's theoretical view because 'mixing theory and practice is the more complete way to discover new problems and new solutions or to better solve old business problems with new solutions'. [Participant 17, Academic]

Organisational and institutional layers may exert negative influences on the outcome of value co-creation in digital R&D projects. This occurs when a project's goals are not aligned with organisational architecture or in cases in which external sponsors limit the project scope to a specific outcome being sought. For instance:

'We cannot share a project goal that does not lead to an immediate economic return of the project or compromise the existing revenue stream'. [Participant 16, Practitioner]

'The type of work to perform depends on a sponsor that invests in the project. We have to adapt to the sponsor's focus even if the problem is broader than what the sponsor wants'. [Participant 11, Academic]

'An information symmetry is required at all levels of the organisation. Otherwise, people do not assimilate the potential of digital in their specific functions and tasks'. [Participant 21, Practitioner]

5. Discussion

5.1 Theoretical and managerial implications

The paper's purpose was to examine value co-creation within U-I collaborations on R&D projects in the digital arena. Adopting S-D logic as an interpretative lens, resources, interactions, and outcomes were analysed across three contextual layers-in a process view-to provide a comprehensive understanding of the value co-creation process between U-I.

Academia and business players co-create value in digital research projects by co-designing value propositions as the result of synergistic interactions and dynamic processes of resource integration. By rereading the conceptual framework in light of the findings, value co-creation was conceptualised as a process that affects the contextual layers in a circular and synergistic way.

In particular, the individual layer refers to the subjective dimension, embracing the abilities of both university and industry and their propensity for technology adoption. Thus, intangible resources, mainly consisting of digital skills, are crucial, and academia must rethink its strategic orientation to trigger value co-creation processes with firms. The organisational layer refers to the transformational mechanisms that allow the co-creation of digital value in R&D projects. In fact, only when U-I act as active integrators, assimilators, and transformers of knowledge can new practices and interactive modes emerge, generating new knowledge and thereby innovation. These new practices and interactive modes involve the social dimension to which the institutional layer refers. They produce new meanings, norms, and rules, and they pave the way to a new entrepreneurial culture that shapes academia as an entrepreneur in a digital ecosystem.

The research findings underline the importance of U-I proximity, which is reflected at various contextual layers given their strong interdependence. At individual layers, academia and business should be connected by cognitive proximity in terms of the alignment of values essential for achieving shared purposes. Cognitive proximity at the individual layer leads to a relational proximity at the organisational layer such that the mutual exchange and integration of resources in the reality of the U-I exploit the potential of digital platforms. Cognitive and relational proximities represent the basis of the institutional proximity at the institutional layer, where the alignment of values and digital relationships between academia and industry create and renovate an ongoing social and economic development in a specific context.

Drawing on the results, some drivers were identified as fostering the circular and synergistic process of value co-creation across the contextual layers. First, social capital represents a crucial operant resource that acts on the value co-creation process in the domain of U-I collaborations. In line with previous studies (Hitt *et al.*, 2003; Thune, 2007), familiarity, trust and norms of reciprocity, mutual understanding, and long-term commitment to co-creation have a significant and positive bearing on the establishment and management of U-I relationships. Thus, as it is difficult to co-create value between previously unconnected actors, the desirable practical action is to invest in developing social capital. Hence, social capital gives rise to the co-creation of value since it fosters the generation and exploitation of knowledge, builds new resources and capabilities, and enhances interactional dynamics between academia and companies. Additionally, our results shed light on the role of social capital in lowering barriers to value co-creation over time. Long-term linkages and mutual trust between actors facilitate the reduction of problems related to the differences in the orientation of universities and businesses, IP conflicts, and contract management (Canter *et al.*, 2017; Garcia *et al.*, 2018). In this

vein, institutions act as fundamental coordinating mechanisms that inspire direct and indirect interactions through institutional arrangements created and recreated through the agency of actors. They enable or constrain value co-creation, guiding resource integration and service exchange among actors.

