THE UNIVERSITY OF NOTTINGHAM

THE DEVELOPMENT OF ENTREPRENEURIAL COMPETENCIES

A TRANSDISCIPLINARY APPROACH

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Abstract

Entrepreneurial competencies are a major topic of interest within the field of entrepreneurship, providing a better understanding of the generation and development of new ventures across different settings (Ardichvili, Cardozo, & Ray, 2003; Chandler & Jansen, 1992; Hayton & Kelley, 2006). In the area of academic entrepreneurship, the work of Rasmussen and colleagues (Rasmussen, Mosey & Wright., 2011, 2014, 2015; Rasmussen & Wright, 2015) have recognised that entrepreneurial competencies play a critical role in the development of university spinoffs. However, what is not yet clear is the impact of the broader context of academic entrepreneurship on entrepreneurial competency development.

Scholars have argued for the existence of an emerging entrepreneurial ecosystem in universities (Wright et al., 2017), with calls to evaluate contemporary changes (Siegel and Wright, 2015), considering different stakeholders (Nabi et al., 2017) and emphasising the evaluation of the social impacts of these activities (Fini et al., 2018). At the same time, universities have been called to build collaborative strategies with the participation of non-academic actors to adequately address the challenges facing society (Lang et al., 2012), recognising that complex social challenges cannot be addressed by academe alone. Instead, it requires a paradigm shift, coalescing within the literature as transdisciplinarity (Gibbons et al., 1994; Lang et al., 2012; OECD, 2020).

This thesis defines transdisciplinarity within academic entrepreneurship as “a collaborative process to address societal problems, bringing together scholars from different disciplines and non-academic actors from society, who integrate their knowledge to find transferable solutions to society, which can be exploited through entrepreneurial activities”. Moreover, to differentiate these novel elements of the entrepreneurial ecosystem, this research defines the new actors of such entrepreneurial activities as ‘university entrepreneurs’ and their entrepreneurial projects as ‘non-traditional new ventures’.

Empirically, this thesis explores the potential impact of transdisciplinarity upon developing competencies by following projects that participated in the intervention 'Ingenuity19' at University of Nottingham. Ingenuity 19 encouraged social and environmental challenges to be addressed through the interaction of academic and non-academic actors. Using a qualitative multiple-case study research design,13 cases are investigated longitudinally, representing a variety of industrial sectors, disciplinary perspectives and founders such as students, alumni and individuals who are not directly involved in academic activities.

The findings of this study show that a transdisciplinary setting influences the development of entrepreneurial competencies (Opportunity Development Competency, Championing Competency and Resource Acquisition Competency) for non-traditional new ventures. In this vein, the evidence reveals that competency development was influenced before, during and after participation in the entrepreneurial intervention, supporting the idea of an evolving process of competency development (Ahuja & Katila, 2004; Rasmussen et al., 2011).

The thesis also explores the impact of this intervention at the individual level of university entrepreneurs, indicating a positive effect on developing individual skills such as opportunity recognition and evaluation, communication, and confidence. Further, building upon Stokols et al. (2008), this thesis also identifies institutional, interpersonal and intrapersonal enablers and barriers as factors that influence the entrepreneurial process of non-traditional new ventures.

This research concludes that transdisciplinarity is an appropriate research context to contribute to the study of academic entrepreneurship study, as it reveals new insights into competency development within entrepreneurial universities (Urbano & Guerrero, 2013) Finally, recommendations for research, educational practice, and policy are proposed.

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Chapter I: Research Introduction

The development of Entrepreneurial Competencies through a transdisciplinary approach

1.1. Chapter Overview

The primary purpose of this chapter is to provide an initial outline of the research area, research topic and research context in which this investigation is framed. Likewise, the depth of discussion of each theme is limited to ensuring continuity and to prepare for what will be discussed in the following chapters. In doing so, the chapter is divided into eight sections. Section 1.1 introduces academic entrepreneurship as a research domain that frames this study. Section 1.2 presents Entrepreneurial Competencies as the theoretical framework of this thesis. Section 1.3 introduces transdisciplinarity as an emergent collaborative mechanism that can provide new insights into the study of academic entrepreneurship and entrepreneurial competencies development. Then, Section 1.4 presents an overview of the research context focused on the University of Nottingham and the programme "Ingenuity19". The following sections will present the research question and objectives, research design, research contributions, and finally, the structure of the thesis.

1.2. Academic Entrepreneurship

Over the past 40 years, academic entrepreneurship has become a relevant area in entrepreneurship research (Hayter et al., 2018; Miranda et al., 2018; Mustar et al., 2006; O'Shea et al., 2004; Rothaermel et al., 2007). The literature on academic entrepreneurship explores how entrepreneurial activity occurs within higher education institutions, with emphasis on the nature, antecedents, and effects of academic entrepreneurship (Yusof & Jain, 2010). Scholars have argued that this body of literature can be classified into four main areas (Miranda et al., 2018; Rothaermel et al., 2007): productivity of Technology Transfer Offices (TTOs), entrepreneurial research universities, new firm creation and environmental context. The results have shown that universities have become "entrepreneurial" institutions,

where the generation of new ventures has been established as an appropriate pathway to transfer academic knowledge produced by research activities into practical applications for business and as a direct benefit to society (Miranda et al., 2018). As a result, academic entrepreneurship has been accepted by the academic community as a strategic goal of universities, being included as a “third mission” of these institutions (Goethner & Wyrwich, 2020). Furthermore, considering the current context of the world crisis in different areas such as the environment, economy and health, this body of literature has even more relevance in days when universities should take centre stage in providing solutions to those issues by providing practical ways to transfer knowledge to the different needs that society is facing (Sinell et al., 2018).

In 2015, Siegel and Wright called upon the academic community to evaluate academic entrepreneurship from a broader perspective due to changes observed in the context where entrepreneurial academic activities are developed. In the 1980s and 1990s, Technology Transfer Offices were the organisational units in charge of activities related to patents and licences of scientific research for commercial purposes. Nowadays, universities integrate entrepreneurship as part of their institutional missions, highlighting the economic and social impact of these activities. As a result, more stakeholders are involved in the activities developed in the entrepreneurial ecosystem, such as business plan competitions, garages and incubators, and in turn, higher education institutions have developed a strategic approach to promote academic entrepreneurship at all organisational levels (Aguinis et al., 2014; Siegel & Wright, 2015). Therefore, significant changes have been observed in the research area of academic entrepreneurship that should be considered for an adequate understanding of the current state of the art of this phenomenon.

Recent research confirms those changes by including new actors and activities considered part of the university entrepreneurial ecosystem (Hayter et al., 2017, 2018; Wright et al., 2017). This research follows this invitation by including individuals involved in current academic entrepreneurial activities, such as students,

alumni, or other actors from the community, who are defined in this study as university entrepreneurs, in order to explore their experiences within academic entrepreneurship and how they interact with the more traditionally studied academic actors of entrepreneurial ecosystems.

Similarly, as the elements of analysis of the context and future scenarios proposed by Siegel & Wright (2015) regarding academic entrepreneurship, the authors argue that research should consider these new modes and activities that are emerging in this context and, at the same time, evaluate the extent to which they complement traditional mechanisms of entrepreneurial ecosystems. In this sense, the transition is from the perspective of traditional academic spinoffs, licensing and patents generated by TTOs or science parks towards new formats of academic entrepreneurship, such as student and alumni new ventures or entrepreneurially equipped students generated in broad ecosystems that include entrepreneurship programmes as incubators or student business plan competitions supported by collaborative networks with industry and alumni.

Building on this argument, this research explores ventures that are being developed within entrepreneurial university ecosystems but are different from the traditional perspective of university spinoffs, where the emphasis is on the transference of academic knowledge (research) and the commercialisation of intellectual property (Djokovic & Souitaris, 2008) in projects led by academics with the support of surrogate entrepreneurs (Ben-Hafaïedh et al., 2018).

To formally recognise these novel types of projects in the context of academic entrepreneurship, this research proposes to conceptualise them as non-traditional new ventures. For example, entrepreneurial projects whose opportunities have been identified from academic work (scientific or technological), where university entrepreneurs have been involved (through dissertations, assignments and evaluations).

Likewise, this research evaluates projects whose ideas have arisen in situations other than those of academic training. For example, entrepreneurship projects

identified and developed by locals outside the university environment community, but after they participate successfully in open training programmes and competitions at universities, they are invited to keep improving their businesses with the support of the university entrepreneurial ecosystem. As discussed in Chapter II, academic entrepreneurship has several research areas, from individual determinants to institutional and contextual influences. However, following Rasmussen et al. (2011), this research focuses on the area of Entrepreneurial Competencies as a theoretical framework. More specifically, considering this new scenario of university entrepreneurs and non-traditional new ventures, this research explores the development of entrepreneurial competencies in this context.

1.3. Entrepreneurial Competencies

Competencies emerged as a research area in entrepreneurship from the possibility of exploring the relationship between the entrepreneurial performance of emerging new ventures and the individual characteristics of entrepreneurs and their role in leading those projects (Chandler & Jansen, 1992). This theme has been consolidated and strengthened over the years due to its potential for contribution in terms of theory and practice to entrepreneurial activity by providing new insights into the understanding of new venture generation and development across different settings (Ardichvili et al., 2003; Chandler & Jansen, 1992; Hayton & Kelley, 2006).

Scholars have defined competencies from an individual perspective emphasising the role of knowledge, skills and personal traits applied in a particular situation in aiding superior entrepreneurial performance (Hayton & Kelley, 2006; McEvoy et al., 2005). Similarly, material resources have been recognised as part of the competencies that contribute to reaching entrepreneurial objectives (Danneels, 2002).

Two main perspectives can be identified in the literature related to the study of entrepreneurial competencies in an academic entrepreneurial context. From one side, as mentioned, scholars have studied competencies from an individual point of

view. In this sense, competencies are related to skills, knowledge, attitudes and personality traits (González-López et al., 2019; González Moreno et al., 2019; Morris et al., 2013; Williams Middleton et al., 2019) that are manifested in entrepreneurial behaviour (Man et al., 2002; Mitchelmore & Rowley, 2010) and those competencies can be influenced by learning processes (Oosterbeek et al., 2010; Sánchez, 2011, 2013) (teachability perspective and the result of educational programmes). However, those studies are not focused on the later stages of the entrepreneurial process. Therefore, they are limited in effectively evaluating entrepreneurial competency under realistic venture creation and development settings. It means entrepreneurial projects beyond the idea generation phase, being already in the initial stages of implementation or commercialisation of their products or services.

From the other side, scholars have focused on the study of entrepreneurial competencies as drivers of venture formation, where the emphasis is to evaluate the capacity of new ventures to acquire entrepreneurial competencies over time, considering initial conditions where the project emerges, evaluating the influence of the university ecosystem (Rasmussen et al., 2011, 2014; Rasmussen & Wright, 2015) and how those competencies contribute to entrepreneurial development.

Although there are different conceptualisations for individual competencies, it is possible to identify coincident categories that emphasise the meaning of the different competencies. In this sense, competencies can be grouped into the following categories: Identification of entrepreneurial opportunities, obtaining resources, human agency (motivation) and relational competency (communication) (see Chandler & Jansen, 1992; Hayton & Kelley, 2006; Man et al., 2002; Mitchelmore & Rowley, 2010; Rasmussen et al., 2011). In this regard, three competencies have been defined in an academic context (Rasmussen et al., 2011; Rasmussen & Wright, 2015).

- Opportunity Development (ODC): The ability to discover opportunities based on scientific research and to further refine these opportunities into a viable business concept

- Championing (CC): The ability to identify with the venture and to convince others to contribute to its development
- Resource Acquisition (RAC): The ability to develop and integrate the internal and external resources needed to develop the venture.

Considering that entrepreneurial competencies have been studied in different settings and contexts, it seems reasonable to argue that the framework proposed by Rasmussen and colleagues is a more appropriate approach to address the nature of academic entrepreneurship and the purpose of this thesis, which focused on university entrepreneurs (individuals that are practising entrepreneurial activities under an academic setting) and the development of non-traditional new ventures. However, there is still a research gap on how those competencies can be developed under the current context of academic entrepreneurship, which is explained as follows.

1.4. Transdisciplinarity: a Novel Context for Academic Entrepreneurship and the Study of Entrepreneurial Competency Development

As an activity developed by modern universities, academic entrepreneurship congregates various disciplines that provide the necessary knowledge inputs to carry out different entrepreneurial activities (Wright et al., 2007). In this sense, scholars have recognised the need for cross-disciplinary collaboration that enhances entrepreneurial ecosystems (Brennan & McGowan, 2006), where actors from outside higher education institutions should also actively participate (Yusof & Jain, 2010), such as industry experts or individuals with professional backgrounds that complement the needed expertise to develop entrepreneurial projects.

Based on the above, it can be argued that the nature of academic entrepreneurship is sustained in the permanent interaction of individuals who can balance different

knowledge, skills, and experiences to carry out a generation of applied knowledge to entrepreneurial objectives (O'Shea et al., 2004). Therefore, it seems reasonable to say that academic entrepreneurship depends on collaborative approaches to be effective. In this sense, scholars have argued that universities require a transdisciplinary approach to improve entrepreneurial ecosystems (Urbano & Guerrero, 2013). This means that higher education institutions should encourage interactions among different disciplinary perspectives, but it also requires collaborative meeting points with different industries as well as public and private institutions that allow the development of entrepreneurial activities.

The question is, what are we talking about when we discuss transdisciplinarity? When searching the literature for concepts related to collaboration mechanisms, terms such as multidisciplinary and interdisciplinary tend to be widely recognised (Choi & Pak, 2006; K Huutoniemi, 2010a). However, although both approaches recognise the collaborative or complementary nature between disciplines for generating knowledge and achieving some objectives, both are limited regarding the integration of non-academic actors.

While multidisciplinarity focuses on an additive (disciplinary independent) collaboration mechanism, interdisciplinarity focuses on the permanent interaction of academic disciplines. In this context, transdisciplinarity provides a more adjusted alternative in light of the reality of academic entrepreneurship since its origin responds to the need to generate collaboration mechanisms, including those non-academic actors (Choi & Pak, 2006) as a new perspective of the generation of knowledge (Hessels & van Lente, 2008). Moreover, this integration of multiple actors seeks to bring together the appropriate conditions that allow addressing and solving real/social challenges that society is facing (Di Iacovo et al., 2016; Hadorn et al., 2008; Lawrence & Després, 2004; Schauppenlehner-Kloyber & Penker, 2015; Zscheischler & Rogga, 2015).

After an extensive literature review of collaboration and transdisciplinarity (see Chapter II), this research defines this phenomenon through a working definition applied to the academic entrepreneurship context. In doing so, transdisciplinarity is

defined as “a collaborative process to address societal problems, bringing together scholars from different disciplines and non-academic actors from society, who integrate their knowledge to find transferable solutions to society, which can be exploited through entrepreneurial activities”.

Bearing in mind the call of scholars to generate social impacts through academic entrepreneurship (Fini et al., 2018) and the fact that university activities must be linked to the world of practice (Yusof & Jain, 2010), academic entrepreneurship activities require this non-academic complement (Urbano & Guerrero, 2013). This thesis argues that transdisciplinarity is a plausible alternative to be implemented in entrepreneurial ecosystems. Therefore, this research contributes to the understanding of transdisciplinarity in the study of academic entrepreneurship.

1.5. Research Question and Research Objectives

Considering the literature on academic entrepreneurship and its current context that generates research gaps in the field, this research focuses on exploring the development of entrepreneurial competencies (Rasmussen et al., 2011). These gaps offer the research opportunity to explain how transdisciplinarity as a collaborative mechanism offers novel insights to understand entrepreneurial competencies development better. While prior studies include some elements of the current context of academic entrepreneurship in the study of entrepreneurial competencies from an individual perspective (Treanor et al., 2020), this research contributes to this area by empirically evaluating an emerging perspective of collaboration such as transdisciplinarity.

In the university entrepreneurial ecosystem, it is possible to observe different activities and cooperation mechanisms among different university actors, which shows that collaboration is a fundamental part of the nature of the entrepreneurial phenomenon in universities (Hayter, Nelson, et al., 2018). This research focused on

evaluating an entrepreneurship training programme that concluded with a business plan competition, where the characteristics of transdisciplinarity can be observed.

Scholars have reported that the main objectives of entrepreneurial competitions as an entrepreneurial intervention are: (1) to provide an appropriate experiential learning process, (2) to frame an entrepreneurial idea into a viable business proposal, (3) to encourage participants to pursue an entrepreneurial career, (4) to help in the generation of entrepreneurial skills, (5) to provide a networking platform for mentoring and contacts for future venture development, and (6) to give initial soft funding and provide links with potential investors (e.g., Fichter & Tiemann, 2020; Huster et al., 2017; Kwong et al., 2012; Russell et al., 2008; Watson et al., 2018).

Contrasting these objectives with the definition of entrepreneurial competencies (ODC, CC RAC) (Rasmussen et al., 2011), it is possible to suggest that this type of activity could impact the development of each one of them. However, except for Treanor et al. (2020), few researchers have explored the potential impact of business plan competitions on entrepreneurial competencies development. In this sense, prior research has focused on entrepreneurial competitions and their effects, mainly at the individual level of participants and in a short-term evaluation period, with emphasis on individual capabilities such as communication skills, motivation for entrepreneurial careers and self-confidence (Huster et al., 2017; R. Russell et al., 2008; Watson et al., 2018). Therefore, this research explores how entrepreneurial competitions can be a platform for developing entrepreneurial competencies.

Regarding transdisciplinarity and competitions, these activities have included sustainability and social development as part of the challenges to be addressed in the interventions (Fichter & Tiemann, 2020; Huster et al., 2017; Kwong et al., 2012). Thus, it is possible to affirm that by including those elements as a framework, the participants will be trying to solve challenges framed within the definition of transdisciplinarity. Additionally, interactions through mentoring and networking are a fundamental part of the design of these activities (Russell et al., 2008; Watson et al., 2018). In the case of the research context, the programme was defined with programmed activities where participants could meet individuals with different

academic and professional experiences, which generated instances of interaction and collaboration that can be considered under the working definition of transdisciplinarity.

Therefore, the research question that this research seeks to examine is:

How does a transdisciplinary entrepreneurial competition influence the development of entrepreneurial competencies and what are the enablers and barriers in this process? It is argued that this research question can contribute to the theory and practice of academic entrepreneurship. For theory, this study can provide new knowledge in several respects: first, to conceptualise transdisciplinarity in the context of academic entrepreneurship; second, whether or not entrepreneurial competencies can be developed in this setting; third, to evaluate how a transdisciplinarity context can affect the development of entrepreneurial competencies; fourth, to identify enablers and barriers observed in a transdisciplinarity context that may affect the development of entrepreneurial competencies and, as a result, the development of entrepreneurial projects.

For academic entrepreneurial practice, this research can contribute by providing new insights to universities and policymakers in a few areas: first, to evaluate the design, implementation and results of a transdisciplinary entrepreneurial intervention; second, to evaluate the impact of a business plan competition in the potential development of entrepreneurial competencies; and third, to explore other impacts of this type of activities (general skills development) in a broader set of participants recognised in entrepreneurial ecosystems (alumni, students, individuals from the community).

Based on the above, five research objectives were defined:

1. To conceptualise transdisciplinarity in the context of academic entrepreneurship.
2. To identify and examine the potential impact of an entrepreneurial intervention carried out in a transdisciplinary context in developing entrepreneurial

competencies, focused on non-traditional new ventures led by university entrepreneurs.

3. To identify and examine the potential impact of an entrepreneurial intervention carried out in a transdisciplinary context at the individual level.
4. To identify and examine possible enablers and barriers observed in a transdisciplinary entrepreneurial intervention that can affect the entrepreneurial process of non-traditional new ventures led by university entrepreneurs.
5. To discuss how enablers and barriers observed in a transdisciplinary entrepreneurial intervention can facilitate or hinder the development of entrepreneurial competencies.

1.6. Research Design and Research Context

The research methodology of this research follows a qualitative approach. The empirical examination of the research question and the research objective consists of a multiple-case-study research design where 13 entrepreneurial projects are analysed with a longitudinal approach after their participation within an entrepreneurial intervention developed by the University of Nottingham. The entrepreneurial intervention in which the entrepreneurial projects were involved was the annual entrepreneurial programme called “Ingenuity19”; a transdisciplinary activity carried out by the Haydn Green Institute for Innovation and Entrepreneurship. The Ingenuity programme is based on the open invitation for the community of the University of Nottingham, the public and third sector organisations, partner universities, as well as Nottingham’s individuals and businesses who are interested in entrepreneurial training to develop an entrepreneurial idea, with an emphasis on resolving crucial social challenges.

This entrepreneurial intervention was chosen as a research context due to: first, its similarities with the academic context where the theoretical framework of

Rasmussen et al. (2011) was defined; second, the transdisciplinary design of the intervention manifested in the collaborative mechanisms, where it is possible to observe academic and non-academic actors interacting in order to develop entrepreneurial projects that allows expansion of the initial framework of Rasmussen and colleagues by including new modes (business plan competitions and supportive programmes) that can be found in entrepreneurial activities in higher education institutions; and third, the possibility of exploring the development of entrepreneurial competencies considering a broader diversity of new actors, concerning disciplinary backgrounds, professional experiences, and industrial sectors represented among the cases. In this sense, the cases are represented by founders of the entrepreneurial projects who are students, alumni, and individuals who are not directly involved in academic activities of the University of Nottingham.

The data collection process was divided into two stages: from October 2019 to March 2020 and from September 2020 to October 2020. Following Eisenhardt (1989, 2021) and Yin (2017), the data was collected by using and combining multiple sources of evidence within the data collection process, specifically through semi-structured interviews, documents and public information of the entrepreneurial projects as archival data, documents and video recording of the entrepreneurial intervention and direct observation of the supportive programme implemented after the entrepreneurial competition. This was followed by a second-order analysis of the data (Gioia et al., 2013), where the central idea is iteratively grouping and organising raw data resulting in abstract conceptualisations as part of a constant comparison between theory and data (Eisenhardt, 2021). The emphasis of this analysis was moving from the particular (categories) to the general (aggregate dimension), which allowed the grouping of qualitative data in a structured way. Moreover, Saldana's coding model of two cycles (2013) was used for thematic analysis.

1.7. Overview of the Research Findings and Research Contributions

The findings of this investigation showed that most of the cases participating in this research developed entrepreneurial competencies (Rasmussen et al., 2011) during and after the entrepreneurial intervention. From this evidence, the analysis focused on examining each competency individually to provide an appropriate account of the different elements and factors observed in a transdisciplinary context and explain their specific development. In this sense, the findings provide strong evidence to answer the research question and address the research objectives.

As a general description of the findings, it is possible to argue that entrepreneurial competencies as a theoretical framework can explain the emergence and development of entrepreneurial projects, particularly those that have been neglected in prior studies on academic entrepreneurship, which this research defines as non-traditional new ventures. Consequently, it was concluded that those kinds of projects, led by university entrepreneurs, can develop entrepreneurial competencies when exposed to collaborative mechanisms such as a transdisciplinary setting. In this regard, the analysis also allowed the researcher to identify how different factors observed in a transdisciplinary environment (classified as institutional, interpersonal, and intrapersonal) act as enablers and barriers to the developmental process of entrepreneurial competencies.

The implications of the findings provide insights into academic entrepreneurship theory, specifically to the understanding of entrepreneurial competencies, and shed light on the practice of entrepreneurship in higher education institutions. Furthermore, the current world scenario affected by the global health crisis, added to the significant challenges we have faced in recent decades related to economic, social, and environmental issues, has highlighted the importance of entrepreneurship and entrepreneurs as relevant actors in identifying solutions to these challenges. In this context, entrepreneurial competencies seem fundamental

to university entrepreneurs and non-traditional new ventures to enhance their performance, resulting in practical solutions to these problems. Likewise, when scholars have manifested concerns about the role of modern universities in solving these problems (Acs et al., 2017; Etzkowitz, 2003b) and have called to generate social impacts through academic entrepreneurship activities (Roux et al., 2017), transdisciplinarity as a research context emerges as a plausible path of new avenues for entrepreneurial practice. In summary, five of the main contributions of this research are presented.

First, considering the current scenario of academic entrepreneurship, where multiple ways of promoting entrepreneurial activities in universities converge (such as incubators, accelerators or business plan competitions), and multiple actors participate in these initiatives (students, alumni, external actors) (Hayter, Nelson, et al., 2018; Miranda et al., 2018), the findings provide evidence to support the idea that, in this setting, entrepreneurial competencies can be developed. These findings expand upon previous research on this theoretical framework (Gümüsay & Bohné, 2018; Rasmussen et al., 2011), which was developed in a traditional vision of academic entrepreneurship. Moreover, this context represents an answer to scholars' call to consider a redefinition of academic entrepreneurship (Siegel & Wright, 2015), to include a cross-disciplinary spillovers perspective in entrepreneurial competency development (Goethner & Wyrwich, 2020), and to complement recent studies, which have considered those new actors who participate in these activities (Treanor et al., 2020).

However, the findings of this research provide new evidence about the impact of an entrepreneurial intervention as a business plan competition in the later stages of venture creation. Unlike the findings of Treanor et al. (2020), who found that these activities have a positive impact on short-term skills and competence acquisition and influence on longer-term career aspects such as commercialisation and financial awareness, it was limited in exploring the development of entrepreneurial competencies from the perspective of the creation and development of new ventures as a process resulting from their participation in the competition.

Second, entrepreneurial competencies are argued to have an evolutionary approach that defines the nature of these competencies and explains their developmental process over time (Rasmussen et al., 2011). In the same way, this research provides evidence that the development of competencies began before the involvement of university entrepreneurs within the entrepreneurial intervention, which supports the idea of competency development from existing trajectories (Ahuja & Katila, 2004). However, the developmental process also continued during and after this activity, demonstrating an evolving perspective on the phenomenon.

Third, Rasmussen, Wright, and Mosey (2011) argued that "universities provide a distinct institutional incubator environment that likely influences the evolutionary path of competence development". In this sense, this research confirms this stance but also contributes by shedding light on entrepreneurial competence development by exploring an emerging and novel mechanism of collaboration implemented in universities that has been neglected in prior studies in the area. The findings provide important insights to better understand entrepreneurial competencies, showing that a transdisciplinary context affected their developmental process. Moreover, following Stokols, Hall, Taylor, et al. (2008), the evidence supports the idea of contextual influences on transdisciplinary collaboration. In this vein, different aspects of interpersonal, intrapersonal, and organisational/institutional factors were identified as enablers and barriers for ODC, CC, and RAC.

Fourth, focused on the contributions for academic entrepreneurship as a general research field, this research offers an initial conceptualisation of transdisciplinarity in this area. Moreover, the evidence of this research shows that transdisciplinarity brings together the characteristics highlighted by scholars to develop academic entrepreneurial activities (Hayter et al., 2017; Hayter, Nelson, et al., 2018; Yusof & Jain, 2010) that can reach commercial-economic objectives but, even more importantly, to have a social impact in the communities where the universities participate (Fini et al., 2018; Roux et al., 2017). Therefore, this research strongly supports the stance that transdisciplinarity is required for entrepreneurial universities (Urbano & Guerrero, 2013).

Fifth, related to practical implications for academic entrepreneurship, the findings show that entrepreneurial interventions, mainly those implemented in transdisciplinary contexts, can be complementary activities for entrepreneurial education in universities. In this sense, business plan competitions are effective activities to inspire the student community to develop entrepreneurial ideas and to foster entrepreneurial thinking within universities (H. Bergmann et al., 2018). In the same vein, in line with previous studies (Muñoz et al., 2019; Munoz et al., 2011; Nabi et al., 2017), the impacts of the involvement in these activities are not only related to the potential development of entrepreneurial skills but can also help the participants in their future careers by developing their personal and professional skills (communication, confidence, opportunity identification, evaluation and development). Furthermore, these activities, such as the Ingenuity19 programme, help the management of entrepreneurship in higher education institutions by generating support programmes and platforms that can respond to calls for the decentralisation of entrepreneurial ecosystems (Fini et al., 2017; Gümüsay & Bohné, 2018) and the generation of new intermediaries for entrepreneurial resources (Hayter, 2016a), providing a better climate for academic entrepreneurship.

1.8. Structure of the Thesis

This chapter has introduced this doctoral research by delineating the research area (academic entrepreneurship), the theoretical framework (Entrepreneurial Competencies) and the research context (transdisciplinarity). This chapter also presents the research question, the research objective, and a summary of the contributions of this study. The five remaining chapters are summarised as follows.

Chapter II is divided into three main sections, presenting a detailed literature review of this research's theoretical and conceptual base. Section one defines academic entrepreneurship by discussing what is known and why it is appropriate to rethink this area of study. This section addresses the relevance of including the new actors

and new modes of academic entrepreneurship, justifying the conceptualisations of university entrepreneurs and non-traditional new ventures that are central ideas of this research. Section two reviews the literature regarding entrepreneurial competencies. This section argues for the importance of a competency approach in entrepreneurship literature and distinguishes its understanding for academic entrepreneurship. In doing so, two main approaches are discussed, considering their relationship with the academic context and the particular setting of this research. Also, this section argues that entrepreneurial interventions as business plan competitions are an appropriate space to explore the development of entrepreneurial competencies. Finally, section three explores the literature concerning different collaborative mechanisms, emphasising transdisciplinarity as a novel setting that presents an opportunity to evaluate the development of entrepreneurial competencies empirically.

Chapter III develops the research methodology and design to examine the research question and objectives empirically. The chapter begins by presenting the philosophical assumptions of this study. The chapter also discusses multiple-case study as a research design and describes the rationale for the decision of the research setting and the case selection. Finally, the chapter describes the data collection process and data analysis.

Chapter IV reports the findings of the empirical analysis of this research. In doing so, the chapter is divided into two main sections. The first section reports the findings related to entrepreneurial competency development and the participants' impacts (individual level). The second section reports the enablers and barriers observed in the transdisciplinary collaborative process in the entrepreneurial intervention that affected an entrepreneurial process, categorised as Institutional/organisational, Interpersonal, and Intrapersonal factors.

Chapter V discusses the research findings and their contributions to theory and practice. First, the chapter discusses the theoretical significance of the findings concerning the extant literature on Entrepreneurial Competencies, entrepreneurial

competitions and transdisciplinarity. Then, the discussion focuses on additional contributions to the practice of academic entrepreneurship and policy.

Chapter VI presents the main conclusions of this research. First, the chapter describes the research framework, the research methodology, and the study's main findings. Then, the chapter summarises the implications of the research and outlines the study limitations. Finally, the chapter discusses potential avenues for future research in this area in light of the findings.

Figure 1 summarises the structure of this thesis.

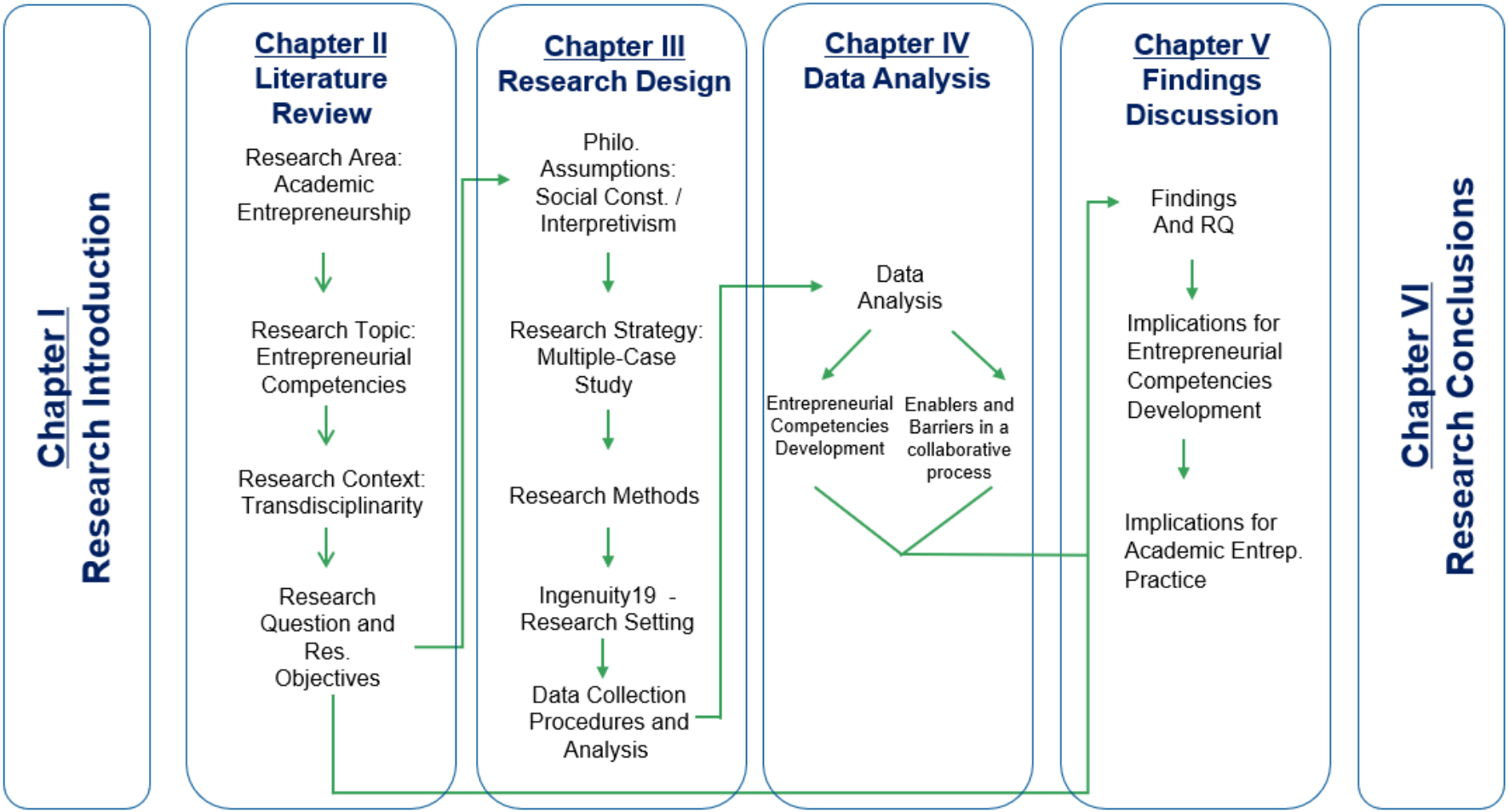


Fig. 1 Structure of the thesis

Chapter II: Literature Review

Academic Entrepreneurship, Entrepreneurial Competencies and Transdisciplinarity

2.1. Chapter Introduction

Entrepreneurship has taken a leading role in university activities since it contributes to economic growth and development (Acs, Audretsch, Lehmann, & Licht, 2017; Etzkowitz, 2003a). Consequently, research in academic entrepreneurship has focused on exploring how higher education institutions can generate and promote effective mechanisms to foster knowledge transfer into commercial and social impact (Hayter, Nelson, et al., 2018). In this context, the development of entrepreneurial competencies has been recognised as a valuable approach to understanding how academic entrepreneurs create and develop successful new ventures from universities (Gümüsay & Bohné, 2018; Rasmussen et al., 2011).

There are currently new actors in the university entrepreneurial ecosystem that were not traditionally considered, such as students, alumni, or individuals outside formal university structures. At the same time, new activities and programmes have been implemented that allow the new actors' participation (Siegel & Wright, 2015; Wright et al., 2017). Therefore, this new scenario is appropriate to explore how such changes can affect entrepreneurial competency development.

This new context can be associated with different models of participation and collaboration between academic and non-academic actors. In this vein, transdisciplinarity emerges as a cross-disciplinary mechanism that can answer the call of scholars regarding a move towards models that promote broader participation in academic entrepreneurial activities (Nabi et al., 2017) and go from traditional entrepreneurial outcomes to societal impacts (Fini et al., 2018).

Through a review of the entrepreneurship literature, this chapter argues that entrepreneurial competencies play a crucial role in the emergence of academic new ventures. Moreover, it argues for the importance and need for exploring competency development in an underexplored context: transdisciplinarity.

The literature review is divided into three sections: the research area, research topic and research context. Section 2.2 introduces the research area of academic

entrepreneurship, examining determinants at the individual and institutional level, and presents contextual changes that make it possible to argue a research opportunity. Section 2.3 introduces entrepreneurial competencies as a research topic, examining different approaches in the literature. This section also argues that the entrepreneurial competency framework of Rasmussen et al. (2011) is the most appropriate to address the research enquiry of this doctoral study and proposes that entrepreneurial competitions can be an appropriate intervention to evaluate the emergence of entrepreneurial competencies. Section 2.4 explores different academic collaboration mechanisms, arguing that transdisciplinarity is a novel research context where the development of entrepreneurial competencies has not yet been evaluated. Section 2.5 presents chapter conclusions.

2.2. Academic Entrepreneurship as a Research Area

Entrepreneurship has been highlighted as an essential source of economic growth that promotes innovation in local and national economies (Acs & Szerb, 2007; GEM, 2019; Sánchez, 2013). Simultaneously, entrepreneurship has become relevant in higher education institutions, and is even considered a "third mission" in modern universities (Goethner & Wyrwich, 2020). It has brought a change in understanding institutional objectives, where academic research is not only important in terms of scientific knowledge production and teaching as a formative process (Di Paola, 2020). Universities have been called upon to contribute to entrepreneurial ecosystems (Acs et al., 2017; Etzkowitz, 2003b; Sciarelli et al., 2020), defined as "combinations of social, political, economic, and cultural elements within a region that support the development and growth of innovative start-ups and encourage nascent entrepreneurs and other actors to take the risks of starting, funding, and otherwise assisting high-risk ventures" (Spigel, 2017, P.50). The organisation of those elements in what is called entrepreneurial ecosystem responds to the purpose to increase the success of entrepreneurial activities (Audretsch et al., 2019; Cunningham & O'Reilly, 2018), where universities are considered key actors in the conformation and the influence of their activities to local and national ecosystems(Chapple et al., 2005; Hayter, 2013; Miller et al., 2018; Vohora et al., 2004). As a result, research in academic entrepreneurship has become relevant when trying to understand the role those entrepreneurial ecosystems play inside educational organisations since it is understood that modern universities' purpose is not only the generation and dissemination of knowledge (Guerrero & Urbano, 2012).

This has been echoed by policymakers and national governments, who have invited universities to be relevant actors in the design of national innovation systems (Carayannis & Campbell, 2009; Grimaldi et al., 2011). Hence, academic entrepreneurship has been identified as a plausible way to enhance innovation capacity through knowledge and technology transfer from higher education institutions to society (Sinell et al., 2018).

In order to understand the phenomenon of academic entrepreneurship, it is necessary to define its conceptual basis. In this regard, entrepreneurship has been an important research area in business and management since the last century. Even though there is not a single definition shared in the academic community, there is an agreement that entrepreneurship *"involves the innovative combination of resources in order to introduce new goods or services, ways of organising, markets, processes or raw materials"* (Abreu & Grinevich, 2013, P. 409). This research will take Shane's (2003) stance, which considers the entrepreneurial process as a search for an opportunity that has uncertain results. Therefore, there is an assumption of risks from the entrepreneur. Besides, there is an effective way of organising resources that would allow the exploitation of an opportunity. Finally, the outcomes should show an innovative outcome, resulting in a different solution to current products or services.

In the context of academic entrepreneurship, it is possible to find a wide variety of their definitions, showing an evolution in terms of the emphasis of their activities and the actors involved in the process (Abreu & Grinevich, 2013). For example, Louis et al. (1989) defined academic entrepreneurship as *"the attempt to increase individual or institutional profit, influence, or prestige through the development and marketing of research ideas or research-based products"* (P.110). Following a similar approach, lately, it was defined as the generation of new companies where both academic staff and universities as organisations are key equity-holders (Siegel & Wright, 2015; Wright et al., 2009).

More specifically, the activities related to academic entrepreneurship have been focused on encouraging entrepreneurial technological initiatives through licensing, patenting, start-up creation and university-industry collaboration (Grimaldi et al., 2011; Nicolaou & Souitaris, 2016). However, other scholars have pointed out that this academic activity not only seeks an economic aim, where the social value of the outcomes should also be considered as a possible consequence (Mars & Rios-Aguilar, 2010) but also non-commercial activities that bring reputation, prestige, influence and social benefits to universities (Abreu & Grinevich, 2013). In the same

vein, scholars have identified additional forms of academic entrepreneurship such as the creation of a formal place where the entrepreneurial activities are located, consulting, grantsmanship, the publication of academic results, and the production of highly qualified graduates with entrepreneurial skills, which is closer to a traditional university paradigm (Philpott et al., 2011). Thus, it is possible to argue that academic entrepreneurship is a series of activities within the university context, which creates an entrepreneurial ecosystem (Friedman & Silberman, 2003; Qian et al., 2018).

Following the definition of Siegel & Wright (2015), the creation of spinoffs or new ventures is the core of the current academic entrepreneurial phenomenon. It is manifested in higher education institutions' effort to promote their research activities as a knowledge transfer channel (Miranda et al., 2018). In this vein, scholars argued that university new ventures are a channel of solutions to societal challenges that the world is facing, generating a positive impact on economic growth and the generation of new jobs for local and national economies (Clarysse et al., 2005; Di Gregorio & Shane, 2003; Rasmussen & Wright, 2015; Sciarelli et al., 2020). As a consequence, academic spinoffs or new ventures have been one of the focuses of analysis regarding academic entrepreneurship (Nicolaou & Souitaris, 2016) in order to identify and understand the enablers and barriers that facilitate or diminish the success of these projects (Di Paola, 2020; Sinell et al., 2018, Miranda et al., 2018).

The definitions of a spinoff as a "university new venture" have shown significant variations in recent decades. This results from changes to the university contexts, where scholars have included other aspects representing the current state of this activity (Marzocchi et al., 2019). Scholars have defined a spinoff broadly as the outcome of entrepreneurship in the universities (Berbegal-mirabent et al., 2015). More specifically, a shared understanding of academic spinoff considers the creation of a company that exploits research developed in universities, where academic staff play critical roles in the generation and development of the ventures (Hayter, Nelson, et al., 2018; Meoli & Vismara, 2016; Philpott et al., 2011; Rasmussen et al., 2014; Shane, 2004; A. Walter et al., 2006).

Recent studies have been broadened to include additional aspects of universities' entrepreneurial context to define a spinoff properly. For example, they have incorporated new ventures that do not have a formal contract with a university (Fini et al., 2010). In light of the current context of academic entrepreneurship, it is important to recognise new ventures that are different from USOs' traditional perspective. Similarly, scholars have considered entrepreneurial projects developed by "new actors" in the entrepreneurial ecosystem (Wright et al., 2017), such as research staff (doctoral and postdoctoral students), graduates and alumni (Boh et al., 2016; Hayter et al., 2017). Those last definitions are the most precise produced so far because they represent the current status of higher education institutions' entrepreneurial activities.

