Empirical Research Paper

Knowledge co-creation in project studies: The research context

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ABSTRACT

This paper proposes a framework for a collaborative environment formed by a University Research Centre (URC) in Project Studies and external organizations. The framework resulted from a literature review process enriched with empirical data from twenty-eight semi-structured interviews with academics, PhD candidates, and practitioners. The thematic analysis identified four macro-elements of the URC ecosystem: Project Studies; Impact Generation Process (Partners, Resources, Activities, Outputs, Outcomes, Impacts); Governance & Management and Circumstances; and Context, broken down into sixty elements, for the co-creation of knowledge in Project Studies. The study adds to the body of knowledge on Project Studies by proposing a "Ba" for the co-exploration and co-exploitation of the knowledge generated by academics and practitioners. Furthermore, it reinforces the importance of engaged scholarship and supports the proposal of more robust theories that lead, in practice, to better collaborative project performance.

1. Introduction

Research in projects is fast-paced and diverse. Scholars have referred to multiple schools of thought to light up research questions with different methodological approaches and alternative theories (Söderlund, 2011). Moreover, beyond the project itself and its management, they consider other levels of analysis such as individuals, teams, organizations, and society (Pollack and Adler, 2015). Attentive to this scenario and to enhance the understanding of the diversification of the domain of projects, Geraldi and Söderlund (2018) adopt the term "project studies", representing the current stage of development in this area, which comprises studies in, on, and around projects.

Traditionally practice-oriented, the project area responds to a strong call from the community to bridge the knowledge gap between academic research and practical applications (Clegg et al., 2018; Söderlund and Maylor, 2012; Walker and Lloyd-Walker, 2016). Bridging this gap and stimulating change in the field has been a constant challenge (Söderlund and Maylor, 2012). Not surprisingly, practitioners in the field perceive the need for a more meaningful relationship with the academic community to address the challenges of practice. In addition, by getting closer to practitioners' everyday lives, academics contribute to the integration between theory and practice (Konstantinou, 2015).

The academic recognition of the area of projects as a domain of knowledge was consolidated with the creation of a Doctoral Program in Project Management in 2001 by RMIT University in Australia (Walker, 2002). From this milestone, numerous universities have created Doctoral Programs in Project Management, including professional doctorates (Mellors-Bourne et al., 2016). In addition to contributions to theory, professional programs impact on personal and professional practice through applied research and development in the workplace, emphasizing knowledge creation embedded in practice (Boud et al., 2018). But there seems to be difficulty reconciling academics and practitioners' knowledge.

An alternative path considers the joint creation of knowledge by academics and practitioners (Van de Ven and Johnson, 2006) in a vision of the complementarity of knowledge. Since different perspectives and knowledge tend to be partial and limited in relation to complex problems, it opens the way for the co-creation of knowledge between researchers and practitioners in search of a better understanding of the problems and phenomena studied (Van de Ven, 2018). One way found for the co-creation of knowledge (Orr and Bennett, 2012) is through collaborative interorganizational partnerships. Such environments are conducive to developing current knowledge (knowledge exploitation) and new knowledge (knowledge exploration). Partnerships are perceived as a dynamic process between multiple entities to achieve a common goal (Vangen et al., 1994). They may involve different actors

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such as: universities, research institutes, companies, governments, communities, and professional associations. However, their implementation may not be easy since it considers distinct perspectives that can be influenced by individual, organizational and environmental factors (Bruneel et al., 2010).

Attentive to this scenario, universities have perceived the need for change in their structures. Allied to the desire to join researchers from diverse origins to address complex problems, they instituted University Research Centers - URCs (Bozeman and Boardman, 2003). Characterized as the main internal units for the creation of new knowledge (Sabharwal and Hu, 2013), URCs enable the development of collaborative research with internal and external actors in universities (Boardman and Corley, 2008), and do not only focus on the knowledge transfer (Vargas and Villazul, 2019) but also lead to the co-creation of knowledge (Onyx, 2008). Indeed, the context where academics and practitioners interact to co-create knowledge is especially favourable for collaborative research methods such as action research, engaged scholarship and its variations (Svejvig et al., 2021; Tekic et al., 2022).

Legitimately, academics and practitioners have distinct interests and require different types of knowledge (Di Benedetto et al., 2019). To address this scenario, the interaction between scholars and practitioners can produce knowledge (Geraldi and Söderlund, 2016) combined with contextual resources (Håkansson and Waluszewski, 2007). This fruitful interaction between actors aligns with the theory of organizational knowledge creation (Nonaka and Takeuchi, 1995) and the concept of "Ba" (Nonaka and Konno, 1998). "Ba" is a dynamic and shared space that promotes relationships and interactions between stakeholders and leads to knowledge creation. Indeed, the co-creation of knowledge in projects remains underexplored. Berggren and Söderlund (2011) indicate the potential of academic sites to create space for the co-creation of knowledge aimed at the development of research involving academics and practitioners. A "Ba" where they can address questions about projects to discuss and propose solutions (Söderlund and Maylor, 2012).

One possible way to represent "Ba" is by using conceptual frameworks (Konno and Schillaci, 2021). When robust, frameworks play an essential role in advancing scientific and practical knowledge (Lindgreen et al., 2021). Their structuring can build on existing literature as a primary source and be guided and enriched with empirical data (Saunders et al., 2019). Thus, the research question is: How can a "Ba" be represented for the co-creation of knowledge in Project Studies involving academics and practitioners? This article is intended to fill the gap in the specialized literature on the phenomenon of the co-creation of knowledge in projects involving scholars and practitioners (Brunet, 2022; Geraldi and Söderlund, 2016; Tekic et al., 2022). The aim is to propose the framework of the collaborative environment formed by a University Research Centre in Project Studies (URC-Project Studies) and external organizations. It is an environment to integrate academics and practitioners to discuss theoretical and practical issues in Project Studies and conducive to creating knowledge relevant to practice and has the necessary scientific rigor to create an impact on organizations. As a result, the framework will provide a common understanding of the environment to support actors directly involved in collaborations, decision-making and mutual relationships, leading to more effective and sustainable partnerships.

To achieve its objective, this article uses an initial framework conceptualization of the Collaborative Research Centre in Project Studies developed on literature review (Moutinho et al., 2023), which joints together the theory of organizational knowledge creation (Nonaka and Toyama, 2007) and the concepts of knowledge exploration and knowledge exploitation (Centobelli et al., 2019). This theoretical-conceptual basis guided the twenty-eight semi-structured interviews conducted with academics, practitioners, and PhD candidates. As a result, the article presents a URC-Project Studies framework composed of four macro-elements and sixty elements discussed according to the literature and the empirical data. Finally, it provides conclusions, theoretical contributions, managerial implications,

limitations, and proposals for future work.

2. Background

2.1. Project studies and engaged scholarship

Studies in, on, and around projects are defined as Project Studies. According to Geraldi and Söderlund (2018), this term considers research whose scope can occur at several levels, including micro (e.g., individual, and project team), meso (e.g., project and its management), and macro (e.g., organization and society). Furthermore, ontological orientations, epistemological anchors, and methodological approaches can all be considered under Project Studies (Geraldi et al., 2020). In addition, the approach recognizes the participation of scholars from other disciplines who approach the field and gain increasing interest in Project Studies by aggregating theoretical frameworks, disciplinary backgrounds, and alternative research methods (Grabher and Ibert, 2014).

Project Studies have the potential to illuminate various topics related to strategic management, innovation, entrepreneurship, organizational behavior, and human resource management. They also offer insights into governance, risk management, and coping with complexity, facilitating learning opportunities across projects. Moreover, with their unique singularity and eventfulness, Project Studies provide a vast and unexplored space for innovative research, allowing for the development and test of theories. Therefore, practitioners and academics are encouraged to view projects as an intriguing theoretical setting, fostering collaboration and bridging research fields to enhance scholarship (Locatelli et al., 2023).

As per trends in general management research, there has been a growing concern within Project Studies regarding its limited relevance (Söderlund and Maylor, 2012). This is often attributed to the increasing gap between theory and practice, which has been discussed in the general management literature as a result of research publications being generated within academic institutions (Blomquist et al., 2010; Geraldi and Söderlund, 2018; Geraldi et al., 2021). This leads to shaping the field based on research problems defined not through engagement with practice but theoretical conversations within the academic community. Geraldi and Söderlund (2018) advocate for engaged scholarship to bridge this gap and produce theoretically rigorous and practically relevant research.