Second, given that value co-creation does not lie in the technological architecture per se but in its use, a platform approach (Thomas *et al.*, 2014), one that combines digital technology tools and socio-technical systems, is required. This approach champions the digital interactional dynamics during all project stages because it offers communication and user feedback, collaboration, and computing capabilities (Nambisan, 2017) that enable organisational integration and reciprocity among academic and industrial collaborators. Within such an approach, digital platforms play the role of the enabler of the value co-creation process between U-I. In line with Soendergaard *et al.* (2015), we found that digital platforms act as intermediary services that help universities and companies develop and maintain multilateral interactions supporting joint research. In doing so, digital platforms become innomediary (Mele and Russo-Spena, 2015; Ciasullo, 2018), bridging academia and business actors and promoting and diffusing innovation as a result of the value co-creation process between U-I. In addition, digital platforms contribute to reducing the barriers to value co-creation that are linked to the generally small amount of funding for R&D projects because U-I collaborations in a virtual space offer resource savings on both sides. Moreover, connection barriers (Galán-Muros and Plewa, 2016) are also reduced since platforms can support U-I in many directions. First, they can assist in more effectively identifying actors to involve in co-creation-for instance, mapping them with complementary resources and common interests. Then, platforms can help to disseminate awareness of collaboration opportunities across the globe, bypassing the constraints of geographical proximity between the actors (Laursen *et al.*, 2011; D'Este *et al.*, 2013). In sum, digital platforms can be viewed as transformative resources that enhance actor engagement, providing access and engagement opportunities for generating new knowledge capable of fostering innovation (Wieland *et al.*, 2012; Storbacka *et al.*, 2016). Hence, a platform approach-expressed by the adoption of an integrated set of digital platforms and proactive involvement of users-reveals itself to be an ideal approach not only for successfully completing a research project but also for building a long-term collaborative research program and, finally, for contributing to the emergence of a university digital ecosystem. In this vein, a system-based perspective (Barile and Polese, 2010; Meynhardt *et al.*, 2016) can contribute to fostering a service-based logic according to self-contained and self-adjusting collections of social and economic actors sharing institutional arrangements. Moreover, a system-based perspective can provide organisational structures and principles that facilitate the exchange and integration of resources and, in so doing, the co-creation of value-in-use with and among actors.

5.2 Limitations and future research directions

This research contributes both theoretically and practically to the debate on value co-creation between U-I in the context of digital research projects.

From a theoretical perspective, the paper enriches the scientific debate on digital academic entrepreneurship. This is an emerging research area because contemporary universities are expected not only to provide knowledge-intensive outputs but also to contribute to economic growth and regional development through start-ups and spin-offs by leveraging the rapid acceleration of digital technologies (Rippa and Secundo, 2019).

Additionally, the paper extends the previous relevant literature by broadening the research focus to the entire value co-creation process and both sides of U-I collaboration, accomplishing a holistic analysis of the phenomenon. More specifically, the paper provided enhanced understanding via both a holistic view and an analysis of individual elements as well as their relationships, exploring the main drivers that foster or inhibit value co-creation. In doing so, an S-D logic-related midrange theory was developed (Vargo and Lusch, 2017) through a theoretical framework that broke down the complex process of value co-creation into building blocks and contextual layers, shedding more light on multi-actor interactions.

From a practical point of view, some engagement activities are suggested to develop successful research collaborations and to facilitate the transfer of knowledge among and between economic and scientific actors.

Despite these valuable contributions, our work also had some limitations, and yet these limitations can serve as the basis for future research.

On the empirical side, U-I interactions were observed within digital R&D projects, excluding other types of cooperation activities. Future studies could unpack the various collaborative projects in which U-I engage, exploring whether the interactions, resources, and outcomes across the contextual layers vary by different kinds of projects. The focus group technique also presents some risks that should be considered in the design of future research. First, the crucial role of the moderator in directing the discussion group is a potential source of bias. Second, group interviews push the participants to focus only on the positive aspects of value co-creation, making it socially undesirable to discuss personal benefits gained and to criticise collaboration.

Regarding the findings, a larger number of focus group interviewees and a wider geographic range could improve the generalisability of the research results. Moreover, although this study highlighted the tangible and intangible outcomes of value co-creation, more effective performance metrics must be developed, as well as measures that adequately capture the broader implications of undertaking research collaborations between U-I (e.g., personal development, change in employability of students).