The evolving context of universities in recent years invites us to observe a broader spectrum of mechanisms and actors that are involved in entrepreneurial academic activities (Siegel & Wright, 2015), considering the different missions that a higher education institution has to reach (Guerrero & Urbano, 2012). There is evidence of students' active role and alumni in the generation of new ventures and start-ups (Guerrero, Urbano, & Fayolle, 2016; Hayter et al., 2017). However, little research has addressed these phenomena beyond the academic staff's role. Therefore, there is a gap in understanding entrepreneurial development in universities, considering the stakeholders currently involved in the emergence of new ventures (Marzocchi et al., 2019). Therefore, to properly include all the involved actors, this research defines *university entrepreneurs* as research staff, students, graduates, alumni, and external actors involved in the development of non-traditional new ventures within an academic entrepreneurial context. Moreover, building upon Siegel and Wright (2015) and Wright, Siegel & Mustar (2017), it seems appropriate to include the emerging perspective of academic new ventures. Based on the above, this research defines a university *non-traditional new venture* as a new firm created by research staff, students, graduates, alumni and external actors that higher education institutions support.

This section has attempted to provide a summary of the literature regarding the understanding of academic entrepreneurship as a research area, highlighting key definitions for this research, such as university entrepreneurs and non-traditional new ventures. The following sections discuss the literature's main findings of individual and institutional determinants on academic entrepreneurship and how these inputs affect universities' entrepreneurial activity.

2.2.1. Understanding Academic Entrepreneurship: What Is Known

Having defined what is meant by academic entrepreneurship, this section describes and discusses the main factors that impact higher education institutions' entrepreneurial activities. A large and growing body of literature has investigated different events and contextual circumstances that affect academic entrepreneurship development. Different scholars have published outstanding literature review papers that have provided a better perspective of the field through their main findings. Based on the reviews of Hayter et al. (2018), Mars & Rios-Aguilar (2010), Miranda et al. (2018), O'Shea et al. (2004) and Rothaermel (2007), individual and institutional/contextual elements are discussed. Nonetheless, it is necessary to bear in mind that most prior research within the area has been carried out based on the traditional perspectives of academic entrepreneurship. Therefore, the purpose of the following sections is to provide an overview of what is known in the literature about the determinants of academic entrepreneurship. In this way, the discussion should be understood with caution, given that some of these inputs could be not entirely applicable to the context of this research project.

2.2.1.1. Determinants of academic entrepreneurship from an individual level

Regarding individual characteristics of academic entrepreneurs, studies demonstrate many features that influence the capacity to develop an entrepreneurial project, gender and age being among the most recurrent topics in the literature (Hayter, Nelson, et al., 2018).

Regarding gender, research has shown that males are prominent in the involvement of these activities (Abreu & Grinevich, 2017; Clarysse et al., 2011; Shane et al., 2015). Among the reasons to explain this, females present a lower entrepreneurial intention (Goel et al., 2015; Miranda et al., 2017), and they are also less likely than males to be involved in activities of science commercialisation (Ding et al., 2006). In the same vein, studies suggest a gender gap in participation in informal activities such as contract research and consultancy (Abreu & Grinevich, 2013).

Regarding age as an individual factor, studies suggest an academic entrepreneurship increment in the older academic population (Aldridge & Audretsch, 2011; H. Bergmann et al., 2016; Hayter, Nelson, et al., 2018). A reason for this is that a more significant research experience is linked with the academics' age, which increases the probability of identifying an entrepreneurial opportunity (Miranda et al., 2017), and their social and human capital (Haeussler & Colyvas, 2011). However, other studies have shown different results. For example, Karlsson & Wigren (2012) provided evidence that older academics are less likely to start a firm. Similarly, Bercovitz & Feldman (2008) reported that as much time has gone by since academics have graduated from academic degrees, they are less likely to engage in universities' entrepreneurial activities. It could be related to the fact that the older the age, the higher the costs and risks of starting an entrepreneurial activity. Besides, a methodological point of view of these discrepancies is that the population in these types of studies, in general, presents a high average age because it takes time to achieve the required academic degrees to be involved in academic entrepreneurial activities, which is different to the reality outside academia (Karlsson & Wigren,

2012). Considering the current status of academic entrepreneurship, with the involvement of new actors (Siegel & Wright, 2015), future research should re-evaluate this factor because age may cease to have an inverse effect on academic entrepreneurship's propensity to participation.

In terms of motivations to be involved in academic entrepreneurship, it has been argued that different reasons would explain academic entrepreneurs' participation. Scholars have pointed out two main motivational factors: searching for commercialisation and further research projects (Pablo D'Este & Perkmann, 2011). Regarding commercialisation, some sub-factors have been identified. For example, from the individual perspective, the pursuit of personal financial gain, where money is seen as a benefit of work, career enrichment as a way to be their own boss and job creation as an extension of the social missions of universities have been mentioned (Hayter, 2011; Lam, 2011). In addition, commercialisation is considered a plausible way to develop and disseminate research projects (Fini et al., 2009; Hayter, 2011). Depending on the motivations, academic entrepreneurs use different mechanisms of implementation. For example, patenting and creating new ventures are directly related to commercialisation, while contract research, joint research and consultancy are influenced by research development goals (Pablo D'Este & Perkmann, 2011). Moreover, contextual factors have been studied regarding the motivations of postgraduate engagement. The low demand for doctoral holders and funding constraints in academic environments have pushed these academic groups' entrepreneurial motivations (Rizzo, 2015).

Concerning entrepreneurial experience, several authors have analysed different events that affect academic entrepreneurial activities. More specifically, as a predictive factor for future involvement, scholars have argued that previous participation in spinoffs (Abreu & Grinevich, 2013; Clarysse et al., 2011; Muscio et al., 2016; Rasmussen et al., 2011), prior invention experience through academic research (Pablo D'Este et al., 2012; Karlsson & Wigren, 2012), the participation in research projects with externally employed individuals and participation in contract research and product development (Karlsson & Wigren, 2012) positively affect future

entrepreneurial activities. This evidence suggests that individuals with these experiences are better placed to identify entrepreneurial opportunities (Clarysse et al., 2011; Hayter, Nelson, et al., 2018). Moreover, depending on the pathway of development, it is possible to argue that academic entrepreneurs can explore (patenting) or exploit (generation of new ventures) entrepreneurial opportunities (Pablo D'Este et al., 2012).

Scholars have argued that other types of human capital also predict the behaviour of the academic entrepreneur concerning professional experiences unrelated to academic entrepreneurial activities (Hayter, Nelson, et al., 2018). Research has mostly found evidence of this positive relation in academic entrepreneurs who have been involved in industry engagement acquiring commercial experience (Aldridge & Audretsch, 2011; Knockaert et al., 2011; Perkmann et al., 2013; Shane et al., 2015; Tartari et al., 2014; Vohora et al., 2004). These results support the argument that a thriving academic entrepreneurial ecosystem should consider individuals with these professional backgrounds to promote and enhance the results and outcomes, inviting researchers to evaluate the role of non-traditional actors, as students, alumni, or experienced entrepreneurs, in the development of entrepreneurial activities.

Although most research has studied academic entrepreneurs from the perspective of faculty members (Hayter, Nelson, et al., 2018), some scholars have pointed out the role of non-academic profiles (Sciarelli et al., 2020; Visintin & Pittino, 2014) as experienced entrepreneurs (Boh et al., 2016), surrogate entrepreneurs (Mosey & Wright, 2007) and graduates (Boh et al., 2016; Pirnay et al., 2003; Rasmussen & Wright, 2015), who provided a different set of resources and knowledge to the entrepreneurial activities. Particularly, research has shown that they can contribute to filling the lack of commercially experienced scientists and academics (Mosey & Wright, 2007; Sciarelli et al., 2020), helping to develop new ventures from a university context and as a channel of knowledge transfer to the industry (Hayter et al., 2017; Rasmussen et al., 2015)

Regarding disciplinary backgrounds, it has been found that the discipline has an impact on the perception of academics about their disciplinary knowledge as an appropriate input for entrepreneurial activities, and also it is related to the interest of the industry in the research of some particular fields (Philpott et al., 2011). In the same vein, Kalar & Antoncic (2015) found that academics from social sciences perceived their departments as less entrepreneurially oriented than others from natural sciences. This is reflected in the outcomes of academic entrepreneurship, where traditional fields such as biological sciences, physics, computer sciences and engineering are more likely to engage in entrepreneurial activities (Fini et al., 2009, 2010; Kenney & Patton, 2011) and predominantly by the creation of university new ventures and licensing (Abreu & Grinevich, 2013). However, scholars have questioned differences among disciplines and the inclination to start a new venture, arguing that academics from social sciences have a higher interest in being involved in academic entrepreneurship than other faculty members (Karlsson & Wigren, 2012). Considering the above, it is a matter of concern for universities aiming to improve their entrepreneurial ecosystem. Encapsulating entrepreneurial activity to some specific disciplines goes against the common sense of entrepreneurship as a creative activity. Scholars have argued that individuals can identify and improve entrepreneurial ideas by integrating different disciplinary perspectives (Bercovitz & Feldman, 2008; Shane, 2004). As a result, academic entrepreneurs who can combine different disciplinary perspectives in their projects are more likely to find disruptive and successful solutions (Pablo D'Este et al., 2012). Therefore, it supports the argument that a cross-disciplinary approach to academic entrepreneurship should be considered in designing activities, programmes and strategies.

On an individual level, networking has also been studied as a factor in the academic entrepreneurship phenomenon. Scholars agree about the importance of networks that academic entrepreneurs possess to develop entrepreneurial initiatives (Hayter, Nelson, et al., 2018; O'Shea et al., 2004; Vohora et al., 2004). Networks act as a social mechanism that improves the application of knowledge (Bozeman & Corley, 2004), having a similar effect in terms of nurturing new ventures with guidance and

critical information from their expertise (Abreu & Grinevich, 2013) and as a source of resources to the project (Hayter, Nelson, et al., 2018; Shane & Stuart, 2002). Mosey & Wright (2007) pointed out that a lack of commercial experience in academic entrepreneurs likely confronts a gap between their scientific research and industry networks. Simultaneously, academic entrepreneurs with prior entrepreneurial experience have broader networks and are more successful in creating network ties. This last point demonstrates the relevance of networking for the development of new ventures in an academic context. Therefore, improving the networking skills of academic entrepreneurs becomes crucial.

In sum, scholars agree about the existence of a multitude of individual factors that affect academic entrepreneurship, such as demographics, previous individual experiences, motivations, disciplinary backgrounds and social/human capital. Nonetheless, the literature indicates that the university context also plays a role in promoting or constraining entrepreneurial activity, which will be examined in the following section.

2.2.1.2. Institutional and contextual determinants of academic entrepreneurship

Successful universities carrying out entrepreneurial activities show distinctive characteristics in terms of macro-level features (O'Shea et al., 2004). There is an alignment between the traditional institutional objectives and missions that promote entrepreneurial activity, reflected in policies and management that facilitate this process (Renault, 2006), and establishing an organisational culture that encourages entrepreneurship (O'Shea et al., 2004). Concurrently, a clear university-industry link strengthens universities' research and commercial activities to different markets (Berbegal-mirabent et al., 2015; Debackere & Veugelers, 2005; Sciarelli et al., 2020). It is also possible to identify a clear financing policy for academic entrepreneurship with internal sources from higher education institutions and to acquire financial

resources from external organisations, both public and private (Lockett & Wright, 2005).

In this regard, academic entrepreneurship has been related to national, local and institutional policies that promote universities' entrepreneurial activities (Miranda et al., 2018; Munari et al., 2016). Those policies mainly help and nurture academic entrepreneurship, in its different outcomes, and merge the traditional academic purpose of universities with entrepreneurial orientation objectives (O'Shea et al., 2004).

From a general institutional perspective, the allocation of financial resources shows the basis of the support to develop an entrepreneurial ecosystem in universities (Hayter, Nelson, et al., 2018). In this vein, the expenditures in organisational structures, programmes and activities enhance the entrepreneurial activities, mainly manifested in a greater level of new venture creation (Algieri et al., 2013; Lockett & Wright, 2005; O'Shea et al., 2005; Powers & McDougall, 2005).

However, an entrepreneurial university not only depends on the expenditure for entrepreneurial actions. Higher education institutions should also adopt a university culture that promotes those activities (Jacob et al., 2003; Rothaermel et al., 2007). Some universities intentionally promote an entrepreneurial attitude, where the institutional culture is manifested in social relationships and subjective norms, which allows a supportive environment for academic entrepreneurship (Guerrero & Urbano, 2014). An entrepreneurial culture can be observed at different organisational levels, such as departmental (Ambos et al., 2008; Rasmussen et al., 2014) and institutional (Clarysse et al., 2011). Bercovitz & Feldman (2008) argued the critical role of peers and leaders in building an entrepreneurial environment. As a result, it positively affects industry engagement (Tartari et al., 2014) and the generation of new ventures (Hayter, 2011). Recently, scholars have pointed out the relevance of developing an entrepreneurial culture among different university actors, including employees, staff and students, encouraging them to create and develop entrepreneurial activities (Carayannis et al., 2016).

Networking as an organisational capacity has also been recognised as an essential driver of academic entrepreneurship (Hayter, Nelson, et al., 2018). Building on Rothaermel et al. (2007), there is a distinction between social networks from an individual perspective and networks as an environmental context, where networking can be an institutionalised activity of universities (Fini et al., 2020). As mentioned, academic entrepreneurs experienced a lack of knowledge and commercial expertise to implement entrepreneurial projects in external markets (Mosey & Wright, 2007; Sciarelli et al., 2020). As a potential solution for that issue, scholars have pointed out the importance of universities and their infrastructure in facilitating the possibility of connecting with relevant actors that help develop entrepreneurial projects (Rasmussen et al., 2011; Rasmussen & Wright, 2015). Moreover, scholars have highlighted that the primary purpose of the academic entrepreneurship infrastructure is to develop the networks between the academic community and individuals who can provide the financial and human resources needed to start a new venture (Fini et al., 2020; Guerrero et al., 2014; Lockett et al., 2003).

Research shows that universities' different programmes and intermediaries positively impact a fruitful network for academic entrepreneurs (Hayter, Nelson, et al., 2018; Rothaermel et al., 2007). Nonetheless, organisational networks' effect can be constrained by entrepreneurial projects' developmental stage (Pérez & Sánchez, 2003). Therefore, although the value of networks within academic entrepreneurship is widely recognised, it is important to consider that this organisational factor's effect can be different depending on contextual circumstances.

Wright et al. (2017) outlined a framework that allows understanding how entrepreneurial ecosystems observed within various university settings make the entrepreneurial activity possible. As seen in Figure 2, this framework recognises the elements previously discussed, such as external contextual factors and the current university environment that works in an evolving environment. Also, there is an acknowledgement of non-traditional actors as entrepreneurs (faculty, students, post-docs, alumni) as well as different support mechanisms developed by internal and external actors and investors that, when interconnected, contribute to developing

continuum support to entrepreneurial projects from the early stages of ideation and identification of opportunities to future phases of development. Even though this framework focuses on student start-ups, it observes the interrelation among different factors that assist venture formation. In this sense, a potential contribution could be the consideration of external actors as university entrepreneurs that nowadays are formal members of entrepreneurial activities in universities.



Fig. 2 University entrepreneurial ecosystem (from Wright et al., 2017)

More specifically, entrepreneurial universities have created different structures and programmes (Hayter, Nelson, et al., 2018) as mechanisms that facilitate the generation of entrepreneurial projects (O'Shea et al., 2005), such as Technology Transfer Offices (TTOs) (Miranda et al., 2018; Perkmann et al., 2015), sciences parks (Link & Scott, 2005; Zou & Zhao, 2014), incubators (Boh et al., 2016; Kolympiris & Klein, 2017; Mustar & Wright, 2010), proof-of-concept programmes

(Munari et al., 2016) and entrepreneurial competitions (Hsu et al., 2007; Jefferson et al., 2017; Watson et al., 2018).

TTOs were one of the starting points of policies to promote knowledge transfer from universities to industry (Perkmann et al., 2015), being one of the prominent topics in academic entrepreneurship research (Hayter, Nelson, et al., 2018). Moreover, the literature shows that those units are important in terms of facilitating the research commercialisation process (O'Gorman et al., 2008) through licensing (Siegel et al., 2007), patenting (Coupé, 2003) or encouraging the generation of new ventures (Fini et al., 2011). In doing that, TTOs help entrepreneurial projects to get in contact with external experts and industrial actors, to acquire monetary resources to develop new ventures (Huyghe et al., 2014; O'Shea et al., 2004) and also provide mentoring and experience in the initial stages to develop managerial skills (Fernández-Alles et al., 2015).

However, some scholars have shared their concerns about TTOs and their impact on universities. Wright, Vohora, & Lockett (2004) argued that TTOs learned to transform scientific knowledge into a potential commercial application. In the same vein, scholars mentioned that the staff of newly TTOs could possess deficient social capital outside universities (Vohora et al., 2004), resulting in difficulties in creating bridges with external actors. Mosey & Wright (2007) highlighted that different academic entrepreneurs' experiences resulted in diverse challenges interacting with a TTO. For example, nascent entrepreneurs showed a lack of ability to explain their entrepreneurial ideas in an industrial context, considering it was not easy to engage with the TTOs. Similarly, it has been reported that some academic entrepreneurs intentionally avoid working with TTOs because those structures are mainly focused on traditional sciences and technologies with emphasis on company licence instead of new venture support (Hayter, 2016a), which indicates that these offices are mainly designed for the traditional perspective of academic entrepreneurship. Some scholars have suggested alternative structures to the traditional perspectives to destress a unique academic intermediary approach (Fini et al., 2017; Hayter, 2016a)

and establish a better transfer structure that promotes academic collaboration (Perkmann et al., 2013).

Following Hayter et al.'s (2018) classification, complementary programmes to the traditional structure of academic entrepreneurship are incubators, proof-of-concept centres and science parks. Regarding university incubators, those are programmes that offer assistance to entrepreneurial projects in providing a physical space to work, managerial advice, mentoring and getting financial resources (Boh et al., 2016; Mustar & Wright, 2010; Peters et al., 2004). University-related services are also linked to the access to the whole university structure that contributes to developing new ventures in the initial stages (Barbero et al., 2014; Mian, 1996). Among the positive impact of these programmes, it has been argued that they are helpful in the process of coaching academic entrepreneurs and also in developing the required networking among different individuals involved in academic entrepreneurship, such as entrepreneurs, researchers, students and industrial actors, who help to move the projects forward (Hayter, Nelson, et al., 2018; Lamine et al., 2018; Rothaermel et al., 2007).

Nonetheless, some scholars have raised doubts about their effectiveness. In terms of institutional policies, it has been argued that university incubators' presence is followed by a decrease in quality innovations and licencing incomes in universities, suggesting that the resource allocation in different programmes harm academic entrepreneurship (Kolympiris & Klein, 2017). Another weakness identified that university incubators could suffer from a lack of managerial knowledge that harms market or technology commercialisation (Barbero et al., 2014). Concerning physical space, it seems to be necessary for projects in the initial stages (van Geenhuizen & Soetanto, 2009), having a limited value for more experienced and successful new ventures (Hayter, Nelson, et al., 2018).

While some concerns have been shared in the academic community, there is a recognition that incubators play a role in creating a better entrepreneurial ecosystem, integrating a wider community, including faculty and students, establishing bridges with the external actors and generating economic benefits as well as prestige for

universities (Kolympiris & Klein, 2017). Therefore, considering the concerns about their effectiveness, research should contribute to a better understanding of how these programmes can be improved.

Complementary to the traditional academic entrepreneurship programmes, proof-of-concept centres have emerged as alternative support for entrepreneurial activities, which are included in national innovation systems (Bradley et al., 2013; Gulbranson & Audretsch, 2008). Similar to other programmes, proof-of-concept centres aim to provide initial funding, training and mentoring to entrepreneurs in order to evaluate the technical feasibility, to develop and verify a commercial concept, to identify target markets and protect the intellectual property of the early-stage projects from universities and public research organisations (Maia & Claro, 2013; Munari et al., 2016). Differences with other programmes include the fact that those centres can be formally in the university structure or be an external actor working in association with higher education institutions (Maia & Claro, 2013). Dissimilar to incubators, those centres do not have a collaborative physical space. However, they facilitate and nurture the exchange of ideas between industry actors and academic entrepreneurs through mentors associated with the centre (Gulbranson & Audretsch, 2008). Hayter et al. (2018) argued that little research had reported the efficacy of these programmes, which does not allow generation of a conclusion of their performance results. However, recent findings report that universities that work with proof-of-concept centres show an increase in spinoffs established each year after adoption, supporting the idea that those programmes can enhance economic growth and development (Hayter & Link, 2015)

Regarding science parks, this type of structure has been implemented since the early 1950s, and similar to the programmes described above, its purpose is to support the transfer of technology and the generation of new ventures that base their development on innovation with growth potential, providing an environment of interaction and mutual collaboration with other local and international businesses that share a particular focus on knowledge development (Lecluyse et al., 2019). Science parks are usually defined as property-based initiatives that work as an

external intermediary to universities. However, higher education institutions have formal participation links (Phan & Siegel, 2006; Salvador, 2011). So, they are considered part of the ecosystem of academic entrepreneurship. It is highlighted that science parks help universities transfer and disseminate academic knowledge into commercial applications, contributing to national economies (Zou & Zhao, 2014). Those infrastructures provide critical resource networks to new ventures (Lindelöf & Löfsten, 2003). Also, young start-ups do not have the reputation and legitimacy to create business relationships in the market. For that weakness, science parks can work as a solution, giving a "brand name" and indicating that new ventures working under its infrastructure have the potential for development and economic growth. As a result, they may reach new partners, customers and funding (Lecluyse et al., 2019; Salvador, 2011). Nonetheless, little research has demonstrated the legitimacy building's impact and reputational advantages of these organisational structures (Lecluyse et al., 2019). Therefore, more evidence is needed in order to clarify this potential benefit.

Business plan competitions[1] are other programmes that universities develop to promote entrepreneurial activities, mainly among the student community (Watson et al., 2018). While some scholars have defined competitions as a path of potential investment for student start-ups (Wright et al., 2017), others have defined them as part of entrepreneurial ecosystems' support programmes and infrastructure (Hayter, Nelson, et al., 2018). Even though the perspective of competitions as a channel of funding for the winners is correct, taking into account the impacts that the literature has reported (Kwong et al., 2012; R. Russell et al., 2008; Watson et al., 2018), it seems to be somewhat limited. In addition to the financial effects of competitions, scholars agree that these interventions are an appropriate learning process that allows materialising an entrepreneurial idea into a business plan, where the participants can develop entrepreneurial and professional skills as well as get valuable mentoring that would be helpful for future careers (e.g. Fichter & Tiemann,

[1] Considering the research context of this study, a more detailed discussion of business plan competitions can be found in section 2.3.4.

2020; Huster et al., 2017; Kwong et al., 2012; Russell et al., 2008; Treanor et al., 2020; Watson et al., 2018),

As previously discussed, the literature shows a wide variety of determinants (individual and institutional) that affect academic entrepreneurship. Over the years, universities have undergone substantial changes in their structures related to promoting higher education institutions' entrepreneurial activities. Consequently, scholars have argued that there is a research opportunity to understand how these new organisational characteristics have changed the context for academic entrepreneurship. The following section addresses this invitation and justifies how this research intends to contribute to the field.

2.2.2. Academic Entrepreneurship: Time to Re-think

In line with the discussion in previous sections about the changes that academic entrepreneurship has experienced during the last years, scholars have argued that the educational impact of the activities developed for higher education institutions should be understood from a pluralist conceptualisation (Aguinis et al., 2014; Guerrero, Urbano, Fayolle, et al., 2016; K. Miller et al., 2014, 2016). In this sense, the traditional conceptualisation focuses on one stakeholder: academics. Nonetheless, scholars have agreed on the need for the integration of multiple stakeholders, such as undergraduate and postgraduate students, businesses, not-for-profit organisations, local authorities, and policymakers (Aguinis et al., 2014; Audretsch et al., 2022). What Aguinis and colleagues offered as a diagnosis and solution to a narrow and insufficient approach to understanding the scholarly impact is reflected in similar arguments by Siegel and Wright (2015) and the need to rethink academic entrepreneurship.

Following the argument of Siegel and Wright (2015) and considering more recent literature, it seems plausible to argue that it would be an opportune moment to redefine academic entrepreneurship in terms of what it is and how it should be

addressed in research. The reasons found in the literature are presented in three main areas.

First, universities have shown changes in their strategies to promote entrepreneurial activities, resulting in new institutional goals and affecting resource allocation. While at the beginning of the century licensing was highlighted as the preponderant way to commercialise university research (Siegel et al., 2003), currently, the understanding of entrepreneurship in universities is broader than these traditional forms of commercialisation (i.e., patents) (Cunningham, Lehmann, et al., 2019). For example, scholars have identified new commercialisation strategies as the generation of new businesses and ventures from the university to improve the rates of technology transfer and the impact of universities on private firms and non-profit organisations (Audretsch, 2014; Audretsch et al., 2019; Hayter et al., 2018; Lockett et al., 2003; Miranda et al., 2018), as a transformation and application of knowledge which create effective bridges between science (knowledge) and business (Audretsch et al., 2019; Cunningham, Menter, et al., 2019).

Second, there is an extensive scope of new actors interested in entrepreneurship and interacting in the university environment. On the one side, from the traditional perspective of academic entrepreneurs, there is a high economic cost to participating in entrepreneurial activities, suggesting the need to modify organisational policies (Siegel & Wright, 2015). On the other side, more actors are involved in entrepreneurial activities, which have concomitantly been recognised by scholars in the field. When it comes to the university community involved in entrepreneurial activities, there is a clear recognition of four representative groups of actors from the university: Academics, staff members, students and alumni (Audretsch, 2014; Crow et al., 2020; Guerrero et al., 2018; Kolb & Wagner, 2015; Mathisen & Rasmussen, 2019; K. Miller et al., 2016; Wright et al., 2017). This indicates that entrepreneurship is a phenomenon where all university levels can participate actively (Guerrero et al., 2015). Moreover, the nature of the challenge and problems that society is facing has encouraged the inclusion of external actors such as industry, government, civil society organisations, end-users (Audretsch et al., 2019; K. Miller et al., 2014, 2016)

and marginalised groups (Dodd et al., 2022) to address the problems together through combining academic and practical knowledge (Cunningham et al., 2018; George et al., 2016; Sharma et al., 2022).

A third area related to rethinking academic entrepreneurship is manifested in the changes in supportive organisational structures that universities have established to promote entrepreneurial activities in their local context (Siegel & Wright, 2015). Scholars have argued that higher education institutions are committed to generating social impacts, which requires universities to expand the understanding of the economic and social benefits of academic entrepreneurship as organisations than intentionally pursue social transformations (Crow et al., 2020; Guerrero & Urbano, 2016). In this vein, the evolving process of entrepreneurship within universities is not an isolated phenomenon separated from other processes that society has experienced. Building upon Audretsch (2014), the transition from economic structures based on the exploitation of natural resources and physical capital to economic models based on knowledge has forced universities to implement novel mechanisms of interaction considering the new actors involved in these processes (K. Miller et al., 2016)

Based on Klofsten et al. (2019), it is possible to argue the critical impact of the institutional environment that nurtures the creation and development of entrepreneurial activity in universities. Nowadays, there are new modes that universities have created to facilitate academic entrepreneurship. In the current entrepreneurial ecosystem, and unlike in past decades, it is possible to find incubators, accelerators, entrepreneurship garages, entrepreneurial competitions and informal collaborative networks (Autio et al., 2014; Cunningham, Lehmann, et al., 2019; Feldman et al., 2019; Guerrero et al., 2018; Hayter, Nelson, et al., 2018; K. Miller et al., 2014; Miranda et al., 2018; Wright et al., 2017). Those intermediaries have contributed to the greater involvement of new actors by building a robust entrepreneurial architecture that provides support more effectively (Dolan et al., 2019). Therefore, the creation of new organisational structures has allowed the generation of new boundaries and networks, uniting academic contexts and those

that traditionally were not included in this environment (Cunningham et al., 2018). However, academic entrepreneurship as a research area should evaluate how these new modes are being operationalised, their effect on entrepreneurial projects, and their influence on local and regional contexts (Siegel & Wright, 2015).

As Audretsch et al. (2020) pointed out, research on entrepreneurship has been focused on academics, predominantly scientists, and the related collaborations between universities and industries. Nonetheless, a few years ago, some scholars began to consider multiple stakeholder influences as a better understanding of the reality of academic entrepreneurship (K. Miller et al., 2014; Siegel & Wright, 2015). In this vein, this study offers a novel perspective by including a broader view of actors, interactions and mechanisms of collaboration that has been neglected in the literature. Also, university entrepreneurship is not only enclosed in activities as patents, academic spin-offs, or licensing with academics and research staff's participation. The emergence of university entrepreneurs, non-traditional new ventures, social entrepreneurship and on-campus collaboration between universities and industries is part of academic entrepreneurship's current context (Wright et al., 2017). Simultaneously, TTOs are no longer the only actors responsible for promoting and articulating entrepreneurial activity in universities and incubators, accelerators, garages and competitions are complementary mechanisms of entrepreneurial promotion. Based on the above, this research provides a significant opportunity to explore the effect of broader institutional support manifested in non-traditional entrepreneurial programmes and intermediaries, such as an entrepreneurial competition where leading universities, corporates and public and third-sector organisations invite a regional community to explore entrepreneurial solutions to critical challenges that society is facing.

This research explores the emergence of non-traditional new ventures led by university entrepreneurs, who can be categorised as nascent, novice or habitual entrepreneurs, depending on their previous experience in entrepreneurial activities (Mosey & Wright, 2007). Conceptually, entrepreneurs have been defined as economic agents who "may develop a special competence in interpreting information

that signals the existence of opportunities to create new wealth" (Fiet, 2002. p.3). Similarly, it has been argued that recognising opportunities requires a set of aptitudes and skills that are not widely or uniformly distributed (Vohora et al., 2004). Because of the importance of competencies in the academic context and their evolving nature (Rasmussen et al., 2011), this research investigates the development of entrepreneurial competencies within an underexplored academic mode of academic entrepreneurship, such as entrepreneurial competitions (Fichter & Tiemann, 2020; Huster et al., 2017; Kwong et al., 2012). Entrepreneurial competencies as a research topic and entrepreneurial competitions as a platform to develop those competencies are discussed in the next section.

2.3. Entrepreneurial Competencies as a Research Topic

2.3.1. A Competency-based Approach in Entrepreneurship

The study of competencies' role within entrepreneurial activities has provided a more nuanced understanding of the generation and development of new business across a range of settings (Ardichvili et al., 2003; Chandler & Jansen, 1992; Hayton & Kelley, 2006) and has been identified as a fundamental driver of business growth (Mitchelmore & Rowley, 2010). Therefore, a competency approach has been recognised as valuable in order to understand how entrepreneurs create and develop successful new ventures (Gümüsay & Bohné, 2018; Rasmussen et al., 2011).

Scholars have used concepts such as competencies, skills, assets, capabilities and resources as synonyms (Colombo & Grilli, 2005; Rasmussen et al., 2011), generating a broad spectrum of applications of the terminology within analytical frameworks and their practical implications. McEvoy et al. (2005) defined competency as *"What a person is, knows and does that is causally related to superior performance*" (p. 385). From an individual point of view, Hayton & Kelly (2006)

argued that competencies are a mix of knowledge, skills and personality traits and those three elements are manifested in a particular situation where a competence is applied. Danneels (2002) extends the definition beyond the purely cognitive scope, including material resources to complete goals. A common feature in all definitions is the human character that must be understood as a fundamental part of a competency approach in studying the entrepreneurial process (Rasmussen et al., 2011). Building on Danneels (2002), competencies can be defined as characteristics that involve immaterial resources (skills and knowledge) and material resources that bring the ability to complete something through the appropriate use of those resources (Danneels, 2002; Gümüsay & Bohné, 2018; Rasmussen et al., 2011).

Entrepreneurship as a research area has paid attention to generating knowledge about how entrepreneurs can obtain and develop entrepreneurial competencies that allow the emergence of new ventures, resulting in a better performance facilitating their development (Chandler & Jansen, 1992; Wright, 2014). Considering the existing body of literature, it is possible to find some cross-cutting competencies that have been identified in different settings and levels of analysis. These include the identification and development of opportunities (Chandler & Jansen, 1992; Man et al., 2002; Oosterbeek et al., 2010; Rasmussen et al., 2011), the ability to manage, use and obtain new necessary resources to move forward the entrepreneurial project (Chandler & Jansen, 1992; Hayton & Kelley, 2006; Man et al., 2002; Mitchelmore & Rowley, 2010; Rasmussen et al., 2011), the human agency and motivational side of the entrepreneurial activity, which is close to the idea to championing the project with strategic commitment (Chandler & Jansen, 1992; Hayton & Kelley, 2006; Man et al., 2002; Rasmussen et al., 2011) and a relational competence related to communicative and conceptual skills (Man et al., 2002; Mitchelmore & Rowley, 2010).

The relevance of the study of competencies relies on the notion that entrepreneurial projects are affected by resources' availability, but they are not the unique variable determining their success. Entrepreneurs need abilities to use and combine the available resources to develop entrepreneurial opportunities (Gümüsay & Bohné,

2018). Hence, if entrepreneurship is not dependent on a particular set of resources, it may be necessary to develop a set of competencies to achieve a successful entrepreneurship process (Rasmussen et al., 2011)

Different approaches to studying entrepreneurial competencies have emerged in the literature. For example, some scholars have defined competencies as a feature that mainly resides at the individual level (Chandler & Jansen, 1992; Man et al., 2002; Mitchelmore & Rowley, 2010; Oosterbeek et al., 2010), while others have considered the role of contextual factors affecting their development (e.g. advice from experts, social networks, organisational support) (Gümüsay & Bohné, 2018; Rasmussen et al., 2011). Besides, the study of entrepreneurial competencies has been applied to practising entrepreneurs (Chandler & Jansen, 1992; Hayton & Kelley, 2006; Man et al., 2002), and in educational settings (Gümüsay & Bohné, 2018; Munoz et al., 2011; Oosterbeek et al., 2010; Rasmussen et al., 2011), demonstrating that the perspective of competencies is inherent to the entrepreneurial process in different contexts.

However, scholars have raised doubts about approaches that focus only on entrepreneurs' characteristics or only on contextual factors since it could fall into underestimating or overemphasising what influence an entrepreneur as an individual has on this phenomenon, but also considering the low probability that an entrepreneur can possess all the necessary competencies to perform appropriately (Rasmussen et al., 2011). In this vein, a framework that evaluates the interrelations between multiple actors within a particular context and through multi-level evaluation (Davidsson & Wiklund, 2001) can contribute to research on entrepreneurship and the area of entrepreneurial competencies.

Ahuja & Katila (2004) pointed out that the generation of competencies is an evolutionary process highly influenced by "*idiosyncratic situations*". They highlighted that the organisations could answer the environmental requirements through the heterogeneity of resources in a trial-and-error process. Therefore, individuals could develop competencies through experimentation (own or seeing others), interaction, training or education, and industrial or personal experiences (Hayton & Kelley,

2006). Following the argument about evolutionary process and idiosyncratic situations, Rasmussen et al. (2011) suggested that new ventures develop entrepreneurial competencies considering starting points from existing trajectories and influenced by their surrounding environment.

Given that one of the factors that have driven the study of competencies is its contribution to a better understanding of how new ventures are generated (Rasmussen et al., 2011), it is imperative to consider that entrepreneurial competencies differ according to the stage of development of new ventures. Competencies required to start a project are different from those identified in already-established companies (Zahra, S.A., Sapienza, H.J. & Davidsson, 2006). This research focuses on nascent non-traditional new ventures in an entrepreneurial academic context. Considering that nascent ventures do not possess all the needed competencies, a significant challenge for them is to acquire those competencies at the beginning of the entrepreneurial process (Rasmussen et al., 2011). Therefore, based on the above, this doctoral research explores the development of entrepreneurial competencies that allow new ventures to progress from an initial stage (idea generation) to a value-creating project.

The intended contribution of this research is to expand the understanding of the generation of competencies in a particular setting, such as higher education institutions, under the evolving context in which academic entrepreneurship is currently defined (Siegel & Wright, 2015; Wright et al., 2017). Hence, it is important to consider the characteristics that universities present at the organisational level. Ambos et al. (2008) pointed out that academic entrepreneurship has acquired relevance, manifested in the importance of commercial outcomes as elements of evaluation within university organisational performance. However, it becomes challenging due to the differences presented by higher education institutions compared to traditional business perspectives. Rasmussen et al. (2011) argued that it was one of the reasons for proposing a new understanding of entrepreneurial competencies in a non-commercial environment, identifying their path of generation and evolution. Following the same gap, this research aims to look in-depth at the

development of entrepreneurial competencies under the current context of academic entrepreneurship, particularly among entrepreneurial projects involved in a business plan competition.

2.3.2. The Academic Entrepreneurial Competency Perspective

While a competency perspective has gained attention in the umbrella of entrepreneurship, this approach has also been studied in the academic context (Gümüsay & Bohné, 2018). Similar to what was reported in the previous section, in academic entrepreneurship or entrepreneurial education, the concept "competencies" is applied to study different phenomena and their potential effects. Hence, it is relevant to clarify the different terminology applications and the analytical approach used in this research.

Entrepreneurial competencies have been addressed mainly from two perspectives: (1) Competencies as individual features that link personal features with entrepreneurial behaviour and (2) competencies as drivers of new venture formation. Regarding individual aspects, the literature shows that a competency approach is understood as a broad set of skills, knowledge, attitudes and personal traits related to self-efficacy, proactiveness, risk-taking, resilience, determination, productive thinking, motivation, interpersonal skills and leadership (Glackin & Phelan, 2020; González-López et al., 2019; González Moreno et al., 2019; Morris et al., 2013; Rezaei-Zadeh et al., 2014; Rezaei-Zadeh et al., 2017; Sánchez, 2011, 2013; Williams Middleton et al., 2019).

The research objectives in those studies have examined the impact of educational programmes on students and how those skills, knowledge, attitudes and personal traits are affected after courses and how those competencies can affect entrepreneurial intention (Oosterbeek et al., 2010; Sánchez, 2011, 2013). Other scholars have proposed more comprehensive frameworks, integrating entrepreneurial and sustainable development competencies (Lans et al., 2014) and

social entrepreneurial competencies (Halberstadt et al., 2019). However, they also focus on individual attributes that could be affected by different educational programmes.

The teachability perspective of entrepreneurial competencies within entrepreneurial education has been relevant to better understanding its impact on individual traits. Nonetheless, their findings do not attempt to analyse how competencies can contribute to the generation of new ventures. Moreover, those results do not consider the long-term impact of entrepreneurial interventions because their conclusions are made immediately after one educational intervention (e.g., entrepreneurial modules), mainly by students' self-perception, limiting the evaluation of its effectiveness, which is one of the reported limitations by scholars when evaluating the potential impact of entrepreneurship education (Nabi et al., 2017; Treanor et al., 2020).

The second approach of entrepreneurial competencies put the focus beyond the individual effect. It is related to the capacity of new ventures to acquire entrepreneurial competencies over time, considering initial conditions where the project emerges and the influence of the venture's setting (Rasmussen et al., 2011, 2014; Rasmussen & Wright, 2015). Rasmussen and colleagues argued that academic entrepreneurship as a research context (Kuratko, 2005) presented plausible conditions to fill a gap relating to the emergence of academic spin-offs in a distinct institutional setting (Sapienza et al., 2004).

As mentioned in the previous sections, research on academic entrepreneurship has demonstrated that universities as institutional environments impact the emergence of new ventures and their development, providing capabilities and resources (Hayter, Nelson, et al., 2018; Miranda et al., 2018; Siegel & Wright, 2015). However, because of the heterogeneity of entrepreneurial projects in universities, every new venture could need a particular combination of resources. Building on that argument, Rasmussen et al. (2011) pointed out that entrepreneurial activity requires combinations of tangible and intangible resources. Hence, new ventures require entrepreneurial competencies to make that possible.

Rasmussen et al. (2011) proposed that three main competencies are essential for a successful nascent entrepreneurial project in an academic context. First, Opportunity Development (ODC) allows the refinement of the opportunity into a clear and viable business venture. Second, Championing (CC) brings the project the necessary personal commitment to sustain the entrepreneurial project. Third, Resource Acquisition (RAC) is the ability to get the external and internal resources required to develop the project. This research applies this framework because, among the main analytical approaches found in the literature (Chandler & Jansen, 1992; Hayton & Kelley, 2006; Man et al., 2002; Mitchelmore & Rowley, 2010; Oosterbeek et al., 2010; Rasmussen et al., 2011), this one was developed in a similar context to the current doctoral study and evaluates different levels of the organisation to explore the development of competencies. Moreover, it was evaluated on practising entrepreneurs rather than students undergoing entrepreneurial training (Oosterbeek et al., 2010). Therefore, it is helpful to address the research gap mentioned in the academic entrepreneurship's evolving environment (Siegel & Wright, 2015; Wright et al., 2017). A more detailed definition of competencies that build this framework is presented as follows.

2.3.2.1. Opportunity development competency

As a first entrepreneurial competency in an academic context, Opportunity development (ODC) is defined as the ability to identify viable business opportunities based on scientific knowledge (Rasmussen et al., 2011). Furthermore, discovering opportunities has been identified as a critical element in the new venture process (Shane & Venkatamaran, 2000). In this vein, nascent new ventures in the early development phases would be positively impacted if they are able to acquire this competence (Rasmussen et al., 2014).

In the process of refinement of an entrepreneurial opportunity, new ventures explore different business models simultaneously (Clausen & Rasmussen, 2013), and those

are enhanced as individuals obtain knowledge about available resources or potential new opportunities (Eckhardt, 2013; Rasmussen & Wright, 2015). Within an academic context, it is known that there is a lack of commercial knowledge and experience that hinders the transition from a business idea to a new venture (Hayter, Nelson, et al., 2018; Mosey & Wright, 2007). Therefore, university entrepreneurs should contact different actors, inside and outside universities, to gain technical and business knowledge. As Rasmussen and colleagues showed, initial ideas of academic new ventures were refined several times. In doing so, new ventures were able to develop competencies to identify market needs addressed by the entrepreneurial project.