In this study, we define engaged scholarship, following Van de Ven and Johnson (2006), as collaborative research involving academics and practitioners integrating their various views and expertise to co-produce new knowledge. The long-standing issue of the validity and applicability of Project Studies has been addressed in part by including practitioners in the study process (Blomquist et al., 2010; Geraldi and Söderlund, 2018). The study of Tekic et al. (2022), which builds on the discussion of engaged scholarship in Project Studies, seeks to characterize the development of the field by examining the scope and possibilities of practitioner participation in project research. The paper contributes to the discussion of engaged scholarship in Project Studies and examines the challenge of incorporating practitioners in generating project-based research.

2.2. Collaborative Research Centre in Project Studies

The research reported in this article is based on the conceptual framework of the ecosystem of a Collaborative Research Centre in Project Studies (Fig. 1) developed by Moutinho et al. (2023), which was considered as the initial framework to conduct empirical research. Four macro-elements form the framework. The first macro-element represents the field of knowledge, Project Studies (Geraldi and Söderlund, 2018) and responds to structuring the Research Design with the definition of the research question, the purpose of the intention, the rigor of the methodological approach, relevance, and coherence (Lauriol, 2006).

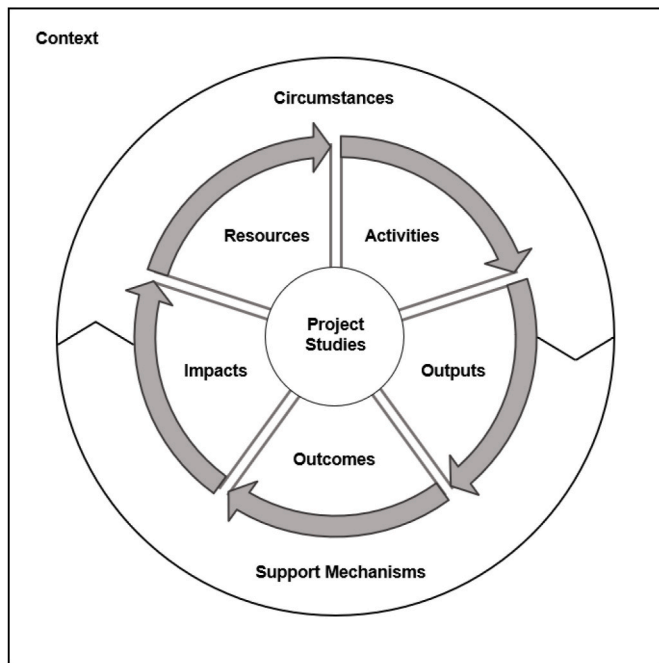The second macro-element corresponds to generating the outcomes

Fig. 1. Ecosystem of a collaborative research centre in project studies. Adapted from Moutinho et al. (2023).

and impacts of the collaboration between academics and practitioners (Galán-Muros and Davey, 2019). It initially considers the: Resources (human, financial and material) available for the activities and that contribute to achieving the success of the collaboration (Daoud et al., 2017); the Activities of collaborative interaction (Ankrah and AL-Tabbaa, 2015); the Outputs as products, services or other properties directly delivered to individuals or organizations (Perkmann et al., 2011); the Outcomes as direct results of the collaborative process (positive or negative) for individuals and organizations (Van der Sijde, 2012); and finally the Impacts as indirect results of the collaborative process received by individuals, organizations and society (Perkmann et al., 2011).

The third macro-element is formed by Circumstances and Support Mechanisms (Alunurm et al., 2020; Galán-Muros and Davey, 2019). Circumstances are seen as internal and external factors to the collaborative environment of temporary influence, driving and inhibiting collaboration (Bruneel et al., 2010; D'Este and Perkmann, 2011). As for Support Mechanisms, their main functions are to develop and coordinate the activities of the collaborative environment and seek to make the most of the circumstances (Galán-Muros et al., 2017).

The fourth macro-element represents the Context in which the collaborative environment is embedded. It deals with fixed factors, independent of the collaborative process, such as the personal characteristics of those involved, the collaborating organizations and the environment in which the collaboration takes place (Ankrah and AL-Tabbaa, 2015; Galán-Muros and Davey, 2019). This conceptualization is underpinned by the theoretical approach focused on organizational knowledge creation (Nonaka and Takeuchi, 1995). It considers three elements: the "Ba", the knowledge conversion, and the knowledge assets. These elements interact with each other and enhance knowledge creation.

The "Ba" is presented as a shared space emerging from the interaction between actors able to produce knowledge (Nonaka and Konno, 1998). Its potential to support knowledge-creation processes and provide new perspectives on the workplace became evident in the early 2000s. Nonaka's idea of "Ba" is a common foundation for inquiry. "Ba", which can be physical (like an office or a distributed workspace), virtual (like an e-platform, a teleconference or email), mental (like shared

experiences, ideas, or ideals), or any mix of these, is the shared context and the location where knowledge is created (Nonaka et al., 2000). "Ba" offers a platform for growing one's own or shared knowledge.

Specifically, "Ba" is a common context in which knowledge is created, shared, and used (Nonaka and Toyama, 2007). "Ba" is a temporary locus whose space and temporality must be specified. "Ba" can be defined as a platform for the "resource concentration" of an organization's knowledge assets (Nonaka and Konno, 1998). It can be a context for an individual, a team, an organization, or even involve distinct organizations, given the growth of strategic alliances (Niccolini et al., 2018).

Huhtelin and Nenonen (2015) investigated the environments that foster knowledge co-creation and sharing in university-industry collaboration. According to them, a setting that encourages the start of university-industry collaboration should be one where people can freely express their thoughts, feelings, and experiences while supporting networking and having an informal atmosphere. "Ba" encourages participant thought and conversation. Individuals share and translate their mental models and competencies into generic language and express them as ideas.

Knowledge can be created by interactions between explicit and tacit knowledge, called knowledge conversion. Through the conversion process, tacit and explicit knowledge expand in quality and quantity (Nonaka et al., 2000). The four modes of knowledge conversion – the SECI process (Socialization, Externalization, Combination, and Internalization) - form a spiral that expands and can trigger a new spiral of knowledge creation. It is a dynamic process, which starts in the individual, expands as it moves through interactive communities and can transcend the boundaries of organizations (Ichijo, 2007).

Knowledge assets are fundamental elements of knowledge creation. There are company-specific resources indispensable to create values for the company and are inputs, outputs, and moderators of the knowledge creation process. Therefore, there are in constant evolution (Nonaka et al., 2000). Due to its dynamic nature, the ability to create and apply knowledge assets is an important source of competitive advantage for organizations (Alavi and Leidner, 2001). In this context, the concepts of exploration and exploitation of knowledge (Davenport and Prusak, 1998) have been discussed widely in studies involving knowledge management (Gaviria-Marin et al., 2018). While exploration deals with the rejuvenation of an organization's knowledge base (Oehmichen et al., 2017), which involves acquiring, creating, or developing new knowledge for future opportunities, exploitation is concerned with the use, refinement, synthesis, and adaptation of existing knowledge for current needs (Filippini et al., 2012; Lavie et al., 2011).

Knowledge management studies also address the ability of organizations to balance exploration and exploitation (Hislop et al., 2018) since specific authors see such activities as mutually exclusive (Filippini et al., 2012) and their relationships as paradoxical (Oehmichen et al., 2017). However, some perceive their duality and interdependence as being possible to balance efforts to simultaneously develop both current and new knowledge (Knight and Harvey, 2015) in a perspective of organizational ambidexterity (March, 1991).

Studies on organizational ambidexterity entail an approach through which exploration and exploitation can develop together (García-Lillo et al., 2016). Moving beyond the organization's boundaries, another possibility considers interorganizational ambidexterity with the simultaneous development of exploration and exploitation supported in partner organizations' relationships with resource integration and an ambidextrous context, that is, in co-exploration and co-exploitation (Kauppila, 2010).

3. Research methodology

The research philosophy adopted in this study is anchored in the constructivist paradigm for organizational research (Avenier, 2010). The epistemological position considers the reality co-constructed

between researcher and research as shaped by individual experiences. The aim of this study is to propose a framework for the collaborative environment formed by URC - Project Studies and external organizations. To achieve this, empirical, qualitative, and exploratory research was conducted to identify elements present in the daily life of similar environments, with the potential to be added to the initial framework proposed from a systematic literature review (Moutinho et al., 2023). This analysis was guided by an inductive perspective, whereby the collection, examination, and process of continual re-examination of data determined the research findings (Saunders et al., 2019). The initial attempt to conceptualize the framework was used to guide the empirical exploratory study.