From a policy perspective, possible actions for the development of successful R&D projects between U-I were identified. Despite their

importance, as suggested by empirical evidence, one-size-fits-all actions do not exist. Thus, there is a need for tailoring the actions to different projects that depend on characteristics of researchers in different scientific fields and business players in different industries. Standardised actions that neglect such differences may be neither appropriate nor effective within a specific U-I collaboration.

References

AGRAWAL A., HENDERSON R. (2002), "Putting patents in context: Exploring knowledge transfer from MIT", *Management Science,* vol. 48, n. 1, pp. 44-60.

BARILE S., POLESE F. (2010), "Smart service systems and viable service systems: Applyng system theory to service science", *Service Science*, vol. 2, n. 1-2, pp. 21-40.

BAUERSFELD H. (1995), "Language games' in the mathematics classroom: Their function and their Effects", in Cobb P., Bauersfeld H. (Eds.), *The emergence of mathematical meaning: Interaction in classroom cultures,* Hillsdale, US-NJ: Lawrence Erlbaum: pp. 211-292.

BEKKERS R., BODAS FREITAS I.M. (2008), "Analysing knowledge transfer channels between universities and industry: to what degree do sectors also matter?", *Research Policy*, vol. 37, n. 10, pp. 1837-1853.

BHARADWAJ A., EL SAWY O.A., PAVLOU P.A., VENKATRAMAN N. (2013), "Digital business strategy: Toward a next generation of insights", *MIS Quarterly,* vol. 37, n. 2, pp. 471-482.

BOZEMAN B., FAY D., SLADE C. (2013), "Research collaboration in universities and academic entrepreneurship: The-state-of-the-art", *The Journal of Technology Transfer,* vol. 38, n. 1, pp. 1-67.

BRAUN V., CLARKE V. (2006), "Using thematic analysis in psychology", *Qualitative Research in Psychology,* vol. 3, n. 2, pp. 77-101.

BRUNEEL J., D'ESTE P., SALTER A. (2010), "Investigating the factors that diminish the barriers to university–industry collaboration", *Research Policy*, vol. 39, n. 7, pp. 858-868.

BRYMAN A. (2012), *Social research methods,* 4th Ed., Oxford: Oxford University Press.

CANTNER U., HINZMANN S., WOLF T. (2017), "The coevolution of innovative ties, proximity, and competencies: Toward a dynamic approach to innovation cooperation", in Glückler J., Lazega E., Hammer I. (Eds.), *Knowledge and networks. Knowledge and space,* pp. 337-372.

CHANDLER J.D., VARGO S.L. (2011), "Contextualization and value-in-context: How context frames exchange", *Marketing Theory*, vol. 11, n. 1, pp. 35-49.

CIASULLO M. (2018), *Service innovation in (Eco)System View. Towards a circular path of co-innovation,* Giappichelli Editore, Torino.

CHRYSSOU C.E. (2020), "University-industry interactions in the Sultanate of Oman: Challenges and opportunities", *Industry and Higher Education*, pp. 1-16.

COHEN W.M., NELSON R.R., WALSH J.P. (2002), "Links and impacts: The influence of public research on industrial R&D", *Management Science,* vol. 48, n. 1, pp. 1-23.

CORSARO D., RAMOS C., HENNEBERG S.C., NAUDÉ P. (2012), "The impact of network configurations on value constellations in business markets. The case of an innovation network", *Industrial Marketing Management*, vol. 41, n. 1, pp. 54-67.

D'ESTE P., GUY F., IAMMARINO S. (2013), "Shaping the formation of university–industry research collaborations: What type of proximity does really matter?", *Journal of Economic Geography,* vol. 13, n. 4, pp. 537-558.

DENZIN N.K., LINCOLN Y.S. (Eds.) (2012), *Strategies of qualitative inquiry,* 4th ed., London: Sage.

DU J., LETEN B., VANHAVERBEKE W. (2014), "Managing and measuring value co-creation in business-to-business relationships", *Research Policy*, vol. 43, n. 5, pp. 828-840.

EDMONDSON G., VALIGRA L., KENWARD M., HUDSON R.L., BELFIELD H. (2012), *Making industry-university partnerships work. Lessons from successful collaborations,* Science/Business/Innovation Board AISBL.

EDVARDSSON B., TRONVOLL B., GRUBER T. (2011), "Expanding understanding of service exchange and value co-creation: A social construction approach", *Journal of the Academy of Marketing Science*, vol. 39, n. 2, pp. 327-339.