Finally, interaction with non-academic actors is an essential factor for this competency. They provide new insights into the projects based on the market experience, industry knowledge and technical expertise (Rasmussen et al., 2015). Particularly in nascent new ventures developed within universities, these interactions help conceptualise and develop business plans into new ventures (Rasmussen et al., 2011).

2.3.2.2. Championing competency

Championing competency is defined as the ability to feel identified with the project and, at the same time, to encourage other individuals to support the project, where the primary purpose is related to motivation and human agency (Rasmussen & Wright, 2015). In addition, it has been argued that this competency is related to the leadership role or the personal commitment required to maintain the venture process (Rasmussen et al., 2011).

The evidence provided by Rasmussen and his colleagues (2011) about developing this competence indicates that teams play a preponderant role in determining who will be the champions according to the entrepreneurial projects' stage. For example, some academic entrepreneurs were relevant in playing the champion's role in obtaining credibility and internal support inside universities. However, other team

members played the role to champion commercial aspects in later stages, developing credibility and external support with investors, customers and industry partners.

The context of academic entrepreneurship provides an appropriate setting to explore the development of championing competency. This is because entrepreneurial projects can be championed by different university actors, such as TTO staff, university managers, academics or staff involved in entrepreneurial university units (Rasmussen et al., 2011). However, scholars have also suggested the inclusion of champions from outside the university. In this sense, external champions or surrogate entrepreneurs can contribute with experience, advice, and networks to the founders of new ventures (Clarysse & Moray, 2004; Hayter, Nelson, et al., 2018).

2.3.2.3. Resource acquisition competency

The competence linked to the acquisition of resources (RAC) has been defined as the ability to obtain resources, both internal and external actors, to develop the project. It is based on the entrepreneurial project's capacity to gain the confidence of the university and external actors, who have the necessary resources and, more importantly, who are willing to share them (Rasmussen & Wright, 2015).

It has been argued that entrepreneurial projects in academic contexts depend significantly on the contributions obtained from various actors outside the new venture to acquire the required resources. It would be conditioned to the environment of risk and uncertainty that impacts extended periods to be economically viable (Rasmussen et al., 2011).

The evidence shows that the previous experience in entrepreneurial activities makes a difference in academic entrepreneurs and the possibility of manifesting this competency. In this sense, nascent academic entrepreneurs require more external support than novice or habitual ones (Mosey & Wright, 2007). It is an important

challenge for higher education institutions because there is a hole in terms of getting access or establishing bridges with external actors, such as investors or industrial partners (Rasmussen et al., 2011; Wright et al., 2008). An academic context provides an appropriate environment to foster new ventures regarding access to research, knowledge, and institutional intermediaries that can help connect with potential sources of resources (Hayter et al., 2018). However, due to the emphasis on primary activities in universities, it is unlikely that resource acquisition competition will be developed without interaction with external agents (Rasmussen et al., 2011). Finally, the mechanism for developing this competency in nascent entrepreneurs is through getting credibility and gaining trust from actors within and outside the university who can bring critical resources to the venture (Rasmussen & Wright, 2015).

In summary, Rasmussen et al. (2011) proposed three competencies for a successful nascent entrepreneurial project in an academic context: Opportunity Development (ODC), which allows the refinement of the opportunity into a clear and viable business venture; Championing Competency (CC), which brings the project with the personal commitment necessary to sustain the entrepreneurial project; and Resource Acquisition (RAC), the ability to get the external and internal resources required to develop the project. This theoretical framework enhances comprehension of why some academics or university entrepreneurs achieve success while others do not, even when they experience similar resource endowments and institutional environments (Gümüsay & Bohné, 2018). However, studies analysing the development of entrepreneurial competencies in nascent academic entrepreneurs before venture formation are still scarce (Gümüsay & Bohné, 2018; Rasmussen et al., 2011). The current research addresses this gap by understanding the early stages of entrepreneurial competency development in nascent university entrepreneurs (Gümüsay & Bohné, 2018; Wright, 2014) within academic entrepreneurship, a context where entrepreneurial competencies are in short supply (Rasmussen et al., 2014).

Following Siegel and Wright (2015), one of the intended contributions of the research is to expand the evaluated actors as founders of non-traditional new ventures in an academic context, including students, alumni, staff, or the surrounding community. As a result, the possibility of finding a new competence that responds to this particular setting is not excluded. In addition, a deeper understanding of how competencies may be developed in an evolving context, with emphasis on non-traditional new ventures, and which actors can interact and contribute to this process could yield new insights into the field.

2.3.3. Entrepreneurial Competencies and their Interrelation with the Academic Context

Rasmussen & Wright (2015) suggested how higher education institutions can facilitate the emergence of entrepreneurial projects in an academic context, both in their creation and development. The competency framework previously discussed considered university new ventures, evaluating how different institutional levels can affect entrepreneurial competency development.

The scholars evaluated six university levels and the impact of each one of them on the development of competencies. In line with the stance of scholars highlighting the importance of institutional commitment regarding academic entrepreneurship (Hayter, Nelson, et al., 2018; O'Shea et al., 2004), Rasmussen & Wright (2015) argued an indirect role of "Central university management" in developing the three competencies. The primary purpose of this level is to promote a high standard of scientific activity and enhance collaboration with both users and the industry. As a result, the ODC is affected. The activities related to this level are to design policies for commercial development and provide professional support through the internal infrastructure, resulting in a potential impact on the CC. Universities can also define the generation of new ventures as a relevant institutional activity. As a result, a

higher allocation of internal resources and the promotion of networks with external university stakeholders could indirectly affect RAC.

At the second level, TTOs play a crucial role in getting external funding sources (public or private) to support entrepreneurial projects, affecting RAC of new ventures. TTOs would also have an indirect role in providing spaces for the search of commercial applications and giving access to a diversified set of industry contacts and mentors outside the university, which impact RAC and CC (Rasmussen & Wright, 2015). However, limitations of TTOs in providing adequate support for nascent new ventures have been reported (Mosey & Wright, 2007; Vohora et al., 2004; Wright et al., 2004). Moreover, considering the calls of scholars to diversify the intermediary structure within universities (Fini et al., 2017; Hayter, 2016a), it seems reasonable to question to what extent this organisational structure can enhance the development of non-traditional new ventures since historically, its focus has been on supporting faculty and post-docs instead of students or other actors (Wright et al., 2017).

At a third level, departments would play a vital role in encouraging commercial activities in defining promotion criteria, hiring individuals with business/industrial experience, and actively resolving and managing conflicts of interest that may arise in commercialisation activities, impacting CC. Furthermore, as an indirect role, departments can include the new venture's involvement as part of research activities, impacting ODC. Finally, these units can allocate resources (laboratories, sabbaticals, consumables) and get additional ones from external sources, affecting RAC (Rasmussen & Wright, 2015). Nonetheless, there is a risk in terms of conflicting goals that departments have regarding entrepreneurship, which can generate internal disputes between departments (which should be the centre of entrepreneurial activity) or cause "silos" in the entrepreneurial ecosystem (Wright et al., 2017).

Fourth, the lab/research group level has a crucial role in contacting industrial actors, entrepreneurs, and investors from the initial stages of research projects, affecting ODC and CC. However, the role played by this level to RAC is indirect and has a

limited impact, where individuals involved in this organisation's units are called to share their networks of potential resource holders (Rasmussen & Wright, 2015).

The fifth level, individual researcher, is one of the most relevant in determining researchers' participation in commercial projects. High scientific performance and previous experience in the industry or entrepreneurial projects are critical factors in ODC and CC. The external network or academics also helps to acquire the needed resources to move forward new ventures (Rasmussen & Wright, 2015).

The last level evaluated is student/alumni, having an indirect role for the three analysed competencies. The involvement of students could be a plausible way to explore commercial opportunities through their thesis or dissertations linked to entrepreneurial projects (ODC) or their join to new venture (CC). Regarding alumni, their role has been linked to the industrial/commercial network they can bring to the project to gain resources (RAC) (Rasmussen & Wright, 2015). In light of the arguments proposed by scholars who recognise students and alumni as formal entrepreneurs (Siegel & Wright, 2015; Wright et al., 2017), it seems plausible to re-think how universities are defining the role played by those actors within academic entrepreneurship and their impact on the emergence of non-traditional new ventures.

This research intends to re-evaluate those organisational levels, providing new insights into their potential effect in developing entrepreneurial competencies, exploring a broader spectrum of activities and actors involved in academic entrepreneurship. Research concerning the development of entrepreneurial competencies in academic entrepreneurship has mainly focused on traditional university spin-offs, answering a research gap regarding a particular institutional setting and providing new knowledge about how and who is involved in the competencies development process (Rasmussen et al., 2014, 2015). This doctoral study's stance is that under the current academic entrepreneurship circumstances, the research gap still has elements that have not been fully addressed.

Although universities have been highlighted as environments that help generate entrepreneurial activities (Hayter, Nelson, et al., 2018; Lockett & Wright, 2005), scholars have questioned their impact at different organisational levels (Clarysse et al., 2005). For example, while TTOs have been singled out as primary sources of entrepreneurial competencies (Fini et al., 2017), scholars have debated their ability to generate them effectively (Gümüsay & Bohné, 2018). Hence, it has been recommended that universities should decentralise the entrepreneurial competency development, encouraging the generation of capabilities across different university intermediaries and extending the possibilities to the surrounding entrepreneurial ecosystem (Fini et al., 2017; Gümüsay & Bohné, 2018). Following this suggestion, it seems possible to explore how nascent university entrepreneurs develop non-traditional new ventures, supported by different institutional units and a broad spectrum of mechanisms and actors.

In answering the research gap concerning the decentralisation of universities' entrepreneurial capabilities, this study provides a novel approach to evaluating entrepreneurial competencies' development considering two main features of the current academic entrepreneurship context. First, universities have deployed new modes to support entrepreneurial activities, such as collaborative programmes involving business plan competitions and subsequent incubation to go beyond idea generation evaluation. Besides, those programmes aim to conclude with the creation of new ventures. Second, in those new activities, a broader set of participants are currently involved in those activities, such as students, administrative staff, or the university's surrounding community. Thus, it seems reasonable to argue that those new university entrepreneurs could experience different realities to develop entrepreneurial competencies. Therefore, following Rasmussen et al. (2011), this research intends to provide a more comprehensive framework related to entrepreneurial competencies, understand the initial phases of new ventures' emergence, and consider the new individuals involved in academic entrepreneurial activities developed in this evolving context.

To sum up, the appearance of new objectives, new actors, new organisational units, and new forms in academic entrepreneurship (Siegel & Wright, 2015) reaffirms Rasmussen and Wright's (2015) findings of being able to analyse the development of entrepreneurial competencies considering each organisational level (Davidsson & Wiklund, 2001). As mentioned, the generation of competencies is an evolutionary process affected by the situations surrounding it. In this search for competencies that respond to new challenges and opportunities, Ahuja and Katila (2004) stated that little information addresses how competencies emerge. The literature has shown that the development of entrepreneurial competencies in a traditional academic context is influenced by internal and external actors (Rasmussen et al., 2011; Rasmussen & Wright, 2015). However, little research has addressed the current university setting to evaluate this phenomenon. A way to fill this gap is by exploring collaborative mechanisms used in academic entrepreneurial activities where different actors are encouraged to interact to enhance entrepreneurial projects. Hence, the entrepreneurial competency framework will be used to evaluate the development process of nascent non-traditional new ventures and how a collaborative setting may or may not contribute to overcoming these challenges. Mainly, this study argues that a business plan competition is a novel research context that can adequately represent the characteristics already mentioned about the current entrepreneurial ecosystem, providing new insights regarding the development of entrepreneurial competencies.

2.3.4. Entrepreneurial Competitions as a Platform to Develop Entrepreneurial Competencies

As mentioned in previous sections, business plan competitions are commonly considered part of the university and regional entrepreneurial ecosystem (Wright et al., 2017). Entrepreneurial competitions have increased their frequency during the last decades (Fichter & Tiemann, 2020; Huster et al., 2017; McGowan & Cooper,

2008; Watson et al., 2018), being part of the extracurricular entrepreneurial activities (Pittaway et al., 2011; Watson et al., 2015) and seen as the most common short-term intervention format within entrepreneurial education (Treanor et al., 2020).

It has been argued that entrepreneurial competitions are implemented to motivate students to create their own businesses (Kwong et al., 2012). Also, scholars have argued the importance of these activities in terms of the support that competitions bring to students and nascent entrepreneurs (Fichter & Tiemann, 2020) as participants interested in starting an independent business (Delmar & Davidsson, 2000; Watson et al., 2018). Considering the participant's profile and their lack of commercial or business experience, competitions are the first approach to developing market research that allows them to frame a potential idea into an entrepreneurial opportunity (McGowan & Cooper, 2008). As a result, competitions help get knowledge and skills to identify and develop entrepreneurial opportunities (Huster et al., 2017).

According to Cant (2016), a business plan competition can be defined as a structured activity where individuals develop a feasible and practical business project evaluated based on criteria adapted to international standards by industry experts and practitioners of entrepreneurship. Usually, the process begins with individuals or teams submitting an entrepreneurial idea. Later, there is the first filter to ideas with a higher potential. Finally, after a period of work and improvement, the best projects are evaluated and rewarded in terms of their impact, with cash awards and the possibility of enhancing the networking and the exposure of entrepreneurial projects as well as opportunities for financial investment (Huster et al., 2017; McGowan & Cooper, 2008; Watson et al., 2018).

In line with the arguments about developing academic entrepreneurship activities with social impact (Fini et al., 2018), it is possible to find a growing number of entrepreneurial competitions with an emphasis on sustainability and social development (Fichter & Tiemann, 2020; Huster et al., 2017; Kwong et al., 2012) that approaches the idea of transdisciplinarity and the invitation to solve the challenges that society currently faces. Even though it is possible to find some contests

emphasising particular industrial sectors, technologies or topics, most of these activities are described as generic and cross-sectorial because they are open to different types of participants and potential new ventures (Fichter & Tiemann, 2020; McGowan & Cooper, 2008).

The business plan as an entrepreneurial tool has been widely used since the 1970s and supported by extensive literature, implemented as part of the curricula of universities and backed by public entrepreneurial agencies and business experts (Karlsson & Honig, 2009), being one of the most used techniques in entrepreneurship teaching (Kwong et al., 2012). More specifically, entrepreneurial competitions using business plans tend to achieve two main objectives. The first is to increase the probability of success of entrepreneurial projects by improving the quality of ideas. The second is to generate appropriate learning processes based on the interaction among participants and the competition interlocutors (Passaro et al., 2017). The learning process of these interventions has been highlighted because of its experiential approach. According to Kwong et al. (2012), this is represented by three stages. First, participants need to observe and understand potential problems in the market/society (experiencing). Second, they should propose a plausible entrepreneurial solution (thinking and reflection), and finally, they need to turn it into a business plan that solves the problem (acting). However, scholars have pointed out some concerns about writing business plans rather than implementing new ventures, questioning the significance of these interventions for entrepreneurial practice (Lange et al., 2007).

In terms of the motivations for entering into competitions, research has concluded that participants applied for a wide variety of reasons where the prestige of the activity is highlighted, such as to improve an entrepreneurial idea, to have the chance of being involved in a learning process about business and management, to have access to mentoring, networking, and also for the opportunity to win a prize and awards (Boh et al., 2016; Huster et al., 2017; R. Russell et al., 2008; Watson et al., 2018). While participants perceive a higher value to mentoring than monetary prizes when deciding whether to enter an entrepreneurial competition (R. Russell et al.,

2008), scholars agree that one of the most important effects of these activities is the mentoring process into the entrepreneurial projects (Huster et al., 2017; R. Russell et al., 2008; Treanor et al., 2020). Additionally, the positive impact of these interventions for new venture development in terms of team formation and the credibility and publicity that competitions bring to the winning participants (Boh et al., 2016) has been mentioned.

At the individual level, Huster et al. (2017) argued that mentoring was vital in building skills and developing the willingness to take the risks required to become an entrepreneur. Research has also shown that competitions facilitate developing capabilities related to communication (public speaking, pitching, presentations), teamwork, networking, business planning and self-confidence, which are commonly recognised as examples of entrepreneurial skills developed after participating in these interventions (Huster et al., 2017; R. Russell et al., 2008; Treanor et al., 2020; Watson et al., 2018). However, even when there is evidence to support the positive impacts at the individual level, scholars have different positions when discussing and evaluating long-term impacts.

Watson et al. (2018), through a longitudinal study in the context of an interuniversity competition open to current students and recent graduates (UK), conclude that the capabilities developed by the participants were maintained over time. However, it helped the participants apply for new competitions rather than the routine day-to-day aspects of venture implementation. More critical is the position of McKenzie & Sansone (2019). After an empirical analysis of an open competition for Nigerians under 40 years of age, the evaluation received by the winners of the competition does not predict survival, employment, sales, and profits outcomes compared to those who obtained low evaluations. This differs from the view of Treanor et al. (2020) when evaluating a national entrepreneurship education intervention (UK) focused on science, engineering and technology postgraduate students and postdoctoral researchers. They concluded that this activity was helpful to develop entrepreneurial competences that enhanced the business success (professional career) of those participants engaging in entrepreneurial activities as well as

improved the employability of the participants in the industry. These mixed results invite us to reflect that business competencies should not be assessed in a generic way, but rather understand their context, the background of the participants and the subsequent assessment that could allow the effects to be observed over a long period of time.

Considering the definitions and the discussions of entrepreneurial competitions (e.g. Fichter & Tiemann, 2020; Huster et al., 2017; Kwong et al., 2012; Russell et al., 2008; Watson et al., 2018), the main functions of those activities as an entrepreneurial interventions are: (1) to provide an appropriate experiential learning process, (2) to frame an entrepreneurial idea into a viable business proposal, (3) to encourage participants to pursue an entrepreneurial career, (4) to help in the generation of entrepreneurial skills, (5) to provide a networking platform for mentoring and contacts for future venture development, and (6) to give initial soft funding and provide links with potential investors. As a result, business plans or entrepreneurial competitions are effective mechanisms to improve the organisational climate in universities, particularly to inspire the entire academic community to develop ideas and engage in entrepreneurial activities (H. Bergmann et al., 2018).

Even though scholars have investigated entrepreneurial competitions as part of the academic entrepreneurship ecosystem, a relatively small body of literature is concerned with the effects of entrepreneurial competitions and the development of entrepreneurial competencies (Rasmussen et al., 2011). Moreover, except for Treanor et al. (2020), prior research has focused on entrepreneurial competitions and their effects, mainly at the individual level of participants and in a short-term evaluation period, with emphasis on individual capabilities such as communication skills, motivation for entrepreneurial careers and self-confidence (Huster et al., 2017; R. Russell et al., 2008; Watson et al., 2018).

Nonetheless, based on the reported results in the literature, it is possible to expect potential effects on developing entrepreneurial competencies. For example, regarding ODC, business plan competitions usually consider access to mentoring and training with specialists and experienced entrepreneurs for later stages of the

competitions. Therefore, through a vicarious process, participants can learn from the experience of successful entrepreneurs, who provide valuable advice to winners and losers who get feedback about venture feasibility, resulting in improving or reshaping their entrepreneurial ideas (Huster et al., 2017; McGowan & Cooper, 2008). In this sense, participants of competitions have reported that these kinds of activities have helped them boost the ideation phase, validated their basic idea, or helped refine the plan (Huster et al., 2017). Furthermore, when it comes to Championing, scholars have suggested that entrepreneurial competitions stimulate a motivational context (Treanor et al., 2020), resulting in developing confidence, resilience and a positive mindset towards entrepreneurship (Huster et al., 2017; McGowan & Cooper, 2008; Souitaris et al., 2007). Finally, in terms of RAC, Huster et al. (2017) reported that launching a business after a competition was highly correlated with winning a prize, which suggests a positive impact of this type of initial funding for the first stages of entrepreneurial activity for university entrepreneurs.

Scholars have pointed out the need for more empirical research to explore the impacts of business plan competitions as they are an essential component of entrepreneurial ecosystems (Fichter & Tiemann, 2020; Huster et al., 2017; Kwong et al., 2012). Considering that little research has linked competitions (contests) and the development of entrepreneurial competencies (Rasmussen et al., 2011), this research proposes that the current context of academic entrepreneurship (Siegel & Wright, 2015; Wright et al., 2017) is appropriate to empirically evaluate new forms of entrepreneurial competitions within universities and local communities. Specifically, this research argues that it is important to consider that these interventions are open to a broad range of participants and usually with an emphasis on social challenges that require a novel, collaborative and cross-disciplinary approach that allows complex problems to be solved with an entrepreneurial purpose (Huster et al., 2017; Treanor et al., 2020).

While it has been argued that disciplinarity diversity has been a relevant factor for participants' success in entrepreneurial competitions (Huster et al., 2017), it is less known how cross-disciplinarity approaches enhance entrepreneurial performance in

those interventions. Similarly, there is a general assumption of the efficacy of entrepreneurial competitions; even most of the evidence is focused at the individual level of participants with little research following the development of entrepreneurial projects after these activities (Watson et al., 2018). Building upon Treanor et al. (2020) and the suggestion for future research exploring entrepreneurial competitions that consider the participation of different disciplinary cohorts at undergraduate and postgraduate levels to evaluate the efficacy of these interventions, and the recommendation of scholars to explore the effects of broader participation of stakeholders in academic entrepreneurial activities (Nabi et al., 2017), this research tends to be a contribution to the field in investigating a transdisciplinary entrepreneurial competition, exploring long-term entrepreneurial competencies development (Rasmussen et al., 2011).

The following section discusses the collaborative environment in which universities are currently operating and how this new scenario could benefit academic entrepreneurship activities in general and entrepreneurial competitions in particular. Different modes of collaboration will be defined, emphasising transdisciplinarity as a mechanism that integrates academic and non-academic actors, which respond to policymakers' calls to establish bridges that help universities integrate their work with the surrounding communities, where academic entrepreneurship provides an opportunity to translate traditional knowledge purpose of higher education institutions into economic and social development (Roux et al., 2017).

2.4. Research Context: Collaboration as a Prominent Phenomenon

Collaboration has become an increasingly prevalent phenomenon in academia throughout recent decades (Chen et al., 2019; Muriithi et al., 2018; Ponds, 2009; Porac et al., 2004; Wagner-Döbler, 2001). In particular, research-focused universities have encouraged academic collaboration across disciplines, on the

basis that it can produce positive results in the generation and sharing of knowledge (Sa, 2008; Tan & Md. Noor, 2013), which has been demonstrated tangibly on research productivity (Bozeman & Boardman, 2014). This effect has been observed across different disciplines, from social and natural sciences (Morrison et al., 2003) and with non-academic actors' involvement (Cummings & Kiesler, 2005). Collaboration can be defined as "*a process in which autonomous actors interact through formal and informal negotiation, jointly creating rules and structures governing their relationships and ways to act or decide on the issues that brought them together; it is a process involving shared norms and mutually beneficial interactions"* (Thomson & Perry, 2006. p. 23).

Some of the core factors underpinning an increment of these activities within universities include new public policies that encourage collaboration, greater access to financial resources for research, and an imperative call to share those resources. Besides, the academy has suffered a high degree of scientific specialisation, simultaneously with the complexity of the challenges addressed (social and academic themes) that require the involvement of more than one discipline for their resolution (Bozeman et al., 2013; Bozeman & Boardman, 2014; Katz & Martin, 1997; Walsh & Maloney, 2007). As a result, universities are edging closer to the "real" world – or the world of practice – and this scenario has created an exciting opportunity for studying academic entrepreneurship and mainly how these new environments affect the development of entrepreneurial competencies.

2.4.1. Different Mechanisms of Cross-disciplinary Collaboration in the Academy

According to Katz and Martin (1997), collaboration in an academic context can be defined as the "working together of researchers to achieve the common goal of producing new scientific knowledge" (p. 7). Bozeman et al. (2013) expand the definition as "social processes whereby human beings pool their human capital for

the objective of producing knowledge" (p. 3). Later, Bozeman & Boardman (2014), in a new conceptualisation of collaboration, divided the concept of human capital used previously, including experience, knowledge, and social skills. Besides, the authors clarify that the result of the collaboration is "new" scientific knowledge, which also includes knowledge as an asset embedded in technology. The main difference among definitions is that Bozeman et al. (2013) considered another type of collaboration beyond a publishing-oriented focus. They argued that collaboration could also pursue technology developments goals, such as software or patents, where publishing an article is not the primary objective.

An important aspect mentioned by Bozeman & Boardman (2014) and Bozeman et al. (2013) is the human character of collaboration. The traditional definitions of collaboration from the 90s pointed out organisations' role in the collaborative process (Henneman et al., 1995; Mattessich & Monsey, 1992; Wood & Gray, 1991). However, Bozeman et al. (2013, 2014) highlighted that when we talk about collaboration between organisations, individuals finally represent it, emphasising the human aspects of this phenomenon.

Although most of the research about scientific collaboration addresses traditional university researchers' collaborations, this research tends to be a contribution in expanding the study of these phenomena in the academic entrepreneurship context but in the particular challenge of boundary spanning through novel ways of collaboration, which includes the participation of non-academic actors from society, with the purpose to address social problems. Also, this research is close to the definition of Bozeman et al. (2013) because the projects under study are pursuing the development of entrepreneurial opportunities, which in some sense is in line with technology development goals. In this vein, this research intends to add new knowledge about the understanding of the collaborative process in academia, moving one step closer to academic entrepreneurial activities based on the theoretical approach of the development of entrepreneurial competencies (Rasmussen et al., 2011, 2014).

When it comes to cross-disciplinary collaboration in an academic context, one of the issues that emerge is that concepts to identify the type of collaborative mechanisms such as multidisciplinary, interdisciplinary or transdisciplinary are employed as synonyms, even though there are implications, both in their form and substance (Choi & Pak, 2006; Katri Huutoniemi et al., 2010; G. Tress et al., 2005). Thus, it is necessary to define the main concepts used in this research. In doing so, the terms discipline, monodisciplinary, multidisciplinarity, interdisciplinarity, and transdisciplinarity are discussed and defined to understand their main differences. An overview table of all definitions and their critical differences is provided (see Table 1).

Discipline has been defined by the Organisation for Economic Co-operation and Development (OECD) (Apostel et al., 1972), as "*A specific body of teachable knowledge with its own background of education, training, procedures, methods and content areas*" (p. 25).

More specifically, when it comes to mono-disciplinarity (or just disciplinarity), it refers to an objective related to individuals with one discipline. They try to answer a specific question associated with a field, sharing the same paradigm and using their own disciplinary concepts, theories, methods, procedures and tools, where cooperation with another discipline is not possible (Flinterman, Teclemariam-Mesbah, Broerse, & Bunders, 2001; Tress et al., 2005).

By contrast, multidisciplinarity is a mode of interaction of fields, where multiple disciplines with a shared goal contribute from their knowledge, keeping its boundaries and defining multiple disciplinary objectives (Choi & Pak, 2006; R. C. Miller, 1982; G. Tress et al., 2005; Wagner et al., 2011). Some authors, following the research of Klein (1990), have associated multidisciplinarity with the additive character of this methodology, where the key feature is the "Juxtaposition" of disciplines (Apostel et al., 1972; Choi & Pak, 2006; Tress et al., 2005).

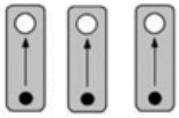
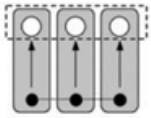
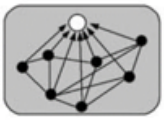
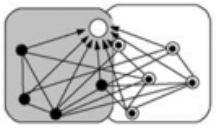
	Monodisciplinarity	Multidisciplinarity	Interdisiciplinarity	Transdisciplinarity
Numbers of disciplines	Working with one academic discipline	Working with several academic disciplines	Working between several academic disciplines	Working across and beyond academic disciplines
Paticipation of non-academic	Not possible	Not possible	Not possible	Yes
Type of Goal	Disciplinary goal setting	Multiple disciplinary goals setting under a thematic umbrella	Common goal setting	Common goal setting
Discipline Boundaries	Does not apply	Keeping their boundaries	Their boundaries are crossed	The work is across and beyond boundaries with a trascendent sense
Type of interaction	Does not apply	Juxtaposition of disciplines - collaborators works independently, in parallel or sequencially	Interaction of disciplines - Collaborators work together	Integration of disciplines - Collaborators work together sharing conceptual framework
Roles of members	Collaborators mantein the disciplinary roles	Collaborators have differents but inter-related roles, manteining their own discipline nature.	Collaborators have common roles. They abandon some aspects of their own disciplinary participation. However, they keep their discipline-specific base	Collaborators can release their roles from their own disciplines and also expand to another disciplines
Keyword	Singular	Additive	Interactive	Integration - Holistic
Diagram				
Mathematic Example	1+0=1	2+2=4	2+2=5	2+2=Yellow

Table 1: Different mechanisms of collaboration. Adapted from Choi & Pak (2006), Evely et al. (2010), Tress et al. (2005) and Wagner et al. (2011). Illustrations (diagram) from Tress et al. (2005).

The relationship among the fields is based on proximity with low rates of integration (Tress et al., 2005), where the outcomes are the sum of each discipline's results working in a project, just as a linear combination of factors, without a synergistic effect (Choi & Pak, 2006).

A third definition is interdisciplinarity. It is also a form of collaboration based on the use of several disciplines, which can be unrelated, to address a common research objective (Rosenfield, 1992; Tress et al., 2005). However, the degree of integration is higher than multidisciplinary, reflected in the exchange, contrast, and combination of concepts, methodologies, procedures, and paradigms for the participants' mutual benefits (Apostel et al., 1972; Flinterman et al., 2001). For that reason, the boundaries of each field are crossed to create new knowledge and reach a shared research aim (Tress et al., 2005).

In an interdisciplinary project, collaborators from each discipline work jointly as an integrative interaction (Choi & Pak, 2006; Rosenfield, 1992), with constant communication (Apostel et al., 1972). However, they keep their theoretical background to address the common objective (Rosenfield, 1992). The epistemological approach also arises as a distinctive feature because it allows the generation of new knowledge or even creating a new discipline (Choi & Pak, 2006; Flinterman et al., 2001; Rosenfield, 1992).

The final definition is transdisciplinarity. Similar to interdisciplinarity, those projects are also a way of collaborating with participants from different fields and unrelated disciplines, but also include individuals who can come from a non-academic environment, such as persons with industrial experience or representing social and public organisations (Klein, 2008; Stokols, Hall, et al., 2008; Tress et al., 2005) and where interaction is across and beyond boundaries and fields (Choi & Pak, 2006). In this context, collaborators share a conceptual framework for solving a common problem (Choi & Pak, 2006; Rosenfield, 1992).

Tress et al. (2005) comment that transdisciplinarity could be exemplified as intensive interdisciplinary collaboration, with the risk that it is difficult to execute in daily work. Transdisciplinarity is more than the addition or the interaction of disciplines; it is an integrative way of cooperation (Choi & Pak, 2006). Following the review developed by Choi & Pak (2006) and the contributions in the conceptualisation from Mobjork (2010), the reasons to justify the use of cross-disciplinary collaborative approaches are to find answers to real-world problems, solve complex issues, work with different perspectives, and identify the correct “question” to address a problem that requires an integrated perspective of different fields. Particularly in transdisciplinarity, it has been argued that it is a type of collaboration that focuses on real/social challenges (Di Iacovo et al., 2016; Hadorn et al., 2008; Lawrence & Després, 2004; Schauppenlehner-Kloyber & Penker, 2015; Zscheischler & Rogga, 2015). Based on the above, transdisciplinarity seems to be a plausible collaborative mechanism to answer the call of scholars to pursue academic entrepreneurship outcomes with social impact (Fini et al., 2018).

To conceptualise the different types of collaboration, Mobjork (2010) provided a framework that distinguishes the main categories of multiple-disciplinary collaboration (Table 2).[2]

	Multidisciplinarity	Interdisciplinarity	Transdisciplinarity
Collaboration	Cooperation between researchers within each discipline.	Cooperation between researchers crossing the disciplines.	Cooperation between researchers and practitioners.
Motives	Mainly instrumental.	Both instrumental and critical.	
Integration	Integration concerns mainly the synthesis phase.	Integration is pivotal and a shared problem definition is needed.	

Table 2 Analytical framework of multiple-disciplinary collaborative approaches. Source: Mobjork (2010)

In summary, there are a variety of concepts that can be used to refer to collaborative work. The disciplinary bases, kind of collaborators (stakeholders) and the degree of integration of the fields are crucial to understanding and defining the mechanism applied (Evely et al., 2010). While multidisciplinarity shows low degrees of integration and is integrated by academic members, interdisciplinarity is the next level of collaboration among academic collaborators but with a high level of interaction. The next stage is transdisciplinarity which also has high integration, but the cooperation is among academics and practitioners, including the non-academic sector (Tress et al., 2005).

Research on academic entrepreneurship has generated an essential contribution to understanding how different academic and non-academic actors' interactions can enhance the entrepreneurial ecosystem and resulting outcomes (Hayter, Nelson, et al., 2018). However, due to the evolution that this environment has experienced (Siegel & (Wright et al., 2017)Wright, 2015; Wright et al., 2017), it is still possible to improve both the theoretical and practical understanding of studying a type of collaboration that has been little studied: transdisciplinary in the emergence of non-traditional new ventures developed by university entrepreneurs. Furthermore, it

[2] Considering that this research explores the effects of transdisciplinary collaboration in academic entrepreneurship, a dedicated section to transdisciplinarity is developed in sections 2.4.1, 2.4.2 and 2.4.3.

could provide new insights into transdisciplinary collaboration with academic entrepreneurial purposes and their effect on entrepreneurial competencies development. The following section addresses transdisciplinarity, contextualising its appearance in the academic discussion.

2.4.2. Transdisciplinarity: History, Theoretical Influences and Definitions

2.4.2.1. Transdisciplinarity emerging in academia and society

In the last few decades of the twentieth century, transdisciplinarity emerged in the academic environment at a time when society had to deal with new problems linked to environmental issues, poverty, diseases, natural and human-made disasters and technological development (Lang et al., 2012), social problems that have been defined as transdisciplinary challenges (Max-Neef, 2005). The increasing demand for non-traditional knowledge exposed the fact that science's structure was inefficient in solving society's challenges (Scholz & Marks, 2001). This scenario required the production of scientific knowledge from a new approach (multi, inter or transdisciplinarity) (Stock & Burton, 2011), which involves disciplines such as traditional sciences, humanities and social sciences (Lawrence, 2015), where academic knowledge and the non-academic background are critical factors in the design of strategies to face real-world problems.

Even though the first references and definitions of collaborative projects can be related to calls made in the 1950s in the context of interdisciplinary research focused on environmental or social issues (Miller, Baird, Littlefield, & Kofinas, 2008), scholars have agreed on the emergence of transdisciplinarity since the 1970s with the definition of Jantsch (1972) (Apostel et al., 1972; Augsburg, 2014; Balsiger, 2004; De Jong, Wardenaar, & Horlings, 2016; Hadorn et al., 2008; Hoffmann, Pohl, & Hering, 2017; Jahn, Bergmann, & Keil, 2012; Klein, 2004; Nicolescu, 2010;

Ramadier, 2004) being the youngest concept among cross-disciplinary approaches (Balsiger, 2004). Jantsch (1972) proposed a system-theory approach to understand a transdisciplinary university, highlighting the importance of active connections of universities with the industry, public sector and society to address relevant social problems and where the integration and coordination among science, education and innovation is critical (Hadorn et al., 2008).

Since then, it has been observed that more research has used a transdisciplinary approach to produce knowledge that rises above traditional academic boundaries and disciplinary fields (Klein, 2015; Kueffer et al., 2007; Stokols et al., 2005). The application of transdisciplinarity has been widespread in academia, including humanities, social and natural sciences, and the professional context (Lawrence, 2015). Considering different research areas, transdisciplinary studies have been developed in projects with broader purposes. For example, sustainable development is usually mentioned as a field where this approach fits (M. Bergmann et al., 2005; Di Iacovo et al., 2016; Pohl & Hadorn, 2008; Walter, Helgenberger, Wiek, & Scholz, 2007). In the same vein, research on topics such as climate change (De Jong et al., 2016; Gaziulusoy et al., 2016; Klenk & Meehan, 2017; Serrao-neumann et al., 2015) and urban development studies (Ramadier, 2004; Schauppenlehner-Kloyber & Penker, 2015) using a transdisciplinary approach are frequently published. Nonetheless, other topics are also included, such as medical research (Lawlor et al., 2015; Nash et al., 2003) or evaluations and applications of transdisciplinarity in the context of higher education (Aneas, 2015; Balsiger, 2015; Hagoel & Kalekin-Fishman, 2002; Tejedor, Segalàs, & Rosas-Casals, 2018; Wall & Shankar, 2008).

The emergence of international conferences and special issues of academic journals has also been mentioned where interdisciplinarity and transdisciplinarity are central themes (Lawrence, 2015; B. Tress et al., 2005). In terms of the frequency of cross-disciplinary concepts, Stock & Burton (2011) showed that while interdisciplinarity is the most widely used terminology, multidisciplinarity began to be less mentioned. Nonetheless, transdisciplinarity shows growth from the 2000s, reflecting that the

academic community recognises this as a pathway to produce knowledge and address research topics.

More specifically, an overview of the literature on transdisciplinarity showed that most research had addressed this phenomenon from a non-empirical angle (Zscheischler & Rogga, 2015). For example, there are a significant number of papers sharing opinions, conceptual discussions in particular contexts or reflections about theories. On the other hand, less research is focused on empirical analysis, which demonstrates the novelty of the study of transdisciplinary in academia and, in turn, shows that it is a topic in a permanent discussion about its ontological, epistemological and theoretical bases (Zscheischler & Rogga, 2015).

The following section explores theoretical perspectives that have influenced transdisciplinarity, and based on the review, transdisciplinarity within an academic context will be defined. Also, barriers and facilitators to the transdisciplinary process are discussed.

2.4.2.2. Theoretical influences in the development of Transdisciplinarity

Some authors have discussed the impact of the General System Theory (presented by Ludwig von Butterfly) in the development of cross-disciplinary collaboration (Balsiger, 2004; Bernstein, 2015; Brown, 2015; Hadorn et al., 2008) being used as a first approximation to define transdisciplinarity (Jantsch, 1972). This lens influenced the understanding of the different scientific disciplines and their interdependence with the context of the developed academic activity (Balsiger, 2004; Hadorn et al., 2008).

There was a reflection about knowledge production in the nineties, where the integration of different perspectives took relevance. Gibbons et al. (1994) introduced a new framework to understand knowledge production in two main scenarios. The

first, Mode 1, is associated with the traditional way to produce knowledge. It means that knowledge generation occurs in a prominent cognitive and disciplinary context (Aneas, 2015; Di Iacovo et al., 2016; Hagoel & Kalekin-Fishman, 2002), which was the usual manner of understanding institutional academic research. Second, the authors raised a new perspective on the generation of knowledge called Mode 2, which explicitly refers to a transdisciplinary approach as one of this features (Balsiger, 2004; Jackson & Ward, 2004), where social and economic factors take place in the creation of new knowledge (Gibbons et al., 1994; Gibbons & Nowotny, 2001). As a result, Mode 2 as a research system is socially distributed and highly interactive (Hessels & van Lente, 2008). In this way, the link between society, education and knowledge begins to be established visibly (Di Iacovo et al., 2016; Hessels & van Lente, 2008).

This new generation of knowledge is a complement of the traditional one without replacing it. Therefore, modes 1 and 2 are equally relevant to higher education institutions in addressing organisational goals challenges (Aneas, 2015; Hessels & van Lente, 2008). The following table presented by Hessels & van Lente (2008) summarises each mode of knowledge production (Table 3).

Mode 1	Mode 2
Academic context	Context of application
Disciplinary	Transdisciplinary
Homogeneity	Heterogeneity
Autonomy	Reflexivity/social accountability
Traditional quality control (peer review)	Novel quality control

Table 3 Characteristics of knowledge production. Source: Hessels & van Lente (2008)

Based on Gibbons et al. (1994), Jackson & Ward (2004) argued that transdisciplinarity is an approach to learning and behaviour in the academic context. Using the theory of complexity and the matrix of certainty-agreement (Stacey et al., 2000), the authors showed three areas of thinking and behaviour linking the matrix with the modes of knowledge (Gibbons et al. 1994). They argued that Zone A is related to the traditional disciplinary knowledge – Mode 1 – with a prominence of ideological, political, and judgemental control. On the other side, Mode 2 is

associated with Zone B of the matrix. Transdisciplinary knowledge should be generated in this zone, which is represented by less certainty and further complexity. This zone is associated with innovation, experiential learning, and creativity due to an adaptation and continuous evolution generated through the interaction between individuals and organisations searching for answers for the challenges they face (Jackson & Ward, 2004). Aneas (2015) presents a diagram showing the combination of complexity theory and knowledge production (Figure 3).

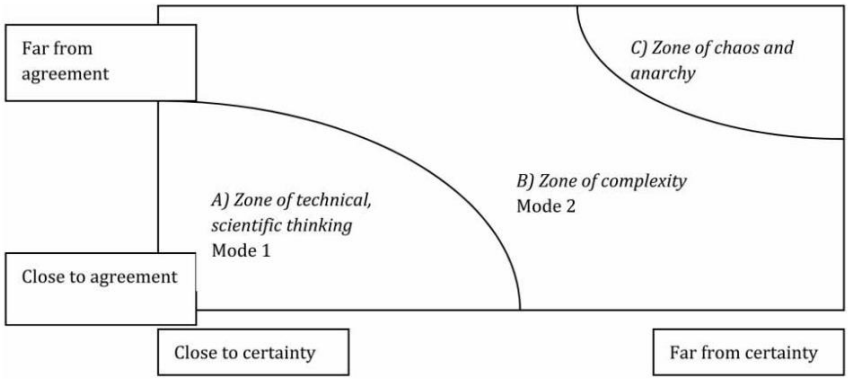


Fig. 3 Complexity theory and production of knowledge. Source: Aneas (2015)

This research is framed in the zone of complexity related to Mode 2 of knowledge production, where the aspects mentioned by Jackson & Ward (2004) (innovation, experiential learning, and creativity) have also been recognised in the dynamics of entrepreneurial activities (Klotz et al., 2014). Although Mode 2 has been highlighted in the frame of academic entrepreneurship and the features of an entrepreneurial university (Bienkowska & Klofsten, 2012; Campbell & Carayannis, 2016), little research has considered transdisciplinarity as an aspect to be considered within entrepreneurial universities (Urbano & Guerrero, 2013), which, in turn, is one of the gaps where this research tends to be a contribution.