3.1. Data collection

Data collection involved interviewees with different profiles, namely: academics, PhD candidates, and practitioners with experience in project management and collaborative environments. Therefore, the interviewees were from distinct organizations, such as research centers, higher education institutions, research institutes, the government, companies, and professional associations. The selection process relied on a convenience sampling (Mac Donald et al., 2020). Before the interviews, all the interviewees received information detailing the research scope, the interviews' purpose, and the main guiding questions.

The semi-structured interviews were conducted in Portuguese since all the researchers and the interviewees were Portuguese, and the data analysis was also conducted in Portuguese. The translation from Portuguese to English was carefully reviewed by the three researchers, with the support of an expert with extensive experience in management research.

The main themes addressed during the interviews originated from the initial framework conceptualization (Fig. 1) and involve: Project Studies, resources, activities, outputs, outcomes, impacts, circumstances, support mechanisms and context. Although critical questions guided the interviews, such as: "What project topics could be discussed between academics and practitioners?" the main aim was to encourage the interviewees to explore each issue, which led to the emergence of additional questions providing essential insights.

The interviews took place online, using the zoom platform (due to COVID-19 pandemic restrictions) between July and September 2021, with an average of 71 min deviation of $\pm$ 17 min. The characterization of the twenty-eight interviewees is presented in Table 1.

3.2. Data analysis

The summarization process of the twenty-eight interviews took around 94 h and resulted in fifty-two pages of transcription. The summaries were forwarded to each interviewee to confirm or rectify the information and to potentially add to and complement their answers. As a result, two interviewees made specific changes to the content, and only one added new information. This process culminated with the insertion

Table 1
Interviewee characterization.

Interviewee role		Main job organization	
Practitioner*	16	Higher Education Institution	10
Academic	10	Company	8
PhD Student	2	Research Institution	5
		Professional Association	3
		Government	2
Years of Experience			
More than 15	19	Level of education	
Between 5 and 15	5	MSc	15
Less than 5	3	PhD	13

Note: (*) Practitioners are defined as project managers, not professors or Ph.D. students, independently of their main job in the organization.

of the summaries into the ATLAS.ti software (ATLAS.ti 9 Windows), which formed the dataset to begin the analysis.

Thematic analysis was used to identify patterns and themes from the dataset (Saunders et al., 2019). Thematic analysis was conducted in four phases: familiarization, coding, searching for themes and recognizing relationships, and refining themes. During the familiarization phase, the reading allowed the identification of important quotations. The first author carried out this process, which was then reviewed by the other two authors. The next step, coding, was performed recurrently and by the same author, facilitating the coding consistency as in Fernandes et al. (2015). However, to check the validity of the coding process, the two other researchers were asked to examine the audit trail of the key coding decisions made during the research process. The first round occurred with the provisional coding from the pre-codes extracted from the initial conceptual framework of Moutinho et al. (2023). The authors added new codes (open codes) to the original list during the second round. This process then required a third round to ensure the necessary consistency for data analysis. Saturation was reached with twenty-eight interviews, as the last few interviews were not adding any new insights (Saunders et al., 2019). In the third phase of thematic analysis, the codes were organized by themes to give them meaning. In the last step, the authors analyzed and refined the themes proposed to determine coherence and distinction, giving rise to the framework's elements. Fig. 2 provides an example of how the data analysis process was conducted. It initially considered 'a priori' codes from the conceptual framework (Moutinho et al., 2023) that were enriched with 'In vivo' codes from the interviews. From there, the macro-elements and the elements that form the URC-Project Studies Framework were identified.

4. Results

Below, each of the four macro-elements that served as a theoretical framework is described according to the findings of the interviews.

4.1. Project studies

The first macro-element, the framework's core, represents the area of research study (Project Studies) and deals with topics at different levels of analysis: micro, meso and macro levels.

According to the interviewees, potential research topics include: "project manager career", "project management leadership", "benefits management", "stakeholder management", "communication management", "virtual team management", "risk management", "artificial intelligence", "machine learning", "knowledge management" "project management approach", "project management standard", "project management office", "project success", "organizational project management maturity", "project portfolio", "multicultural environment", "large scale collaborative projects", "collaborative project management", and "VUCA environment", among others.

For a collaborative environment to occur, it is necessary to define the research collaboration objectives as well as the research methodology that must be followed considering aspects of relevance and rigor. Table 2 presents the elements identified by the interviewees.

4.2. Impact Generation Process

The second macro-element is named the 'Impact Generation Process'. It is structured considering 'Partners', 'Resources', 'Activities', 'Outputs', 'Outcomes', and 'Impacts'. Partners (e.g., 'Higher education institutions', 'Research institutions', 'Companies', 'Governments', and 'Professional associations') can enrich the environment with specific resources needed to execute collaborative projects. The main 'Resources' are 'Staff', 'Financial resources', 'Facilities', and 'Knowledge assets', which, depending on the characteristics of the collaborative environment, may be needed. The collaborative interactions between partners were identified as 'Activities'. The elements of 'Collaborative
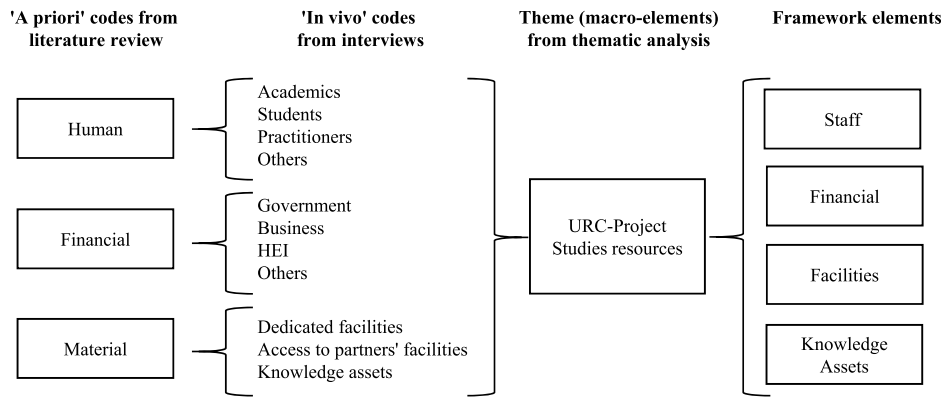
Fig. 2. Example of the data analysis process.

Table 2
Elements of project studies.

Elements	Description
Project Design	Project design with a defined purpose, methodology, relevance, and rigour (Lauriol, 2006). As the interviewee [I06] states, *"there needs to be a well-defined objective (purpose) to establish a collaborative environment. It is the central piece, without which what is around it does not make sense"*, interviewee [I26] *"to start a collaborative research, once the purpose has been defined, it is necessary to define well which methodology will be used"*, and interviewee [I07] *"it is important that it is felt that what will result from the work is effectively valued and that it has a context of post-collaboration use"*.
Level of analysis	Corresponds to the scope of discussion and its level of analysis in Project Studies (Geraldi and Söderlund, 2018) and may involve, according to the interviewees, " … *development of studies on traditional, agile and hybrid approaches*" [I04], " … collaboration in large-scale (mobilizing) projects" [I09], ". … *artificial intelligence as planning support*" [I11], ". … *research on an ideal project manager career*" [I18], " … *benefits realization management, where theory is already quite rich, but in practice, organizations are not doing it well*" [I24], " … *a study of global project management, in multicultural environments*" [I25], among others.

research', 'Joint supervision of students', 'Lifelong learning', and 'Professional and student mobility' stand out. 'Outputs' are seen by respondents as products, services or other properties directly delivered to individuals or organizations and can take the form of: 'New theories and practices', 'Technical and scientific publications', 'Intellectual property', and 'Technological products and processes'. 'Impacts' of collaborations are seen as indirect and more far-reaching outcomes of collaborative activities such as: 'Enhance reputation', 'Reinforce knowledge transfer' between partners, 'Develop R&D roadmap', 'Increase knowledge breakthrough', 'Increase employability', among others. Table 3 presents the elements present in this macro-element.

4.3. Circumstances and Governance & Management

The third macro-element of the framework is comprised by 'Circumstances' and 'Governance & Management'. As mentioned in the research conceptualization, circumstances are understood as factors of temporary influence and may take the form of drivers or barriers. As collaboration is, by its nature, a complex phenomenon, it requires specific management mechanisms. One way to enhance drivers and neutralize barriers in a collaborative environment is to adopt policies, processes, and rules that guide its operation (Governance) and its implementation (Management) to achieve success and generate impact. Thus, 'Supporting Mechanisms' give way to 'Governance & Management' actions as measures to improve the development of collaboration between the academic environment and external actors. Table 4 presents the elements of this macro-element.