ETZKOWITZ H. (2016), "The Entrepreneurial University: Vision and Metrics", *Industry and Higher Education,* vol. 30, n. 2, pp. 83-97.

FEREDAY J., MUIR-COCHRANE E. (2008), "Demonstrating rigour using thematic analysis: A hybrid approach of inductive and deductive coding and theme development", *Journal of Qualitative Methods,* vol. 5, n. 11, pp. 80-92.

FRANCO M., HAASE H. (2015), "University-industry cooperation: Researchers' motivations and interaction channels", *Journal of Engineering and Technology Management,* vol. 36, pp. 41-51.

FRISINA A. (2010), *Focus group: Una guida pratica,* Il Mulino, Bologna.

GALÁN-MUROS V., PLEWA C. (2016), "What drives and inhibits university-business cooperation in Europe? A comprehensive assessement", *R&D Management,* vol. 46, n. 2, pp. 369-382.

GARCIA R., ARAÚJO V., MASCARINI S., SANTOS E.G., COSTA A.R. (2018), "How the benefits, results and barriers of collaboration affect university engagement with industry", *Science and Public Policy,* vol. 46, n. 3, pp. 347-357.

GUMMESSON E., MELE C. (2010), "Marketing as value co-creation through network interaction and resource integration", *Journal of Business Market Management,* vol. 4, no. 4, pp. 181-198.

HA Y., KWON S. (2016), "A study on factors influencing the outcomes of university-industry collaborative activities focusing on the faculty's need for and engagement in university-industry collaborative activities", *Indian Journal of Science and Technology,* vol. 9, n. 46, pp. 1-8.

HEMMERT M., BSTIELER L., OKAMURO H. (2014), "Bridging the cultural divide: Trust formation in university-industry research collaborations in the US, Japan, and South Korea", *Technovation*, vol. 34, n. 10, pp. 605-616.

HENARD D.H., MCFADYEN M.A. (2006), "R&D knowledge is power", *Research-Technology Management,* vol. 49, n. 3, pp. 41-47.

HITT M.A., IRELAND R.D., SANTORO M. (2003), "Developing and managing strategic alliances, building social capital and creating value", in Ghobadian A., O'Regan N., Gallear D., Viney, H. (Eds.), *Strategy and Performance: Achieving Competitive Advantage in the Global Marketplace*, Palgrave Macmillan, Houndmills.

JANSSEN O., VLIERT E.V.D., WEST M. (2004). "The bright and dark sides of individual and group innovation: A special issue introduction", *Journal of Organizational Behavior,* vol. 25, n. 2, pp. 129-145.

KITAGAWA F., LIGHTOWLER C. (2013), "Knowledge exchange: A comparison of policies, strategies, and funding incentives in English and Scottish higher education", *Research Evaluation*, vol. 22, n. 1, pp. 1-14.

KITZINGER J., BARBOUR R. (Eds.) (1999), *Developing focus group research: politics, theory and practice,* Sage, London.

LAMBERT D.M., ENZ M.G. (2012), "Managing and measuring value co-creation in business-to-business relationships", *Journal of Marketing Management*, vol. 28, n. 13/14, pp. 1588-1625.

LAURSEN K., REICHSTEIN T., SALTER A. (2011), "Exploring the effect of geographical proximity and university quality on university-industry collaboration in the United Kingdom", *Regional Studies,* vol. 45, n. 4, pp. 507-523.

MARBACH G. (2010), *Ricerche per il marketing,* 2th Ed., Utet, Torino.

MEYNHARDT T., CHANDLER J.D., STRATHOFF P. (2016), "Systemic principles of value co-creation: Synergetics of value and service ecosystems", *Journal of Business Research*, vol. 69, n. 8, pp. 2981-2989.

MELE C., RUSSO-SPENA T. (2015), "Innomediary agency and practices in shaping market innovation", *Industrial Marketing Management,* vol. 44, pp. 42-53.

MUSCIO A., POZZALI A. (2012), "The effects of cognitive distance in university-industry collaborations: Some evidence from Italian universities", *The Journal of Technology Transfer*, vol. 38, n. 4, pp. 486-508.