2.4.2.3. Definitions of transdisciplinarity

The literature shows no consensus on transdisciplinarity's meaning and understandings (Brandt et al., 2013; Jahn et al., 2012; Klein, 2013; Zscheischler & Rogga, 2015). It is mostly true since it is not easy to find a general definition of transdisciplinarity because there are many of them (Scholz & Marks, 2001). This fact has been a challenge to define transdisciplinarity as a research paradigm that can contribute to theory, terminology and methodology (Enengel et al., 2012; Lang et al., 2012). However, despite the lack of a shared definition of transdisciplinarity among scholars, research that has used this terminology to frame its collaborative approaches is growing, which shows that it is being strengthened at least as a comprehensible concept for some research activities (Brandt et al., 2013; Zscheischler & Rogga, 2015). In this sense, it is possible to identify similarities when scholars provide conceptualisations of transdisciplinarity (Lawrence & Després, 2004; Zscheischler & Rogga, 2015). These are: (1) a collaborative approach, (2) using a problem or goal-oriented approach that (3) emphasises the integration of disciplines with the representation of academic and non-academic actors

First, a collaborative process could be the starting point (Aneas, 2015; Enengel et al., 2012; Hoffmann et al., 2017; Zscheischler & Rogga, 2015). Furthermore, it has been argued that collaboration is critical in understanding transdisciplinary activities (Mobjork, 2010) (the implications of collaboration were discussed in section 2.4).

A second pattern is that transdisciplinarity is a problem-oriented approach (Klein, 2015; Pohl & Hadorn, 2008; A. W. Russell et al., 2008), where some scholars pointed out in the real-world context (Di Iacovo et al., 2016; Hadorn et al., 2008; Lawrence & Després, 2004; Schauppenlehner-Kloyber & Penker, 2015; Zscheischler & Rogga, 2015). Besides, it has also been argued that transdisciplinarity has a goal-oriented character (Hoffmann et al., 2017; Klein et al., 2001; Lang et al., 2012; Pohl & Hadorn, 2008) due to the actions and solutions that it suggests (Lawrence & Després, 2004).

Regarding the engagement of different actors and sectors, most scholars agree that transdisciplinarity requires the participation of academic disciplines and also the involvement of individuals from society and stakeholders of universities (De Jong et al., 2016; K Huutoniemi, 2010b; Jahn et al., 2012; Klein, 2015; Lauto & Sengoku, 2015; Lawrence & Després, 2004; Mobjork, 2010; Pohl & Hadorn, 2008; G. Tress et al., 2005). As a result, non-academic actors' participation made the difference between interdisciplinarity and transdisciplinarity (Jahn et al., 2012; Mobjork, 2010). These two angles provide a wide range of different knowledge and expertise, which would allow extensive options of solutions, taking a multi-perspective approach (Hoffmann et al., 2017), in order to address complex and multidimensional issues (Klenk & Meehan, 2017; Lang et al., 2012; Mobjork, 2010; Stock & Burton, 2011).

In this sense, it is possible to argue that transdisciplinarity can be associated with a Resource-Based View and the Social Network theory, conceptual frameworks widely used in entrepreneurship highlighting the relevance of resource diversity in entrepreneurial activity and specifically for competency development (Gümüsay & Bohné, 2018; Rasmussen et al., 2015). This research contributes to theoretical perspectives from the angle of a transdisciplinary programme and how it can provide new knowledge to academic entrepreneurship and the development of entrepreneurial competencies.

Regarding integrating actors from outside traditional academic environments, this implies considering their values and knowledge (Walter et al., 2007), transforming this collaboration into an interaction that includes ethical and moral concerns (Bernstein, 2015; Max-Neef, 2005). However, it has been also mentioned the disadvantages of the influence that social actors and trends, specifically how this affect the scientific work, damaging the independence of the academic environment (Scholz & Marks, 2001).

A final aspect mentioned in the literature is the transgressive character of transdisciplinary activities (Klein, 2015; Klein et al., 2001; Kötter & Balsiger, 1999; Lawrence, 2015; Mobjork, 2010; A. W. Russell et al., 2008). According to Klein (2015), who is a leading voice under the discourse of transgression,

transdisciplinarity is an answer to the traditional educational system, which compiles social-political movements, post-normal science views and cultural critique to the more classical approach of reductionism or disciplinary sciences.

Although most scholars agree on the main aspects of transdisciplinarity, Pohl (2011) summarised the conceptualisation's main commonalities. Based on Carew & Wickson (2010), the author grouped four features of transdisciplinarity's definitions. These are *"(1) the focus on socially relevant issues, (2) transcending and integrating disciplinary paradigms, (3) doing participatory research and (4) the search for a unity of knowledge beyond disciplines*" (Pohl, 2011. p. 619) (see Table 4).

Transdisciplinarity according to concept **Features of transdisciplinarity**	**A**	**B**	**C**
Relating to socially relevant issues			
Transcending and integrating disciplinary paradigms			
Participatory research			
Searching for a unity of knowledge			

Table 4 Three definitions of transdisciplinarity based on four features – source: Pohl (2011).

This research takes the stance related to the definitions of Kötter & Balsiger (1999), Lawrence & Després, (2004) and Scholz & Marks (2001) (Column B – Table 4). It means that the entrepreneurial project goals should consider social problems, with a collaborative pattern that integrate disciplinary backgrounds, manifested in academic and non-academic actors' representation and interaction.

Regarding the last feature about participation, different actors' involvement has also been discussed among scholars to understand collaboration dynamics. An easy way to differentiate interdisciplinarity from transdisciplinarity is non-academic actors' contributions (Jahn et al., 2012). However, Mobjork (2010), criticising the fact that the inclusion of non-academic members is too general to differentiate the roles of team members, made a significant contribution providing a clear and understandable classification regarding the type of participation of non-academic actors: consulting

or participatory transdisciplinarity (Jahn et al., 2012; Rosendahl et al., 2015; Zscheischler & Rogga, 2015).

According to Mobjork (2010), the main difference lies in the knowledge production process. Consulting transdisciplinarity is defined as a transdisciplinary approach where non-academic actors have no active role in generating knowledge, limiting their contribution to "*responding and reacting to the research conducted"* as *"researchers bear their thoughts and perspectives in mind during the research*" (p. 870). On the other side, participatory research is closer to the more general definition of transdisciplinarity, where non-academic actors *"are fully included in the knowledge production process, and their knowledge is equally valuable to scientific knowledge*" (p. 870). Transdisciplinarity with a participatory focus requires individuals to be highly involved, which will be reflected in the co-generation of knowledge (Rosendahl et al., 2015). For the nature of this research project's setting, both the consulting and participatory transdisciplinarity processes are included as potential projects to evaluate.

To summarise, transdisciplinarity is a novel concept in the academic environment, which emerged during the last decades of the twentieth century. Currently, there is no agreement to identify a precise single definition of transdisciplinarity. However, it is possible to identify the main cross-cutting features among scholars. Those elements seem reasonable and rational in order to adequately define transdisciplinarity.

To date, after a literature review of transdisciplinarity in different fields, this research uses a working definition of transdisciplinarity, which is applied to theoretical sampling. Definitions in the literature do not mention aspects related to the academic actors' requirements, such as a minimum number of scholars from different disciplines, a minimum standard in terms of experience (years of experience, number of publications), or positions in universities. A similar situation is for the inclusion of non-academic actors. Therefore, for this research, the following points are the base of the definition:

- An academic disciplinary representation that can be manifested in the disciplinary background of nascent university entrepreneurs and the field of application of the entrepreneurial project. Moreover, it considers the interaction with academics from different disciplines within the university context
- A non-academic representation can be manifested in nascent entrepreneurs' professional experiences and backgrounds and the field of application of the entrepreneurial project. Complementarily, it considers the interaction with non-academics' interlocutors involved in the transdisciplinary programme.
- Ideally, the project should be addressing a social challenge. However, considering the nature of universities' entrepreneurial activities, a transdisciplinary programme's effect on a traditional perspective of university new venture (technological/commercial approach) is also evaluated.

By extension, in this research, the working definition of transdisciplinarity defines this phenomenon in the academic entrepreneurship context as "*a collaborative process to address societal problems, bringing together scholars from different disciplines and non-academic actors from society, who integrate their knowledge to find transferable solutions to society, which can be exploited through entrepreneurial activities".*

2.4.2.4. Enablers and barriers of transdisciplinary collaboration

The following section discusses the main factors, conceptualised as facilitators or barriers that scholars have suggested regarding transdisciplinary activities.

Based on the reviews of Lang et al. (2012), Stokols, Misra, Hall, Taylor, & Moser (2008), and Zscheischler & Rogga (2015), it is possible to identify the main factors found in empirical transdisciplinary studies. Stokols et al. (2008) proposed a

comprehensive typology of contextual factors for transdisciplinary activities. They divided the factors into six categories: intrapersonal, interpersonal, organisational, physical environmental, societal, and political-technological.

In the first category, intrapersonal, research findings point out the effect of members' attitudes on collaborative projects (Stokols, Misra, Hall, et al., 2008). Among the factors that make up this category, it has been argued that a culture of sharing, having equalitarian values and being open to other academic and non-academic perspectives is a facilitator of transdisciplinary projects (Giri, 2002; Nash, 2008; Stokols et al., 2003; Stokols, Misra, Hall, et al., 2008). In addition, a participatory leadership style has also been mentioned as a factor of an individual's engagement in the different processes in the project (Jakobsen et al., 2004; Stokols, Hall, Taylor, et al., 2008). In this sense, intrapersonal factors can be framed by the individual capability perspective proposed by Nash et al. (2003). They defined those transdisciplinary actors that should manage attitudes, knowledge, and skills to participate in transdisciplinary activities. According to the authors, the methods that can be used to develop individual capabilities are coursework, seminars/workshops, interactive groups dynamics, the institutional environment, the mentoring relationship, and research experience (either mentored or collaborative).

As barriers related to this factor, some scholars have argued that transdisciplinary activities tend to take an extended time in order to create social relations and also to address the difficulties that can appear in this collaborative teamwork (Jakobsen et al., 2004; Stokols, Misra, Hall, et al., 2008; G. Tress et al., 2007; White et al., 2009). Therefore, individuals should be willing to spend a considerable amount of time in the collaborative process (Stokols, Misra, Hall, et al., 2008). Fear of talking to other individuals involved in the process (Tress et al., 2007) and insufficient knowledge about other disciplines (Tress, Tress, & Fry, 2009) also harm the transdisciplinary process. Similar factors and barriers have been suggested in Klotz et al. (2014) review regarding entrepreneurial teams' interactions. Therefore, for this research, both factors and barriers are considered in analysing interactive processes.

Regarding the interpersonal factor, communication emerges as a critical element in the literature (Lang et al., 2012; Stokols, Misra, Hall, et al., 2008). The importance of promoting an active and permanent communication culture in transdisciplinary projects has been highlighted. It allows consensus and overcoming uncertainties to be achieved (Stokols, Misra, Hall, et al., 2008; White et al., 2009; Zscheischler & Rogga, 2015). Zscheischler & Rogga (2015) pointed out that no unique instrument warrants effective communication because it depends on the goals and context. They emphasised the role of communication in transdisciplinary projects, arguing that "*many of the challenges that are associated with transdisciplinary research may be solved by establishing proper communication among those involved*" (p. 41). In this regard, personal contact in face-to-face meetings and informal settings (Blättel-Mink & Kastenholz, 2005; Jakobsen et al., 2004), members' familiarity (Jakobsen et al., 2004; Stokols, Misra, Hall, et al., 2008), and trust and respect among team members (Ray, 1998; Stokols, Misra, Hall, et al., 2008; White et al., 2009) enhance transdisciplinary interactions. Regarding the last point, transdisciplinary processes require trusting in other knowledge, which, in turn, implies that individuals are willing to sacrifice their disciplinary standards and beliefs (Hadorn et al., 2008).

Difficulties related to communication are commonly associated with (1) disciplinary terminology, codes and problems of mutual understanding (Blättel-Mink & Kastenholz, 2005; Jakobsen et al., 2004; G. Tress et al., 2007) and (2) team size (a higher number of individuals involved in a project, leading to greater communication difficulty) (Jakobsen et al., 2004). These findings align with the literature on entrepreneurial team interactions, where communication has also been identified as a factor affecting project viability and self-satisfaction (Foo et al., 2006). Hayton & Kelley (2006) also highlight communication as influencing entrepreneurial competencies. Therefore, for this research, the interpersonal dimension is one of the critical variables to be observed in the interactive processes and how those are related to the development of entrepreneurial competencies.

Diversity in skills and knowledge has been mentioned as a factor that influences effectiveness based on the availability of different resources from the individuals

involved in a project (Fauchald & Smith, 2005; Gibbons et al., 1994; Stokols, Misra, Hall, et al., 2008). However, it may also be considered a barrier. Difficulties in transdisciplinary projects are mainly associated with differences among members manifested in their ontological models, difficulties in integrating methodological perspectives, expectations, and the possession of skill and experience (Jakobsen et al., 2004; B. Tress et al., 2009; Zscheischler & Rogga, 2015).

Positive impacts of diversity in transdisciplinary projects have also been reported from the general perspective of collaboration. Its effect is associated with group innovation (West, 2002; West & Anderson, 1996), decision-making processes (Martins & Milliken, 1996), commercial success (Kirchberger & Pohl, 2016) and fundraising (Beckman, 2006). From the entrepreneurial perspective of the resource-based view, the heterogeneity of resources is a prerequisite for success. However, this is not guaranteed (Alvarez & Busenitz, 2001). Regarding barriers in interacting with individuals with different backgrounds, research on collaborative processes argues that epistemological problems emerge in the interactive process (Andersen, 2016; Fallis, 2006; Thagard, 1997; Wray, 2002). Considering the above, the research context is based on evaluating a transdisciplinary programme, where heterogeneity and diversity of participants are essential elements of its design. As scholars have reported (Rasmussen et al., 2011, 2014, 2015), the development of entrepreneurial competencies in academic settings depends on the possibility of academic entrepreneurs having access to a broader set of resources and individuals to gain those competencies. In this sense, it is reasonable to assume that a transdisciplinarity environment, manifested in a greater diversity of actors, can contribute to the development of competencies. For that reason, this factor is also relevant in order to answer the research gap.

As a third factor, transdisciplinary projects are affected by organisational or institutional conditions. Similar to the reported in academic entrepreneurship, higher education institutions can promote transdisciplinary activities through establishing incentives (tenure and promotion policies) (Stokols, Misra, Hall, et al., 2008; G. Tress et al., 2007) or generating an organisational structure according to those objectives

(A. W. Russell et al., 2008; Scholz & Marks, 2001; Stokols, Misra, Hall, et al., 2008; Zscheischler & Rogga, 2015). Moreover, organising social activities to meet other members of the community, boosting communication among individuals from different places in the organisation (Stokols, Misra, Hall, et al., 2008) and allocating resources to promote these kinds of initiatives (Stokols, Misra, Hall, et al., 2008; G. Tress et al., 2007) all have a positive impact on implementing a transdisciplinary strategy. This is in line with the argument of scholars, who claim that the lack of institutional support and the prominence of single and temporary transdisciplinary projects instead of a "permanent programme" hinders the ability to build a transdisciplinary culture based on the learned lessons (Hadorn et al., 2008). In the same vein, one macro-organisational barrier in universities is that academic achievement is mainly related to publications in journals that do not consider transdisciplinary as a base. Therefore, most pathways to publishing research are related to work in topics in particular disciplines (Aneas, 2015; Fry, 2001; Giri, 2002). From the side of academic entrepreneurship, similar findings have been commented on regarding the organisational structure and their mechanism of incentives (Guerrero & Urbano, 2012; Siegel et al., 2003). Therefore, institutional aspects where entrepreneurial projects emerge are evaluated to better comprehend the transdisciplinary context influence in developing entrepreneurial competencies.

Fourth, physical and environmental factors also play a role in this type of project. The geographical proximity of individuals involved in transdisciplinary projects acts as a facilitator in the process (Jakobsen et al., 2004; Stokols, Misra, Hall, et al., 2008; G. Tress et al., 2007; Zscheischler & Rogga, 2015). Other factors that have been mentioned in the literature are comfortable, distraction-free and equipped areas according to the needs of the projects (Stokols, Misra, Hall, et al., 2008). Similar evidence has been found in the entrepreneurial context. Link & Scott (2005) pointed out that nurturing environments and geographical proximity improve academic entrepreneurial activity. Recently, Goethner & Wyrwich (2020) reported complementary evidence showing that the emergence of entrepreneurial opportunities in natural science disciplines is positively affected by proximity to

business schools. Therefore, this factor is considered to evaluate its possible impact on the development of entrepreneurial competencies.

Contextual factors have been described and contrasted to distinguish facilitators or barriers in transdisciplinary activities. Remarkably, similar factors identified within a transdisciplinary context have also been reported in academic entrepreneurship. Although this research can identify facilitators and barriers in the collaborative transdisciplinary process applied in an entrepreneurial programme, one of the intended contributions is to understand better how these enablers or barriers affect entrepreneurial competencies development.

2.4.3. Transdisciplinarity: an Opportunity to Evaluate Entrepreneurial Competencies in an Academic Context

Scholars have appealed to the academic community that research not only remains as a contribution to traditional knowledge but also translates into economic and social development (Roux et al., 2017). As such, academic entrepreneurship represents a plausible bridge to reach that objective (Etzkowitz, 2003a). More recently, researchers have highlighted the need to move from traditional entrepreneurial outcomes to societal impacts (Fini et al., 2018). Following the call of Siegel & Wright (2015), who highlighted the need to re-think the study of academic entrepreneurship due to the greater scope of actors that are involved in entrepreneurial activities and the new forms and modes observed within universities, the current research takes transdisciplinarity as a novel context to evaluate academic entrepreneurial activities and, mainly, how this scenario influences the development of entrepreneurial competencies. To date, limited research has addressed how entrepreneurial competencies can be developed in such scenarios beyond traditional university activities. Following the recommendation of Nabi et al. (2017), who suggest exploring the impact of academic entrepreneurship activities on different stakeholders, this research addresses this gap by empirically exploring the

potential impact of the novel context of transdisciplinary, being an emerging area of practice that could yield new insights into the field. It is evaluated in an entrepreneurial intervention based in a training programme that ends with a business plan competition, where the development of entrepreneurial competencies in non-traditional new ventures is explored (Gümüsay & Bohné, 2018; Wright, 2014).

Transdisciplinarity has emerged as an appropriate context to evaluate the development of entrepreneurial competencies. It has been argued that "*entrepreneurial universities require transdisciplinary and heterogeneous structures, as well as hybridising organisms for collaborating, networking, and partnering with multiple industries, universities, and private and public institutions*" (Urbano & Guerrero, 2013 p.46). Nowadays, students (Guerrero et al., 2014), alumni (Wright et al., 2017), industrial actors and individuals from the wider community (Hayter, Nelson, et al., 2018; Siegel & Wright, 2015) are considered actors of the entrepreneurial ecosystem within universities. Thus, it seems reasonable that academic entrepreneurship can apply a collaborative approach that recognises all these actors' participation and potential contributions.

As mentioned before, scholars have called for a decentralisation process of entrepreneurial capabilities among different university structures at the organisational level (Fini et al., 2017; Gümüsay & Bohné, 2018). In this sense, the entrepreneurial activity does not reside only in technological transfer offices. Although TTOs play a relevant role in assisting the commercialisation of research (O'Gorman et al., 2008), transdisciplinarity allows different modes of academic entrepreneurship to be explored, along with the activities that new intermediaries can develop and their results.

Transdisciplinarity also is an appropriate approach to investigate entrepreneurial competencies development. Building on Rasmussen and colleagues, the evolutionary path of competencies (Ahuja & Katila, 2004) is likely to be influenced by characteristics of the nascent university entrepreneurs (H. Bergmann et al., 2016) and also the institutional incubator environment of higher education institutions (Davidsson, 2015; Rasmussen et al., 2011). Moreover, the emergence of non-

traditional new ventures is affected by the multiple interactions university entrepreneurs can experience with academic and external actors (Rasmussen et al., 2015). Therefore, it is reasonable to assume that a transdisciplinary approach can influence the development of competencies.

Recently, scholars have pointed out that future research projects should explore the evolution of entrepreneurial competencies in spin-off ventures and venture success considering disciplinary backgrounds and cross-faculty spillover (Goethner & Wyrwich, 2020). In the same way, scholars have suggested research directions to evaluate the development of entrepreneurial competencies in short-term and non-compulsory interventions, such as competitions, considering different disciplinary backgrounds with undergraduate and postgraduate students with a focus on long-term impacts (Treanor et al., 2020). Based on the above, this doctoral research represents an effort to answer those research suggestions. The research question that this research seeks to examine is:

How does a transdisciplinary entrepreneurial competition influence the development of entrepreneurial competencies and what are the enablers and barriers in this process? Specifically, this is related to how individuals responsible for entrepreneurial projects involved in an entrepreneurial intervention account for entrepreneurial competencies development. Through the answer to the research question, this research addresses the following research objectives:

- To conceptualise transdisciplinarity in the context of academic entrepreneurship.
- To identify and examine the potential impact of an entrepreneurial intervention carried out in a transdisciplinary context in developing entrepreneurial competencies, focused on non-traditional new ventures led by university entrepreneurs.
- To identify and examine the potential impact of an entrepreneurial intervention carried out in a transdisciplinary context at the individual level.

- To identify and examine possible enablers and barriers observed in a transdisciplinary entrepreneurial intervention that can affect the entrepreneurial process of non-traditional new ventures led by university entrepreneurs.
- To discuss how enablers and barriers observed in a transdisciplinary entrepreneurial intervention can facilitate or hinder the development of entrepreneurial competencies.

2.5. Chapter Conclusions

This chapter developed the literature review underpinning this doctoral research. First, academic entrepreneurship was presented as a research topic, examining individual and contextual determinants influencing entrepreneurial activity of higher education institutions. Based on Siegel and Wright (2015), this section also discusses how the context of academic entrepreneurship has changed and how it occurs in universities, with new modes, programmes, and actors involved. It allows arguing that the entrepreneurial ecosystem changes could affect academic entrepreneurship phenomena, presenting a research opportunity.

Second, as a research area, it was argued that the entrepreneurial competency approach helps understand how entrepreneurs create and develop successful new ventures. Although different approaches to studying entrepreneurial competencies can be found in the literature (Gümüsay & Bohné, 2018), this research applies the theoretical framework presented by Rasmussen et al. (2011) because it was developed in a similar context to the current study (academic entrepreneurship). Moreover, it includes different levels of the organisation to explore the development of competencies, with practising entrepreneurs rather than students undergoing entrepreneurial training. Therefore, it fits with the research enquiry.

Third, this chapter also reviewed transdisciplinarity as a research context. The concept of transdisciplinarity has become increasingly prevalent, as societies have

had to deal with new problems linked to crucial social and economic challenges (Lang et al., 2012) and closely reflect many of the United Nations' Sustainable Development Goals (United Nations, 2020). Given that science's existing structure has been identified as inefficient for solving society's significant challenges (Scholz & Marks, 2001), scientific knowledge production requires a different collaborative approach (Stock & Burton, 2011), including actors from the world of practice who can bring resources that are not available in the academic context. At this point, transdisciplinarity may produce answers to the increasing demand for non-traditional knowledge. After reviewing different research areas, this study uses a working definition of transdisciplinarity. By extension, transdisciplinarity is defined as *"a collaborative process to address societal problems, bringing together scholars from different disciplines and non-academic actors from society, whom integrate their knowledge to find transferable solutions to society, which can be exploited through entrepreneurial activities*".

Finally, the chapter concludes that a transdisciplinary context gives an appropriate opportunity to explore entrepreneurial competencies under academic entrepreneurship's new circumstances. Figure 4 illustrate the key themes in the literature review and the linkages between them. The next chapter develops the research design used to evaluate the development of entrepreneurial competencies empirically

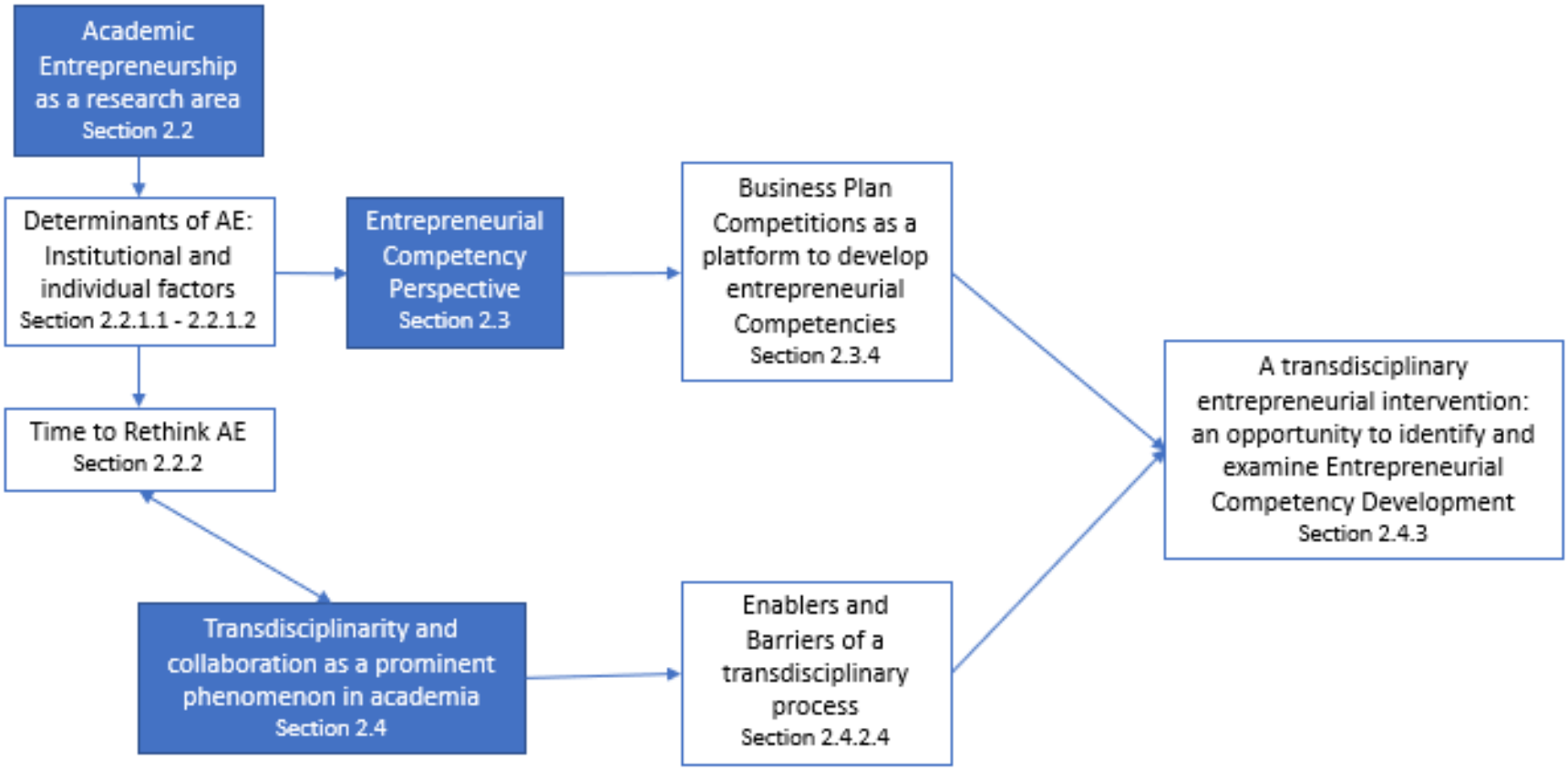


Fig. 4 Key themes in the literature review and the linkages between them

Chapter III: Research Design and Methodology

A qualitative approach to explore the development of Entrepreneurial Competencies within an academic transdisciplinary context

3.1. Chapter Introduction

This research examines how nascent university entrepreneurs, and their new ventures develop entrepreneurial competencies in a transdisciplinary context. Chapter II introduced this study, highlighting the importance of academic entrepreneurship as a research area and pointing out scholar calls to re-think and reflect on the current status of entrepreneurial activities in higher education institutions. The chapter also presented the research topic of entrepreneurial competencies as a theoretical approach, which proposes three main competencies that have explained how academic entrepreneurs create and develop successful new ventures within universities. Finally, the chapter concludes by arguing that a transdisciplinary context is a novel setting where the development of entrepreneurial competencies could be studied, providing new insights to understanding competency development within contemporary academic entrepreneurship. Then, based on the discussed research gaps, the research question and objectives were derived.

This chapter addresses the research design used to evaluate and examine the research question and objectives by providing the rationale for the research methodology derived from the study of entrepreneurial competency development under a transdisciplinary context. Section 3.2 discusses the philosophical assumptions of this research. Section 3.3 discusses different methodological approaches to address the study of collaboration in academia, followed by explaining the qualitative stance defined in this project. Section 3.4 provides the rationale for using a multiple-case study research design. Section 3.5 explains the data collection procedures and analysis, including a description of the research context, the rationale for case selection and description of cases, the data collection process, and data analysis steps. Finally, Section 3.6 presents the conclusions of the chapter.

3.2. Research Philosophy

In order to address a research question, it is crucial to define how the research phenomenon will be understood, firstly regarding its philosophical assumptions, explaining how researchers answer their inquiries (Tsang, 2016). These philosophical paradigms act as a research guide, influencing ontology, epistemology and methodological definitions, interpreting findings, and making research conclusions (Guba & Lincoln, 1994; Tsang, 2016). While ontology refers to beliefs about how reality will be understood, categorised and associated, the epistemological position determines how researchers acquire knowledge, formulate analyses, and raise conclusions (Tsang, 2016).

In general, most philosophical research perspectives go from empiricism, positivism and post-positivism, usually related to the natural and traditional sciences, to more recent philosophy claims such as critical realism and constructivism, linked to social sciences (Tsang, 2016). While positivism and post-positivism assume an objective/single/unique reality, with a sense of causality understood in a probabilistic way, constructivism or interpretative research assumes local, different, multiple, relative and specific constructed realities (Gephart, 2004; Guba & Lincoln, 1994; Tsang, 2016; Tashakkori & Teddlie, 1998; Lincoln, Lynham, & Guba, 2018). The latter proposes that the understanding of reality moves from a given to local and constructed realities, assuming that reality is the result of human perception, which, in turn, can change if individuals (constructors) have changes in their cognitive level (Guba & Lincoln, 1994). The following sections discuss the ontological and epistemological approaches applied in this research: social constructivism and interpretivism.

3.2.1. Ontology

As explained in Chapter II, this research considers the phenomenon of collaboration, bounded as transdisciplinarity, as a novel research context to explore the development of entrepreneurial competencies. To determine the ontological stance of this research, which is defined as the nature of the phenomenon (reality) under study (Duberley et al., 2012), this section explains how the collaborative phenomenon will be understood, explaining its implications for university entrepreneurs and the development of entrepreneurial competencies.

Collaboration as a phenomenon can be studied from different perspectives (Melin, 2000). Particularly in an academic context, several collaboration approaches have been implemented to address different research objectives (Bozeman et al., 2013). Hence, the study of collaboration cannot be restricted to one philosophical approach. Considering the research question and the research objectives of this study, a socially constructed reality is an appropriate stance to help define how collaboration is understood in a transdisciplinary context and how entrepreneurial competencies could be developed within this setting,

Even when there is no single (unique) definition of collaboration in the academic context, some common aspects arise to explain this phenomenon (Bozeman et al., 2013). Based on the widely used definition of Katz & Martin (1997), which emphasises the combined efforts of individuals to achieve a common goal, and also considering a more recent definition by Bozeman and Boardman (2014), who defined collaboration as "*social processes whereby human beings pool their experience, knowledge and social skills with the objective of producing new knowledge, including knowledge as embedded in technology*" (p. 2), it can be argued that collaboration is predominantly a human phenomenon, where the interaction among individuals is the basis of the social process.

According to Morgan (1980), the ontological definition in an interpretive paradigm is based on the idea that social reality *"is the product of the subjective and inter-*

subjective experience of individuals" (p. 608). It is consistent with the definitions of collaboration that were discussed in Chapter II, where human interaction is the basis of the phenomenon. It is also essential to recognise the role of subjective aspects in the collaborative process, particularly in transdisciplinary activities, where, for example, the values of individuals play roles in making decisions (Bernstein, 2015; Max-Neef, 2005; A. I. Walter et al., 2007). Additionally, in the collaborative process, "*participants create a shared social context through their interaction"* (Carayannis, Alexander, & Ioannidis, 2000, p. 481), consistent with the view that this reality is socially constructed (Tuli, 2011).

One of the main elements evaluated in this research is the interaction of individuals with different backgrounds and experiences, manifested as academic or practical knowledge. Based on the above, it is possible to argue that the basis of the interaction is the knowledge that each individual brings to the process, and the result is the generation of new knowledge embedded in ideas, products or services. Moreover, considering the main features of transdisciplinarity as a collaboration mechanism, it has been argued that this approach convenes multiple realities expressed in the social interaction (Max-Neef, 2005), supporting the fundamentals of social constructivism (Guba & Lincoln, 1994).

When we talk about transdisciplinary collaboration and the convergence of individuals from different disciplinary backgrounds, this research follows the idea of academic disciplines as "*the result of the artificial fragmentation of knowledge*" (Choi & Pak, 2006, p. 357). Therefore, it implies that disciplines are a consequence of human action transforming reality into something known for society, where this "*body of knowledge comes to be socially established as reality*" (Berger & Luckmann, 1966, p. 15), consistent with social constructivism (Guba & Lincoln, 1994).

Similarly, following Berger & Luckmann (1966), it is possible to point out the concepts of social stock and social distribution of knowledge, which are antecedents to explain the social construction of reality. This idea, to some extent, can explain one of the bases of transdisciplinarity. On the one hand, individuals may be aware of the knowledge that each one has learned and possesses. So, they may know their limits

and scope of action at the moment to use their expertise. Nevertheless, on the other hand, individuals may know that knowledge is distributed among society, and presumably, they know that they can ask for help to obtain additional information to achieve a goal. Hence, the phenomenon of transdisciplinary collaboration can be understood from the explanation of Berger and Luckmann (1966) and their conception of the social construction of knowledge, where individuals from different disciplines and backgrounds are involved in social interactions to complement their stock of knowledge.

Scholars have also argued about a constructionist perspective within the study of entrepreneurship, focusing on the inter-subjectively interpreted phenomenon and where the entrepreneurial process is built by understanding how individuals interact, emphasising how the involved actors experience the events (Lindgren & Packendorff, 2009). It is consistent with transdisciplinarity as a novel context for entrepreneurship research. This research intends to contribute by studying how the features of this collaborative mechanism can impact academic entrepreneurship, oriented on the development of entrepreneurial competencies.

In addition, regarding philosophical definitions within studies evaluating similar research contexts (business plan competitions), scholars have pointed out that the learning process of nascent entrepreneurs in those interventions can be defined as a subjective event, affected by the unique experiences of the participants, their motivations to be involved, their feelings and meanings (Watson et al., 2018). Following those approaches, this research's stance is that the experience of university entrepreneurs in this entrepreneurial intervention is considered true or real to them. Therefore, in line with a social constructionist perspective (Berger & Luckmann., 1967; Guba & Lincoln, 1994), it is possible to find as many realities as there are participants' experiences.

From the competency perspective, it has been argued that competencies can be developed through social processes such as vicarious learning, sharing experiences with other individuals (Hayton & Kelley, 2006) and also as an answer to idiosyncratic situations (Ahuja & Katila, 2004; Rasmussen et al., 2011). Therefore, this suggests

that the nature of the development of competencies could be influenced by social interactions, allowing the framing of the ontology of entrepreneurial competencies development under a socially constructed reality.

3.2.2. Epistemology

Epistemology has been defined as "*the study of the criteria by which we can know what does and does not constitute warranted, or scientific knowledge*" (Duberley et al., 2012, p. 16). However, in social sciences, there has been some disagreement about how researchers can guarantee what knowledge is, a debate that has been influenced by the progress of qualitative research (Duberley et al., 2012). Specifically, within management and business studies, it is possible to find various philosophical approaches, which show different ontological and epistemological assumptions that could not be implanted simultaneously without falling into philosophical contradictions (Johnson et al., 2006). Therefore, based on the social constructionism ontological stance previously discussed, it seems reasonable to explain how this definition affects what knowledge about entrepreneurship entails and how it can be known (Lindgren & Packendorff, 2009).

Considering the research aims, gaps, the research context discussed in Chapter II, and the ontological position discussed in the previous section, this research adopts interpretivism as the appropriate epistemology. Based on Carson et al.'s (2001) framework, interpretivism as epistemology can work simultaneously with social constructionism because it approaches reality through perceived knowledge, where the research is focused on something specific and concrete, seeking to understand a particular situation. Moreover, interpretivism assumes "*reality and meaning making as socially constructed, and it holds that* individuals *make their own sense of social realities*" (Tuli, 2011, p. 101). Particularly within the perspective of entrepreneurship as a social construction (Berger & Luckmann., 1967), scholars have argued that epistemology should be considered as "*knowledge on how individuals and*

collectives perceive, define, produce and re-produce entrepreneurial action in society" (Lindgren & Packendorff, 2009. p.31).

This research assumes the same stance based on the research context related to transdisciplinary collaboration, particularly to the experiences of university entrepreneurs leading entrepreneurial projects. The focus is grounded in individuals' accounts about entrepreneurial competency development in this particular scenario (entrepreneurial intervention at the University of Nottingham). In addition, it is not expected that the findings lead to the verification of hypotheses deductively. Then, relations of predictive nature, something characteristic of the positivist angle, are not established. Hence, this research takes an inductive approach, where knowledge is created through individuals' interactions and experiences (Lindgren & Packendorff, 2009), aligned with the enquiry aims, which is the understanding of reconstruction based on the view of the research participants (Bryman, 2016).

In exploring entrepreneurial theory and interpretivism, Packard (2017) pointed out some essential features to justify interpretivism as an epistemological approach that can fit with the field, such as the voluntary, human nature of the entrepreneurial phenomenon, an ideographic methodology, and a theory-building process. For this project, the definitions of collaboration and transdisciplinarity previously discussed assume that the involvement of individuals in these activities resides in a voluntary decision, which is also manifested in the non-compulsory character of the research context. This research is developed by an ideographic approach (multiple-case study), with the purpose of obtaining abundant evidence of entrepreneurial projects to seek a deeper understanding of the mechanisms contributing to the development of entrepreneurial competencies in an underexplored type of non-traditional new venture led by university entrepreneurs.

In summary, collaboration was defined as a social phenomenon based on the interaction of individuals with shared aims, and where each one contributes with their knowledge and skills to achieve goals (Bozeman et al., 2014; Katz & Martin, 1997). Transdisciplinary is defined as a type of collaboration where multiple actors and multiple realities converge (Max-Neef, 2005). Moreover, entrepreneurship as a

research field was discussed as a phenomenon constructed and interpreted inter-subjectively through social interaction, and where reality is known through how entrepreneurs interpret entrepreneurial processes (Lindgren & Packendorff, 2009). Therefore, it seems reasonable to argue that the interactive processes underlying the cases studied in this research project fit with the ontological perspective of social construction (Berger & Luckmann., 1967; Guba & Lincoln, 1994; Lindgren & Packendorff, 2009) and an interpretive epistemological approach (Lindgren & Packendorff, 2009; Tsang, 2016; Tuli, 2011). Having discussed the philosophical assumptions of this research project, the following section addresses the resulting methodological definitions.

3.3. Research Methodology

One of the most significant decisions in research is the definition of the methodological strategy, which has to be coherent with the ontological and epistemological positions in which the study is founded (Cohen, Manion, & Morrison, 2018). Therefore, defining the research design is a crucial moment in the research process, setting the nature and orientation of the study, where decisions are made according to the research context and considering the limitations and restrictions that it could have. Furthermore, the research design is an important stage for the study, making it achievable and verifiable to establish empirical conclusions (Cohen et al., 2018).

According to Cohen et al. (2018), the research enquiry determines the methodology that should be applied. The following sections discuss different methodological approaches in studying academic collaboration and justify why a qualitative method is appropriate for this study's research question and objectives.

3.3.1. Methodological Approaches to Explore Academic Collaboration

A literature review about collaboration in academia makes it possible to find different methodological strategies that respond to each research project's diverse aims and objectives. From a quantitative perspective, some research has focused on *measuring* the impacts of collaborative activities in an academic context. For instance, studies have addressed the effect of collaboration in productivity – number of publications (Lee & Bozeman, 2005; Ynalvez & Shrum, 2011), have estimated relations between collaboration and co-authorship/citation impacts (Glänzel, 2001; Melin, 2000; Schummer, 2004; Ubfal & Maffioli, 2011; Wagner-Döbler, 2001), have measured the collaborative impact in registered patenting (Shin, Kim, & Park, 2016), have provided predictive models of innovative effects generated by different types of collaboration (González-Pernía, Parrilli, & Peña-Legazkue, 2015), have estimated opinions and attitudes towards academic collaboration (Bienkowska & Klofsten, 2012), have measured gender effect on collaborative strategies (Bozeman & Gaughan, 2011; Tartari & Salter, 2015; Van Rijnsoever & Hessels, 2011), and have established relationships between members' profiles (citizenship, work experience, among others) and types of collaboration (Gulbrandsen & Thune, 2017; Woolley, Sánchez-Barrioluengo, Turpin, & Marceau, 2015). In sum, these studies were developed to explain, predict, or measure facts regarding the collaborative process, which was made by verifying hypotheses, which in turn frame these projects in a positivist paradigm where a quantitative method is appropriate (Guba & Lincoln, 1994).

On the other hand, a qualitative approach has been chosen for research objectives related to understanding human experiences and interactions among individuals undertaking collaborative processes. For example, those studies have focused on understanding the negotiation process in collaborative teams (Creamer, 2004) and evaluating communities' role in an innovative, collaborative process (Franke & Shah, 2003). Also, this type of methodological research has investigated how networks and

strong ties can affect collaboration and the development of spin-offs (Johansson, Jacob, & Hellstrom, 2005) and how collaborative processes with industry can affect different academic actors and educational processes (Fern, Cardinal, & O'Neill, 2012; Malfroy, 2011; Mendoza, 2007; Slaughter, Campbell, Holleman, & Morgan, 2002). Finally, scholars have applied a qualitative angle to reconceptualise definitions and concepts about collaboration within academic contexts (Rajalo & Vadi, 2017) or identify barriers and facilitators in those processes (Siegel, Waldman, Atwater, & Link, 2003). In sum, these studies have tried to fill a gap by providing a better understanding of human action and social phenomenon, not based on accounting data, but instead through considering the subjective opinion and judgement of participants who were part of their studies. In doing so, scholars seek the reconstruction of reality by interpreting individuals' perceptions.