4.4. Context

Finally, the fourth macro-element corresponds to the Context where the collaborative environment is embedded and represents the set of factors independent of the collaboration but may affect the collaborative process. The 'Context' is composed of elements of direct influence called 'Environmental factors', 'Organizational factors' and 'Individual factors'. 'Environmental factors' can have political, economic, and even social origins. There are also 'Organizational factors' such as: the resistance to change, tradition, culture, aversion or even difficulty to adapt, which interfere with collaborations. 'Individual factors' such as security, previous experiences or even immediacy also integrate the 'Context'. Table 5 presents the elements of 'Context' identified by the interviewees.

5. Discussion

Interview data analysis resulted in the new URC-Project Studies framework presented in Fig. 3, representing the "Ba" for the co-creation of knowledge in Project Studies involving academics and practitioners. The framework comprises four macro-elements and the sixty elements discussed above. The framework considers not only the knowledge domain ('Project Studies') and the 'Impact Generation Process', but also the 'Managerial and Governance' dynamics, 'Circumstances', and 'Environmental factors' that influence the co-creation of knowledge. It should be noted that even with the linear representation of the Impact Generation Process in Fig. 3, it is a recursive process, and the principle of the circular approach is implicit, as in Fig. 1.

5.1. Project studies – knowledge co-creation domain

The first macro-element, the knowledge creation domain – 'Project Studies' represents the area of investigation in which the collaborative research will occur. The diversity of themes pointed out by the interviewees shows that discussions in the area are not restricted to the project, its management, and the organizations but encompass and delve into issues that also involve individuals, teams, and society, in line with the concept of Project Studies (Geraldi and Söderlund, 2018). Consequently, questions such as "what study?", "why study?" and "how study?" need to be addressed and dealt with in this macro-element (Lauriol, 2006). How can traditional paradigms applicable to the social sciences dedicated to explaining, describing, exploring, or predicting phenomena and their relationships (Hegenberg, 1969) answer the questions above?

One possible path points to action research and its variants (Svejvig et al., 2021). Action research aims to solve or explain practical problems generating knowledge for practice and theory. In this approach, the action researcher works collaboratively with practitioners in predefined steps and typically involves identifying problems, action planning,

Table 3
Elements of the 'Impact generation process'.

	Elements	Description
Partners	Higher education institutions - HEI	Academic environment housing URCs (Liefner et al., 2019). According to Interviewee [I24], *"the encouragement to engage in collaborative research comes more from academia, although it might be companies that need more of these collaborations, it seems there is still a preconception of what academia is."*
	Research institutions	Research institutions frequently linked to universities (Liefner et al., 2019) *"work with collaborative innovation and bring the two worlds together, i.e., the companies that consult them, with academics from universities who bring know-how, along with students"* [I22].
	Companies	Organizations in general, concentrating practitioners and problems to be solved (Perkmann and Schildt, 2015). As the interviewee [I24] stated, *"the need and the encouragement may come from practice, from industry looking to academia to solve a practical problem."*
	Government	Government can also participate in collaborative environments, either by direct involvement through project funding or through the execution of a public policy (Situmorang et al., 2019). Interviewee [I02] stated: *"in certain countries and collaborations, a government entity is needed to support and fund major R&D investments."*
	Professional associations	Organizations that work on promoting specific areas of knowledge (Hopkins et al., 2019). Interviewee [I21] highlighted that *"professional associations can actively participate in collaborative environments as they play an important role in the professional context."*
Resources	Staff	People integrating the collaborative environment (Daoud et al., 2017), comprising students *"core workforce of the teams that will integrate the projects"* [I02], academics *"... with a diverse set of skills underlying the projects ... "* [I04], practitioners: *"... that participate in the organizations' innovation projects"* [I27]. But the collaborative environment also counts on other roles such as managers, as indicated by interviewee [I22] *"... with a broad enough vision, as mediators, and that can bring different worlds together [...] in addition to a team to manage collaborative projects."*
	Financial resources	Financial resources may have different sources (Daoud et al., 2017) as from HEIs, as highlighted by interviewee [I25] *"sometimes, the university provides financial resources for the development of projects .... or even pays the salaries of the academics involved."* As indicated by interviewee [I17], *"... financial resources that go from the companies to the universities."* The government also plays a vital role here by *"public funding programs [...] since companies sometimes cannot afford such expenses"* [I08]. Others, such as *"... co-funded projects"* [I17].
	Facilities	A possible first reason to join a collaborative environment is the access to facilities (Ramli and Senin, 2015).

Table 3 (*continued*)

	Elements	Description
		According to interviewee [I04], access to partner facilities may be necessary *"... to test an idea or even a theoretical concept"*. But there are also dedicated facilities, as interviewee [I18] affirmed *"... a place where collaborations are born and managed so that then knowledge can be consolidated and leveraged beyond the lifecycle of the environment itself."*
	Knowledge assets	It refers to accumulated intellectual resources (Nonaka et al., 2000). For interviewee [I24], *"... the collaboration process is initiated by some academics who need to corroborate some previous study or even validate some theory"*. Complementarily, interviewee [I09] highlighted the dynamic characteristic of knowledge assets *"since what is learned during collaborative projects, must be transformed into knowledge assets after its completion."*
Activities	Collaborative Research	A mechanism to generate creative research results by setting common research topics among partners (Cohen et al., 2002). According to interviewee [I18], *"what you get in a collaborative environment is exactly to mix the ideas and generate insights from the ones that each member brings."*
	Joint supervision of students	With specific assignments, joint supervision by academics and practitioners whose complementary experiences enrich the investigations (Arinaitwe, 2021). According to interviewee [I25], *"collaborative environments enable PhD candidates to be co-supervised by academics and skilled practitioners."* As a result of the joint supervision of students, interviewee [I13] emphasized that *"experience in collaborative settings also enables one to achieve a balanced result between theory and practice."*
	Lifelong learning	As a way of personal development, a collaborative environment enables practitioners to engage in continuous training in an academic environment (Davey et al., 2011). For interviewee [I15], *"... it allows for the development of skills aligned with the company's needs."*
	Professional and student mobility	For students, there is mobility outside the university to an environment suitable for developing skills beyond academia (Benson and Chau, 2019). This mobility leads them, as interviewee [I13] mentioned, *"to work on something more applied and more focused."* For academics, collaborative environments also generate opportunities for mobility, whether in another university or even in some company, *"which makes a huge difference that materializes in the richness of teaching"* [I25]. For practitioners, *"... it is an opportunity to go to university for some time to learn what the company needs"* [I15].
Outputs	New theories and practices	Experience in collaborative environments enables a balanced result between theory and practice, and the complementary role view is highlighted (Moeini et al., 2019). In the opinion of interviewee [I21], *"what is expected is that academia investigates, formulates, conceptualizes business*

(*continued on next page*)

Table 3 (*continued*)

	Elements	Description
		environment experiments to see if it works." Sometimes, academia initiates the collaboration process "*since it needs to corroborate some theory and the need to validate new theories*" [I24].
	Technical and scientific publications	While academia demands international publications, companies encourage and push for technical publications, which are shorter and more objective, with practical managerial applications (Tartari and Breschi, 2012) and, as interviewee [I05] indicated, "*closer to the end-user.*" Moreover, publications may involve not only academics because, as interviewee [I20] mentioned, " … *practitioners are invited to participate as co-authors*".
	Intellectual property	A possible result of the innovation process developed in collaboration with potential economic benefits is intellectual property (Lin et al., 2011). As a characteristic, interviewee [I12] highlighted " … *in projects developed in a collaborative environment the teams are freer to create, generate ideas.*" However, interviewee [I11] pondered that "*intellectual property and value sharing issues can be difficult to address.*"
	Technological products and processes	The result of new scientific knowledge, techniques, and expertise directly applied to solve problems in organizations might result in technology products and processes (OECD, 2005) that, according to interviewee [I07], " … *cause changes in the organizations' daily lives.*"
	Other outputs	For interviewee [I26], outputs can generate new content for workshops and seminars "*collaborative projects are a field that generates new content that can be shared in workshops and seminars.*" It also provides, as indicated by interviewee [I13], access to new technologies " … *which are soon assimilated and become added value*", or even data for publications "*there is a wealth of data that comes up …* " [I16], or even income as highlighted by interviewee [I25] " … *paid internships, either by companies or by the government, make it possible for students to participate.*"
Outcomes	Increase practical skills knowledge, and experience	There is an increase in people's knowledge and experience in collaborative environments. This involves at least contact with new environments and people with a different mindset (Van der Sijde, 2012). For example, interviewee [I23] mentioned "*The participation of students in collaborative projects makes them develop competencies in new and different areas.*"
	Practical application of research results	Outputs created in the collaborative environment can give rise to new ways of working in organizations, such as the implementation of new routines, practices, systems, etc., which are also perceived as benefits for the university, as they consolidate new concepts and reinforce theories (D'Este and Patel, 2007). For interviewee [I11], "*knowledge stands out for its practical side for the university, demonstrating its degree of involvement in solutions, since it has a more immediate application.*"