NAMBISAN, S. (2017), "Digital entrepreneurship: toward a digital technology perspective of entrepreneurship", *Entrepreneurship Theory and Practice*, vol. 41, n. 6, pp. 1029–1055.

NGUGI I., JOHNSEN R.E., ERDELYI P. (2010), "Relational capabilities for value co-creation and innovation in SMEs", *Journal of Small Business and Enterprise Development,* vol. 17, n. 2, pp. 260-278.

PERKMANN M., TARTARI V., MCKELVEY M., AUTIO E., BROSTRÖM A., D'ESTE P., SOBRERO M. (2013), "Academic engagement and commercialisation: A review of the literature on university–industry relations", *Research Policy,* vol. 42, n. 2, pp. 423-442.

PERKS H., GRUBER T., EDVARDSSON B. (2012), "Co-creation in radical service innovation: A systematic analysis of microlevel processes", *Journal of Product Innovation Management*, vol. 29, n. 6, pp. 935-951.

POTTER J. (1996), *Representing reality: Discourse, rhetoric and social construction*, Sage, London.

PRAHALAD C., RAMASWAMY V. (2004), *The future of competition: Co-creating unique value with customers,* HBS Press.Boston, MA.

RAMASWAMY, V., OZCAN, K. (2014), *The co-creation paradigm,* Stanford University Press.

RIPPA, P., SECUNDO, G. (2019), "Digital academic entrepreneurship: The potential of digital technologies on academic entrepreneurship", *Technological Forecasting and Social Change,* vol. 146, pp. 900-911.

SAAD M., ZAWDIE G. (2011), "Introduction to special issue: The emerging role of universities in socio-economic development through knowledge networking", *Science and Public Policy*, vol. 38, n. 1, pp. 3-6.

SIEGEL D.S., WALDMAN D.A., ATWATER L.E., LINK A.N. (2003), "Commercial knowledge transfers from universities to firms: Improving the effectiveness of university-industry collaboration", *Journal of High Technology Management Research,* vol. 14, n. 1, pp. 111-133.

SOENDERGAARD H.A., BERGENHOLTZ C., ROSENDAHL J.C. (2015), "University-Industry collaboration: Drivers and barriers for going online", In *Proceedings of DRUID Summer Conference*, Rome, June 15-17, 2015.

STORBACKA, K., BRODIE, R.J., BÖHMANN, T., MAGLIO, P.P., NENONEN, S. (2016), "Actor engagement as a microfoundation for value co-creation", *Journal of Business Research,* Vol. 69, n. 8, pp. 3008-3017.

THOMAS, L. D., AUTIO, E., GANN, D.M. (2014), "Architectural leverage: Putting platforms in context", *Academy of Management Perspectives,* vol. 28, n. 2, pp. 198-219.

THUNE T. (2007), "University-industry collaboration: The network embeddedness approach", *Social and Public Policy*, vol. 34, n. 3, pp. 158-68.

UN C.A., CUERVO-CAZURRA A., ASAKAWA K. (2010), "R&D collaborations and product innovation", *Journal of Product Innovation Management*, vol. 27, n. 5, pp. 673-689.

VARGO S.L., LUSCH R.F. (2011), "It's all B2B…and beyond: Toward a systems perspective of the market", *Industrial Marketing Management*, vol. 40, n. 2, pp. 181-187.

VARGO S.L., LUSCH R.F. (2008), "Service-dominant logic: Continuing the evolution", *Journal of the Academy of Marketing Science,* vol. 36, n. 1, pp. 1-10.

VARGO S.L., LUSCH R.F. (2016), "Institutions and axioms: An extension and update of service-dominant logic", *Journal of the Academy of Marketing Science*, vol. 44, n. 1, pp. 5-23.

VARGO S.L., LUSCH R.F. (2017), "Service-dominant logic 2025", *International Journal of Research in Marketing,* vol. 34, n. 1, pp. 46-67.

ZAMMUNER V.L. (2003), *I focus group*, Il Mulino, Bologna.

WIELAND H., POLESE F., VARGO S.L., LUSCH R.F. (2012), "Toward a service (eco) systems perspective on value creation", *International Journal of Service Science, Management, Engineering, and Technology (IJSSMET)*, vol. 3, n. 3, pp. 12-25.

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