Considering that scholars have used different methodological approaches to gain knowledge about collaboration, either according to the question they posed or the gap they were looking to fill, it is inappropriate to encapsulate the collaborative phenomena under a specific methodological approach. Therefore, it is possible to argue that research about collaboration in the academic context can be approached from several angles. Having explained the philosophical stances of this research and the different methodological perspectives to study collaboration, the following section explains the methodological aspects of this study.

3.3.2. Qualitative Approach as a Research Methodology

Following the structure presented by Bryman (2016) to define the different methodological stages within a research process, it is possible to frame this research under a qualitative strategy. Building upon the stances discussed in the philosophical section, a qualitative approach fits with social constructivism and interpretivism to investigate, describe, and interpret social realities (Tuli, 2011). Moreover, scholars have pointed out that qualitative research facilitates a deep understanding of

interactional social processes and the subjective perspectives of their participants (Hammersley, 1996), which provides access to their perceptions, beliefs and experiences (Leitch et al., 2010). These definitions imply that university entrepreneurs and their experiences developing non-traditional new ventures are crucial in understanding the phenomenon, where multiple or multivalent realities can be recognised (Cohen et al., 2018).

Cohen et al. (2018) argued that qualitative research is appropriate if the objective is to develop theory. Also, if the goal is to gain a deep understanding of a particular situation, a qualitative/interpretative approach should be used. Furthermore, qualitative research emphasises how individuals interpret their social reality, and this last, in turn, is susceptible to change by the individual's experiences (Bryman, 2016). For example, an interpretive approach has been highlighted to evaluate entrepreneurial behaviour (Leitch et al., 2010). Similarly, scholars have also applied qualitative methods to explore the development of entrepreneurial competencies in the academic environment (Gümüsay & Bohné, 2018; Rasmussen et al., 2011; Treanor et al., 2020) in order to understand how individuals make sense of their experiences regarding their roles within their entrepreneurial projects.

Moreover, qualitative research has also been used to evaluate business plan competitions to reveal participant experiences from an interpretive orientation (Kwong et al., 2012; Watson et al., 2018). Therefore, a qualitative method offers an effective way of gaining an in-depth understanding of competencies that can be developed in the initial stages of entrepreneurial projects exposed to these types of entrepreneurial interventions. Also, this method helps to provide information on personal views on how competencies may or may not be developed or who is bringing new ones (from the project or externally), which is analogous to the objectives of this study. As a result, this research is framed under a qualitative method.

Additionally, in correspondence with a qualitative angle, this research utilises inductive logic, which means that it is an exploratory study based on descriptions generating theoretical ideas (Bryman, 2016; Hartley, 2004; Hammersley, 1996;

Tashakkori and Teddlie, 1998). Building on Tuli (2011), and an inductive qualitative methodology is adopted to gain a rich understanding of the research problem underlying the research question and its unique context previously discussed in Chapter II. From this methodological angle, this research intends to contribute to the academic discussion about the development of entrepreneurial competencies within academic entrepreneurship, providing new insights by exploring a transdisciplinary context. Consequently, a multiple-case study was applied as outlined in the following section.

3.4. Definition of the Case Study

Qualitative research is a broad term that considers different research design perspectives (Mohajan Kumar Haradhan, 2018). Based on Yin (2017), a case study is a type of qualitative strategy that, in the case of this research project, was chosen to explore the phenomenon of the development of entrepreneurial competencies, where a multiple-case study approach was adopted (Bryman, 2016; Eisenhardt, 2021). While in the literature there is not a consensus among social scientists and methodologists about what a case study is (Patton, 2015; Schwandt & Gates, 2018), it is possible to identify some standard features of a case study that scholars have discussed.

Building on Eisenhardt (1989), "[a] *case study is a research strategy which focuses on understanding the dynamics present within single settings"* (p. 534), which combines different data collection methods such as interviews, documents, or observations. In terms of theory building, a case study "*involves using one or more cases to create theoretical constructs, propositions and/or midrange theory from case-based, empirical evidence"* (Eisenhardt & Graebner, 2007, p. 25).

The focus of a case study is related to real-life events where, through an exhaustive analysis during a period, to develop a deep understanding of a phenomenon (Yin, 2009). Moreover, the context where the activity occurs plays a vital role in the

process, and the design allows for capturing detailed and valuable empirical data due to the variety of sources of evidence that can be used (Eisenhardt & Graebner, 2007; Hartley, 2004; Yin, 2017). One of the distinctions in case studies is that these are naturally cases without any manipulation (Yin, 2017; Hammersley, 1996), which gives researchers the responsibility to precisely define it in a particular context (Patton, 2015).

More specifically, Yin (2009) proposed a guide to decide when it could be possible to use a case study as a method. Based on three categories, a researcher should consider (1) the form of the research question, (2) the control of the behavioural events that are being studied and (3) the focus on contemporaneous instead of historical events. This research meets all of these requirements, as explained below.

First, a case study works as a research method when researchers are looking for answers to explanatory questions such as “why” or “how” (Yin, 2009). In the same vein, Hartley (2004) argued that a case study works in research questions aimed at exploring how organisational or social processes are influenced by their context, pointing out that this research strategy could be the only way to gain in-depth knowledge on a kind of behaviour which is understandable in this context. Moreover, it is in line with social constructionism and interpretivism perspectives previously discussed that focus on answering questions related to how the entrepreneurial process is constructed through individual interactions, emphasising how the different involved actors account for the experience of that process (Lindgren & Packendorff, 2009). Therefore, as explained in Chapter II, this research intends to answer a “how” question, specifically, how university entrepreneurs that participated in a transdisciplinary intervention account for the development of entrepreneurial competencies. For the exploratory character of the question, a case study works for theory building (Eisenhardt, 1989) regarding the entrepreneurial competency framework.

Second, Yin (2017) pointed out that “cases studies are preferred when the relevant behaviours still cannot be manipulated and when the desire is to study some contemporary event or some set of events” (Yin 2017, p12). Unlike experimental

research, where investigators can manipulate behaviour directly, systematically, and precisely (Yin, 2017), this research captured information of a real-life intervention without manipulating the events studied.

Third, by referring to contemporary events, this research applies the definition of Yin (2017), where it is manifested in a fluid rendition of events that happened in the recent past and the present (not just the present). Therefore, this research focuses on contemporary events, mainly examining non-traditional new ventures led by university entrepreneurs evaluating how they can develop entrepreneurial competencies after participating in a transdisciplinary entrepreneurial competition.

This research considers real-life entrepreneurial projects led by university entrepreneurs who participated in a transdisciplinary entrepreneurial intervention hosted by the University of Nottingham. The entrepreneurial projects were evaluated in a longitudinal/follow-up process to capture information from the experience of university entrepreneurs about how entrepreneurial competencies are built and how transdisciplinary contexts can affect this developmental process. Therefore, it seems appropriate to frame this research under a case study design.

Bearing in mind that entrepreneurial competency development is a human process that implies time (Rasmussen et al., 2011), the possibility to have an appropriate period of evaluation and monitoring new ventures brings essential and in-depth information to identify the developmental attributes and factors that can explain how these competencies may or may not be developed. In the same vein, Hartley (2004) highlighted that a case study is appropriate for capturing changes in organisational behaviour and understanding daily practices and their meaning, contributing to a more comprehensive approach to theory building about entrepreneurial competency development within academic entrepreneurship.

Regarding the type of case studies, there is no single way to understand them. According to Yin (2009), the type of case study is defined by its purpose, where descriptive, exploratory, and explanatory are the main categories. A descriptive case study has been associated with providing a detailed depiction of some phenomena.

The exploratory one has been associated with theory development, where the case selection is related to theoretical ideas. Finally, explanatory is the one that is related to theory and hypothesis testing (Schwandt & Gates, 2018). In a complementary way, Yin (2009) classified the four primary uses in terms of the applications of a case study. First, to explain supposed causal relationships to real-life events that are impossible to analyse by other research methods such as experimental or surveys. Second, to describe a real-life event and the context where it happens. Third, to illustrate some topics under evaluation in a similar descriptive mode. Finally, the last application is to enlighten events of real-life that show unclear patterns of results (Yin, 2009). For this research, the focus is mainly a descriptive-exploratory case study in an inductive way, pursuing a deep understanding of entrepreneurial competencies development in an underexplored context such as a transdisciplinary setting.

One of the strengths of case studies as a research design is the possibility to combine multiple sources of evidence and data collection methods such as interviews, observations and archival records (Eisenhardt, 1989; Yin, 2017) to increase the robustness of the project (Yin, 2009), mainly by triangulation of the data (Eisenhardt, 1989; Yin, 2017). Moreover, scholars have pointed out that case studies allow the overlapping of data collection and data analysis, giving the researcher the flexibility to adapt data collection instruments, to include new cases or add data sources in light of emergent themes or research opportunities that arise as the research is developed (Eisenhardt, 1989). In this research, semi-structured interviews, documentation of non-traditional new ventures, documentation of the entrepreneurial intervention and direct observation were the source of evidence, which are discussed in sections 3.4.2 and 3.6.1

Regarding the unit of analysis, scholars have pointed out that, in general, research has focused on the university level to study helpful contexts to the emergence of new venture development (Rasmussen et al., 2011). However, Rasmussen and colleagues (2011, 2014, 2015) have provided an alternative perspective from the entrepreneurial competency approach to show how higher education institutions

promote or inhibit the creation and development of new ventures, giving insights to the discussion of academic entrepreneurship regarding how different university levels can support entrepreneurial activities. In this vein, the entrepreneurial competencies framework has been recognised as a distinct unit of analysis (Gümüsay & Bohné, 2018) because it is built on their knowledge-based nature, affected by the context and also by individual experiences of entrepreneurs (Danneels, 2002; Gümüsay & Bohné, 2018; Rasmussen et al., 2011), and has been recently applied in similar research settings (Treanor et al., 2020). Based on the entrepreneurial competency perspective outlined in Chapter II, this research explored how such competencies may or may not be developed by new ventures led by university entrepreneurs that participated in the transdisciplinary entrepreneurial intervention. This approach of the unit of analysis offers the potential to contribute to the discussion of academic entrepreneurship in understanding the mechanisms that facilitate the entrepreneurial process in successful university entrepreneurs (Gümüsay & Bohné, 2018). In the same vein, units of analysis focused on entrepreneurial competency development can contribute to understanding the mechanisms that constrain the entrepreneurial process in those ventures that are less prominent, considering that all of them were exposed to similar resource endowments and institutional environments (ibid.).

This research will use a multiple-case study, conceptualised as a comparative design (Bryman, 2016). Building on Yin (2017), multiple-case studies are considered a variant of case studies within the same framework. In this regard, Eisenhardt (2021) has argued that this design *is first and foremost about theory building* (p.148), based on the principles of *replication logic* (Yin, 2017) and iterative process of *constant comparison* of data and theory (Glaser and Strauss, 1967). Replication logic means examining two or more cases as something analogous to multiple experiments to predict similar or contrasting results (Yin, 2017). Constant comparison implies systemic iteration to provide a close link between theory and data within and across the cases, where theory is defined as *a "set of constructs linked together in relationships that are supported by theoretical arguments (i.e.*

mechanisms) that seek to explain a focal phenomenon" (Eisenhardt, 2021 P.148). The constructs and relations that are the base of the theory-building process for this research project are mainly related to entrepreneurial competency development, academic entrepreneurship and transdisciplinarity, described and discussed in Chapter II.

According to Yin (2009; 2017), using a multiple-case design is seen as a positive way to obtain more convincing, robust, and compelling evidence, highlighted as one of the advantages of applying this research design, giving a better validation of the findings. This research achieved this by considering various entrepreneurial projects regarding composition, goals, disciplines, and industries. Thus, it brought to the research a vital input to compare and contrast similarities and differences across the non-traditional new ventures that were analysed. Moreover, Yin (2009) highlighted that multiple-case designs allow the theoretical generalisation of results. Given the qualitative nature of this research, this strength is related to the potential transferability of findings to similar contexts (Merriam & Tisdell, 2015).

In summary, applying a multiple-case study as a research design in this project pursues two primary goals. First, to evaluate the development of entrepreneurial competencies among different nascent non-traditional new ventures to understand how their differences could affect their development. Second, as mentioned, replication logic helps improve the external validity of the findings, showing how and whether the conclusion and findings of this research could be generalised and transferred to similar contexts (Yin, 2017). In this regard, Yin (2017) proposes four main criteria for judging the quality of research findings within a case study, which are addressed as follows.

3.4.1. Quality Criteria for Judging Case Studies

Regarding the criteria that can be used to ensure the quality of the research, academics have proposed similar concepts that share some aspects in their

definitions but with some differences in terminology (see Bryman, 2016; Cohen et al., 2018; Creswell, 2014; Guba & Lincoln, 1994; Merriam & Tisdell, 2015; Yin, 2009). For example, validity, replicability, reliability, or generalisation are common elements as quality criteria among scholars in different methodological approaches.

Following the guidelines of Yin (2017), there are four criteria for judging the quality in case studies (construct validity, internal validity, external validity and reliability) which are addressed within the context of this research project. Furthermore, these criteria will be complemented by addressing the approach proposed by Merriam & Tisdell (2015) and Guba & Lincoln (1994), who discussed quality aspects regarding trustworthiness and rigour focused on qualitative interpretative research.

First, construct validity is proposed by Yin (2017), who defined it as an appropriate way to operationalise the procedures used to evaluate the concepts being studied in the case. According to the author, the strategy to obtain valid research findings should be implemented in the data collection phase. This criterion is addressed in this project by considering different data sources (mentioned in section 3.4.2 and 3.5.5), and developing a transparent chain of evidence, showing how the research findings are concluded in light of the collected data (the data analysis is presented in Chapter IV).

Second, internal validity has been defined as examining causal relationships, where some circumstances could generate another situation, which allows for identifying false associations (Yin, 2009). However, it has been argued that this criterion is not relevant for descriptive or exploratory case studies (Yin, 2017). Nonetheless, when it comes to qualitative – interpretative studies, internal validity has been associated with credibility and validity (Guba & Lincoln, 1994; Merriam & Tisdell, 2015). In this vein, internal validity relates to congruence, capture and matching of research findings with reality (Merriam & Tisdell, 2015). Based on Ratcliffe (1983), validity is assessed as "*something other than reality itself*" (Merriam & Tisdell, 2015, p. 242), where it is assumed that researchers are always interpreters of the data/reality, who cannot observe the phenomenon without changing it, linked to the idea of an abstract representation of reality through words. This last point represents the notion of

credibility (Lincoln & Guba, 1985), emphasising that findings should be credible in light of the data presented (Merriam & Tisdell, 2015).

Scholars have argued that triangulation from different data sources is one strategy that increases credibility (Merriam & Tisdell, 2015; Patton, 2015; Yin, 2017). This research applies triangulation from multiple sources of evidence by comparing and cross-checking data collected through semi-structured interviews with university entrepreneurs and advisors, documentation of their projects and documents, recordings of activities of the entrepreneurial intervention the entrepreneurial intervention. A second strategy to increase credibility is an adequate engagement in data collection (Merriam & Tisdell, 2015) (presented in section 3.5). Also, a longitudinal design allows proper time to be spent on each case and allows the researcher to get closer to university entrepreneurs' understandings of the phenomena studied.

Additionally, the research's position or reflexivity is a criterion related to the credibility of the researcher's integrity (Merriam & Tisdell, 2015). Reflexivity has been described as the ability "*to enhance the credibility of the findings by accounting for researcher values, beliefs, knowledge, and biases*" (Cutcliffe, 2003, p. 137). By sharing my experiences and knowledge that can affect my understanding of this research, I can recognise academic antecedents, such as my bachelor's degree and how it relates to business administration. More specifically, my dissertation evaluated the development of the capacity to identify entrepreneurial opportunities in students of the Faculty of Administration and Economy in the Universidad de Santiago de Chile. As a professional experience, I worked in the Ministry of Economy in 2013 in the Innovation Office. In that place, I was a member of the organisational division in charge of the "Year of Innovation", a public programme that sought to bring innovation and entrepreneurship to the general population, business and companies, universities and the public sector (Gobierno de Chile, 2014). Since 2014, I have been a lecturer at the Universidad de Santiago de Chile in the Faculty of Administration and Economy with experience in lecturing, designing, delivering, and assessing courses related to entrepreneurship education. I was also in charge of

organising the annual business plan competition (2015-2017) within the business school. Therefore, my professional experience has been related to actions that promote an entrepreneurial ecosystem, where I could learn about the national innovation system and how different actors interact to produce more entrepreneurial and innovative activities.

Moreover, I have been involved in research projects that evaluated the potential impact of entrepreneurship education on doctoral students (see Muñoz, Guerra, & Mosey, 2019). The role as a research assistant was important in terms of research training to develop my doctoral project. Hence, I recognise that I am close to academic entrepreneurship as a research area. However, the doctoral project allows me to better understand the dynamics that can be observed in a context such as the United Kingdom and specifically at the University of Nottingham.

Regarding my prior entrepreneurial exposition, I have never pursued an entrepreneurial opportunity because my focus on entrepreneurship is from an academic perspective. Therefore, I am not close to the participant's experiences when considering my previous exposition and the relation with the evaluated projects. Consequently, I do not have a personal bias as an entrepreneur, which can strongly influence me to interpret data and findings. However, a potential barrier is related to my cultural context. I am from Chile, a developing country where entrepreneurship as an economic phenomenon has been a theme in the political agenda during the last two decades, with the recent inclusion of universities as actors of the entrepreneurial ecosystem. Even though it differs from the current research context (UK), where entrepreneurial activities are more common and highly promoted, my previous experience as a student and lecturer in a university in Chile could influence my understanding of the role of universities in entrepreneurial ecosystems. Additionally, Chile is a country with a pre-eminently Hispanic-American culture, which differs from the Anglo-Saxon contexts, not only in terms of language but also in how reality can be perceived and interpreted. Therefore, these aspects of my background could influence my interpretation and conclusions.

The third quality criterion proposed by Yin (2017) is external validity, which has been defined as the possibility to generalise the findings in a particular context or domain. According to Merriam & Tisdell (2015), this criterion is associated with transferability in qualitative research. In this sense, the type of conclusions that a case study can provide does not correlate with statistical generalisation associated with a quantitative angle (Ibid.). Instead, qualitative generalisation relates to theoretical arguments and how they were evaluated and contrasted with other contexts (Hartley, 2004; Hammersley, 1996). Building on Lincoln & Guba, (1985), Merriam & Tisdell (2015) commented on the notion of transferability in the sense that "*the burden of proof lies less with the original investigator than with the person seeking to make an application elsewhere. The original inquirer cannot know the sites to which transferability might be sought, but the appliers can and do*" (p. 254). In this scenario, the researcher is responsible for providing rich descriptive data to enable transferability (Ibid.). The strategy suggested to address this criterion is a comprehensive and thick description of the case where future readers can determine if some situations match the research context, thus making the findings transferable (Merriam & Tisdell, 2015). This research addresses this criterion in two main ways. First, by providing a detailed description of the non-traditional new ventures that participated as cases and the research context at the University of Nottingham and the organisational structures supporting the entrepreneurial intervention (Ingenuity19) (see section 3.5). Second, selecting different cases provides findings from a wide range of entrepreneurial projects representing multiple non-traditional new venture characteristics (Merriam & Tisdell, 2015).

The last criterion is reliability, and it is one of the most common ways to understand the judgement of quality in research. The idea with this criterion is that if any other researcher develops a similar case study, with the same research design and implementing the same research tools, they will obtain similar conclusions (Yin, 2017). However, it is essential to bear in mind that in qualitative-interpretative research, reliability is problematic because human behaviour can change. Therefore, it is possible to argue that the replication of qualitative-interpretative

research could not get the same findings. However, this does not invalidate the findings of a particular investigation whenever the findings and conclusions are congruent with the data collected (Merriam & Tisdell, 2015). Merriam & Tisdell (2015) pointed out the overlap between internal validity and reliability, highlighting that "*from an interpretive-constructivist perspective, triangulation remains an important strategy to ensure validity and reliability*" (p. 246). In addition to the previously discussed strategies related to credibility (internal validity), the use of an audit trail or a detailed case study database with a clear chain of evidence has been suggested (Merriam & Tisdell, 2015; Yin, 2017). This is addressed by providing a detailed description of the steps applied during the data collection and the subsequent analysis (section 3.5) to facilitate future readers to understand how the researcher came to those findings and conclusions.

This section has discussed most of the principles for a case study as a research strategy and its implementation in this research project. The data collection methods and procedures for data analysis are described in the following sections.

3.4.2. Methods for Data Collection

Building on Yin (2017) and Eisenhardt (1989, 2021), it can be argued that one of the strengths of case studies relies on the use of multiple sources of evidence. Based on the above, this research applied interviews, documentation, and multimedia records as sources of evidence. These were selected according to the nature of the research methodology (qualitative) and the access to data in the research process. In this regard, this decision was made considering that those data sources can complement each other to corroborate and seek convergence (Bowen, 2009), providing robustness, validity, and reliability to the research project (Yin, 2017). Each source of evidence will be described below.

3.4.2.1. Interviews

Yin (2017) argued that interviews are one of the most important sources of evidence in a case study. The importance resides in getting access to crucial information about the “how” and “why” as subjective perspectives of the phenomenon studied. Also, one of the essential aspects of interviews is the possibility of capturing information about human behaviours and actions, which is one of the bases of a case study (Yin, 2017).

Yin (2017) highlights how the strengths of interviews are the targeted and insightful aspects of this method. First, interviews allow focus straight on the topics of the research. Second, interviews also provide participants’ personal views (meanings, attitudes, perceptions) regarding the theme under research. In this vein, as mentioned in the philosophical section, by following an interpretative epistemology, this research seeks to deeply understand how competencies may or may not be developed from university entrepreneurs’ subjective views. Therefore, the use of interviews fits this aim.

According to Bryman (2016), different types of interviews can be applied, where structured, unstructured, and semi-structured interviews are the traditional categories. A structured interview is used in social survey research as an additional tool for traditional surveys. Usually, this type of interview is applied in quantitative research or projects with a higher degree of standardisation. The researcher previously defines an interview schedule to provide the same questions to the interviewees in the same order, looking for minimising context variations. When using this type of interview, it is intended that those responses can be aggregated if they are identical. To make that possible, questions need to be very specific, offering the interviewee a fixed range of answers.

In qualitative research, the interviews are commonly unstructured and semi-structured. Both are more flexible than structured interviews regarding the direction that an interview can take, based on information that emerges through previous

answers. In addition, both types have deeper interests in how interviewees frame events and issues, which provide data to understand forms of behaviours based on the subjective point of view of the interviewee (Bryman, 2016), and this, as aforementioned, concurs with the purpose of this investigation.

More specifically, unstructured interviews are a method that does not have defined questions. Here, the researcher might address a list of topics or issues in the interview. There may just be a starting question where the interviewee answers freely. Then the interviewer could ask aspects that seem relevant to the research project. The questioning style is very informal and spontaneous. As a result, the interviews in a research project could vary in questions and content (Bryman 2016). This last creates one of the weaknesses to this method for data collection regarding the difficulties of organising and analysing raw data, which is less systematic than in the other types of interviews (Patton, 2015).

Concerning semi-structured interviews, Bryman (2016) argues that it is a procedure that begins with the researcher opening a conversation based on an interview guide, focused on the research question and objectives. Compared to a structured interview, the questions aim to frame the topic or theme, leaving more space for a detailed response. Additionally, the researcher has more freedom to generate new questions related to relevant issues in the interview, helping to explore particular insights in greater depth (Bryman, 2016). According to Eisenhardt (1989), semi-structured interviews within case studies allow the researcher to focus on relevant aspects of the research, reducing the amount of data to be analysed. In the same vein, an interview guide increases the comprehensiveness of the data, facilitating the data analysis. Particularly for a multiple-case study, this method has been suggested because it helps to ensure cross-case comparability (Bryman, 2016).

Based on the above, semi-structured interviews seem to be a suitable primary method for data collection for three main reasons. First, considering the constructivist interpretive philosophical approach, interviews allow the researcher to get the subjective perspectives of university entrepreneurs regarding their experiences of the development of entrepreneurial competencies. Second, as

multiple-case studies are a strategy that begins with a priori constructs and requires flexible and opportunistic data collection methods (Eisenhardt, 1989), semi-structured interviews allow the researcher to enter the field with an interview guideline focused on constructs related to entrepreneurial competency development and transdisciplinary collaboration as the main areas. Nonetheless, its method allows researchers to ask new questions that emerge as the interviews are done. Also, as mentioned, it aids the comparability of the cases under study.

Based on the above and in line with a longitudinal approach, two sets of semi-structured interviews were conducted (more information about the data collection process and analysis can be found in section 3.5.5). In addition, other data sources were used to triangulate evidence, which strengthened the findings and conclusions, which are explained below.

3.4.2.2. Documents

Documents have been defined as a source of qualitative data that consists of written materials, whether personal (individual) or official (for example, from the government or an organisation), as well as administrative documents (internal records, proposals) or formal studies and evaluations related to the case study, and finally other articles from the mass media or in the public newspapers. The data from these sources "*consists of exceptions from documents captured in a way that records and preserves the context*", which can be linked to the research focus (Patton, 2015, p. 14). Regarding the analysis of documents, this method requires the examination and evaluation concurrently with the interview analysis, where codes and themes allow the integration of data gathered from both methods resulting in empirical knowledge (Bowen, 2009).

Yin (2017) argued that the strengths of documents in case study research rely on: (1) the possibility to review the documentation repeatedly (stable), (2) the data is not generated as a result of the case study (unobtrusive), (3) the access to specific

details, events, names of references and (4) the coverage of different settings or a long time. On the other hand, as weaknesses, documents can be challenging to find or can be withheld, generating a potential bias of incomplete collection. Moreover, this data can be affected by the bias of the authors.

This research considered different types of public documentation from the non-traditional new ventures and their web pages, social networks, blogs, media interviews, and news on local or specialised websites. Additionally, official documents from the Haydn Green Institute for Innovation and Entrepreneurship related to the Ingenuity Lab and the Ingenuity programme (University of Nottingham) were analysed to understand the transdisciplinary research context. This selection is based on the criteria argued by Bryman (2016) to evaluate the quality of documents. First, *authenticity* is assured because the research participants are authors or are involved in those contents. Second, it is assumed that these documents have a higher level of *credibility* because non-traditional new ventures and Ingenuity as an entrepreneurial intervention are called to show the best of their projects in these pieces of work. Third, those documents are widely used in new ventures (*representativeness)*. Fourth, those sources are clear and comprehensible (*Meaning*).

In addition to the written elements typically considered as documents, this research also evaluated multimedia resources of the entrepreneurial intervention that the Haydn Green Institute for Innovation and Entrepreneurship made available for the public on their official web page (University of Nottingham, Ingenuity19 Resources, 2019). Video records of the six-week programme and methodological resources used in the training sessions were explored and contrasted with the reports and answers of the university entrepreneurs. Even though it was not a direct observation of the intervention, it helped create a passive observation of participants' experiences.

3.4.2.3. Direct Observation

As mentioned in previous sections, case studies can use various methods to collect data (Eisenhardt, 1989; Eisenhardt & Graebner, 2007). One of them is observation, which can be applied with the researcher's active or passive role within the process (direct or participant, respectively). One of the advantages of a case study as a research strategy is that researchers can access the real-world setting where the case occurs, giving the chance to know the social and environmental conditions through observation (Yin, 2017).

Following Swanborn (2010) and Yin (2017), this research project applied direct observation focused on material resources and surrounding conditions to explore the functional role of the immediate environment where university entrepreneurs could work. As Yin (2017) pointed out, the observation of workspaces can contribute to understanding the potential impacts that organisational factors can have on a social phenomenon. Moreover, it has been argued that observation in real-time cases with longitudinal designs helps to address potential bias regarding retrospective and impression management (Eisenhardt & Graebner, 2007). Therefore, as this research had access to physical facilities that most university entrepreneurs commonly used, direct observation was conducted during fieldwork, particularly during the first phase of interviews. Even when it was an auxiliary (secondary) data collection method, it helped to contrast insights regarding participants' experiences about the environmental factors of the research context.

In summary, scholars suggest that in qualitative research, more than one source of evidence improves the research findings in terms of quality and validity (Bowen, 2009; Yin, 2017). In this research, interviews were the primary method because the research relies on the experiences and views of participants. However, by having access to documents and direct observation as additional sources of evidence, it was possible to contextualise, corroborate and seek convergence between the data collected (Bowen, 2009; Yin 2017).

3.5. Data Collection Procedures and Analysis

The following section discusses the data collection procedures carried out in this research project. The discussion is presented in four main areas: a description of the research context and the reasons that justify why it is an appropriate transdisciplinary setting, the rationale to select the entrepreneurial projects as cases, a description of the cases, and the specific data collection procedures and analysis.

3.5.1. Research Context: The University of Nottingham

This research aims to study transdisciplinary collaborative processes within an academic context. In this vein, the type of collaboration that was studied implies a strong connection between academic and non-academic actors, where the UK as a country and the University of Nottingham as the particular research context is a place where these conditions can be observed.

First, from a national perspective, higher education institutions in the UK have defined entrepreneurial development as one of the main activities of their education systems (Kirby, 2004), manifested in policies that encourage research excellence and commercialisation through university business engagement (P. D'Este & Patel, 2007; Hewitt-Dundas, 2012), the promotion of formal initiatives to enable technology transfer activities (Fini et al., 2017), and the active role of universities in the creation of spin-offs (Rasmussen et al., 2015; Wright, 2007). In addition, the UK has also shown considerable support to policies that foster cross-disciplinary activities within universities to generate knowledge that can be applied in industry, contributing to resolving societal problems (Mosey, Wright, et al., 2012). Finally, even though transdisciplinary is an emerging theme in the local academia, scholars have argued that research funding policy in the UK shows elements of transdisciplinarity in practice (Lyall et al., 2015). Hence, it is argued that this research intends to

contribute within the discussion and development of transdisciplinarity in the British context.

Turning now to the particular research context, placed at the University of Nottingham, this institution has been historically connected with the vision of Sir Jesse Boot. He encouraged the university's role in society through the combination of science (education) and industry. It is evident from his own opinion saying that *"the University will spread the light of learning and knowledge and will bind science and industry in the unity that is so essential for the prosperity of the nation and the welfare of our fellow citizens"* (University of Nottingham, Global Strategy 2020, 2018).

From an academic perspective, the University of Nottingham has an excellent academic reputation. According to the Research Excellence Framework (REF) 2014, the university ranks 8th in the British top 10 "research power" rank, which considers the quality of the research developed by the university. Furthermore, the research activities developed in the university achieves more than 97 per cent of international recognition, considering different areas such as health and welfare, economy, society, environment and public policy, and more than 80 per cent of this is evaluated in the categories "world-leading" or "internationally excellent" (University of Nottingham, Global Strategy 2020, 2018). Moreover, the university declares that it is made by interdisciplinary research excellence, reflected in its Global Strategy 2020 (University of Nottingham, Global Strategy 2020, 2018). The university also establishes objectives related to creating, strengthening, and increasing local, national, and international partnerships with public, private and voluntary organisations, and alumni, demonstrating the full range of collaborations it pursues. These include goals related to traditional research and commercial partnerships. In this vein, the university declares that it needs to increase its partnership activities "*to contribute to our educational mission, commercialise and share our research, identify future funding priorities for research and education and promote philanthropy to generate resources to support our core activities*" (University of Nottingham, Global Strategy 2020, 2018).

Moreover, the university states that collaboration is a central element of its research activities, which is achieved through partnerships with the industry to transfer knowledge to applications in society, being an active actor in local economies (University of Nottingham, Research/Collaborate, 2018). Therefore, the importance of collaboration in the daily activities linked to institutional culture promoting these interactions can be framed as transdisciplinarity by its features. Based on Hewitt-Dundas (2012), this could be a research opportunity because evidence suggests that culture and research quality influences knowledge transfer performances more than institutional capabilities within the UK context.

In terms of academic entrepreneurship, this university has an organisational structure that promotes entrepreneurship, considering education, research, and practice. The Haydn Green Institute for Innovation and Entrepreneurship is where university entrepreneurial activity is concentrated (University of Nottingham, Haydn Green Institute for Innovation and Entrepreneurship, 2018), bringing together academics and students, developing different activities such as teaching, research, entrepreneurial competitions, and fostering the development of new ventures. What demonstrates entrepreneurship's role within this university is its methodological authorship resources related to entrepreneurship education and practices. For example, the methodology to guide a creative entrepreneurial process called Ingenuity, the toolkit to support female entrepreneurs in the generation of new ventures (My business my way) and the Ingenuity programme, an entrepreneurial intervention open to all university members and local stakeholders, which emphasises the creation of new ventures that address global issues locally.

More specifically, the university is recognised as a relevant actor among higher education institutions regarding entrepreneurial activities at the national level. For example, in 2019, the university was ranked 7th in the UK for entrepreneurial impact and 8th in 2020 (Octopus Ventures, 2020). Additionally, among the universities of the Russel Group, the University of Nottingham is the leader for the number of established and active social enterprises and 2nd for the number that are active after three years (University of Nottingham, Impact Report 2020, 2021), showing the

broad support that the university provides to different forms of entrepreneurial development and that this assistance is effective in the long term. Moreover, in 2019 the Business School of this university obtained the accreditation of the Small Business Charter (University of Nottingham, Impact Report 2020, 2021). This certification recognises business schools that play an influential role in supporting student entrepreneurship, small businesses and local economies (Small Business Charter, 2021). Finally, the university promotes interaction with non-academic actors, such as small business leaders and entrepreneurs involved in academic activities (University of Nottingham, Impact Report 2020, 2021). Based on the above, it is possible to argue that the University of Nottingham shows a distinctive emphasis on entrepreneurship education and practice, where their activities are congruent with the fundamentals of a transdisciplinary context. As argued in Chapter II, the institutional setting influences the emergence and development of new ventures within an academic context (Hayter, Nelson, et al., 2018). Moreover, the theoretical framework of entrepreneurial competencies considers that the university's evolutionary paths can be facilitated or inhibited as an incubator environment (Rasmussen et al., 2011). Therefore, considering the British context and the University of Nottingham as an institution that encourages an entrepreneurial ecosystem, it is plausible to claim that this research setting could be one of the most entrepreneurially oriented within the UK, but also that it integrates a transdisciplinary approach in its design, which fits with the research enquiry of this thesis.

3.5.2. Ingenuity19

As argued in Chapter II, business plan competitions are one of the traditional and prevalent extracurricular activities of entrepreneurial ecosystems (Hayter, Nelson, et al., 2018; R. Russell et al., 2008; Watson et al., 2018; Wright et al., 2017), presented in 69% of higher education institutions in the UK (Watson et al., 2015). One of those interventions is the Ingenuity programme. Since 2015, an annual entrepreneurial

competition has been developed at the University of Nottingham, where aspiring university entrepreneurs are trained to discover and develop entrepreneurial opportunities. Ingenuity takes its name from the problem-solving methodology created by the Haydn Green Institute of Innovation and Entrepreneurship, and since its launch, more than 2,000 participants have been involved in different versions of the competition and awarded over £500,000 (University of Nottingham, Ingenuity Programme, 2021)

Regarding Ingenuity19, this activity aimed to redefine entrepreneurial impact from universities and their effect on society and industry through open collaboration, mutual understanding, and the generation of plausible solutions considering social and cultural perspectives (University of Nottingham, Why get involved, 2019). The participants in this event received entrepreneurial knowledge and skills training for its practical entrepreneurial projects addressing social and technological issues (University of Nottingham, What is Ingenuity19, 2019). Additionally, the participants had access to an extensive network of start-ups, investors, and social community actors to improve their ideas. In the end, the best projects received some funding to develop their business plan.

In 2019, an important change to the transdisciplinary angle was made. For the first time, the call for participants was not made only to the academic community and the competition was opened to the public. In this case, there was an invitation to the public and third sector organisations, partner universities, as well as Nottingham's businesses to be involved in the intervention (University of Nottingham, What is Ingenuity19, 2019). This last manifests an essential aspect of transdisciplinarity, approaching Mode 2 of knowledge generation (Hessels & van Lente, 2008), explained in Chapter II. Moreover, Ingenuity19 was framed to develop ideas that can give commercial and social answers to two of the UN's Sustainable Development Goals – Goal 1: No Poverty, and Goal 9: Industry, Innovation & Infrastructure (University of Nottingham, What is Ingenuity19, 2019), which fits another of the essential characteristics of transdisciplinarity as the search for solutions to social

problems (Di Iacovo et al., 2016; Lawrence & Després, 2004; Schauppenlehner-Kloyber & Penker, 2015; Zscheischler & Rogga, 2015).

In 2019, the programme was developed with the support of 33 community partners and eight universities from the UK. For example, Ingenuity19 was sponsored by the European Regional Development Fund, Experian, Hello Student, Sainsbury Management Fellows, Santander Universities, Shakespeare Martineau and the Smallwood Trust. In addition, there were other higher education institutions as partners as Loughborough University, Nottingham Trent University, University of Derby, University of Leicester and University of Warwick. Moreover, Ingenuity19 had the support of the Nottingham City Council, Nottingham Forest Football Club, Nottingham School of Boxing and their social programme called Switch Up CIC, which focused on communities affected by crime and violence. This extensive list of supporters and partners shows the broader spectrum of public and private organisations involved in the activity, where most of them contributed with mentors, speakers, judges and participants (University of Nottingham, Programme - Ingenuity19, 2019)

Turning now to the competition and their activities, the programme was divided into three main stages: Inspire, develop and compete (University of Nottingham, Programme - Ingenuity19, 2019). Inspire is related to a set of activities where participants can get knowledge and insights about environmental and social challenges and how those can be addressed through an entrepreneurial project. Develop is the stage where participants receive entrepreneurial knowledge and skills training to transform potential ideas into a business plan, obtaining feedback and expert evaluation. Compete is the final stage where the best projects have to pitch their ideas to a panel of industry specialists, competing for investment and further entrepreneurial support from the Institute.

Ingenuity19 was deployed in three months, from January to April 2019. The intervention began with the stage Inspire, which was divided into two summits, with an attendance of over 500 individuals, including students, alumni and staff from the regional universities, changemakers from low-income communities, and

professionals representing the public sector and businesses of Nottingham (University of Nottingham, Programme - Ingenuity19, 2019). The first summit was “Future Communities”, where keynote speakers presented the reality of poverty in Nottingham and other British cities to understand the community’s social context and gain insights before thinking about entrepreneurial ideas. Then, the second summit was “Future Technology”, where industry experts from Google, Experian and other technological companies showed a macro view on how technologies, such as AI, big data or psychology of tech, can contribute to the development of entrepreneurial projects and their potential impact on society. Finally, the summits concluded with a cross-disciplinary collaboration activity, where participants were allocated to different tables, encouraged to move from inspiration to ideation.

The summits played a significant role in creating a transdisciplinary environment. First, in the Future Community Summit, the goal was to understand how the business opportunity can be a community-based solution. From the experience of community leaders, individuals can see successful examples of sustainable enterprises to generate fundamental social changes through entrepreneurial activities. Second, the technological summit focused on how ideas can be transformed into scalable projects, making Nottingham an innovation pole in the region and giving insights into how to use technology in individuals and their tendency for technological consumption, expecting that the ideas developed in Ingenuity19 can result in successful businesses, not just local ones but also businesses with a global impact.

The second stage was Develop, where participants were trained in an entrepreneurial skills programme for six weeks, considering more than 50 hours of training. The Haydn Green Institute for Innovation and Entrepreneurship designed the programme based on its extensive experience in entrepreneurial education. The activities were seminars, specialists Q&A and experienced entrepreneurs as keynotes, complemented with a library of methodological resources. The programme was delivered as follows:

- Week 1: Business planning and pitching your idea

- Week 2: Market and competitor analysis
- Week 3: Marketing and promotion
- Week 4: Cash flow and financial planning
- Week 5: IP and protecting your work
- Week 6: Forming and running your business

Then, after the end of the development programme, 215 aspiring university entrepreneurs submitted the final version of their business plans. Once evaluated, the third phase began. Compete considered the 41 projects selected as the year's finalists, divided into social and commercial categories. Finally, finalists were invited to present a pitch, evaluated by an expert panel, who decided on the best to receive a monetary prize and the further support of the Institute. In total, monetary prizes achieved £150.000 in 2019, divided into 12 categories and 34 awards[3] (University of Nottingham, UoN Blogs, 2019).

Considering the argument of Eisenhardt and Graebner (2007, P.27) about "unusually revelatory" settings in case studies to define a theoretical sampling, it is possible to argue that the long tradition of the University of Nottingham collaborating with non-academic actors, the promotion of cross-disciplinary approaches in daily work, and the entrepreneurial culture manifested in the transdisciplinary setting observed in Ingenuity19 made it an appropriate context for the selection of the cases of this study. Ingenuity19 was a relevant initiative encouraging transdisciplinary collaboration, convocating aspiring university entrepreneurs and experienced ones that participated voluntarily as mentors and advisors in the programme, with the purpose of building bridges between academic and non-academic actors to address societal challenges through their entrepreneurial projects. The transdisciplinary character of the activity was also observed in the broad call for participants such as community innovators and disruptors entrepreneurs to explore critical social

[3] Some categories awarded more than one entrepreneurial project. Also. some projects obtained more than one prize, winning in different categories.

problems that society is facing. Moreover, Ingenuity19 was an event where the university collaborates with the city, influencing its civic agenda and investing in projects to transform the future of local and regional communities in a creative, inclusive and sustainable way (University of Nottingham, What is Ingenuity19, 2019).

In summary, it can be argued that Ingenuity19 was an excellent opportunity for individuals that have not been trained in business in their academic instruction or who have no business experience to get knowledge and be exposed to an entrepreneurial environment. By contrast, for those participants exposed to entrepreneurial modules within their academic training, Ingenuity19 was an opportunity to put their knowledge into practice within a social educative context. It could be assumed that aspiring entrepreneurs who participated in the third phase of competing sought help and support to develop an entrepreneurial project. Based on the above, it is reasonable to assume that aspiring university entrepreneurs and their entrepreneurial projects were in the initial phases of venture creation. Therefore, building upon Rasmussen et al. (2011), it seems plausible to explore how those projects may or may not develop the entrepreneurial competencies required to move forward the new venture process and how Ingenuity19 as an entrepreneurial intervention contributed to developing those competencies. In doing that, a multiple-case study was developed. The rationale for case selection and a description of each of them is discussed.