Table 3 (*continued*)

	Elements	Description
	New research opportunities	Collaborative projects can provide new ideas for future collaborative research projects (Nsanzumuhire and Groot, 2020). For interviewee [I14], the results of joint research can " … *serve as an insight for new research*" [I14].
	Commercialization of research	Outputs from partnerships can have commercial value and materialize into financial resources for partners (Bhullar et al., 2017). According to interviewee [I19], they " … *result in patents that can then be commercialized […] either through royalties or through the licensing agreements.*"
	New venture creation	Knowledge transfer to society can occur through the support and encouragement of entrepreneurship (Hasche and Linton, 2021). Such entrepreneurial actions can lead to new venture creations such as *spin-offs* [I11]; [I26], *spin-outs* [I21]; [I27], and even *start-ups* [I25].
	Network	Collaborative environments provide integration between various actors outside the academic environment and contact with different perspectives (Sjöö and Hellström, 2019). For interviewee [I14], " … *they allow contact with groups of excellent researchers with another scientific mindset.*"
	Curriculum update	Curricular units taught at the university may be updated due to the university's experience in the collaborative environment (Plewa et al., 2014). As interviewee [I18] stated, "*the collaborative research process can also be extended to the academic environment, which has a huge potential to be improved.*"
	Other outcomes	For students, " … *they experience new types of technologies, with a tendency to be closer to real-life*" [I02]. For partner staff, " … *as soon as the application is approved, having access to partners' human resources*" [I12]. This also happens with financial resources "*for the research groups and the institution*" [I16], as they can … enable the development of new research. Finally, organizations also benefit from the participation of students in collaborative environments: "*it is necessary to capture the best talents and develop them, which is a clear benefit for organizations as a way to recruit talent*" [I01].
Impacts	Enhance reputation	The image of organizations engaged in collaborative research improves, with the notoriety gained (Perkmann et al., 2011). For interviewee [I16], "*collaboration with companies provide prestige ≪ to universities≫≫*" and in the opinion of interviewee [I23], "*it improves the capacity to attract new students.*" Interviewee [I26] highlighted, "*companies that take part in collaborative environments, that work with differentiated methods, within an innovative culture, increase not only the satisfaction of internal employees but also the potential for the employability of talents, as the image of the organization gets stronger and stronger.*"
	Reinforce knowledge transfer	Collaborative research contexts are favourable for fostering knowledge

Table 3 (*continued*)

Elements	Description
	transfer, especially when partners have a strong absorptive capacity (De Fuentes and Dutrénit, 2012). Interviewee [I28] stated "*multidisciplinary and interdisciplinary teams in collaborative projects favor the flow of knowledge between environments with different specialities.*"
Develop R&D roadmaps	Collaborative research contexts potentiate the development of R&D roadmaps to align the partners' R&D strategy (Abramo et al., 2009). According to interviewee [I13], "*as an individual-level impact, it allows us to align our research with the companies' interests.*" Interviewee [I12] added: "*when it comes to multinationals, for a local partnership to be feasible, it is necessary to align the research with the R&D roadmap and the business plan of the parent company …. ".*
Increase knowledge breakthrough	The knowledge domain also benefits from collaborations' outputs, as it can lead to meaningful theoretical and practical increments (Van der Sijde, 2012). As mentioned by interviewee [I06], "*activities can range from basic research, for knowledge creation and advancement of theoretical knowledge, to practical applications although sometimes not in the short-term.*"
Increase employability	Staff who participate in collaborative environments tend to develop new skills and abilities, increase their network, and consequently enhance their employability (Hurn, 2016). When students are in collaborative research environments, they have several benefits, beyond the probability of continuing in the company that they are collaborating with. Interviewee [I14] indicated that "*the student gets to know the company and the company already knows the student and his or her qualifications.*"
Other impacts	The involvement of people and organizations in collaborative environments can result in the institutionalization of a collaborative culture. For example, "*change in the relationships between universities, companies, and government*" [I04]; "*change in the economic structure of the region under the influence of collaborative environment*" [I28], or even in the formulation of public policies " *… that encourage collaborative partnerships*" [I04].

implementation and reflection on activities and outcomes (Coghlan and Shani, 2018). Another path points to engaged scholarship, which con-templates the coproduction of knowledge (Van de Ven and Johnson, 2006) in an integrative vision involving problem formulation, theory building, research design, and problem solving (Van de Ven, 2018). Finally, the engagement of academia with the practical environment can also lead to the expansion of the epistemological bases with the inclu-sion of Design Science, which focuses on the construction of artefacts and prescriptive solutions (Ahlemann et al., 2013).

Underpinned by theories from various areas such as organizations, management, psychology, economics, and marketing, among others, the area of projects tries to understand the multifaceted and complex nature of current projects (Söderlund, 2011) on the way to the sustainable development of a theory of projects (Geraldi et al., 2020, 2021).

Table 4

Elements of circumstances and governance & management.

	Elements	Description
Circumstances - Drivers	Complementarity	External access to resources that the organization involved in a collaborative partnership does not have internally (Manotungvorapun and Gerdsri, 2016). As interviewee [I11] mentioned, "*partners look for resources they cannot have or access." "The know-how between partners should be complementary, which results in a synergy effect*" [I05].
	Trust	Trust is a critical factor for creating a collaborative environment in the whole collaboration lifecycle. It is a condition to be generated to develop successful collaboration (Huxham, 2003). As affirmed by interviewee [I10], "*There are personal factors that can enhance collaboration, such as past experiences with the entities […] here there is a basis of trust generated.*"
	Previous experience	The existence of people who have extensive knowledge of partners, through previous experience, facilitates the whole collaborative process, since the negotiation process and agreements signing-off until the activities development and the collaboration closure (Sjöö and Hellstrom, 2019). As interviewee [I02] asserted, "*on the university side, there are people with detailed knowledge of the companies' reality, an experience of interaction and who can identify their needs and who can benefit from an interaction with those who have skills and experience of developing applied research." However, previous experiences are fundamental, not only for the staff involved but for the organization itself; as quoted by interviewee [I26], "when a company has already had successful experience of collaborative work with a university everything becomes easier because the doors open.*"
	Motivation	Motivation is a driving force that leads toward a specific action (Hagerdoorn et al., 2000). The interviewees highlighted the need for motivation "*to generate value*" [I26]; "*start an innovation process" [I11];* or even "*share human resources and know-how*" [I16].
	Personal relationship	Once institutionalized, personal relationships and informal channels are considered critical factors in establishing partnerships (Galán-Muros and Davey, 2019). As interviewee [I09] mentioned, "*collaborative projects arise from ideas that are worked out with the network of contacts closest to the people who initiate the project idea.*" Interviewee [I07] emphasizes that "*the origin of collaborations has been very much based on personal contacts … ".*
	Other drivers	But there are also other drivers, as indicated by the interviewees: "*ambitious academics*" [I01]; "*alumni in decision-making positions*"

Table 4 (*continued*)

	Elements	Description
Circumstances - Barriers	Orientation asymmetry	*in companies*" [I02]; "*credibility of potential partner institution*" [I27]; "*professional graduate courses as favourable scenarios for addressing company problems*" [I05]. Collaborative environments can involve distinct institutional logics and broad cultural differences, and finding a common ground becomes a challenge (Garcia et al., 2018). According to interviewee [I13], "*in collaborative partnerships, there are barriers related to timing.*" For interviewee [I27], " ... *academic research and business research have different purposes*". Interviewee [I24] complements, "*companies need to reap immediate results, which the research conducted in academia cannot always satisfy*" [I05].
	People's availability	The availability of people with the necessary competences is commonly limited (Lee, 2018). According to [I02], " ... *There is also a great concern for the stability of the teams, particularly when collaborative projects end.*"
	Confidentiality	Confidentiality and fear of disclosure are an issue, especially among companies (Perkmann and Walsh, 2007). For interviewee [I26], " ... *it represents a barrier since most companies are still very closed,*" and for interviewee [I13], " ... *investigations do not advance through certain paths due to confidentiality issues.*"
	Staff with multiple roles	It is essential to have people in a collaborative environment with an exclusive dedication (Nsanzumuhire and Groot, 2020). As interviewee [I12] highlighted, "*teachers have several other activities such as teaching, supervision of graduate students, and other projects.*" Interviewee [I07] also mentioned "*the human resource departments in companies' are not available, people are involved with several other activities.*"
	Other barriers	There are also financial barriers such as: " ... *high investments to keep teams working continuously for a long-time*" [I02]; time barriers "*the lack of knowledge of another organization's culture makes sometimes the negotiation and the level of expectation not feasible within an acceptable time frame*" [I02]; cultural barriers "*university does not offer adequate conditions for its teachers to be truly involved in these projects, which consume a lot of time with work organizations, with internal and external meetings, technical visits and very close monitoring, and that later all this is not taken into consideration in the evaluation of the academic* " [I04], among others.
Governance & Management	Strategy	A strategic process is required to define precisely the partnership's purpose and direction (Albats et al., 2018), as interviewee [I27] stated, " ... *with well-established systematic processes, procedures, and*

Table 4 (*continued*)

	Elements	Description
	Governance structure	*work dynamics to enhance the achievement of benefits.*" Governance structure sets rules for the partnership operation, establishing roles and responsibilities within the entire decision-making process (Derakhshan et al., 2020). Interviewee [I13] highlighted that *" ... governance boards, such as the steering committee should be formed by elements from both university and industry ... ".*
	Stakeholder management	Stakeholder management is a critical factor for the successful delivery of collaborative projects (Fernandes et al., 2022a). For interviewee [I03], "*it is necessary to know the expectations, the responsibilities, the roles, the collaboration structures that are planned to avoid conflicts between those involved.*"
	Benefits management	Benefits management involves processes to ensure desired benefits are effectively delivered according to stakeholder expectations (Fernandes and O'Sullivan, 2021). "*Collaborative processes enable successive interactions to arrive at more valuable outcomes and benefits for stakeholders*" [I18]; "*The big challenge lies in the timelessness of benefits, the difficulty of mapping and monitoring them overtime*" [I11].
	Leadership	Leadership plays a prominent role because partners have different organizational objectives (Crosby and Bryson, 2005). According to interviewee [I27], "*in collaborative environments, it is possible to have a stronger leadership by the industry (also linked to the sense of urgency), which does not mean that in some moments, the university does not dictate its pace.*"
	Agreements	The regulation of relationships by agreements is critical for successful collaborations, for example, agreements on intellectual property, confidentiality, responsibilities, rights, and duties (Crosby and Bryson, 2005). For interviewee [I10], "*the partnership is also commonly defined previously with an agreement between partners that defines how the consortium will be organized and managed.*" Interviewee [I11] indicated possible obstacles since " ... *issues of intellectual property and value sharing can be difficult to deal with since they involve a clear and tangible definition of who is the holder of these created benefits.*"
	Assessment	It is essential to set metrics to evaluate collaboration results (Qureshi et al., 2009); as observed by interviewee [I12], "*in collaborative projects, there is monitoring and evaluation focused on ensuring the achievement of results ... *", but that comes with some challenges, as indicated by interviewee [I09], "*the projects happen simultaneously, which*

(*continued on next page*)

Table 4 (*continued*)

	Elements	Description
	Communication	*hinders the evaluation and learning processes among projects … ".* The communication process involves exchanging information between interlocutors through mutually understandable signs and rules (Griffin, 2011). For interviewee [I10], "*one of the big problems in collaborative projects has to do with the form of communication because not everyone speaks the same language … "* Interviewee [I07] also emphasized that "*the collaborative environment tends to become complex, given the difficulty resulting from the number of communication channels, communication management is therefore essential.*"
	Internationalization	Collaborative research internationalization produces expressive impacts (Fu and Li, 2016) since, as referred by interviewee [I25], "*when it involves research groups from different countries, the publication, and the visibility of articles tends to be higher.*" Companies also realize the benefits of internationalization; as stated by interviewee [I19], "*at the international level, we should identify potential partners interested in joint work, which strengthens both institutions.*"
	Students and alumni management	Students and alumni represent strong links between academia and external organizations (Straujuma et al., 2018). For interviewee [I04], "*it is common for them to involve master's and doctoral students in developing research in companies.*" In brief, " *… they < <the alumn>> become the professionals with whom the university itself interacts*" [I02].
	Knowledge management	Knowledge management corresponds to knowledge organization, creation, use, and sharing (Alavi and Leidner, 2001). According to interviewee [I24], "*one of the main purposes of establishing collaborative projects with different actors is to generate knowledge. Therefore, it is fundamental that it is not only created but also capitalized … "* [I24]. Interviewee [I27] emphasized, "*there is a perception that the knowledge generated needs to be managed more maturely.*"
	E-platform	An e-platform infrastructure consists of applications to support the collaborative environment (Kohler and Hagen, 2020). As stated by interviewee [I26], " *… management tools, such as Dashboard, Power BI, that assist the management of collaborative projects, ensure its monitoring"; " … there is a lack of decision structures with formal support systems to support collaborations*" [I03].

Complementarily, the engagement with issues faced by practitioners can lead to relevant solutions and impact the decision-making processes of organizations (Flyvbjerg et al., 2009), increasing the connection between practitioners and academics and the mutual benefits (Picciotto,

Table 5
Elements of context.

Elements	Description
Environmental factors	A fixed environment that hosts the collaboration interferes with its functioning (Perkmann et al., 2013). "*When looking from a more general perspective, it may not be a good strategy to develop a single collaboration model because context is always a determining factor*" [I11]. "*In certain countries, academia is seen as an enabler, something that can contribute and is worth collaborating with*" [I06]. "*Public policies need to be created that are aligned with the academia-industry relationship and understand that it brings added value to the economy*" [I02]; "*There have to be public incentives to break the ties that limit the collaboration of universities with industry, which distance academia from the business world*" [I06]. There are also other essential factors such as "*legal factors*" [I08] or "*geographic distance*" [I15].
Organizational factors	Organizations may be more predisposed to work in collaboration than others, such as those that privilege R&D (Perkmann et al., 2013). "*Organizational culture is seen as the main barrier to participating in collaborative environments*" [I26]; "*there is also a perception that academic culture is not prepared to value collaboration and its practical outputs*" [I04].
Individual factors	Personal characteristics interfere with people's predisposition to participate in collaborative environments (Perkmann et al., 2013), such as " *… people with enough openness to realize that they know little and have to go looking for help to know more*" [I22]; "*A large part of university researchers do not have experience in working collaboratively with external actors*" [I26]; "*For people to participate in collaborative environments and truly deliver results, they need to feel socially safe in that space*" [I18].

2020).

5.2. Impact Generation Process – knowledge exploration and knowledge exploitation

Many organizations have formed partnerships that exploit existing knowledge and explore new knowledge collaboratively (Im and Rai, 2019). Interorganizational partnerships can help balance the exploration and exploitation of organizations considering different contexts (Korbi and Chouki, 2017). Partners can engage in ambidextrous knowledge sharing (Im and Rai, 2019) or even co-create new knowledge (Holmqvist, 2004). In terms of knowledge management strategies, a balance can be achieved initially through partner choice and during partnership formation (Lavie and Rosenkopf, 2006). High performing partnerships are often unbalanced within knowledge domains (Penney et al., 2020). However, some balance tends to be achieved over time as interactions occur and the partnership evolves (Filippini et al., 2012). Lee and Kim's (2019) study reveals that a balance between exploration and exploitation is beneficial for the performance of organizations, and collaboration (explorative) is even more useful for companies that emphasize exploitation internally.

The macro-elements proposed in this URC-Project Studies framework reinforce the role of internal and external environments in the processes of exploration and exploitation of knowledge in the university environment (Centobelli et al., 2019). On the one hand, exploitation increases university performance through refining, updating, and controlling existing skills and practices (McClure, 2016), as well as asset efficiency through improvements in available technologies, capabilities, and abilities (Rubino and Freshman, 2005). On the other hand, exploration activities enable the reconfiguration and development of the university's competencies (Etzkowitz, 2017), leading to new research opportunities and considerable performance in a long-term perspective (Lavie et al., 2010).