3.5.3. Case Selection

Multiple-case study as a method emphasises the selection process's importance in choosing the cases where the phenomenon understudied can occur (Eisenhardt, 2021). In this sense, theoretical sampling has been highlighted as a key element in this methodological approach, which means that the intended theoretical contributions define the data that should be collected (Suddaby, 2006). Additionally, Eisenhardt (2021) recently included the concept of case designs as different

strategies to the case selection process to capture differences and similarities among cases that can contribute to theory building.

This research applied theoretical sampling in the selection of entrepreneurial projects. This decision responds to the focus of this research in terms of selecting cases that can be theoretically useful and are most likely to replicate and contribute to expanding emergent theory (Eisenhardt, 1989). Specifically, nascent non-traditional new ventures led by university entrepreneurs that participated within Ingenuity19 and the working definition of a transdisciplinarity, elements discussed in Chapter II, were the primary inputs to define the rationale for the case selection. Furthermore, to maximise the theoretical diversity of the research project, 13 nascent entrepreneurial projects were selected. Following Eisenhardt & Graebner (2007), the choice of cases is based on the potential contribution of each of them to theory development because they gather the necessary features to generate plausible relationships between the primary constructs of the study. In this regard, as discussed in previous chapters, this research focused on non-traditional new ventures as novel nascent entrepreneurial projects that have emerged within the academic entrepreneurship context, which represent different industrial sectors and disciplinary perspectives. Concerning university entrepreneurs, the cases have been chosen because founders of the entrepreneurial projects represent a broader spectrum of new actors in entrepreneurial ecosystems in higher education institutions, such as students, alumni and individuals that are not directly involved in academic activities of the University of Nottingham. Finally, the theoretical sampling related to transdisciplinarity brings to the study the possibility to contribute to the field of entrepreneurial competencies by evaluating this phenomenon in an underexplored research context. In this vein, to ensure that the elements of transdisciplinarity were present in the selected cases, transdisciplinarity followed this particular rationale:

1. An academic disciplinary representation that can be manifested in the disciplinary background of nascent university entrepreneurs and the field of application of the entrepreneurial project. Moreover, it considers the

interaction with academics from different disciplines within the university context.

One of the bases of transdisciplinarity is the disciplinary collaboration to complement knowledge to address a challenge (Choi & Pak, 2006; Max-Neef, 2005; Mobjork, 2010).

2. A non-academic representation can be manifested in nascent entrepreneurs' professional experiences and backgrounds and the field of application of the entrepreneurial project. Additionally, it considers the interaction with non-academics' interlocutors involved in the transdisciplinary programme (Ingenuity19).

A key aspect in transdisciplinarity is the relevance of Mode 2 of the generation of knowledge. This perspective considers the participation of non-academic actors in the collaborative processes (Gibbons et al., 1994; Hessels & van Lente, 2008).

3. Ideally, the entrepreneurial project should address a social challenge.

By definition, transdisciplinarity is a type of collaboration that focuses on real/social challenges (Di Iacovo et al., 2016; Hadorn et al., 2008; Lawrence & Després, 2004; Schauppenlehner-Kloyber & Penker, 2015; Zscheischler & Rogga, 2015) that is in line with the call of scholars for research considering academic entrepreneurial outcomes with social impact (Fini et al., 2018). However, in light of the nature of universities' entrepreneurial activities, a transdisciplinary programme's effect on a traditional perspective of university new venture is also included. In this regard, scholars have defined academic entrepreneurship as "*the establishment of new spinoff companies by faculty, post-docs, students, or affiliated personnel based on university technology"* (Hayter et al., 2018. p.39). Here, the emphasis is to consider the creation of new ventures and the commercialisation of technology that has been developed within universities through academic activities (Bercovitz & Feldman, 2006; Fini et al., 2017; Pirnay et al., 2003; Shah & Pahnke, 2014; Vanaelst et al., 2006). Nonetheless, this approach helps to evaluate a broader impact of a

transdisciplinary setting on academic entrepreneurship and non-traditional venture development.

Based on Eisenhardt (2021), this research also applied two case designs as additional rationale to approach the case selection: common antecedents and common process design. First, regarding common antecedents, as its name describes, this design for selection in multiple-case method aims to explore how similarities can affect the focal outcome of the study. In this research, it was defined as the shared experience that university entrepreneurs lived as participants of Ingenuity19. Considering the research focus of this study, which explores the development of entrepreneurial competencies among the cases, the approach of common antecedents contributes to understanding better how these shared experiences (Ingenuity19) can influence the focal outcome (entrepreneurial competencies) by studying the intervening processes (enablers and barriers of a transdisciplinary context) (Eisenhardt, 2021).

Second, common process design considers selecting cases focused on the same focal phenomenon in purposely different settings to increase the transferability of theoretical contributions across settings (Eisenhardt, 2021). Following the rationale of Rasmussen et al. (2011) that explored different industry settings, this research selected nascent non-traditional new ventures that represent a broad spectrum of social challenges, industry and market environments, such as education, medical/orthopaedic, fashion, access to water, chemical veterinarian, tourism, food stores, farming and building. Similarly, it was possible to find different disciplinary perspectives as main inputs to the entrepreneurial ideas, such as engineering, biotechnology, computer sciences, design, business and psychology.

As a result, the multiple-case study reported in this research included 13 diverse nascent entrepreneurial projects. The potential cases were identified through the official report of Ingenuity19 launched after the competition that included a brief description of 41 finalists of the year (University of Nottingham, Programme - Ingenuity19, 2019). It was complemented with recommendations from key informants from the Haydn Green Institute for Innovation and Entrepreneurship.

Access to every case was negotiated with the university entrepreneur leading the project. The final selection of cases included 12 finalists of Ingenuity19 and one project that participated in two of the three phases of the competition (a business plan was submitted but it was not considered for the final round of pitching). The real name of cases cannot be informed because participants agreed on participating anonymously. For that reason, every case is identified using a singular pseudonym that illustrates the entrepreneurial project's focus. Table 5, 6 and 7 describes the selected cases.

In summary, this research argues that these multiple cases provide plausible support to answer the research question and address the research objectives by evaluating a comprehensive range of non-traditional new ventures and university entrepreneurs that share a commonality regarding the exposition to a transdisciplinary environment. Considering that a third party assessed all cases previously, it is assumed that there is a positive evaluation of the potential entrepreneurial viability of the ideas. Although this could generate criticism related to a potential bias selection of cases because it could have a greater probability of developing entrepreneurial competencies, scholars have reported that a positive evaluation in a business plan competition does not predict good performance in the future (McKenzie & Sansone, 2019). The latter suggests that even though a project can be positively evaluated in business plan competitions, this does not necessarily imply a later development of entrepreneurial competencies. Moreover, this research does not attempt to determine whether developing entrepreneurial competencies is possible. Instead, the focus explores the potential mechanisms that positively or negatively affect this phenomenon, responding to how competencies can or cannot be developed.

Cases / Entrepreneurial Projects	Students Applica-tions	Equine Repellent	Access to Water	Shells and Creams
Sector	Education	Veterinary medicine	Water	Biotechnology
Team / Individual Project	Team	Individual	Team	Team
Founding Team	Students	-	Professional network	Students
Academic Degrees / Disciplinary Backgrounds	(1) MBA, (2) Bachelor in Computer Science, (3) Entrepreneur-ship, Innovation and Management MSc	MSc Entrepreneurship, Innovation and Management	Sustainable Energy Engineering MSc	(1) MSc Applied Biopharmaceutical Biotechnology and Entrepreneurship, (2) Biotechnology, (3) Biomedicine, (4) Business and Management
Prior professional / industry experience related to the project	Yes	Yes	Yes	No
Internal Informant	Founder	Founder	Founder	Founder
Documentary Data	Company Website, Ingenuity Web, Social Networks	Company Website, Ingenuity web, Social Networks	Company Website, Ingenuity Web, massive media, press	Company Website, Ingenuity Web
Social Top 21 / Commercial Top 20	Commercial	Commercial	Social	Commercial
Finalist awarded	Yes	Yes	Yes	No
Ingenuity Prizes	Experian Commercial Potential Prize, Santander Enterprise Awards, Sainsbury Management Fellows (Engineers in Business) Award	Experian Commercial Potential Prize, Santander Enterprise Awards, Shakespeare Martineau Award	Vice-Chancellor's Impact Scholarship, Santander Enterprise Awards, The Brenda Dean Ingenuity Scholarships, Sainsbury Management Fellows (Engineers in Business) Award	-
Social Challenge	Access to education for international students / Reduction of carbon emissions	-	Access to water	Responsible production of "chitosan."

Table 5 Cases profile

Cases / Entrepreneurial Projects	3D Prosthetics	Accommodation Booking	Housing for Refugees	Designers Platform
Sector	Medical / Orthopaedic	Tourism	Charity / Migrants	Fashion Industry
Team / Individual Project	Individual	Individual	Team	Individual
Founding Team	-	-	Individuals with a professional interest in helping migrants	-
Disciplinary Backgrounds	Product Design Engineer	Bachelor in German and Philosophy	(1) Bachelor in Social Policy, MSc Charity Resource Management, (2)MSc in Human Rights Law - MSc in Public Health, (3) MSc in Broadcast Journalism (4) Social Work, (5) MSc in Human Rights Law	Bachelor's in business
Prior professional / industry experience related to the project	No	No	Yes	Yes
Internal Informant	Founder	Founder	Founder	Founder
Documentary Data	Company Website, Ingenuity Web, Social Networks	Company Website, Ingenuity Web, Social Networks	Company Website, Ingenuity Web, Social Networks	Company Website, Ingenuity Web, Social Networks
Social Top 21 / Commercial Top 20	Commercial	Social	Social	Commercial
Finalist awarded	Yes	Yes	Yes	Yes
Prizes	Experian Entrepreneur of the Year, People's Choice Award, The Brenda Dean Ingenuity Scholarships, Sainsbury Management Fellows (Engineers in Business), BDO Award	Santander Enterprise Awards	Experian Social Impact Prize, The Brenda Dean Ingenuity Scholarships	Santander Enterprise Awards
Social Challenge	Affordable access to prostheses	Help to homeless	Help to migrants	-

Table 5 Cases profile

Cases / Entrepreneurial Projects	Entrepreneu-rial Toolkit	Support for Anxiety	Vertical Farming	Social Supermarket	Outsour-cing App
Sector	Education	Medical Psychology	Vertical Farming	Food stores	Building Industry
Team / Individual Project	Team	Individual	Team	Team	Team
Founding Team	Academic + Professionals	-	Students	Students from Enactus	Students
Disciplinary Backgrounds	(1) PhD [Entrepreneurship] - MSc in Tourism Management, (2) Bachelor's degree English and Communication Studies, (3) Certificate in Organisational Coach-Mentoring [Psychology] - Innovation Masterclass Organisational Leadership - BA Business Studies	BA English and Social Theory - Master of Research in English Literary Research	(1) MSc Sustainable Energy and Entrepreneu rship - BA Environ-mental Engineering, (2) MSc Sustainable Energy and Entrepreneu rship	(1) BA International Management (2) BA in English Studies (3) BA in Economics, (4) BA in Geography, (5) BA in Law, (6) BA in Maths (7) BA in Finances, Accounting and Management (8) MSc in Nursing	(1) PhD © in Human Factors in Engineering - Industrial Design, (2) MSc Entrepre-neurship, Innovation and Manage-ment - Civil Engineer
Prior professional / industry experience related to the project	Yes	Yes	No	No	Yes
Internal Informant	Founder	Founder	Founder	Director	Founder
Documentary Data	Ingenuity Web	Ingenuity Web, Press	Ingenuity Web, Social Networks	Company Website, Ingenuity Web, Social Networks	Business plan
Social Top 21 / Commercial Top 20	Social	Social	Social	Social	-
Finalist awarded	Yes	Yes	No	No	No
Prizes	Smallwood Trust Innovation Prize	Santander Enterprise Awards	-	-	-
Social Challenge	Gender equality in entrepreneurial education and practice	Help to people suffering anxiety	Responsi-ble organic farming produc-tion	Affordable access to food	-

Table 5 Cases profile

3.5.4. Description of the Cases

This sub-section describes the 13 cases of this research. The cases are presented to provide a general idea of the entrepreneurial project submitted in Ingenuity19, their performance in the competition, and their particular developmental context. The sources of data of every project cannot be referenced for the anonymous agreement with the cases.

Case 1: Student Applications

Student Applications is a non-traditional new venture that designs personalised mobile applications to attract, engage, and improve international students' enrolment in higher education institutions. The solution that this project offers is based on two main areas. On the one hand, it facilitates the application process for international students and improves the user experience by personalising profiles, updating qualifications, and accessing university information such as specific courses and accommodation facilities. On the other hand, universities can get a personalised virtual platform to offer recruitment advisors and engage with prospective students effectively. So, universities can manage peer interactions and define specific content to present programmes that help the decision-making process of prospective students. Regarding the technology used in the application's design, React Native technologies allow a high-performance iOS and Android app with an accessible user interface.

This non-traditional new venture was launched in 2017. Currently, it is developed by a team of three members with backgrounds in business, computer science, and artificial intelligence. The founder declares that his experience applying to universities as an international student was fundamental in identifying this entrepreneurial opportunity. When it comes to the social aspects of this venture, the founder declares that one of the significant impacts is giving a fair and accessible

application process to millions of prospective students that sometimes can suffer limitations in terms of geographical barriers to apply to international universities. Additionally, universities can improve their carbon management strategies, reducing the international travel of their recruitment departments.

Finally, they had a highlighted performance in Ingenuity19, being awarded the Experian Commercial Potential Prize, Santander Enterprise Awards and Sainsbury Management Fellows (Engineers in Business) Award, and receiving monetary investment to develop the entrepreneurial project. After the competition, the project is still working with the Haydn Green Institute for Innovation and Entrepreneurship support.

Case 2: Equine Repellent

Equine Repellent is a non-traditional new venture working in the veterinary chemistry industry. This venture offers modern products to the equine sector, using chemistry technology to combine efficiency and practicality for individuals who practice equestrian sports, giving well-being and security to both riders and horses.

From her experience as a horse rider, the founder of this new venture identified the opportunity to create an insect repellent device to horse fly. Unfortunately, the stings of these insects are painful for horses, creating a risk of injury and agitation for the animals. Similarly, this is a risk for riders in terms of accidents.

Based on her practical knowledge of horse riding and complementing her disciplinary background in management, the founder presented this idea as part of her studies on MSc in Entrepreneurship, Innovation and Management. After receiving positive feedback, members of the Haydn Green Institute for Innovation and Entrepreneurship invited her to participate in Ingenuity19. Currently, prototypes for the product have been created, but the commercialisation process is on pause because of the Covid-19 pandemic.

In Ingenuity19, the project was awarded the Experian Commercial Potential Prize, Santander Enterprise Award and the Shakespeare Martineau Award, receiving funding to facilitate the business growth. After the competition, the founder has been working with the support of the Ingenuity Lab.

Case 3: Access to water

As a third case, “Access to water” is one of the projects with the most outstanding media impact that has emerged from the Ingenuity platform. Her founder, , declares that her company aims to solve the water crisis around the world.

Specifically, this venture was influenced by the life experience of its founder, who in her country was forced to move large amounts of water on long walks of more than 7 kilometres a day. After working professionally as an engineer associated with marketing activities for a Dutch energy company that sold solar-powered water pumps, she realised that this type of technology was unachievable for poor communities in developing countries. Later, in the context of her master’s thesis, her research focused on developing solar water pumps that could facilitate access to water in communities that did not have this vital resource.

The social impact of this company is evident. The founder states that, according to UN-Water, over two billion individuals live in areas with high water stress, while it is estimated that in the next two decades, 600 million children will be living in regions of extremely water crisis.

The non-traditional new venture started being developed at Ingenuity in 2019. Since then, prototypes of the pumps have been designed. Similarly, the first versions of its product have been implemented. Currently, the company is led by its founder, who also has the support of a technical team that manages company operations.

This project was highlighted among the most important in Ingenuity19, receiving four awards: Vice-Chancellor’s Impact Scholarship, Santander Enterprise Awards, The

Brenda Dean Ingenuity Scholarships, and Sainsbury Management Fellows (Engineers in Business) Award. Moreover, this company has been awarded in other entrepreneurship programmes at the national level focused on Engineering. After the competition, the project has been part of the Haydn Green Institute for Innovation and Entrepreneurship support programmes to the winners, and the new venture is currently part of the Ingenuity Lab community. Finally, the university entrepreneur has been invited to share her experience as a speaker in different university activities, inspiring individuals in pursuing an entrepreneurial career.

Case 4: Shells and Creams

In the context of biotech product development, “Shells and Creams” is a new venture focused on sustainable, ecologic, and economical production of Chitosan. Chitosan is a biopolymer extracted from shrimp shells waste, used in a wide variety of products in different industries and markets, such as pharmaceuticals, water treatment, agrochemicals, cosmetics, food, textile, photography, paper, and tissue engineering.

Chitosan is made using chemical processes based on acids and alkaloids at high temperatures for several hours, generating high contamination levels. However, with the biotechnological process developed by this company, it is possible to reduce chemicals and pollution by 60%, generating an ecological alternative to the production of this polymer.

This project began in Mexico in 2014, when a group of students from Universidad Tecnologica de Monterrey, from the programmes of Biotechnology, Biomedicine, and Business and Management presented the initial technological idea to the International Genetically Engineered Machine (iGEM), an entrepreneurial competition organised by the Massachusetts Institute of Technology (MIT). In this activity, they were highlighted among the year’s best projects. After this positive result, some team members decided to abandon the project for personal reasons. Two years later, two of its initial members founded a company in 2016.

The connection to Ingenuity is through one of its founders, who studied a MSc Applied Biopharmaceutical Biotechnology and Entrepreneurship. In this context, she evaluated the opportunity to improve her entrepreneurial project through the activities and training that Ingenuity19 offered. In the competition, the project was one of the commercial top 20. After completing her studies, the founder returned to Mexico, where research activities are being conducted in order to raise the capital needed to continue the development of this non-traditional new venture.

Case 5: 3D prosthesis

As its name suggests, the fifth case of this research is related to the design and production of prostheses for children using 3D printing technology. According to the testimony of its founder, this idea began in 2017 when she met a girl born with below-elbow limb loss. Unfortunately, the girl had never had access to a prosthesis, which was the first incentive for the university entrepreneur to change that reality.

After this initial experience, the founder did some investigation and found that it is a global problem, where about 90% of the world population do not have access to the prostheses that they require in order to improve their quality of life, the main barriers being the lack of medical access and high cost of production. In addition, the biological nature makes access to these devices even more complex due to the morphological changes over the years.

In the context of her studies as a Product Design Engineer, both at undergraduate and master's level, the founder applied the idea of 3D prostheses in her dissertations. The positive evaluations from academics encouraged her to turn the project into a potential new venture. Initially, she worked with the support of the Loughborough University Incubator. She knew that this university was a partner of Ingenuity19, a competition where she could present her project.

In Ingenuity19, her performance was exceptional, receiving the most important awards of the year: Experian Entrepreneur of the Year, People's Choice Award, The Brenda Dean Ingenuity Scholarships, Sainsbury Management Fellows (Engineers in Business) and the BDO Award. The successes continued, as she was awarded Enterprising Student of the Year in the Loughborough University and was winner of the EIT Healthcare Entrepreneurship Summer School Competition, the Med-Tech Innovation 3D Printing Award and finalist of the Santander Universities Emerging Entrepreneurship Competition.

The Loughborough University Incubator is supporting the development of this non-traditional new venture. Due to the geographic distance, her relationship with the Haydn Green Institute for Innovation and Entrepreneurship and the Ingenuity Lab is not daily. However, she still participates in specific activities. The product is currently in the patent-pending process (UK) stage with hopes to commercialise the prosthesis in the market soon.

Case 6: Accommodation Booking

In the context of the global housing crisis, Accommodation Booking has emerged as a non-traditional new venture that tries to contribute financially to organisations that help homeless individuals in the UK. Through commercial alliances with the leading travel and hotel reservation websites in the world (Booking.com, Skyscanner, World Nomads), the business model of this project is based on the fact that 7% of the price paid for tourism reservations is donated to Accommodation Booking (without increasing the sale price to the consumer). The new venture subsequently distributes these funds to different social organisations that support homeless individuals throughout the UK.

As declared by the founder, homelessness is a massive current social issue reflected in the fact that 80% more children are now without a home than in 2010. Over 200,000 British households are affected, with another family becoming homeless

every five minutes. This motivated the founder to identify an entrepreneurial opportunity to help solve this crisis by changing how individuals book their holidays or travels. Accommodation Booking has supported more than ten charities, such as Emmaus, Llamau, The Bus Shelter Ipswich, The Passage, and HOPING York Street Kitchen. In addition, the non-traditional new venture also generates activities that raise awareness of the problem in the population, hoping for an increase in direct donations that individuals can make to different social organisations involved in providing solutions to the housing problem.

Regarding its participation in Ingenuity19, the new venture was a finalist among the social top 20 projects and received the Santander Enterprise Award. The prize was important for the company in gaining funds to develop marketing improvements within their communication channels. After the competition, the Ingenuity Lab supported the non-traditional new venture. The company is currently in operation with its renewed virtual platform and is conducting educational campaigns to inform individuals about the massive housing crisis.

Case 7: Housing for Refugees

Housing for Refugees is a charity focused on providing support to refugees, destitute asylum seekers and victims of modern slavery and trafficking, who come to the UK seeking help, specifically in the East Midlands area. According to its CEO, this organisation aims to offer housing to refugees to facilitate their integration into the employment market and society.

Among the cases studied, this charity has the longest operating time. The project was born in 2007 when a vicar of the Church of England, who was working in the zone of Hyson Green, observed how refugees and destitute asylum seekers were evicted from the temporary homes that the Home Office provided to them. Based on similar experiences from other organisations in different UK regions, this project opened its first house in Nottingham. Currently, Housing for Refugees has broad

support from various funders such as the Big Lottery Fund, Lloyds Bank Foundation, Metropolitan Migration Foundation, Near Neighbours and the Souter Charitable Trust. Additionally, many local churches and individuals support their daily work. Financial aid is used primarily for house running costs, salaries, and travel for residents to get to appointments.

Even though this organisation was founded by individuals related to a religious creed, it is currently detached from any church, which gives them greater freedom of operation. In more than ten years of work, the charity has 20 properties, housing over 70 residents. At the time of the data collection, the team running this project consists of five individuals with educational backgrounds in social sciences, law, and management, which allows them to tackle the organisation's work effectively.

Regarding Ingenuity19, its CEO stated that they decided to participate when they knew that this competition was open to the regional community, inviting projects with a social focus. In addition, given the social impact of their activities, they saw the opportunity to obtain financing through the competition. As a result, their participation was recognised among the top 20 social projects, where they were awarded the Experian Social Impact Prize and the Brenda Dean Ingenuity Scholarship. Currently, the charity is still in operation.

Case 8: Designers Platform

Designers Platform is a marketplace for men's and women's clothing, where young and independent designers, designer brands, and fashion graduates can find a place to commercialise their unique products, helping create and consolidate fully fledged independent brands.

According to the founder, this platform invites individuals from the fashion industry to create clothes and accessories, where "art" is the main inspiration. Moreover, they also positioned sustainability as a core aspect of their business proposal, which is

reflected in their support for innovative brands in the fashion industry with ecological responsibility. As an industry that is permanently criticised for the high levels of pollution generated, this platform tries to solve the problem by helping designers become active actors in a sustainable fashion future.

With undergraduate studies in business, the founder has been interested in fashion design for years. It all started when he studied at university and made the first clothing designs. Later, his friends and other students asked him to customise their outfits. Commenting on what inspires him, the motivations are related to connecting the aspirations, self-perceptions and experiences of potential clients and his clothing choices, where personalised design with an artistic approach can bridge style individuals.

The project was highlighted in Ingenuity19 among the commercial top 20, winning the Santander Enterprise Awards. After the competition, the project continued working with the Haydn Green Institute for Innovation and Entrepreneurship support, which allowed it to get essential mentoring to improve its business plan. However, the project is currently on pause due to barriers to operating in the context of Covid-19.

Case 9: Entrepreneurial Toolkit

Entrepreneurial Toolkit is an entrepreneurial-academic project that offers personal development toolkits and associated workshops to support underrepresented groups in building entrepreneurial mindsets and helping in their entrepreneurial journey.

This project has been developed by four women who came from academia and professional practice, who shared their knowledge and experiences for the generation of toolkits. The founders possess knowledge of business, entrepreneurship, psychology, and communication, which allowed them to have a broad view of the entrepreneurial phenomenon applied in creating educational content. Its leading toolkit is focused on women who are running their businesses.

According to one of the founders, the proposal differs from other similar resources from a perspective of content created by and for women, providing a different approach to the traditional masculinisation of the entrepreneurial phenomenon.

One of the project founders is a PhD whose research focuses on social, environmental, and female entrepreneurship related to identities, authenticity, and legitimacy. Her research argued that the standard view of entrepreneurship is biased towards masculinised 'rules of the game', suggesting that legitimacy strategies and approaches are steeped in these norms. As primary insights, she found that women developed their own identities as entrepreneurs and have different definitions of success. Therefore, considering these differences, the toolkit aimed to boost confidence in decision-making processes, looking to generate a collaborative community of female entrepreneurs. Finally, in 2019, the toolkit was officially launched into the community.

Regarding Ingenuity19, they applied to the competition looking for funding to further develop their toolkits and run new workshops. The project was one of the social top 21, winning the Smallwood Trust Innovation Prize. To date, the toolkit can be downloaded for free from the university website.

Case 10: Support for Anxiety

Initially thought as a website that provided a map of nearby locations where individuals experiencing panic attacks could get assistance, this non-traditional new venture consists of an integral programme to support individuals living with anxiety. It aims to create support networks, in different towns and cities, based on venues that can offer public and accessible spaces to individuals dealing with this medical condition, where they can manage feelings of anxiety and find a helpful response.

Based on her experience of living with anxiety for years, the founder realises the need to create a platform to help individuals with anxiety and raise awareness of

mental ill health. Even though her educational background is not related to the traditional disciplines involved in entrepreneurial activities, she could identify an entrepreneurial opportunity that had echoes within the community.

As a staff member of the University of Nottingham, she knew about the Ingenuity programme. With her friends' encouragement, she decided to participate in the competition with the initial idea of a support website. Thus, given the opportunity to present projects outside the traditional commercial approach, where the social impact of the ideas was valued, she applied to the programme. After participating in the three stages of the activity, this project was selected among the social top 21 finalists and received the Santander Enterprise Award. Based on her testimony, the financial award was critical in deciding to leave her job at the university and dedicate all her efforts to developing the project.

Since 2019, the project has evolved significantly. The original idea of a website map that will provide information on places in the city is now only one part of the project. It has been complemented with training and consultancy activities, offering training to businesses and organisations to raise awareness of anxiety accessibility, resulting in functional changes that help individuals access their venues. Additionally, the project is doing research, inviting individuals who suffer from these medical conditions to share their experiences with the programme, helping in improving the proposal of the non-traditional new venture.

Case 11: Vertical Farming

Vertical Farming is a project generated in the context of postgraduate studies of two students at the University of Nottingham. As part of their evaluations of the MSc Sustainable Energy and Entrepreneurship programme, they had to develop a proposal for "the agriculture of the future" where sustainability was critical in the final evaluation. Thinking about the water wasted by the agricultural industry and the severe water crisis that exists today in much of the world, the students proposed

using closed-loop hydroponic technologies for the production of vegetables, specifically coriander, parsley, rosemary, and other herbs of high consumption.

After completing the module, the students thought about using this idea as a business plan that would allow them to apply to Ingenuity19. Even though their primary interest was to participate in the inspiration and development activities of the competition, later in the process they realised that their business idea could have the potential to be chosen as one of the best entrepreneurial projects of the year. Specifically, their proposal was based on hydroponic technology to grow vegetable products, but with the perspective to sell their products directly to restaurants or supermarkets in a B2B model.

After presenting its business plan, “Vertical Farming” was selected among the top 21 social project finalists. However, they did not receive additional awards. One team member attributes this result to their weak choice regarding the participation track, arguing that they would compete on the commercial track if they could choose it again, even though their idea has a positive environmental impact. After the competition, the team continued working on the project and even reached initial funding from an investor from the country of origin of one team member (Mexico). Unfortunately, due to the immigration status after completing his studies, one team member was forced to return to his country, which made it difficult for the project to continue. To date, the project is on pause, and both members are looking for work. However, they do not rule out resuming this project in the medium term.

Case 12: Social Supermarket

Managed and operated by voluntary students from the University of Nottingham, Social Supermarket is a multi-award social enterprise focused on reducing food waste, providing affordable food prices to one of the most impoverished neighbourhoods of Nottingham. Also, they act as a surplus food redistributing

network, being an intermediary between supermarkets, wholesalers, charities, school breakfast clubs and individuals from different areas of Nottingham.

With the support of Enactus Nottingham, an experiential learning platform for university students interested in creating social enterprises, this non-traditional new venture opened its first supermarket in 2017. Run by a cross-disciplinary team, students from business, finances, economics, geography, law, maths, English, and nursing work together in developing and improving the supermarket and its related projects daily. As reported by its director, the team's diversity allows them to address different tasks and challenges, expanding their scope of action.

Working with Hovis Bakery and Tesco as main commercial partners, Social Supermarket can offer food permanently in its store. In doing that, since 2017, the project has been able to sell more than 45,000 kg of food and redistributed additionally 10,700 kg, resulting in more than 740 beneficiaries weekly. However, the store is not the only activity of the social enterprise. With the support of the National Lottery Community Fund and individual donations, they launched a mobile supermarket to bring food to areas with difficult access. In addition, they have developed support programmes for organisations that work with individuals with disabilities. For example, they have an alliance with Open Wings, where adults with learning difficulties bake and prepare dried apples that are later delivered to school breakfast clubs, improving the nutrition of breakfast meals.

In Ingenuity19, the project was selected among the year's social top 21 entrepreneurial projects. Even though they did not get a monetary prize, they recognised the importance of their participation in the previous version of the competition, where they obtained initial funding to launch the supermarket and be financially independent.

Case 13: Outsourcing App

Outsourcing App is an entrepreneurial project developing a mobile application to offer services to homeowners, focused on landlords and landladies, offering to outsource home maintenance tasks. Similar to the commercial approach of famous unicorn apps, which connect customers with individual suppliers, the idea is based on creating a bridge between users and home maintenance workers, such as electricians, gardeners, painters, carpenters, and plumbers. However, the application's final objective is to help in collecting a database based on the types of needs and requirements in homes, and the types of professionals available in the market to those tasks, to finally use the information directly with companies, such as suppliers of construction materials, insurance firms or property letting agencies.

The idea arose from two graduate students' conversations about the construction industry, where they both had professional and educational experience. One of the idea founders studied the MSc Entrepreneurship, Innovation and Management, while the other team member is a PhD student in Human Factors in Engineering, both studying at the University of Nottingham. Once they knew about Ingenuity19, they decided to participate in the programme. Although their primary motivation was to attend the inspiration phase (summits), they also participated in the development phase. Once finalised, they submitted their business plan proposal for the final competition phase. Unfortunately for them, their proposal was not selected among the 41 finalists of the year. Once the competition was over, one of the founders returned to his home country, while the PhD student remained in the UK.

When commenting on the project's current status, its founders mentioned that the geographical distance between them, added to the prioritisation of their educational and professional responsibilities, stopped the project's progress. However, they do not rule out taking it up again in the future.

After explaining the criteria to select Ingenuity19 as a research context, the criteria used to select entrepreneurial projects to be studied and describe each case, the

following section presents the data collection process and explains the different stages within the data analysis.

3.5.5. Data Collection Process and Data Analysis

As mentioned in previous sections, multiple-case studies as a research strategy rely on the principle of using and combining multiple sources of evidence within the data collection process (Eisenhardt, 1989; Yin, 2017). Therefore, following Eisenhardt (2021), who argues that decisions about data collection should consider data availability and the research question, the following sources of evidence were used in this study: two sets of semi-structured interviews with nascent university entrepreneurs, interviews with university staff related to designing and delivering the programme (mentors), documentation of nascent non-traditional new ventures from publicly available data, documentation of Ingenuity19 as a research context from publicly available data (videos, resources, presentations) and direct observation of the Ingenuity Lab as the support programme after the competition.

Before carrying out the interviews, the literature related to academic entrepreneurship, business plan competitions, entrepreneurial competencies, collaboration, and transdisciplinarity was reviewed to define and understand the research's theoretical and conceptual context, providing insights into designing an interview guide, which is presented in the following section.

3.5.5.1. Interview guideline

As was previously argued, an interview guide allows relevant information to be captured to address the research question, increasing the comprehensiveness of the data, and making a multiple-case study comparable among the units of analysis (Eisenhardt, 1989; Bryman, 2016). Based on Yin (2017), the guideline was defined

on two levels of questions. Level one is related to the interviewees' specific information that helps create a friendly conversation with the participants. For example: What is your educational/professional background? When and how did you realise this idea? When did you start working on this idea? Are you working with a team? Who are the members of your team?

Regarding level two, those questions focus on this research's line of enquiry. For example: Could you tell me about your motivations to participate in Ingenuity19? Could you tell me about your experience in Ingenuity19? Could you tell me what has changed since Ingenuity19? How was it manifested before and after Ingenuity19? The interview's questions were asked to capture the meanings and reflections of individuals regarding their participation in Ingenuity19 and how this context could affect the development of the entrepreneurial project.

In addition, the technique of a critical incident was applied for the design of the interview guideline. This technique has been defined as a method to collect data regarding a particular event or activity based on the participant's reflections of key facts (Collis & Hussey, 2013). It has been argued that it is helpful in designing questions for semi-structured interviews under an interpretive methodology, as it helps interviewees "*to talk about issues in the context of their own experience and discourages them from talking about hypothetical situations or other people's experiences"* (Ibid., p. 140). Therefore, through a longitudinal design of two sets of interviews, the participants talked retrospectively about their participation in Ingenuity19, giving their view of entrepreneurial competency development (before, during, and after Ingenuity19).

Following Rasmussen et al. (2011), concepts such as competencies and resources were not explicitly mentioned to avoid biases. In doing the interviews, after the initial answers to level 2 questions, open follow-up questions were asked to gain specific information on particular facts (for example: "When did this happen?", "Who was involved in this event?", "Did you consider alternative actions?", "Why did you do that?"). The interview guides of the two sets of semi-structured interviews with

nascent university entrepreneurs and the guide for the interview with Ingenuity19 interlocutors can be found in appendixes 2, 3 and 4.

3.5.5.2. Set of interviews

After receiving a favourable ethical opinion from the Research Ethics Committee of the Nottingham University Business School, the data collection began in September 2019 with two pilot interviews to ensure that relevant data for the research aims could be captured through the interviews. In light of the pilot responses, the interview guide was confirmed as appropriate to be applied in future interviews. Information from the pilot interviews was not included in the final data analysis.

After the pilots, finalists of Ingenuity19 and one general participant of the previous phases of the programme were contacted by email, where the researcher invited them to participate in this study, receiving 13 positive answers. The ethical and confidential form for the confirmed research participants was sent before the interviews. Data for the first round of interviews were collected from October 2019 to March 2020. The second round of interviews was carried out from September 2020 to October 2020. The interviews were carried out at the convenience of the research participants, either in university facilities or online when geographical distance or meeting restrictions because the health crisis required it. Twenty-four interviews were conducted, which varied in length from 30 to 70 minutes, with minimal interruptions by the interviewer'. Interviews were audio-recorded with the participant’s permission.

The interviews followed a narrative approach (Polkinghorne, 1988), which has been highlighted as a way to get closer to actual events (Mosey, Noke, et al., 2012; Rasmussen et al., 2011, 2014, 2015). In doing this, participants were asked to describe their experience as founders of non-traditional new-ventures, from its inception to date, linking it to the potential impacts of participating in an entrepreneurial competition.

Based on Rasmussen et al. (2011), it is possible to argue that research designs should consider a longitudinal approach to explore the development of entrepreneurial competencies. As competency development takes time and competencies can also be different during different project phases, a longitudinal study using interviews is warranted to capture changes over time, reducing issues of retrospective biases (Eisenhardt & Graebner, 2007; Pettigrew, 1990; Rasmussen et al., 2011). Moreover, this design allows the researcher to observe changes over time in multiple-case studies (Cohen et al., 2018; Bryman, 2016; Pettigrew, 1990), evaluating how "critical events", such as the involvement within an entrepreneurial intervention (Ingenuity19), can influence the development of entrepreneurial competencies. Therefore, a longitudinal approach allowed the researcher to understand the development of entrepreneurial competencies, the underlying process in their development, and who can provide those competencies within a transdisciplinary context.

3.5.5.3. Direct observation and documentation

Direct observation was carried out during fieldwork, particularly during the first phase of interviews developed within the facilities of the Ingenuity Lab. Data collected through the observation of the different areas of the Ingenuity Lab space helped compare and contrast insights obtained within the interviews regarding participants' experiences about the environmental factors of the research context that contributed to the development of entrepreneurial competencies.

Regarding documentation, this evidence was focused on two main areas: public information of Ingenuity as a programme and public information of the participant's non-traditional new ventures. Concerning Ingenuity, the information was collected from January 2019 to December 2019 through physical and digital documents, video recordings, and reports, complemented with the Haydn Green Institute for Innovation and Entrepreneurship information. Specifically, 391 minutes of the weekly recorded

sessions (main speakers and discussion panel) and 166 minutes of weekly talks with experts of Ingenuity19 were watched, and 21 files of methodological resources were read (i.e. PowerPoint presentations, cash flow template, documents of advice for entrepreneurs, business model tools, among others) both to triangulate the information from participants regarding the participation in the competition. Regarding the participants, the documentation search was carried out from October 2019 to March 2021 on the internet, using Google.com as the metasearch engine. The company (project name) and individual information from university entrepreneurs were searched. Data were mainly found in the company's web pages (if any), social networks (Linkedin, Facebook, Instagram, Twitter), mass media, industry-related blogs and web news. This information was helpful to triangulate the data of non-traditional new ventures such as the business core and potential changes over time that they could communicate with customers and the community.

3.5.5.4. Data analysis

This research followed an iterative approach to analyze the data concerning the research question and research objectives. The data analysis began by considering the university entrepreneurs' testimony regarding their experiences leading an entrepreneurial project and their participation in Ingenuity19. First, each interview was transcribed after being conducted by the researcher, which allowed rich closeness with the data. Interviews were also transcribed by a professional transcriber to address idiomatic barriers that could harm the transcription process. Then, transcriptions were read and re-read as data was collected. In addition, notes recorded manually in the interviews were considered in the analysis. Notes were focused on non-verbal aspects that could not be recorded, but that can be important to understand gestures and emotions associated with a particular answer.

As Eisenhardt (2021) argues, the method is specific to defining and developing constructs during the data analysis in multiple-case studies, equivalent to first- and

second-order analysis (Gioia et al., 2013), where the central idea is iteratively grouping and organising raw data resulting in abstract conceptualisations as part of constant comparison between theory and data (Eisenhardt, 2021). Using the model of Gioia, Corley, & Hamilton (2013), a second order analysis was applied, where the emphasis is moving from the particular (categories) to the general (aggregate dimension), which allows grouping qualitative data in a structured way. Moreover, the coding model of Saldaña (2013) of two cycles was used for the thematic analysis, explained as follows.

3.5.5.1. COVID-19 Impact Statement

The data collection process was affected for the external conditions related to the internation health crisis - Covid 19. Specifically, due to the recomendations and measures implemented by the UK goverment, the University of Nottingham suspended face-to-face activities in different campus. For this reason, the facilities of the Ingenuity Lab were closed, which restricted access to field observations related to the interactions between the different actors that participate in this platform. Additionally, due to mobility restrictions, the second round of interviews was conducted remotely through the Microsoft Teams platform. Nonetheless, the field observations made in the first round of interviews and the accounts of the interviewees in the first and second round and the access to public data were sufficiently consistent to be able to carry out analyzes, obtain findings and contribuite to the research area.

3.5.5.2. Data Coding and data structure

In conducting the analysis, it has been suggested that coding is a key process in qualitative case study interviews (Bryman, 2016; Collis & Hussey, 2013). A code "*is a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data*"

(Saldaña, 2013, p. 3). In terms of process, coding methods are usually described within a two-order step analysis or two cycles (Bryman, 2016; Collis & Hussey, 2013; Gioia, Corley, & Hamilton, 2013; Saldaña, 2013), where the emphasis is that the analysis moves from the particular (codes) to the general (theoretical assertions) or, in other words, from the real to the abstract. Thus, analogous to the data structure presented by Gioia et al. (2013), the first-order analysis is related to codes or general categories and the second-order analysis moves to themes that emerge through the concepts identified previously (Saldaña, 2013). Therefore, in doing a second-order analysis, this research applied the Saldaña coding method.

Saldaña (2013) proposes a technique of a first and second cycle of codes. The first cycle "*are those processes that happen during the initial coding of data*" (p. 58). This research applied a descriptive–elemental method. Elemental coding is a primary approach used in qualitative research analysis, providing basics and focused filters for reviewing the data, which provides an appropriate base for future coding cycles (Saldaña, 2013). In descriptive coding, a phrase is used to summarise a portion of the data and the code, in turn, is the identification and not the abbreviation of the topic, showing what is in the data source written or talked about.

The reasons to use this approach are that descriptive coding is appropriate for most qualitative studies. More specifically, this method has been suggested to research questions that are looking for knowledge and understanding of processes and perceptions of the participants working with "how" research questions (Saldaña, 2013), which is the case with this project. The application of descriptive coding generated the first order of categorised inventory as an index of the data's concepts that were the base of the coding in the second-order analysis. The first-order analysis resulted in 191 categories, including 1,580 references, which were later refined in the second-order analysis.

The second cycle's methods are the analytic stage of the coding process, where skills such as classifying, prioritising, integrating, synthesising, abstracting, conceptualising and developing theory are required (Saldaña, 2013). In this stage, the data coded in the first cycle was re-analysed and re-organised to develop "*a*

sense of categorical, thematic, conceptual, and/or theoretical organisation" (Ibid., p. 208). Emerging themes were refined through the pattern coding method. Pattern codes are "*explanatory or inferential codes, ones that identify a 'bigger picture configuration*'*… Pattern Coding is a way of grouping those (first cycle coding) summaries into a smaller number of categories, themes, or concepts*" (Miles, Huberman, & Saldaña, 2020, p. 79). In the analysis, pattern coding begins clustering similar coded data. Then, commonalities are evaluated to assign pattern codes, describing a theme, a network of interrelationships, a pattern of action or the formation of theoretical constructs and processes (Saldaña, 2013). Additionally, for multiple-case research analysis, it has been highlighted that pattern coding lays the foundations for cross-case analysis, identifying common themes among the cases (Miles et al., 2020).