Partner selection may consider contextual, and organizational factors, mutual benefits (Plewa et al., 2013), and use as many subjective methods for selection as objective methods (Manotungvorapun and Gerdsri, 2021). However, interview data analysis has indicated that the
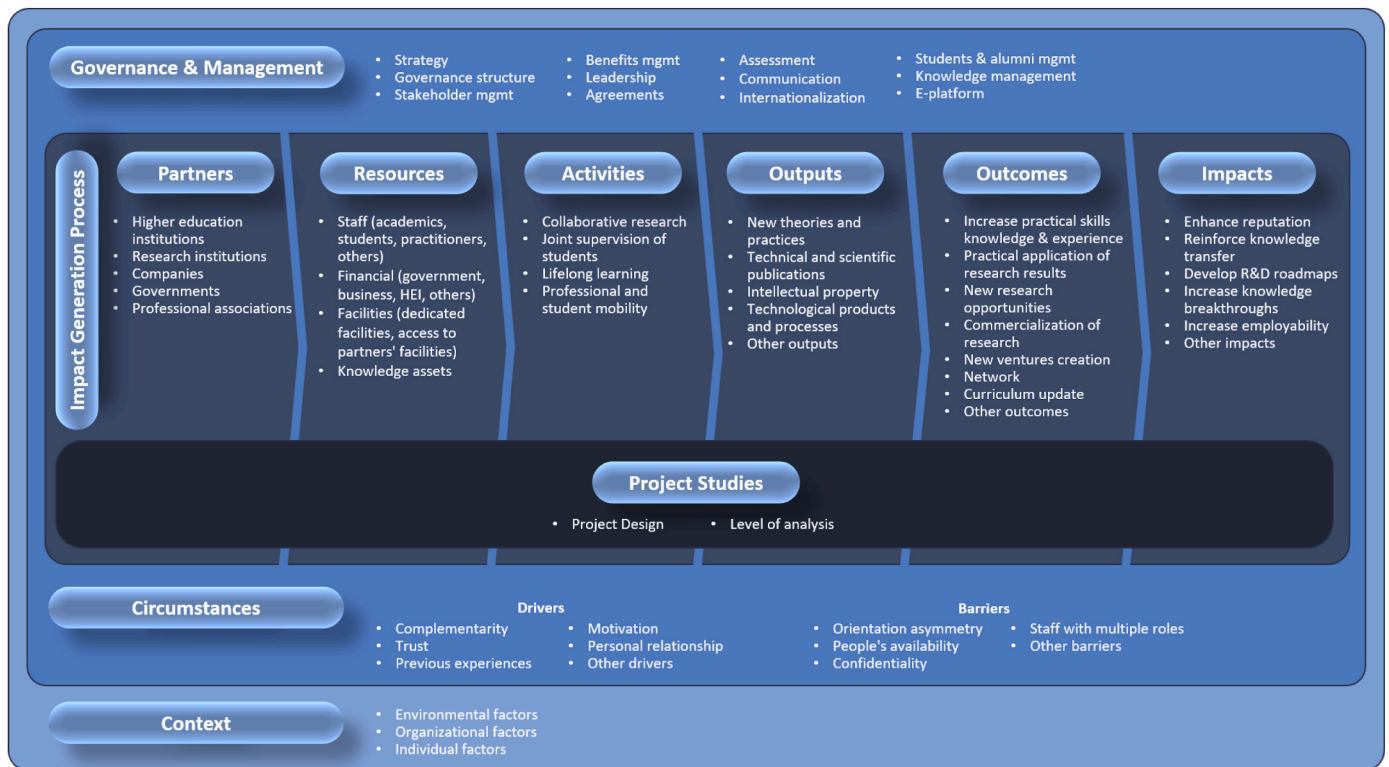
Fig. 3. URC-project studies framework.

choice of partners does not only include objective criteria, which could, according to Jee and Sohn (2020), result in a wrong selection of partners.

In addition to encompassing staff and finances (Daoud et al., 2017), the interviews revealed that resources also include facilities and knowledge assets. As Ramli and Senin (2015) identified, academics may face difficulty in accessing facilities due to their high cost or even lack of funds from universities. Knowledge assets represent the broad set of knowledge available in the organization itself or outside it, potentially forming the basis for the knowledge creation spiral in collaborative environments (Vijayan et al., 2018).

Collaborative environments open a wide range of possible 'Activities' such as: 'Collaborative research' (Cohen et al., 2002), 'Joint supervision of students' (Arinaitwe, 2021), 'Lifelong learning' (Davey et al., 2011) and 'Professional and student mobility' (Benson and Chau, 2019). However, extrapolating the scope of Vangen et al. (1994), the concepts of research partnerships, contract research and academic consultancies were not included in the framework as they are characterized by asymmetric relationships (Perkmann and Walsh, 2007).

One of the critical 'Outputs' identified was the development of 'New theories and practices'. A direct way to increase the practical relevance of collaborative investigations is to motivate researchers to examine emerging and impactful domains of theory application and develop new theories (Moeini et al., 2019). In this environment, other outputs that stand out are 'scientific and technical publications' (Tartari and Breschi, 2012), given their importance for academics, as they can have a bearing on the centrality of their status with the scientific community (Sjöö and Hellstrom, 2019). Co-authorship with practitioners is an indicator for characterizing university interactions with external actors (Kohus et al., 2020). But also 'Intellectual property' is another important output of these collaborations (Lin et al., 2011).

'Practical application of research results' (D'Este and Patel, 2007) and 'New research opportunities' (Nsanzumuhire and Groot, 2020), mentioned by interviewees as 'Outcomes', which are direct benefits for academics involved in collaboration, as they can directly affect research

agendas. An increase in the practical application of skills, knowledge and experience stood out as a benefit from the perspective of academics, as in Van der Sijde (2012), who pointed out the potential gain for students with the development of their competence and knowledge in a specific content area as well as the experience of working together with a company and university in the search for new knowledge. A strong motivator for establishing collaborations, whether for a university or even external partners, is the possibility of 'Commercialization of research' (Bhullar et al., 2017). Collaborative environments can also give rise to entrepreneurial actions and knowledge transfer with 'New venture creation' (Hasche and Linton, 2021), seen as a benefit mainly for the students involved. The expansion of the staff 'Network' is a benefit perceived by both academia and industry (Sjöö and Hellström, 2019). An essential outcome of participation in a collaborative environment is the potential for 'Curriculum updates', improving the student learning process (Plewa et al., 2014) and curriculum alignment to meet business needs.

The interviews highlighted 'Enhanced reputation' as an impact on the organizations involved (Perkmann et al., 2011). On the university side, the recognition by the academic community increases because it is seen as a holder of specific knowledge (Fernandes and O'Sullivan, 2021). On the companies' side, the connections with universities also improve their reputation, besides demonstrating their proximity to important sources of innovation (Mascarenhas et al., 2018). Another impact generated by collaborative environments is 'Reinforce knowledge transfer', especially when partners have a high absorptive capacity (De Fuentes and Dutrénit, 2012). Collaborative research leads to 'Increase knowledge breakthroughs', with gains in societal capital and science domains and their unfolding in cultural capital, strategic capital, network capital, and economic capital (Van der Sijde, 2012). A significant impact for students involved in collaborative environments is to 'Increase employability'. For Hurn (2016), immersion in this collaborative environment has a notable effect on engagement, performance, and the development of new competencies.

5.3. Circumstances, Governance & Management, and context – a macro level perspective on knowledge co-creation

In addition to the knowledge conversion process, which takes place during the Impact Generation Process, we should consider the macro level perspective on knowledge creation, including the macro-elements of 'Circumstances', 'Governance & Management', and 'Context' since they influence the knowledge creation and conversion processes, whether in exploration or exploitation (Solís-Molina et al., 2020; Úbeda-García et al., 2019).

On the one hand, 'Circumstances' can take the form of drivers. 'Complementarity' is one of the main drivers identified since it is crucial to the collaboration performance (Manotungvorapun and Gerdsri, 2016). The empirical findings bring additional support to the literature relating to 'Trust' as a necessary condition to develop successful collaborations (Huxham, 2003) and that 'Previous experiences' are critical, not only for the staff involved but for the organization itself (Sjöö and Hellstrom, 2019). Furthermore, 'Motivation' to participate in collaborative environments (Hagerdoorn et al., 2000) enhances innovative capabilities and external resource sharing. Interviewees also indicated that 'Personal relationships' are critical for developing collaborative partnerships (Galán-Muros and Davey, 2019).