More specifically, the data analysis process was performed using Nvivo (coding) and Microsoft Excel as tools that helped in developing the second order analysis. After the interview transcriptions, the analysis followed the rationale explained by Gioia et al. (2013). As expected at the beginning of the first-order analysis, 183 initial categories emerged from the interviews[4]. The first-order analysis focused on seeking differences and similarities as the research progressed to get a manageable number among the initial categories. This initial stage concluded with 38 categories, labelled with a phrasal descriptor that retained the core of the grouped idea of participants using informant terms when possible. For example, Figure 5 extracts the coding process obtained from the case "*Equine Repellent*". On the left side of the figure, it is possible to see the coded interview sections. On the right side, it is possible to observe the categories related to each paragraph or sentence. It is important to mention that the software Nvivo assigned an automatic colour to every category that facilitates the later analysis.

[4] After the first round of interviews, a first analysis was conducted that led to the formulation of follow-up questions in the second round of interviews with an emphasis on concepts and relationships that appeared to be plausible for further exploration.

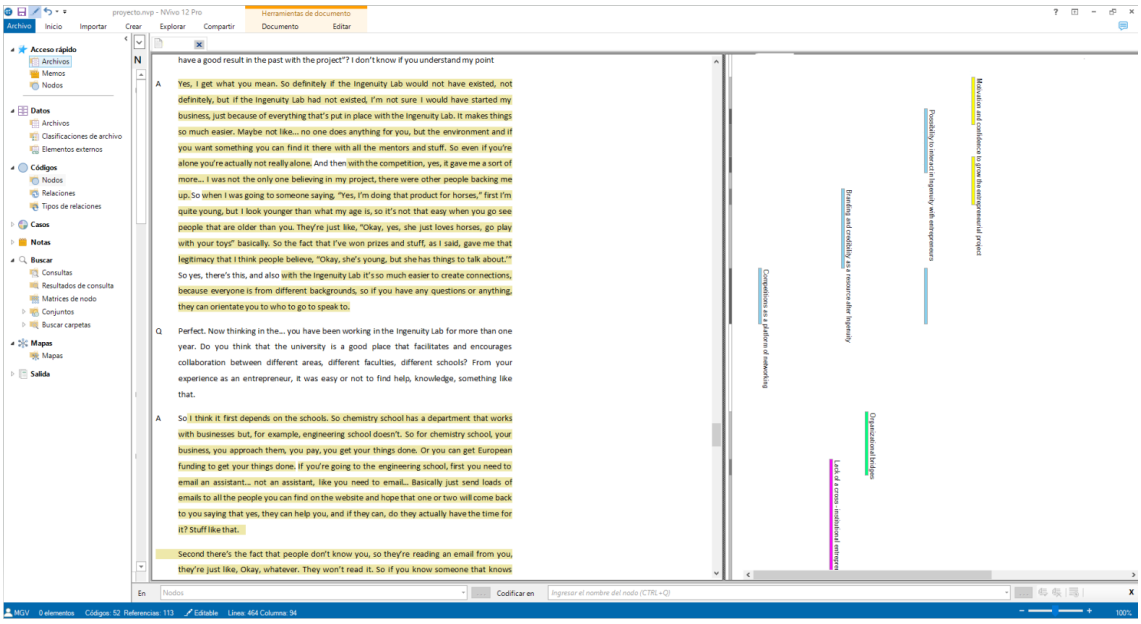


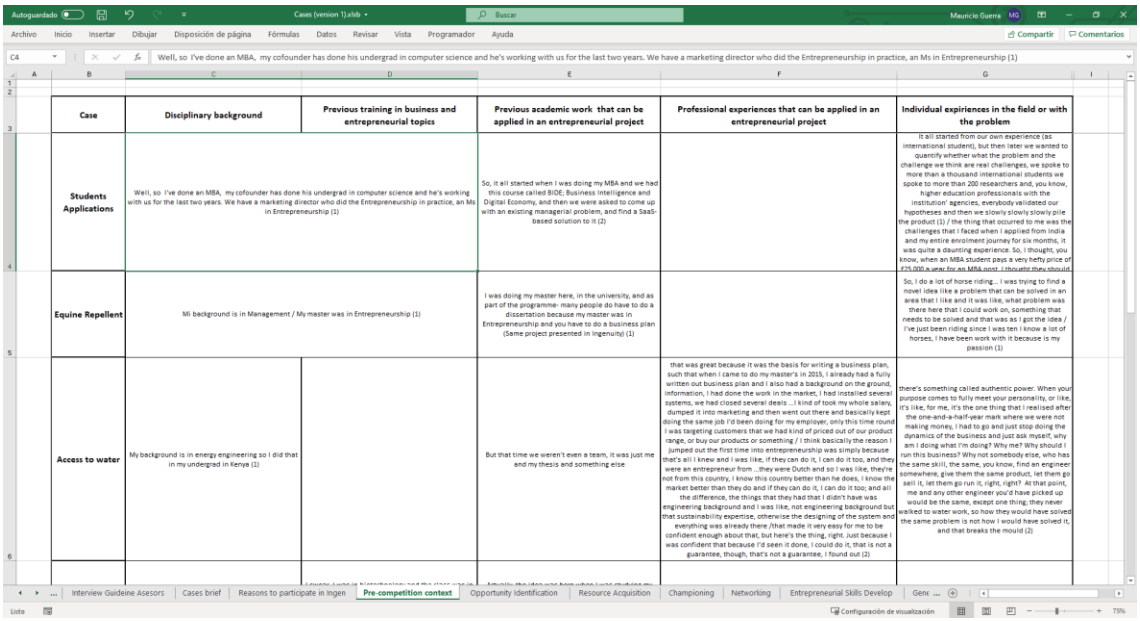
Fig. 5 Example of the coding process

Once the categories were defined, the analysis moved to the data reduction looking for themes suggesting new evidence that can describe and explain entrepreneurial competency development within a transdisciplinary context. In doing so, this research took the stance of Gioia et al. (2013), who suggested that the second-order analysis should focus on novel concepts to the existing literature or existing concepts that can be relevant in light of a new domain. Based on the above, the rationale for case selection (non-traditional new ventures, university entrepreneurs and transdisciplinarity) helped identify new themes that enlightened existing literature on entrepreneurial competencies. In the same vein, transdisciplinarity as a research context allowed the researcher to explore existing concepts in an underexplored setting.

This process resulted in 13 themes and five aggregate dimensions. The aggregate dimensions are: (1) pre-competition context, (2) entrepreneurial competency development, (3) individual skills development, (4) enablers of the collaborative process and (5) barriers of the collaborative process. Each one is presented in Chapter IV, where the empirical findings are discussed, giving a full explanation of the instances where references were made to build those categories, themes and

aggregate dimensions. The thematic analysis was made manually using Microsoft Excel, resulting in 14 tables illustrating the evidence that was the base for building every theme (tables showing the thematic analysis can be found as appendixes). Figure 6 shows an example of the theme “pre-competition context”.

After finishing the second-order analysis, the result is not just a visual representation. Instead, it is an analytical exercise that demonstrates how it was possible to transform raw data into categories, themes and aggregate dimensions. According to Gioia et al. (2013), this is a pivotal moment in the research process, where the data structure serves to move from a methodological view of the data to a theoretical perspective, showing the qualitative rigour in doing the analysis. Table 6 illustrates the data structure discussed in detail in Chapter IV.



Case	Disciplinary background	Previous training in business and entrepreneurial topics	Previous academic work that can be applied in an entrepreneurial project	Professional experiences that can be applied in an entrepreneurial project	Individual expiriences in the field or with the problem
Students Applications	Well, so I've done an MBA, my cofounder has done his undergrad in computer science and he's working with us for the last two years. We have a marketing director who did the Entrepreneurship in practice, an Ms in Entrepreneurship (1)		So, it all started when I was doing my MBA and we had this course called BIDE, Business Inteligence and Digital Economy, and then we were asked to come up with an existing managerial problem, and find a SaaS-based solution to it (2)		It all started from our own experience (as international student), but then later we wanted to quantify whether what the problem and the challenge we think are real challenges, we spoke to more than a thousand international students we spoke to more than 200 researchers and, you know, higher education professionals with the institution' agencies, everybody validated our hypotheses and then we slowly slowly slowly pile the product (1) / the thing that occurred to me was the challenges that I faced when I applied from india and my entire enrolment journey for six months, it was quite a daunting experience. So, I thought, you know, when an MBA student pays a very hefty price of £25,000 a year for an MBA cost, I thought they should
Equine Repellent	Mi background is in Management / My master was in Entrepreneurship (1)		I was doing my master here, in the university, and as part of the programme- many people do have to do a dissertation because my master was in Entrepreneurship and you have to do a business plan (Same project presented in Ingenuity) (1)		So, I do a lot of horse riding... I was trying to find a novel idea like a problem that can be solved in an area that I like and it was like, what problem was there here that I could work on, something that needs to be solved and that was as I got the idea / I've just been riding since I was ten I know a lot of horses, I have been work with it because is my passion (1)
Access to water	My background is in energy engineering so I did that in my undergrad in Kenya (1)		But that time we weren't even a team, it was just me and my thesis and something else	that was great because it was the basis for writing a business plan, such that when I came to do my master's in 2015, I already had a fully written out business plan and I also had a background on the ground, information, I had done the work in the market, I had installed several systems, we had closed several deals ... I kind of took my whole salary, dumped it into marketing and then went out there and basically kept doing the same job I'd been doing for my employer, only this time round I was targeting customers that we had kind of priced out of our product range, or buy our products or something / I think basically the reason I jumped out the first time into entrepreneurship was simply because that's all I knew and I was like, if they can do it, I can do it too, and they were an entrepreneur from ...they were Dutch and so I was like, they're not from this country, I know this country better than he does, I know the market better than they do and if they can do it, I can do it too; and all the difference, the things that they had that I didn't have was engineering background and I was like, not engineering background but that sustainability expertise, otherwise the designing of the system and everything was already there /that made it very easy for me to be confident enough about that, but here's the thing, right. Just because I was confident that because I'd seen it done, I could do it, that is not a guarantee, though, that's not a guarantee, I found out (2)	there's something called authentic power. When your purpose comes to fully meet your personality, or like, it's like, for me, it's the one thing that I realised after the one-and-a-half-year mark where we were not making money, I had to go and just stop doing the dynamics of the business and just ask myself, why am I doing what I'm doing? Why me? Why should I run this business? Why not somebody else, who has the same skill, the same, you know, find an engineer somewhere, give them the same product, let them go sell it, let them go run it, right, right? At that point, me and any other engineer you'd have picked up would be the same, except one thing, they never walked to water work, so how they would have solved the same problem is not how I would have solved it, and that breaks the mould (2)

Fig. 6 Example of thematic analysis

1st Order Concepts	2nd Order Themes	Aggregate Dimensions
• Disciplinary background • Previous academic work that can be applied in an entrepreneurial project • Professional experiences that can be applied in an entrepreneurial project • Individual experiences in the field or with the problem	Professional – disciplinary background and personal experiences	Pre-competition context
• As a source of funding • External evaluation of the idea – Business perspective • A learning experience / Entrepreneurial knowledge	Reasons to Participate in Ingenuity19	
• To develop and enhance business plans and improve products and services • To identify or develop more products, services and applications based on the initial entrepreneurial project • Transform the idea of the project into reality	Opportunity Development Competency	Entrepreneurial Competencies Development
• Motivation through the interaction with mentors, speakers, and other entrepreneurs • Performance increasing motivation and confidence to grow the entrepreneurial project	Championing Competency	
• The competition as a source of capital • Branding and credibility as a resource after Ingenuity19 • Use of facilities and support of the Ingenuity Lab as a complementary external resource provider	Resource Acquisition Competency	
• Development of entrepreneurial skills for future projects (Opportunity Identification, evaluation, and development) • Way of looking at reality	Entrepreneurial Skills Development	Impact at the individual level
• Improve communication skills		

1st Order Concepts	2nd Order Themes	Aggregate Dimensions
• Developing confidence	General Skills Development	
• Competition design and activities of Ingenuity • Prizes and funding • Professional advisors to develop an idea – Improve the project • Ingenuity as a space to find applications to academic knowledge • Work environment and activities after Ingenuity19 • Organisational bridges and support from the university	Institutional / Organisational	Enablers of the collaborative process
• Teamwork, task division and roles • Acknowledgement of the need for complementary/specialised knowledge • Communication among team members and other actors and interaction with other teams	Interpersonal	
• Personal traits • Proactive attitude • Prior experiences	Intrapersonal	
• Weaknesses of the competition and the programme • Organisational barriers	Institutional / Organisational	Barriers of the collaborative process
• Different priorities and additional responsibilities • Communication barriers and interactional difficulties • Disciplinary backgrounds of team members	Interpersonal	
• Personal traits and individual issues • Individual interest and new projects	Intrapersonal	

Table 6 Data structure

Finally, regarding the documents, the analysis involved two phases of examination (skimming as a superficial examination and reading as a thorough examination) and

a third phase of interpretation, looking for matches within the data found in the interview transcription and second-order analysis (Bowen, 2009). Similarly, the notes recorded from the observations were contrasted.

3.6. Chapter Conclusions

This chapter presented the research design and methodology used to explore the development of entrepreneurial competencies in a transdisciplinary context empirically. The chapter developed four major areas of discussion: the philosophical assumptions underpinning the research, the research methodology, the definition of the multiple-case study and the data collection procedures and data analysis.

The chapter began by explaining the role of ontology and epistemology in this research as philosophical assumptions in knowledge generation. Then, based on the nature of the research question and objectives, the chapter argued that this research assumed social construction as ontology and interpretivism as epistemology, which implies that the phenomenon of entrepreneurial competencies development was explored focusing on the accounts of university entrepreneurs related to their experiences leading an entrepreneurial project. Later, the chapter discussed different methodological approaches, explaining why qualitative research fits with the philosophical definitions and the research question and objectives.

The third section defined and justified applying a longitudinal multiple-case study as a research design. In addition, this section described the components of this research design, discussed the quality criteria for judging this study and explained the methods for data collection.

The last section of the chapter described the data collection procedures and data analysis. Specifically, the section began by providing a complete description of the University of Nottingham and Ingenuity19, explaining the criteria to select this research context, the rationale for case selection and a description of the 13 cases

that were analysed. Then, the data collection process was explained, including the definition of the interview guideline, describing the interviewing process complemented by direct observation and documents. Finally, the chapter explained the data analysis, which progressed in two rounds of coding following the Gioia methodology of second-order analysis. The following chapter will present the empirical findings.

Chapter IV: Data Analysis

Reporting the findings on how non-traditional new ventures developed entrepreneurial competencies within a transdisciplinary context

4.1. Chapter Introduction

The following chapter reports the research findings of the empirical examination into how non-traditional new ventures and university entrepreneurs develop entrepreneurial competencies within a transdisciplinary context. This empirical examination consisted of a multiple-case study research design (explained and discussed in Chapter III) in which 13 participants were analysed after participating in an entrepreneurial intervention.

The research context of this study was “Ingenuity19”, an entrepreneurial programme of the Haydn Green Institute for Innovation and Entrepreneurship at the University of Nottingham. The entrepreneurial projects that participated as individual cases in this research were selected to represent a broader diversity of new ventures regarding disciplinary and professional backgrounds, industry, entrepreneurial goals (social/commercial) and university entrepreneurs’ role as new actors leading those projects. The methods used for data collection were semi-structured interviews, documentation and direct observation. As reported in the previous chapter, the primary data collection process (semi-structured interviews) occurred from October 2019 to March 2020 and September 2020 to October 2020. Direct observation took place during the first phase of interviews, and data collection of documents was carried out from October 2019 to March 2021. Data analysis began with two rounds of coding (Saldaña, 2013) and progressed using the Gioia methodology of second-order analysis (Gioia et al., 2013).

Following the methodological approach of Gümüsay and Bohné (2018), a first-round of coding sought to develop descriptive categories focused on how entrepreneurial competencies development is manifested. Nonetheless, the coding process allowed identifying additional categories related to the antecedents of entrepreneurial projects and university entrepreneurs and the impacts of entrepreneurial intervention at the participants’ individual level. Moreover, descriptive categories were found

related to enablers and barriers observed in transdisciplinary entrepreneurial intervention.

Following Gioia et al. (2013) and their model of second-order analysis based on categories, themes and aggregate dimensions, this chapter is divided into two main areas of findings: Section 4.2 reports the findings related to three aggregate dimensions: (1) pre-competition context and antecedents of the participants of Ingenuity19 and its link with entrepreneurial competency development; (2) the impact of Ingenuity19 as an entrepreneurial intervention on entrepreneurial competency development; and (3) the impacts of the competition at the individual level of university entrepreneurs. Section 4.3 reports the two final aggregate dimensions: (4) Enablers of the collaborative process; and (5) barriers of the collaborative process. The last two aggregate dimensions are explained by institutional, interpersonal and intrapersonal factors that affect the entrepreneurial developmental process within an entrepreneurial competition. Finally, Section 4.4 presents the main conclusions of the chapter.

4.2. Exploring the Development of Entrepreneurial Competencies

This section explores the findings observed among the cases related to their pre-competition context, the university entrepreneurs and the development of entrepreneurial competencies (Rasmussen et al., 2011); it also explores the potential impact of an entrepreneurial intervention such as Ingenuity19 in relation to the individual level of the participants.

Through the data analysis, this section addresses the following research objectives:

- To identify and examine the potential impact of an entrepreneurial intervention carried out in a transdisciplinary context in developing entrepreneurial

competencies, focused on non-traditional new ventures led by university entrepreneurs.

- To identify and examine the potential impact of an entrepreneurial intervention carried out in a transdisciplinary context at an individual level.

First, considering the development of entrepreneurial competencies from an evolving perspective (Rasmussen et al., 2011), this research argues that it is important to know the antecedents of university entrepreneurs to understand a potential impact in competency development. Those antecedents are divided into university entrepreneurs' backgrounds, experiences and motivations to participate in Ingenuity19 as an entrepreneurial intervention. The findings suggest that those antecedents impacted the entrepreneurial process by giving favourable conditions as departure pathways for competency development, which were also affected by the intentional search of university entrepreneurs for support mechanisms in developing their projects.

Second, the findings suggest that most cases developed the three entrepreneurial competencies. Regarding Opportunity Development Competency (ODC), the findings indicate that its development is mainly manifested in improvements of the entrepreneurial project and business proposal, which, in most, materialise as a real business. Concerning Championioning Competency (CC), in line with Treanor, Noke, Marlow and Mosey (2020), the findings reveal that this competency was developed mainly at the individual level, manifested in the motivations of university entrepreneurs to keep working on their non-traditional new ventures. Finally, regarding Resource Acquisition Competency (RAC), the findings suggest that most cases obtained resources through their participation in this entrepreneurial intervention, which also works as a platform of credibility and legitimacy, considered an additional immaterial resource acquisition.

Third, in line with previous research about entrepreneurial competitions (Huster et al., 2017; R. Russell et al., 2008; Treanor et al., 2020; Watson et al., 2018), the findings show that participation in an entrepreneurial intervention such as

Ingenuity19 had an impact on university entrepreneurs at an individual level. In this sense, the evidence reports an impact in developing entrepreneurial and individual skills (communication, presentation, opportunity evaluation and confidence), which could affect the future behaviour of the participants beyond the scope of action of their current entrepreneurial projects.

Evidence to support the findings mentioned above are presented as three aggregate dimensions, as follows.

4.2.1. Pre-Competition Context

As reported by the accounts of university entrepreneurs regarding their participation in Ingenuity19, the research findings suggest that the context of participants before the competition can affect the development of entrepreneurial competencies. These are grouped in two main themes: (1) Professional – disciplinary background and personal experiences of university entrepreneurs; and (2) reasons to participate in Ingenuity19.

4.2.1.1. Professional – disciplinary background and personal experiences

As reported by the participants in the interviews, it is possible to connect the base of the ideas of their entrepreneurial projects, which they present to Ingenuity19 with their academic and professional backgrounds as well as personal experiences that complement their entrepreneurial initiatives (see Appendix 5 for illustrative quotes of these categories). In doing the data analysis, this information was contrasted with public information of the participants from their professional social networks (for example, LinkedIn profiles).

An initial element of analysis is the profile of the participants who applied to this programme, in particular, evaluating their disciplinary backgrounds. First, participants' disciplinary backgrounds represent significant academic diversity in terms of academic degrees. Considering bachelor's degrees as the disciplinary basis, most participants who reached the intervention's final stages are not directly related to business or entrepreneurship. Instead, they span disciplines to the traditional sciences, social sciences and humanities. For example, finalists and participants of this study have undergraduate studies in the field of engineering in energy, environment and design (4) and in the area of science (biotechnology) (1). In contrast, others have a bachelor's degree in German and philosophy, English and social policy (3). Finally, a minority of participants have undergraduate studies related to business and management (3).

Second, when contrasting the disciplinary basis with the core of the projects, nearly all relate to the founder's disciplinary background. This first disciplinary classification suggests that the entrepreneurial projects presented in Ingenuity19 that reached the final stages of the competition, covered various academic disciplines, both from the studies that university entrepreneurs carried out and the project's disciplinary perspective.

Third, by exploring postgraduate studies or other types of educational programmes that founders have undertaken or were studying at the time of the intervention, most participants have had some educational training in business and entrepreneurship. To date, little research has pointed out the disciplinary background in participants of entrepreneurial competitions, considering undergraduate and postgraduate studies. Complementing previous studies (McGowan & Cooper, 2008; R. Russell et al., 2008), the findings confirm that competitions attract individuals from the entire university environment. However, this evidence suggests that previous exposition to education in management and entrepreneurship is a common element among the finalist entrepreneurs participating in the competition.

Fourth, some cases used previous academic work as a critical input for the entrepreneurial project. For example, two projects were inspired in an academic

assignment developed at an undergraduate level, while two projects used their dissertations of postgraduate programmes as an entrepreneurial input. In this regard, the founder of "*Shells and Creams*" recognised that the idea was born in the context of her undergraduate studies in her home country. She pointed out:

> *The idea was born when I was studying my undergrad degree in Mexico…we were studying the need of biopolymers, or biomaterials…At the beginning, we were working with chitosan for a technical application…We realised that there was a need of importing that product into Mexico (First Interview)*

Regarding postgraduate dissertations that were useful to initial entrepreneurial ideas, the founder of "*Access to water*" pointed out:

> *But that time we weren't even a team, it was just me and my thesis and something else (First Interview)*

In line with scholars who have argued the key role of research and advanced information in the process of entrepreneurial recognition (Holcombe, 2003; Ozgen & Baron, 2007), these findings suggest that dissertations at different academic levels and from various academic disciplines can be used as a source of ideas to create future entrepreneurial projects.

Concerning the potential impact of prior professional experiences, the findings suggest that it could be related to the future identification of entrepreneurial ideas. In this regard, different experiences in the career of university entrepreneurs have provided insights to identify entrepreneurial opportunities. For example, a university entrepreneur reported that insights for the project were gained from the needs of suppliers that he previously faced in his professional work. In this vein, the founder of the case "*Outsourcing App*" pointed out the following about his founder partner:

> *He was closely linked to the world of construction…He worked for many years in construction companies…so he lived through the process of needing many people for specific tasks, and it was always difficult for him to find*

specialised people in certain areas…So that's where the idea comes from (First Interview)

Similarly, the founder of *"Entrepreneurial Toolkit"* saw the value of the professional experience from their academic role. The founder linked the knowledge they obtained through research as input to identify a potential gap and pointed out:

Based on my academic knowledge... All that research was kind of signalling there was something missing, that women weren't finding what they needed as entrepreneurs quick enough, and they were left feeling kind of vulnerable as a consequence (First Interview)

Regarding individual experiences that could directly or indirectly affect the creation of those projects, a theme identified in the interviews was entrepreneurs indicating that their life experiences helped identify opportunities, triggering the search for possible solutions. University entrepreneurs or individuals (close to them) suffering an illness, relatives facing difficulties or recreational activities (hobbies) were mentioned as inputs or motivations to work in these projects. It is possible to observe that this type of influence on university entrepreneurs can facilitate identifying entrepreneurial opportunities with a social focus, which require a transdisciplinary approach to be addressed (Lang et al., 2012). For example, the founder of *"3D Prosthesis"*, pointed out:

I met somebody that needed a prosthetic and (she) didn't have access to one. So I did my dissertation project to design a prosthetic for her. (First Interview)

Additionally, the founder of *"Support for Anxiety"* recognised her medical condition as the experience that was key to identifying her project's core. She pointed out:

Since I was, I'd say about 15, I had... I have a long term anxiety condition, so I've lived with it for over 20 years. So it is something that was borne out of my experiences living with an anxiety condition. (First Interview)

In sum, it is observed that an entrepreneurial intervention such as Ingenuity19 calls a broad spectrum of participants, manifested in the disciplinary background of the

founders and the field of application of the business ideas. Moreover, professional and individual experiences emerge as important inputs to identify potential opportunities and motivate them to work in these entrepreneurial projects. In line with previous research, this points out the relevance of intrinsic motivation to carry out an activity by interest and satisfaction from the project itself (Amabile, 1993), accompanied by prosocial motivation and manifested in helping other individuals, which, in turn, can encourage individuals' creativity (Grant & Berry, 2011). These antecedents of university entrepreneurs suggest that these aspects are related to the ideation process within non-traditional new ventures.

4.2.1.2. Reasons to participate in Ingenuity19

Turning now to the evidence of how founders of entrepreneurial projects explain their reason for participating in Ingenuity19, three broad categories emerged from the analysis: Ingenuity19 offered a source of funding, the competition offered an instance of external evaluation from a business perspectiveand it was seen as a learning experience (See Appendix 6 for illustrative quotes of these categories).

First, in line with previous research on entrepreneurial competitions (Passaro et al., 2017; R. Russell et al., 2008), more than half of the founders reported that, in this activity, they saw an opportunity to get seed capital for their entrepreneurial projects. The findings suggest that the projects' development stage was also related to the future purpose of using a potential monetary prize. For example, in projects in the initial stages of operation, the founders explicitly mentioned a clear statement about how they were thinking of spending it. In this regard, the founder of *"Accommodation Booking"* pointed out:

> *For the money (reason to participate), I was at a stage where I thought the business needed an injection of cash to do marketing. (First Interview)*

By contrast, university entrepreneurs leading projects in the initial ideation phases also mention the reason for raising seed capital to be involved in this activity. However, there was no specific purpose of use; the founders mainly thought about using the prize to start the project. For example, the founder of "*Vertical Farming*" pointed out:

> *The awards were relevant and we considered Ingenuity as a possible "investor" or a way from which we could obtain the necessary founding, the seed capital to start this project. (First Interview)*

The perspective of seed capital as motivation to participate in this intervention is consistent with the opinion of one of the programme's mentors. The possibility of obtaining the investment was mentioned as a reason for individuals to apply for the competition. Mentor A pointed out:

> *Some of them see the dollar sign; some of them see the potential for cash. (First Interview)*

A second reason for univeristy entrempreneurs to participate in the competition, and in line with Russell et al. (2008), they stated that they were looking for an external evaluation for the business project. More specifically, some of them gave these reasons without mentioning the previous one about financing. In this vein, they highlighted the need for feedback from evaluators who possessed entrepreneurial or professional experiences, looking for their expert opinion and advice about their entrepreneurial projects. For example, the founder of *"Equine Repellent"* pointed out:

> *I wanted to have feedback and, I was probing in the lab and yeah there was this develop programme that was really cool / I did my business plan for the master, but it was in an academic thing, from an academic view…I wanted to have the point of view of business people on it (First Interview)*

Similarly, due to the solid scientific base of *"Shells and Creams"*, its founder highlighted that a reason to apply for Ingenuity19 was the opportunity to receive feedback from a business perspective, with the purpose of enriching her project. She pointed out:

> *I was being focused on the science and I realised it is very important to know also the other part of an idea, like the business side, the entrepreneurial, to take your idea out of the ground and make it grow... to share your idea, to receive feedback of what you did. (First Interview)*

Additionally, the director of *"Social Supermarket"* reported that their reason was influenced by the desire to have real-life experience that complements the academic/theoretical lens that is commonly deployed at the university. She pointed out:

> *I think I wanted to have an idea of how the real world works, of how a real business works, because I am studying international management and they (lecturers) can tell me many things, but if I do not know how it really works, if I do not apply what that they are teaching me, it will not be useful for me. So, I wanted to understand how the real world works and how to connect the academic world with practice. (First Interview)*

As a third emerging theme, university entrepreneurs evaluated Ingenuity19 as an opportunity to participate in a learning experience that gives them personal growth. Following the argument of intrinsic motivations (Amabile, 1993, 1997), the findings suggest that the university entrepreneurs' learning motivations vary and respond to individual needs beyond obtaining prizes or money. For example, the desire to learn topics related to entrepreneurship, the opportunity to listen to speakers of a high academic/business level, the experience of having a personal challenge such as that one offered by Ingenuity19 or simply being part of a process that at the time of the application seemed attractive in educational terms. The founder of *"Entrepreneurial Toolkit"* pointed out:

> *I remember "name of business partner" as well, saying "I'm doing this for personal development as well. I want to do more pitches and put myself out there"… She was challenging herself…I kind of thought it would be a nice opportunity as well and yes, to walk the talk a little bit, live it and see where it could go. (First Interview)*

Mentors of the competition also reported that from their experience in advising different participants, learning motivation is a reason to participate in an activity such as Ingenuity19. Mentor B pointed out:

> *Most of the competitors come from, let's say, real science areas… they can have ideas about how to make a change in a field, but they don't really know how to package that and how to sell it. I believe those are the ideas they want to… the knowledge they want to acquire. (First Interview)*

Finally, supporting the view of scholars regarding the broader purposes of business plan competitions as entrepreneurial interventions within an academic context (Passaro et al., 2017; R. Russell et al., 2008; Schwartz et al., 2013), some university entrepreneurs also reported additional incentives that they had to participate in Ingenuity19, and which are linked to the development of entrepreneurial competencies or aspects of transdisciplinarity.

For example, a minority of participants reported that they participated in Ingenuity19 seeking to expand their network and gain valuable contacts for their projects, which was echoed by one of the senior mentors of the programme. Moreover, for founders of projects in the early stages of development, Ingenuity19 was considered a platform that would help materialise an idea into an entrepreneurial project. Also, a minority of university entrepreneurs mentioned that they participated after receiving advice from academics to apply with their dissertations or coursework, which was confirmed as an appropriate practice by mentor A. Additionally, participants saw an opportunity for branding for the project. A founder also considered a big chance to win a prize given the new evaluation pathway for entrepreneurial projects focused on social issues.

In conclusion, most university entrepreneurs gave three main reasons for participating in this entrepreneurial intervention. While the possibility of getting funding for the project was the most shared reason, the external evaluation of the idea and the opportunity to obtain feedback from business experts was the second and both were highly related to competency development, specifically RAC and

ODC. Also, the participants mentioned the possibility of being involved in a learning experience linked to the activities and methodology that this activity offered, and the opportunity to gain access to new contacts and expand their network could be associated with CC. Concerning transdisciplinarity, when academic staff have observed projects with business potential, their role in advising participation in transdisciplinary spaces stands out. This practice could improve traditional academic evaluations by transforming dissertations or coursework into entrepreneurial applications with social or technological impact, giving a new perspective to entrepreneurial education.

4.2.2. Impact on Entrepreneurial Competencies Development

As reported by the accounts of university entrepreneurs regarding their participation in Ingenuity19, the research findings suggest that the participation in this entrepreneurial intervention had direct and indirect impacts on the development of the three entrepreneurial competencies (Rasmussen et al., 2011): Opportunity Development Competency, Resource Acquisition Competency and Championing Competency, which are described below.

4.2.2.1. Opportunity Development Competency

This research found evidence that Ingenuity19 provided university entrepreneurs with an appropriate context to develop the competency to identify and develop entrepreneurial opportunities. In general, a vast majority of cases reported impacts associated with the development of ODC. The findings regarding this competency are divided into three categories: Ingenuity19 as an activity that contributed (1) to develop and enhance business plans and improve products and services; (2) to identify or develop more products, services and applications based on the initial

entrepreneurial project; and (3) to transform the idea of the project into reality (see Appendix 7 for illustrative quotes of these themes and their categories).

First, most university entrepreneurs mentioned that participation in Ingenuity19 directly impacted their projects, contributing to developing and enhancing their business plans. During their participation in the entrepreneurial intervention, they recognised the specific weaknesses of their business proposals, which were subsequently adjusted to reach the final stages of the competition. In this sense, the interaction with mentors and judges was vital to trigger the enhancement of the projects. Also, it was commented that some business strategies were modified after Ingenuity19. More specifically, the founder of "*Shells and Creams*" reported that Ingenuity19 was useful for giving new uses to the technology they are applying. She pointed out:

> *I realised that the approach of what I wanted to do for that technology was not the best, and that was after Ingenuity. During the competition, they asked you some questions, and with those questions, I realised this is not my … my market, I'm not going to profit with this strategy. So, I changed it.*

Later, in the second interview, she explained in more detail how those changes were manifested in the project:

> *I could also see specific aspects that I had not considered either, such as patent strategies. I had always left it, because my work was more focused on the part of creation, not so much on patent and they made us a lot of emphasis on this "look for this business model, if it works, if it exists, here you have a better option" or "You have the other option to sell it directly." But yes, there was a chance for us to see other alternatives…during Ingenuity I identified a strategy that we could apply to what had already been done. Not so much as to keep working and working, but to exploit what has already been done. And then that was the strategy, as in the technological part that had already been developed, to exploit it commercially, in a business way.*

In the same vein, the director of *"Social Supermarket"* reported that due to the different evaluative activities carried out during the competition, they realised

problems they were previous unaware of. Moreover, after the comments of a mentor about issues and aspects to improve, they decided to change the strategy of future action in their project. She pointed out:

> *When we did the presentation…we got in touch with the judges, especially after the Q&A, and they made us see some problems that we had not identified because when you are very involved in a project, in the end, you want to think that everything is going well…but simply the feedback they gave us and the problems that they showed us that we had and that we did not think we had, it helped us a lot. In fact, we have changed the strategy. (First Interview)*

During the second interview, she explained the strategy changes in more detail, which focused on the type of alliance that *Social Supermarket* can achieve with local actors in Nottingham and identifying new commericalisation methods within the business model. She pointed out that:

> *We are evaluating our business model and other ways to achieve revenues. We are considering making a subscription to boxes of fruits and vegetables with which we could target people who are more concerned about the environment. We're considering that kind of thing now… We have taken the summer to review our strategy, and one of the points that the mentors and judges mentioned was that our exit strategy was not appropriate. Let's put it that way. They told us that it did not make much sense if we were basically fighting with the city council for the money and we are paying for the store, that our exit strategy is to give the store to the city council because the relationship was not so good. But right now we are ... we have thought to go in another direction, looking for another organisation in the same area of Nottingham that they may want, when we decide to finish this project as part of Enactus, they want to lead the project and add it to their regular activities. So we are looking for a local institution that understands the need that the community has for this project because we believe that this way is much better and could make it grow.*

"*Accommodation Booking*", a more progressed project, reported that after the competition, it suffered changes in two specific areas: the strategy of

commercialisation and how they are spending the profits as a charity. The founder pointed out:

> *I've realised since then (Ingenuity19) that it's not really worth it, I need to be targeting businesses because we can put a lot of work into getting you to book your holiday, but you might only book two or three times a year…and I put a lot of work into getting you on board. If I get one business on board, they'll be booking every single week; they might be doing five or 10 bookings a week (First Interview)*

> *So the approach has changed, and now the money we raise is not used for temporary accommodation, it goes to families who have children who are experiencing homelessness because I think that's more effective and it's a bigger problem. But yes, so it just developed from there really (after Ingenuity19)...when I look at the stuff that I was doing a year ago, when I look at how the website was back then I think ah, that was crap, you know, it was rubbish. (First Interview)*

Similarly, one of the programme mentors confirmed that it is one of the significant impacts of Ingenuity as an entrepreneurial intervention. Mentor A emphasised the positive effect of the Ingenuity methodology reflected in improved business plans after carrying out the different stages of the process. He also highlighted that it is beneficial for every entrepreneurial project and all participants. According to his experience, even if they are not among the top projects, most would have learned how to identify viable businesses. This perspective was also shared by mentor B. However, he stated that the difference between the finalist and the other participants was taking the original idea and improving it considerably. Regarding this point, mentor A pointed out:

> *For those of them who have done the homework or the extra work we suggest in the evening classes, for those of them who've asked for help and support and mentoring and listened to it and applied it, you absolutely see an enhanced business plan that's more credible. (First Interview)*

Second, around half of the cases reported that, after participating in Ingenuity19, they had identified or developed more products or services that add value to the business proposal of the non-traditional new ventures. In this sense, the university entrepreneurs reported that they realised these potential new products or services as something that occurred after competition. Therefore, the evidence suggests that after entrepreneurial training such as that learned through Ingenuity19, university entrepreneurs can identify additional opportunities that enhance the initial proposals of their new ventures.

Some university entrepreneurs reported that they identified new products that complement the original offer of the ventures or new services that enrich the business model. For example, in the case *"Equine Repellen"*, it was observed that the original idea of the non-traditional new venture was an insect repellent that prevents accidents when horse riding. Nonetheless, during the first interview, its founder pointed out the fact that she was developing an additional product, but did not provide details of this:

> *I am developing a second product that is still innovative, but it's much quicker to make, so it's not directly from the competition but more from the fact that people believed in the product.*

When she was asked about it during her second interview, she gave additional information. Moreover, her answer shows that she was able to move the idea of the second product to a prototype of it, which reinforced the idea of an ODC development. She pointed out:

> *I had just started then to think about another product (first interview) and I was like, "Oh, that would be cool." So they were horse-riding leggings. So then I started to work with a freelancer, who designed the leggings, started working on it, and prototyped it. I think that took quite a while, because I was more working on the other side of the business, so maybe I started working in January. We found the material, everything, and end of March she sent me an email saying, "Yes, I'll finish the prototype". (Second Interview)*

From the side of new services that enhance business plans, a minority of university entrepreneurs mentioned that after participating in Ingenuity19, their projects suffered changes compared to the initial idea with which they had participated in the intervention. For example, the founder of *"Designers Platform*", a project in its early stage of development, said he had in mind one type of project before participating in Ingenuity19. However, when commenting on the post-competition changes, his response suggested that the competition was useful in questioning whether the business proposition was sufficient or could be improved. He pointed out:

> *I had an idea of a particular business before the competition, which was basically just an e-commerce platform, bog-standard e-commerce platform with a consignment business model, but I think now I'm exploring a lot more avenues in terms of what this business could end up being. (First Interview)*

In this sense, the university entrepreneur commented how those changes are manifested into a potential new technological approach for his project, something that was being evaluated at the time of the interview:

> *It can move on from just being a fashion retail business into potentially a technology, a technology business; and, rather than just sell products, we can sell information and we can actually be a solution to making the value chain of the fashion industry that little bit more sustainable and a little bit more friendly to the environment, a little bit kinder to people… one of the things I'm trying to explore in my business at the moment is, how can technology help build a sustainable fashion business model that can bring real value to the market. (First interview)*

This answer from the university entrepreneur was confirmed after his interview. When looking for information about this business on online platforms, it was found that the proposal he offered was different from an e-commerce site. Even though this element was still present, the project was now defined as a fashion platform, on which aspiring fashion designers can evolve into full-fledged brands, working around art and sustainability. The above suggests that the initial idea of e-commerce was improved to become a comprehensive fashion model.

In the same vein, the case of "*Support for Anxiety*" reported significant changes after Ingenuity19. The initial idea of this project was a website with a map showing safe places and locations for individuals suffering from anxiety or similar mental health issues. However, when the university entrepreneur commented on what the project currently offers, she pointed out:

> *I see what I do now as looking at how organisations, businesses, can embed mental health approaches as they have done with physical health approaches (First Interview)*

> *"Support for Anxiety" is a programme that I run as a self-employed person. So, if you imagine, I always say a family tree but I don't know if that's the right analogy, but I have Training at the top, which is my business, and then I have three programmes that I run underneath that, which is I run the Map, The Anxious Exercise Club and then I run a programme called The Free Period, and so those, they all sit underneath and they're all programmes that I run. (Second Interview)*

The founder's statement about the transition from a virtual map to an integral programme to support and educate communities about anxiety and mental health was verified through online documentation. Furthermore, the evidence shows that what began as a website today is a proposal that integrates all the elements mentioned in the interviews, confirming that the university entrepreneur could identify and develop a more robust non-traditional new venture than the one presented in the entrepreneurial intervention.

In addition, some university entrepreneurs mentioned that Ingenuity19 helped them transform a promising idea into a business opportunity, resulting in an entrepreneurial project. In this vein, university entrepreneurs highlighted that Ingenuity19 played a vital role in transmuting the idea that participants have in mind to something "real" in terms of its materialisation. In this regard, the founder of *"Access to water"* pointed out:

> *What it offers is like the opportunity to bring an idea from your head to the real world / Before Ingenuity, it was in my head, now it's a company that's*

running and people putting money and people behind this...Now it has life, you know, so that's I mean it's like it's day and night. (First Interview)

In the same vein, the founder of "*Equine Repellent*" declared:

In 3 months (period of the competition) I had a product. I was with ideas and stuff and people believed in it. (First Interview)

So when I pitched for the Ingenuity competition, I hadn't started any research or anything, it was just an idea on paper and I was trying to find contacts to help me develop my network and do that. So I think that Ingenuity19 gave me that opportunity by showing that even if it was just at the idea stage, there was something behind it. (Second Interview)

In conclusion, confirming previous research on entrepreneurial interventions such as business plan competitions (Passaro et al., 2017; R. Russell et al., 2008) and positive effects in opportunity identification after entrepreneurial training (Muñoz et al., 2019; Munoz et al., 2011; Nabi et al., 2017), the findings suggest that after participating in the competition, most university entrepreneurs were able to enhance their projects. It was manifested in improvements of their business plans, new business strategies, and new entrepreneurial applications (products or services) related to the base project. It was also helpful to transform an idea into an entrepreneurial project. Finally, it provides evidence to support the idea that the impact of this type of entrepreneurial intervention in ODC can be observed even when the projects that participate in this type of activity are in different stages of development.