On the other hand, 'Circumstances' can also take the form of barriers. A key barrier is 'Orientation asymmetry' such as differences in research priorities and deadlines (Garcia et al., 2018) and cultural and strategic differences (Nsanzumuhire and Groot, 2020). Given the temporality of collaborative environments, 'People's availability' can also be seen as a barrier, especially to those staff with no ties to the organizations involved in the collaboration - the commitment of the organization to its members and the project in these cases is more limited (Lee, 2018). Other barriers are 'Confidentiality', especially on the side of external organizations, with the need for secrecy and fear of inappropriate disclosures (Perkmann and Walsh, 2007), or 'Staff with multiple roles', as in the case of academics, teaching, research, and administrative commitments, allowing limited time for collaborative research work (Nsanzumuhire and Groot, 2020).

There are multiple Management challenges faced in collaborative environments that need to be overcome to achieve success (Fernandes et al., 2022b). There is also a need for a common 'Strategy' between partners with well-defined goals, and roles and responsibilities (Albats et al., 2018); a 'Governance structure' with clearly defined rules for collaboration (Derakhshan et al., 2020); a 'Stakeholder management' considering multiple perspectives (Fernandes et al., 2022a); and a 'Benefits management' bringing together the stakeholders' expectations (Fernandes and O'Sullivan, 2021).

The signing and management of 'Agreements' or contracts between partners was a recurring topic during the interviews. Its importance lies in the discussion that precedes the signing, which increases trust and clarity of objectives to mitigate risks of disputes involving intellectual property, publication rights and confidentiality (Borrell-Damian et al., 2010). The results of the interviews indicate that 'Assessment' in collaborative environments involves multiple dimensions, such as project performance (Qureshi et al., 2009), project success (Bozeman et al., 2012), collaboration success (Fernandes et al., 2019), and benefits delivery (Fernandes et al., 2017), among others. 'Communication' between partner organizations is also critical for success in partnership (Marinho et al., 2020). Furthermore, as emphasized by the interviewees, the 'Internationalization' of collaborative research enables more radical innovations (Fu and Li, 2016) and indicates high-quality research (Kim, 2006).

The interviewees highlighted the role of students and alumni in collaborative environments as they form essential assets for any university. 'Students and Alumni management' brings several advantages (Straujuma et al., 2018) and maintaining their network can contribute to greater engagement with external institutions (Awasthy et al., 2020; Davey et al., 2018). In addition, 'Knowledge management' is highlighted

as an essential asset for maintaining competitive advantage (Sallis and Jones, 2013), namely for universities (Fullwood et al., 2013). Finally, the respondents highlighted the need for an 'E-platform' to facilitate management and communication either in the collaborative environment or externally (Kohler and Hagen, 2020).

The fourth macro-element refers to 'Context'. The research results show that the context influences collaboration in its various dimensions. 'Environmental factors' have been identified and analyzed in previous studies with an emphasis on governmental financial stimulus (Veugelers and Cassiman, 2005), industrial composition (Bergebal-Mirabent et al., 2013), geographical proximity (Segarra-Blasco and Arauzo-Carod, 2008), and even cultural issues, either bringing the world of academics and practitioners closer or pushing them further apart (Sjöö and Hellström, 2019). 'Organizational factors' such as culture and field of knowledge, reported by the interviewees, influence the predisposition to participate in collaborative environments. Other authors have already acknowledged the field of practice (Yu Cheng et al., 2013), the size of the organization (Rajah & VGR, 2009) and innovation culture (Kowang et al., 2015). 'Individual factors' also play an essential role in predicting engagement in collaborative environments (Perkmann et al., 2013). On the one hand, as signaled by Tartari and Breschi (2012), academics' concern for their academic freedom, and fear of losing it by engaging in collaborative environments, may prevent them from pursuing such collaborative initiatives. On the other hand, commercialization, patenting, or creating ventures increases the likelihood of academics' participation in collaborative activities (Bekkers and Bodas Freitas, 2008), as well as previous experiences, also affect individuals' engagement and collaborative behavior (D'Este and Patel, 2007).

6. Conclusions

This paper proposes a framework for supporting Project Studies in the context of University Research Centers (URC) collaborating with external organizations. The study starts from an initial framework developed based on the literature (Moutinho et al., 2023), which was then enriched with empirical data from twenty-eight interviews with academics, practitioners, and PhD students. The URC-Project Studies framework proposed brings theoretical and practical contributions and provides opportunities for future research.

It extends the theoretical understanding of the area of projects from a macro level perspective and emphasizes the relevance and rigor of Project Studies research (Geraldi and Söderlund, 2018; Geraldi et al., 2021). It uses the URC context, which brings together academics and practitioners to discuss theoretical and practical issues of projects in a collaborative logic of co-exploration and co-exploitation of knowledge to respond to recent calls in Project Studies (Brunet, 2022). The research also provides empirical evidence concerning the importance of engaged scholarship, the active role of academics and practitioners in Project Studies, and potential implications for society. This URC-Project Studies framework reinforces the importance of developing engaged research and may be seen as a support to propose more robust theories and lead, in practice, to better project performances.

Studies involving knowledge in URCs have predominantly focused more on the scope of knowledge transfer (Valmeekanathan et al., 2021; Vargas and Villazul, 2019) and less on the knowledge creation process, as well as even on structuring the respective "Ba" for knowledge co-creation. Thus, this study contributes to theory by including and discussing outcomes and impacts, which derive from co-created knowledge, in the URC context. It also explores the concept of "Ba" with a proposal for structuring, organizing, and operationalizing it. It considers, in addition to the knowledge conversion process carried out mainly during the collaborative activities presented in the 'Impact Generation Process', the macro-elements of 'Governance & management', 'Circumstances' and 'Context' since such processes necessarily occur in a specific context (Nonaka and Konno, 1998). Further, the URC-Project Studies framework proposed here provides an integrated view of

the concepts of "Ba", knowledge conversion, and knowledge assets from a process view ('Impact Generation Process') as a contribution to the theory of organizational knowledge creation. This culminates with the generation of impacts on individuals, organizations and society and brings important practical contributions, in that it provides a common understanding of the knowledge co-creation environment. Its primary function is to support the actors directly involved in decision-making, leading to more effective collaborations and the generation of more meaningful impacts.

The second practical contribution is to URCs. By allowing, simultaneously, a holistic view, considering the context in which it is inserted, with an integrative perspective, by the inclusion of management and governance processes considering the circumstances; and a process view, with the description of the elements that lead to the generation of knowledge. It also develops a complementary perspective to the translation of knowledge produced by URCs (Valmeekanathan et al., 2021), with the co-creation of knowledge and practitioners in an engaged research logic (Tekic et al., 2022; Van de Ven, 2018).

Additionally, URC-Project Studies managers have access to a valuable strategic tool to guide the URC's actions and manage relations with external actors. The framework is flexible, adaptable, scalable, and open to customizing elements according to the URC's context. The framework can also serve as an instrument of communication between URC-Project Studies and external actors, guiding and shaping the dynamics of collaboration. Establishing a common language works as a bridge between actors that have origins in organizations that often have distinct institutional cultures and logic. It is expected that the adoption of this framework would have positive impacts on the form of relationships and especially on the intended results.

This research study has added empirical evidence to the initial framework, the underlying concept for which had been based on a literature review. However, the results are based on a sample of twenty-eight interviews, comprising only Lusophone interviewees. Thus, possible cultural and social influences on the elements identified should be considered by comparing with any results from people from other cultures. However, such limitation does not invalidate the findings since previous studies such as Fitjar and Gjelsvik (2018) indicated a prevalence of national collaborations, which mitigate differences between cultural issues.

This study opens the possibility for further research, such as the evaluation of the framework by academics, practitioners, students, and alumni in the light of criteria, such as: completeness, simplicity, elegance, fidelity to real-world phenomena, internal consistency/coherence, robustness, scalability, ease of use and effectiveness (Sonnenberg and vom Brocke, 2012; Prat et al., 2015). The practical usefulness of this framework could be demonstrated were it to be applied in specific contexts, the specific characteristics of which might lead to valuable adaptations and refinements. Other scientific fields that develop collaborative research, such as "Innovation Studies" or even "Quality Management Studies", could explore the framework to see whether new elements would be added.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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