4.2.2.2. Championing Competency

As reported by the participants of this study, the evidence suggests that Ingenuity19 directly impacted the development of the Championing Competency, which focused on motivational aspects of university entrepreneurs. As a general perspective of this particular competence, most of the cases under study are still

working on their projects, which allows observing the ability of university entrepreneurs to champion their non-traditional new ventures from the initial stages of identifying an entrepreneurial opportunity to the later stages of development within the entrepreneurial process. More specifically, the participants stated that Ingenuity19 was vital to increase their motivations and self-belief in their entrepreneurial projects. In this vein, two categories emerged through the analysis: (1) Ingenuity19 as an entrepreneurial intervention that encourages motivation through the interaction with mentors, speakers and other entrepreneurs; and (2) the successful performance of university entrepreneurs within the competition resulting in motivation and confidence to keep working on their entrepreneurial project (see Appendix 8 for illustrative quotes of these categories).

First, university entrepreneurs reported that the different activities developed in Ingenuity19 were a key element in creating an appropriate environment that encouraged their entrepreneurial motivation. For example, during the first stage of the programme called 'Inspire', university entrepreneurs could participate in the summits (open conference), with the opportunity to listen to experienced entrepreneurs and impact innovators who shared inspiring insights with them. Similarly, participants highlighted the possibility of learning from industry experts and interacting with mentors and advisors in the later stages of the programme (develop and compete) to feel motivated with their role as entrepreneurs. For example, the founder of *"Designers Platform"* pointed out:

> *You speak to someone and you suddenly feel encouraged because they're going through and they're finding a way to make it work and you're encouraged to dig a little deeper, I'll find a way to make it work, and you share ideas, you share networks; that, for me, has been invaluable, invaluable, I can't even put a price on that. (First Interview)*

Second, the university entrepreneurs recognised that the participation and the findings in the competition played a crucial role in encouraging them and feeling the confidence to keep working on the idea. For example, the founder of "*Social Supermarket*" mentioned:

> *I think that sometimes we are like in a small bubble and we think "if we know that we are helping people and we are doing things well" but when that is recognised by other people who are not there every day and who do not know the project, you realise that you are not the only one who believes in the project. Other people also believe in the project, they also believe that it can be successful, so I think that gives you a lot of confidence that what you are doing, you are doing well and that you can continue and make it grow; so I think that is the most important It has affected me positively. (First Interview)*

In the same vein, the founder of "3D Prosthesis" pointed out:

> *Definitely, knowing that I've been chosen multiple times for different awards as the company they like the most, or they thought had the most potential, I think was a huge amount of motivation. That combined with the finance that actually made being able to run the business possible I think was huge. That really gave me the motivation to carry on and continue working by myself for the next year. (Second Interview).*

In conclusion, in line with previous research that discusses the mechanism in developing this competency within academic contexts related to the motivational aspects of entrepreneurs to grow entrepreneurial projects (Rasmussen & Wright, 2015), the research findings support the idea that an activity such as Ingenuity19 can positively impact the development of the Championing Competency in university entrepreneurs through similar mechanisms. Moreover, from the findings, it is possible to argue that the competitive spirit of these types of entrepreneurial interventions was essential in the resulting impact of this competency.

4.2.2.3. Resource Acquisition Competency

Regarding RAC development, this research found significant evidence that an entrepreneurial intervention such as Ingenuity19 contributed to developing this competency. It was reported by nearly all the university entrepreneurs and observed in their non-traditional new ventures. In this context, three themes emerged through

the analysis: (1) Ability to obtain external resources required to develop non-traditional new ventures; (2) branding and credibility as a non-monetary resource obtained after the competition; and (3) access to facilities (Ingenuity Lab) as a complementary external resource provider for the development of non-traditional new ventures (see Appendix 9 for illustrative quotes of these categories).

First, as an expected finding due to the antecedents of the competition and the performance of the cases in the entrepreneurial intervention, over half of the university entrepreneurs reported that one of the most critical impacts of their participation in Ingenuity19 was the fund they received as competition finalists. Thus, the evidence supports the idea that monetary prizes in these entrepreneurial interventions within an academic entrepreneurship context is helpful to provide essential financial resources for venture development. In this sense, it was reported in all cases that the monetary award was used in activities to move the entrepreneurial project forward. For example, creating prototypes, carrying out business activities, such as marketing or branding and allocating hours of work to develop the project. Regarding this category, the founder of *"Students Applications"* pointed out:

> *The biggest impact, definitely, is the cash that was given to us. It helped us to grow the company fearlessly, giving us a maximum boost. (First Interview)*

During the second interview, he mentioned details about how the prize was used in the business, confirming the importance of these resources to develop the non-traditional new venture.

> *All of the money was completely put into the business, in terms of managing the resources, getting new components for the business itself, making marketing and sales, some for legal activities, as well. So, we have used that small amount of money for quite a lot of activities*

In the same vein, during the first interview, the founder of "*Access to water*" mentioned how she expected to spend the monetary prizes that the company won during the competition. She pointed out:

> *With the money that we won this year, we can buy 50–40 pumps and deploy those.*

During the second interview, and in the light of the international Covid-19 crisis, she commented how the initial plans were changed to other activities that have been relevant for developing the non-traditional new venture. However, it was highlighted that the prizes were still used within the company.

> *We created... we branded water bottles, stainless steel water bottles, and so we were selling those on our shop during Covid and stuff like that. So, it is just one of the ways that we've been using the money to kind of just accelerate... either accelerate the projects or keep the company alive because during Covid there wasn't much you could do, not in terms of instalment, not in terms of installation, sorry, not in terms of deploying pumps / (With the monetary prizes) we were doing a lot of the developments…we were doing a data platform which would help us to bring every pump online so you can track it, you can maintain it, you can monitor its performance and if you can track all of them then you can really track the progress of SDG6.*

Additionally, some university entrepreneurs reported that winning prizes allowed them to allocate working hours to develop their projects, similar to obtaining a salary. The evidence from the cases shows that university entrepreneurs who commented on this use have continued working on their businesses during the following months of research. Therefore, this suggests that using the prizes as individual compensation for their work as entrepreneurs was a practical and effective decision. In this vein, the university entrepreneur leading "Support for Anxiety" mentioned:

> *For me personally, it bought me time. So I was able to go part time at work, which is just the hugest relief ever. So, I was working five days a week at the university at the time when I applied for Ingenuity. So I was able to actually go down to three days a week in September of last year and that was*

just a huge feeling of relief, you know, that I was able to do that. In a way, it bought me time because it was able to kind of almost pay myself a salary to be able to work those two days a week on my project rather than in HR. (First Interview)

I've just received £1,500 worth of funding from Ingenuity, which is fantastic, and the way it's looking is that the Map was always part of my sole trader business, so I am a Mental Health Trainer, I'm a... now, I now no longer work for the University of Nottingham, I work two days a week at Nottingham Forest Community Trust, I work for two days a week as a Mental Health Programme Lead, so the money that I generate from that, some of that is going into the Map; and also I have sourced some funding from Ingenuity. (Second Interview).

Finally, a minority of cases reported that, after the competition, they could obtain new funding from other sources different to the Ingenuity19 programme, which suggests that some cases have been able to go further in resource acquisition. For example, the founder of "3D Prothesis" pointed out:

(After the competition) I had some funding from Medilink. I had some funding from Loughborough University. I had some funding from EIT Health and also from Sainsbury's Management Fellows. (Second interview)

As a second category, some cases reported that the participation of Ingenuity19 had an essential impact in terms of project branding, which positively affected the credibility that the non-traditional new venture gained after becoming a competition a finalist of the competition. This impact resulted in the positive exposition of the project in the market, and even when it is difficult to measure this effect economically, it can be recognised as an intangible resource linked to reputation. For example, the founder of "Students Applications" pointed out:

The second one (impact) is like I already said – it's about the branding, the press release and it's the kind of platform that the Ingenuity gave us. (First interview)

> *Winning a recognition in this competition was getting recognition on a live international stage and you have a tonne of audience who sees you for the first time and everyone wants to interact with you. So, that stage, that visibility that we got was quite important for us, and that's where we started to build our prime recognition. So, I think this competition has not only helped us with, you know, the cash prize money that we won during the award, but also, more importantly, it has enabled us to connect with mentors, who then see us as credible in the market. When you win an award, that's a validation that someone has assessed your business and has awarded you with any kind of reward, and that's what makes you more credible, more likeable and it slowly increases your market recognition. We also used this recognition when we went to our sales meetings as well, to tell them that, you know, this product, this concept, has already been validated by industry experts and then they are recognised and we've been awarded for that same and I think it has helped us overall in terms of getting in front of people. (Second Interview)*

In the same sense, the founder of "Vertical Farming" pointed out:

> *Totally, a lot of credibility, totally. More because, well, we also know that there were not only 50 participants, but there were hundreds of applications and to be within that top 21 if it gives the project enough credibility, a lot. That is what we have used, what I used when raising capital and you immediately notice that people are convinced by that, that it gives credibility to your project. (Second Interview)*

Third, around half of the cases reported the importance of having access to facilities in the Ingenuity Lab and the different services and activities that they carry out as an additional resource that offer the non-traditional new ventures an environment that can compensate knowledge, networks and economic deficiencies of entrepreneurial projects in the initial stages of development. In this regard, the evidence supports the idea that RAC was positively impacted by the possibility that the non-traditional new ventures had to establish their companies in the facilities that the programme offers to the competition's finalist. For example, the founder of "Students' Applications" declared:

> *The support services that they provided, the marketing push that they provided in terms of pushing it on their network because their network already had quite a few followers on their social media pages. The surgeries that we had with different experts in terms of accounting, marketing, sales, business development and raising capital, legal surgery…as an international entrepreneur to UK, we had basically no network and Ingenuity served us as a prime centre, space and then we spoke about all the processes and services that Ingenuity Lab provides and supports to help entrepreneurs. I think that's been fantastic for us. (Second Interview)*

In conclusion, in line with the areas that seem to be essential for university business projects to develop their competence to acquire resources within the university and from external actors (Rasmussen & Wright, 2015), most founders indicated that Ingenuity19 had a positive impact in terms of getting resources to build and growing non-traditional new ventures. Although it is important to recognise that it could be an expected finding due to the nature of programmes with monetary prizes (Passaro et al., 2017; R. Russell et al., 2008), the university entrepreneurs reported that prizes were used to develop their projects. Therefore, the awards reach the objective of moving the non-traditional new ventures forward. Additionally, interventions like Ingenuity19 can help as a platform of branding to projects in the initial stages, being a valuable non-tangible resource, generating credibility in local industries and facilitating access to new resources. Finally, the later support of the Ingenuity programme to the prize winning projects of the competition through the Ingenuity Lab not only allows them to save resources on aspects such as office rent and payment of utilities, but also provides advisory and support services that compensate for deficiencies that could limit the development of their projects.

4.2.2.4. Networking and the development of Entrepreneurial Competencies

In addition to the competency development reported in previous sections, university entrepreneurs also mentioned elements that allow arguing that activities such as Ingenuity19 can work as mechanisms that help to develop and increase their network.This impact can be observed in terms of size (Ynalvez & Shrum, 2011) and their networking activity, defined as the action of entrepreneurs in establishing and maintaining contacts for the development of their entrepreneurial projects (Chell & Baines, 2000) (see Appendix 10 for illustrative quotes).

The importance of this finding in the context of this research is that networking stands out as a cross element that overlaps ODC, CC, and RAC development. Similarly to the conceptualisation of Hayton and Kelley (2006) and the sponsoring competence in a corporate setting, the findings suggest that networks helped provide advice and guidance to refine and improve the entrepreneurial projects, to have access to additional resources, and indirectly give legitimacy to the nascent non-traditional new ventures. Table 7 summarises the impacts in each competency:

	Opportunity Development Competency	**Resource Acquisition Competency**	**Championing Competency**
Impact of Networking on	Through the interaction with experienced entrepreneurs, industrial actors and academic staff from other schools, ideas and business plans are improved	New industrial partners / Projects getting additional resources	Validation and support of experienced entrepreneurs and industrial actors. Some of them are in permanent contact with founders of projects

Table 7: Impact of networking on entrepreneurial competency development

More specifically, in most cases, the evidence suggest that Ingenuity as a programme helped university entrepeneurs in expanding their network. As a result, their projects were enhanced, and they had access to new resources. Moreover,

through interaction and communication with external actors and after receiving good feedback on their projects, they felt encouraged to pursue their entrepreneurial goals. For example, the founder of *"3D Prosthesis"* pointed out:

> *I got a lot of contacts out of it and a lot of sort of like really helpful advice. So although the product stayed the same I understood what I was doing a lot more and got a lot more connections just generally into the industry and into enterprise…I got put in touch with a lady called NN who was really helpful, so she put me in touch with people at Nottingham University Hospital and so I got to speak to some people there…I also got passed on to Bio City and I've been on their accelerator programme now because of that (First Interview)*

Similarly, the founder of *"Equine Repellent"* mentioned:

> *For the vet school (network in that place), it was an entrepreneur, mentor A (formal mentor of Ingenuity19) who put me in touch with the vets (Support from the School of Veterinary Medicine and Science-UoN). (First Interview)*

> *With the Ingenuity Lab it's so much easier to create connections, because everyone is from different backgrounds, so if you have any questions or anything, they can orientate you to who to go to speak to / at the Ingenuity Lab there's a lot of entrepreneurs in residence. So I have made use of it, I've made use of the university, but I know, for example, if you go and speak to Mentor A, Mentor X, anyone, they can help you and give you advice on maybe associations or people that work within Nottingham and could help you. (Second Interview)*

In sum, the findings suggest that Ingenuity programme, considering the competition and the further support of the Lab, helps enhance entrepreneurial the networking activity. The involvement of different actors and the participation of experienced entrepreneurs have a crucial role in strengthening the participant network, positively affecting the development of competencies.

4.2.3. Impacts at the Individual Level

Turning now to an individual level, beyond the role of the participants as founders of a finalist's project of Ingenuity19, they state that Ingenuity19 helped develop entrepreneurial and general skills to better cope with future entrepreneurial projects and their professional careers. These findings are described below.

4.2.3.1. Entrepreneurial and General Skills Development

In addition to the findings related to the development of entrepreneurial competencies, most university entrepreneurs recognised that Ingenuity19 helped them incorporate entrepreneurial skills (see Appendix 11 for illustrative quotes of these categories). These skills reside at an individual level, helping entrepreneurs recognise future projects and approach reality through a collaborative, entrepreneurial mindset.

Findings suggest that, after participation in the entrepreneurial intervention, university entrepreneurs have acquired skills that they use in different contexts. For example, they report that they can now evaluate the potential value of entrepreneurial opportunities. Furthermore, it is highlighted that they use academic terminology in their answers, demonstrating that they understand the conceptual knowledge that allows the first assessment of opportunities. Contrasting their answers with the different academic activities they were involved in during the six-week skills programme, the findings suggest that most participants have interiorised this knowledge to apply it for a different context to their entrepreneurial projects. As an example of entrepreneurial skill development, the founder of *"Access to water"* pointed out:

> *It becomes very easy for me to see a gap in the market, but once you see a gap in the market, it also becomes easy for me to see one more don't*

> *work for it. So that's key, because in the future, when I'll have other projects to do or I want to start any business… the longer I've done, the more cycles that I've gone through, the best I have become judging viable ideas. (First Interview)*

In the same vein, the director of *"Social Supermarket*" commented:

> *Now I am able to identify if some projects have a future or I think they should change because I think it won't work like that…I think that at the beginning (before Ingenuity19) I did not have it, but now I have developed it. I think that now I can identify "that really has a market need" or "you want to establish this project, but really there are no people behind it who want it." I think that is the greatest thing I have learned. People may have a passion and want to start something, but if really there are no people who demand it, you are not going to get anywhere. (First Interview)*

In terms of how university entrepreneurs are approaching reality, most reported an impact after participating in Ingenuity19. It has manifested into a reflective process of the self-evaluation of their ideas and the search for different points of view to do so. For example, the founder of *"Support for Anxiety*" mentioned:

> *What Ingenuity has done is allowed me to change that mind-set into sort of saying, "I have this idea, I think it's a good idea but I also want to modify it so that you can feed into it as well", and so it creates that mind-set of belief in yourself but also yes, there's room for manoeuvre, there's room for improvement. (First Interview)*

The founder of "*Accommodation Booking"* gave a similar answer:

> *(After Ingenuity) I try and see things new from a different person's point of view, because when you're working on your own project and it's something you've created, it can be very easy to back it and to see it, just your vision for it, instead of how it might look to an outside person. (First Interview)*

Additionally, there is recognition of a more creative way of looking at reality. For example, the founder of *"Shells and Creams*" pointed out:

> *The way of thinking... Absolutely creativity because I started like with the idea long before and you sometimes forget about the creativity or the innovation. I got stuff like "we need to make this, to make money, to make profit" and you forgot about like creativity to make the change. In my personal change was like stop… to make it different, to make things different, is what I tried to do after Ingenuity and after my master's. (First Interview).*

In this category, evidence focused on the impact on individuals without a business disciplinary background was also found. For them, the new knowledge complements their disciplinary experience in science or engineering. Additionally, as an example of an entrepreneur from outside the traditional academic environment, the founder of *"Housing for Refugees*" reported that she has now a better understanding of corporate development and how a charity can work with a business strategy:

> *I had the idea that you're either an individual that's looking at a corporate kind of development, in terms of private sector, or you're a charity / a charity has to be a business. You can't operate a charity without managing it as a business, it just doesn't work, and that's really helped me. When I've had new staff coming in and I've said we're a business, we are a business, and they're no, no, no, we're a charity. I'm like yes, we're a charitable business. If we don't act like a business we're not going to work, we'll go under. (First Interview)*

In terms of general skills that enhance entrepreneurial activity (see Appendix 12 for illustrative quotes of these categories), most participants highlighted that communication skills had a significant impact. It is manifested in how they can explain their ideas, do presentations, use multimedia resources effectively, and pitch entrepreneurial projects. For example, the founder of *"Accommodation Booking"* pointed out:

> *Because I work with it all the time I would just assume, in the past, that everyone knows what it is. If I just said it's a non-profit charity booking website, but that's not actually very clear. So I've learnt to try and explain things simply. Elevator pitches, trying to perfect them and learn how to convey my message*

> *in a simple way for other people to understand / The biggest effect for me probably was the pitching actually, because that was my first pitch ever, and because it went well it gave me confidence in public speaking. (First Interview)*

A few participants also stated that Ingenuity19 was important to develop confidence in their abilities. It has helped them to confront different activities in their personal life. For example, the founder of *"Vertical Farming*" commented:

> *Having my first try and reaching the top 21 made me think that I can go very far or just as far to try two or try three. It gave me a lot of confidence that I can be a good entrepreneur and I made a switch in my head that said "you see, if you can do it, do it" and from that…something changed inside me when I was there, when we reached the top 21. (Second Interview)*

In conclusion, in line with previous research that reports the positive impacts of business plan competitions at the participants' individual level (Huster et al., 2017; R. Russell et al., 2008), this research also provides evidence suggesting that activities as Ingenuity19 can enhance the development of individual-level entrepreneurial skills that can help them in future projects. Also, it was mentioned that the programme improves general skills, and different communication aspects were widely highlighted.

4.3. Enablers of and Barriers to a Transdisciplinary Collaborative Process in an Entrepreneurial Competition

The following section examines how university entrepreneurs, responsible for entrepreneurial projects and who were involved in Ingenuity19, account for enablers and barriers that they experienced in this entrepreneurial intervention that could affect the development of their projects, with a focus on the transdisciplinary context of the competition and the subsequent support that the programme offered to the finalists. Through the data analysis, this section addresses the following research objective:

- To identify and examine possible enablers and barriers observed in a transdisciplinary entrepreneurial intervention that can affect the entrepreneurial process of non-traditional new ventures led by university entrepreneurs.

From a general perspective, it is important to mention that the reported experiences of universities' entrepreneurs regarding enablers and barriers differ according to their performance in the competition and whether the projects were developed successfully after the programme. Therefore, entrepreneurs who have successfully developed their projects mainly mention the enablers of the collaborative process. At the same time, barriers to the process mainly were mentioned by entrepreneurs who have found more significant difficulties to develop their ventures.

The findings are presented in two aggregate dimensions: Enablers and Barriers in the collaborative process. Both are analysed using the conceptual framework of Stokols, Misra et al. (2008), focused on the typology of contextual factors influencing transdisciplinary collaborations. Based on their work and the empirical data, the analysis is categorised by three themes: organisational/ institutional, interpersonal, and interpersonal factors.

4.3.1. Enablers of a Transdisciplinary Collaborative Process in an Entrepreneurial Competition

As reported by the accounts of university entrepreneurs regarding their participation in Ingenuity19 and their subsequent work in their non-traditional new ventures, this research provides evidence that suggests that the involvement in these types of entrepreneurial interventions, as well as features of teams and individual characteristics of university entrepreneurs, have a positive impact on the development of their projects. The enablers of the entrepreneurial process are classified by institutional/organisational, interpersonal and intrapersonal themes that

individually impact the collaborative transdisciplinary process, which is described below.

4.3.1.1. Institutional/Organisational factors

According to Stokols, Misra et al. (2008), a collaborative transdisciplinary process can be influenced by organisational factors that directly affect the effectiveness of these initiatives. Therefore, it is possible to assume that given the features of Ingenuity19 as a transdisciplinary context (see Chapter III), organisational factors can also affect the collaborative process of this entrepreneurial intervention. Based on the data of each case study, six categories were identified to describe this theme: (1) the relevance of the design and structure of the entrepreneurial competition; (2) the role played by professional advisors to develop and improve entrepreneurial projects; (3) the opportunity that an environment as Ingenuity19 gives to apply academic knowledge; (4) the organisational climate, support and activities that are carried out after the competition; (5) the organisational bridges that can be found in the university context; and (6) the importance of the financing that projects receive to transform them into actual companies (see Appendix 13a and 13b for illustrative quotes of these categories). Each category is explained below.

Competition Design and activities of Ingenuity19

As a first element of the organisational and institutional analysis, the competition independently emerges as an essential factor facilitating the collaborative process. The vast majority of participants highlighted a wide range of aspects that positively impact the development of entrepreneurial projects or the participants themselves as entrepreneurs.

First, as reported by the university entrepreneurs, the methodology of Ingenuity19 was recognised as an enabler of the entrepreneurial process. It is related to the

summits and their interactional activities, the contents taught during seminars and the different competition stages. In this line, it was mentioned that the academic activities had an approachable methodology for participants with different disciplinary backgrounds. Therefore, Ingenuity19 was recognised as an accessible activity in terms of learning. Similarly, most participants mentioned that Ingenuity19 is a feasible activity in terms of its time demands.

Regarding the methodological characteristics that the university entrepreneurs positively reported, they indicated that they could create or improve business plans through seminar sessions and summits. Furthermore, when reviewing the public information and an invitation to the activity and comparing it with the recordings of the six-week seminar programme, it was possible to observe that the contents were addressed. These were delivered in the following order: business planning and pitching an entrepreneurial idea, market and industry analysis, commercialisation strategies, financial planning, legal aspects of entrepreneurship and innovation (IP) and practicalities and formalities in running a business. In addition, each session was developed in the format of an initial presentation by a guest speaker who shared their own experience related to the topic corresponding to that week of the programme. The session concluded with a round table during which more experienced entrepreneurs were invited to interact with the participants through open questions. After contrasting the characteristics and contents at this stage of the Ingenuity19 programme with the impacts reported by university entrepreneurs, the findings suggest that these educational activities are effective for nascent university entrepreneurs when they are working through the phase of entrepreneurial ideation (opportunity recognition) and opportunity framing into a business plan.

In addition, the participants mentioned that the activities were designed in a way that enabled their participation and did not conflict with their responsibilities. In this sense, the clarity of the evaluation processes was highlighted, and the use of virtual platforms to participate in the seminar sessions was positively valued for individuals who had difficulties attending the weekly activities.

From the experiences of the university entrepreneurs with less previous exposure to business and entrepreneurship training, it can be argued that interventions such as Ingenuity19 do not restrict participation regarding disciplinary backgrounds. On the contrary, even individuals from the humanities area highlighted the value of the learning process for themselves and their non-traditional new ventures. Additionally, participants reported positively that the activities and learning methods of the competition consider the countries where the founders were thinking to apply their business, something that seems essential when considering the broad spectrum of nationalities represented by the participants in this type of competition in institutions of higher education. For example, the founder of *"Shells and Chitosan"* pointed out:

> *I liked the workshops because they were preparing you to step by step… I did like the information they gave you about, for example, how to make a business plan, where to obtain a business plan, what is the canvas. I love that and I think it was very enriching for all the teams. (First Interview)*

> *At the beginning they said like "try also, if you want, to implement this also in England, if you want to get into the incubator with this", but the advice, even the objective, was always "think about your market "…If someone works with teams from all over the world, then if they tried to, even without knowing the market, at least they gave you the light from "just check that it is your market, that it is your country and change if necessary. (Second Interview)*

In the same vein, one of the leading mentors of the competition highlighted the benefits of the learning process, both for the participants and for them as mentors. In this sense, he commented that the participants would be able to generate better business plans, be exposed to mentoring and evaluation processes carried out by experts and be confronted with situations during which they must use their communication skills. Therefore, participants, even those who do not reach the final stages of the competition, can benefits from their participation. In turn, these learning processes facilitate the subsequent evaluation stage with better business proposals for evaluators and judges.

Second, university entrepreneurs indicated that one of the best things about Ingenuity19 was that the competition allowed them to interact with individuals from different disciplinary backgrounds. In this regard, individuals could offer their opinions on other participants' projects in a reciprocal manner, enriching entrepreneurial projects from different perspectives and providing input that the university entrepreneurs could have ignored. At the same time, these activities were the basis of the social interactions, working as a platform for participants' future networking. For instance, some mentioned that they were still in touch with other participants after the competition. For example, the founder of "*Equine Repellent*" declared:

> *A girl I met, who was in my team (just in the summit activity), she was doing agriculture and business, and that was quite interesting because she gave me her point of view, she gave me contacts with some of her professors. So in that sense it was…actually, yes, the networking. (Second Interview)*

Third, in terms of the activities carried out during Ingenuity19, which included mainly seminars and summits, participants reported the vital role of speakers and experienced entrepreneurs during their learning process and in motivational aspects of pursuing their entrepreneurial projects. As a central element of the design of the competition, Ingenuity19 invited a wide variety of speakers from different industries as well as private and public contexts. Therefore, it is possible to argue that the learning process in these interventions is positively influenced by the diversity of the speakers, allowing the participants to be inspired by their experiences and advice and to know different business models that have been effective in the market, which, in turn, could be a source of inspiration for their projects. Furthermore, because of these interactions with experienced entrepreneurs, participants reported the importance of opportunities for learning through the successes and failures that speakers and mentors shared with them.

A recurrent theme in the interviews was university entrepreneurs' acknowledgement of prizes and funding as crucial elements for developing their non-traditional new venture. In this vein, as reported in the previous section about the development of

RAC, the awards were used mainly to acquire resources that allowed the first tests of the idea, preparation of prototypes and launches of projects in their initial stages. Some participants also mentioned the importance of obtaining these funds to leave their subordinate jobs and allocate working hours to their entrepreneurial project. Participants who did not receive a prize also reported the relevance, highlighting that these economic incentives helped them do their best to achieve a good result. In addition, some university entrepreneurs who have obtained monetary prizes in other entrepreneurship competitions also highlighted the importance of having access to these funds, which were also invested in their projects. Therefore, these findings suggest that activities that consider these types of awards are helpful in light of their subsequent uses. As the founder of "3D Prothesis" said:

> *The funding has been used to pay me as an employee, to buy products and materials. It's also been used for patent funding to buy trademarks, to buy a 3D printer. Lots of other things like that, just generic business expenses. (First Interview)*

Finally, some participants mentioned that Ingenuity19 as a training programme was useful in developing skills that have been important in developing their projects, mainly essential to the initial stages of an entrepreneurial project, for example, to move from the idea stage to a project with a business plan. However, it was also mentioned by one of the experienced entrepreneur's participants that this impact could be limited due to the nature of the competition. Given that the focus of the activities is framed in the initial stages of a new venture, it could lose the perspective of those entrepreneurial processes and skills that could be relevant to the project's development and growth. It was also reported that Ingenuity19 positively impacted participants in overcoming mental barriers in relation to their confidence in becoming an entrepreneur, which is also addressed as an intrapersonal enabler of the entrepreneurial process.

In sum, the findings provide evidence about the enabler effect of the Ingenuity19 competition's design and activities. As an organisational factor, the competition played a key role in creating an appropriate environment for the learning process,

encouraging transdisciplinary interactions among participants, mentors, and speakers, and providing the initial funding for the projects. As a result, it improved the business plans in the competition and their subsequent progress.

Professional advisors to develop an idea – Improve the project

A second element among the organisational factors, which act as an enabler of the entrepreneurial process, is the role played by the professional advisors as mentors, helping university entrepreneurs in their entrepreneurial journey. More specifically, there were three main reasons to give a positive opinion about the experience of being a mentee of experienced entrepreneurs.

First, there was a shared sense among university entrepreneurs about the influence of mentors advising from their real experience, being a source of complementary knowledge to the projects. Some of the participants said that they did not know what resources, strategies or decisions should be made to move the new ventures forward at the beginning of the process. In this scenario, advisors have been vital in providing insights in the initial stages of the project. For example, the founder of "*Student Applications*" reported:

> *Everywhere, every area like, for example at the start of what happens, a founder in the initial periods does everything, right? It's like being a jack-of-all-trades and that in...particularly, we all know that one person cannot excel in all the areas, right? Everyone has strengths and weaknesses. So, these surgeries (interaction with advisors) help to reduce the uncertainties and the weaknesses, you know, that one possesses in a particular area and helps to keep the right foot ahead because it's (the advice) coming from experienced people. So in the initial period that always helps your company skills. (First Interview)*

From the perspective of mentors and advisors, it is also recognised as a relevant factor for project development. Its importance lies in accessing a wide variety of

advisors who can help companies progress by contributing as support services areas. As advisors, it is possible to find experienced entrepreneurs, entrepreneurs in residence (working in Ingenuity), professors of practice, or other businesses and corporate partners. In practical terms, this help is manifested in legal aspects, accounting, management and even giving access to networks in local contexts. For the participants, receiving advice from individuals with real experience in entrepreneurship would generate a better interaction than mentoring processes with individuals who have not had that experience.

Second, and concerning the point explained in the previous sections, given the experience of the advisors, their contributions and guides directly affect the development of the projects, manifested in the decision-making that university entrepreneurs must carry out. It is reflected in improvements in business plans and the definition of business strategies, helping their transition from being a project to a company.

The founders of the cases that report this type of effect have had a visible development as a business. Therefore, this evidence suggests that those projects that have considered the advice of individuals with business experience perform well. The founder of *"Designers platform*" pointed out:

> *She's been great (his advisor); as I said, she's got years of experience of the industry and one thing she really showed me was really appreciating and understanding the financials and understanding margin, and having a very clear and concise structure in terms of how you price your products, understanding how much they really cost, not how much you want them to cost but how much it really costs to produce your product and your service and relaying that to the designers that we have (First Interview)*

Third, it is easily identified that the interaction between entrepreneurs and advisors is based on a close human relationship, where both sides' enthusiastic attitude and commitment was reported. Even though aspects of interpersonal relationships are described in section 4.3.2, it is important to recognise this element within the institutional factor as an intentional practice of higher education institutions.

Additionally, one of the university entrepreneurs reported that even though she is no longer living in the UK, she keeps in contact with one of her mentors, illustrating the level of closeness achieved in the collaborative processes.

It was also suggested that the cooperation between advisors and entrepreneurs was Also meaningful when entrepreneurs felt unmotivated, or their projects seemed to be in a state of pause and stagnation. For these situations, the role played by the advisors was fundamental to overcome those circumstantial barriers, giving the proper guidance to progress the non-traditional new ventures. In this sense, the founder of "*Access to water*" pointed out:

> *I think the other thing personally has been to kind of realise when you're stuck, yes. So, to realise when you're stuck. That for me is a barrier. I don't know. I had a... I had to get a mentor I think by year one, year one-and-a-half, because I was stuck; it was a good business, it was not making money, there was no traction, there was no nothing, and I was at a point where I was like, "okay, we've worked on this for one-and-a-half years, we've given it everything we've got, it's not working, it's not doing anything and I need to kill it, either it works or I need to kill it". So, in short I was stuck, so that was a barrier and I think, as much as I like learning, I also need to get out of my own head and ask people for help. So, getting mentors kind of got me out of that one (Second Interview)*

Considering the previously exposed antecedents, evidence suggests the positive impact of advisors and mentors in designing an entrepreneurship competition such as Ingenuity19 and in the organisational structure of an entrepreneurial ecosystem that promotes the progress of new ventures in the early stages.

Work environment and activities after Ingenuity19

A third element in the analysis within the enabling factors in the institutional/organisational context is related to the organisational environment and

the support that the finalists had access to after the competition. This category refers to the physical space of the Ingenuity Lab, and the activities carried out there to support university entrepreneurs and non-traditional new ventures. Although it has links to the analysis of RAC, this section seeks to show its relation as an institutional factor.

In this regard, the participants reported the relevance of having access to these spaces. University entrepreneurs who regularly use these facilities mentioned that this has meant having a place that allows them to feel like they are working at a "traditional job", with their desk and facilities similar to an ordinary workspace, highlighting the friendly and supportive environment of the Ingenuity Lab. This dynamic enables them to establish work routines that directly impact the progress of their projects. Additionally, the support activities such as seminars, talks, and workshops were emphasised as elements that help university entrepreneurs improve their projects and still learn from other experiences, even after the competition stage. However, among the participants who use these facilities, the founder of *"3D Prosthesis*" has a geographical barrier that limits her access to the Ingenuity Lab. Nonetheless, her project has been welcomed in a similar university incubator where she studied for her postgraduate degree. She commented that the physical characteristics are analogous, reporting the same mentioned impact for her project. Therefore, regardless of where these workspaces are located, the findings for the non-traditional new ventures working on those spaces are equivalent, showing that university institutions should consider this element in designing an entrepreneurial ecosystem. She pointed out:

> *I've got a desk in there and I work in there… before lockdown I was in there five days a week. I'm now in there maybe one or two days a week… when you would be working by yourself, maybe from home, just being able to have that dedicated space where you go into work, and you have a work environment. (Second Interview)*

More specifically, participants have highlighted additional reasons for the benefits of having this workspace that goes beyond the simple fact of having access to a

physical place. For example, it was commented that the Ingenuity Lab allows entrepreneurs to meet others who are at similar stages of project development or who have recently experienced the process. This would create a fruitful learning environment among those who can share their experiences with those at the earlier development stages like a community of practice. Similarly, some entrepreneurs highlighted the diversity of backgrounds found in the Lab, represented by entrepreneurs based on these facilities, which allow the creation of networks that can be useful for projects in the early stages.

Additionally, these findings also suggest that facilities such as the Ingenuity Lab would affect entrepreneurs' emotional levels. As reported by the participants, the possibility of using this space and the interaction generated among all the members who work in it (entrepreneurs, mentors, advisors, academic and administrative staff) breeds a sense of belonging within a community. In this context, they can find help, both in the required knowledge to progress their project and as emotional support that causes a motivational impact on entrepreneurs. Regarding this point, the founder of *"Equine Repellent*" reported:

> *I love going to the Ingenuity Lab because, as I said, it's more like an office. It's a place where everyone has the same mindset of working on their business and then I guess it's just for me... if I need help I can actually go and see these other people, but yes, I love working from the Lab, because it's quite salute, there's a lot of space, and you get help. It's just the environment…I guess because in the Ingenuity Lab there's loads of different start-ups at loads of different stages, when I just arrived at the lab, for example, I needed to register the company. I didn't even know how to do that. So there's always people to go to and ask … you look at others that already know how to do the things and then you learn by doing. I think I've learnt much, much, much faster with the Ingenuity Lab than I would have on my own, just because there are so many people you can go to ask for help or sometimes just speaking. "Oh yes, what are you doing? Oh, that's very interesting. How did you reach that goal?"…just because of everything that's put in place with the Ingenuity Lab, it*

makes things so much easier…even if you're alone you're actually not really alone. (Second Interview)

In the same vein, the founder of "*Access to water*" pointed out:

It kind of just legitimises you in your brain. You take yourself seriously besides being taken seriously by other people, right, because you have a physical address, you have a place of existence where you can go get your mail. For me, it is also the place where I knew if I am quitting my job I'm going to go here…When you want to talk to somebody who's totally not in the business community but they teach or they do something, they're there. It's that community. It's not the physical address; it's the community. So, I could have a different physical address but without the community, but it's not the same…it's the community that makes the difference. Otherwise, this would have been really hard, really demoralising, a lot of the time you just go... sometimes you just go, just so you can check in, you know what I mean. Like, just so you can go in the office and people know you're around, but maybe that day you just do not feel like coming to work but you've got to go because you've established a routine, you just like, you know, and when you have people around you that you might somehow be accountable to, you show up for other people. It's like exercise; it's hard when you're alone, to exercise, but when you're two people, you show up because there's another person expecting you to show up. (Second Interview)

Ingenuity as a space to find applications to academic knowledge

As the fourth facilitating element of the entrepreneurial process, the participants reported that, in a university context, an activity such as Ingenuity19 generates an appropriate space for the practical application of theoretical/pedagogical knowledge that students have recently learned. In this sense, there are two main reasons to argue why Ingenuity19 created the opportunity for students from different disciplines

to transform academic work into entrepreneurial projects with commercial and social impact.

First, confirming an expected idea, there is a direct beneficial relationship between the competition and the academic programmes of the university's business school, which organises this activity. Participants who are, or were, students at this school report that Ingenuity19 helped reinforce the contents of the modules related to entrepreneurship, innovation and creativity. For some, Ingenuity19 was a kind of compressed module in which they could consolidate learning processes, helped by the possibility of presenting an idea with the potential to be transformed into a business, accompanied by a different environment compared to traditional classroom assessments. For example, the founder of "*Vertical Farming*" pointed out:

> *As part of our module in the master, specifically "Entrepreneurial Creativity" is the same process, it is the same information shown in the talks. The Ingenuity process is the same that we saw within the class, so as such it did not impact the process as much. Rather it was like putting into practice … By having the practice, I obviously reinforced the knowledge and put into practice what I knew. Of course my communication techniques improved, of course I learned… It is like practice, this is like the laboratory that made me reinforce all the knowledge I learned in the master. (First Interview)*

Second, participants who study or studied in other universities made a similar analysis. However, their opinions are related to the opportunity to obtain a place at the university to practice and find applications for the knowledge and theories taught in science or engineering programmes. In this way, an activity such as Ingenuity19 offers the chance to evaluate the viability of potential entrepreneurship ideas, whether they emphasise technological development with a traditional business approach or take the form of projects that seek a social impact through the application of scientific knowledge.

These findings suggest that the academic programmes of business schools and schools of science and technology could use these entrepreneurial interventions as an additional channel to promote entrepreneurship among their student community.

Therefore, those types of initiatives could be a place within higher education institutions to apply academic knowledge and generate further institutional support that facilitates entrepreneurial development.

Organisational bridges and support from the university

As the last element of analysis regarding organisational/institutional factors, it is possible to identify the linkage that the university entrepreneurs can achieve with other schools or university departments. In this sense, some founders reported that they received support from other units outside the Ingenuity structure or the business school, stating that this was helpful for the development of their non-traditional new ventures. However, as reported by a minority of cases, it can be argued that this factor can act as a facilitator and barrier, given that this was an organisational weakness for other participants. Therefore, the effect of these organisational bridges depend on the possibilities that participants have to generate connections with other academic departments.

The founder of *"Access to water*" interestingly reported that the help received from an academic from the engineering faculty was important for the initial stages of the design of the technology required for the further commercialisation of the products (first interview). However, during the second interview, she reported that the engineering development was already finished, so she was working only with advisors from the Ingenuity Lab. This suggests that, depending on the development stages of the entrepreneurial projects, different types of academic knowledge and collaborative approaches could be implemented. Therefore, it would be plausible for universities to coordinate collaboration between academic departments to assist non-traditional new ventures in these developmental processes.

In addition to the aspects of coordination and availability of resources among different university actors, it was also possible to acknowledge the university's support for one participant who was a member of university staff at the time of

Ingenuity19. Being an activity that brings together the different stakeholders that make up the university community, the founder of the project "*Support for anxiety*" highlighted the support received as a staff member; this was manifested in allowing her to participate in the various competition activities when some of these activities clashed with her working hours. Even though this result could only be explored through one participant, this experience suggests that when designing an activity that brings together an entire university community, practical support for participation should be an essential aspect in other units, not only to the academic departments but also to administrative staff. Otherwise, the performance of these participants could be negatively affected.

Summarising the elements observed in the analysis of the institutional/organisational factor, evidence suggests that the design of an activity such as Ingenuity19 should take care of the learning processes that facilitate the achievement of the participants' entrepreneurial objectives. It is also important to note that access to facilities was vital for the entrepreneurs, which gave them a workspace and was relevant around the generation of a supportive community. In line with scholars who argue that a collaborative approach between academic and non-academic perspectives would be a critical factor in designing solutions to real-world problems (Hadorn et al., 2008; Tejedor et al., 2018), most of the founders highlighted the positive impact of mentors and industry experts to improve their projects and find a better business application. Therefore, the findings support the notion that social challenges, like those encouraged by Ingenuity19, can be addressed effectively through a transdisciplinary approach, where these types of entrepreneurial interventions and the later institutional support can provide greater transdisciplinarity to entrepreneurial projects.

4.3.1.2. Interpersonal factors

Through the experiences of the entrepreneurs who participated in the study, and mainly those participating as a team, it was possible to identify the interpersonal enablers of the entrepreneurial process. Those are divided into three main categories: teamwork, task division and roles; acknowledgement of the need for complementary/specialised knowledge; and communication among team members/interaction with other teams (see Appendix 14a and 14b for illustrative quotes).

Teamwork, task division and roles

A common view among the participants who worked as a team was the importance of teamwork as an enabler in developing their entrepreneurial projects. In general, it was observed through the experiences of the university entrepreneurs that teams are empowered based on team members' strengths, and that the disciplinary backgrounds were relevant resources for the execution of tasks.

In this sense, the field of expertise of each member of the teams was essential for carrying out tasks that required specific knowledge in areas in which prior learning and information was relevant for proper performance. In turn, having greater availability of human resources was important to generate an appropriate division of tasks, allowing some members to focus on critical actions regarding the core activities of the projects. In this way, those with more technical knowledge could focus on specific tasks without dividing their time in other administrative activities, mainly related to business and management. For example, the founder of "*Access to water*" pointed out:

> *The team that I'm bringing it is also people to deal with marketing and to do social media and people to do all those other things are taking me away*

> *from the things that I love do or the things that I am really...only me can do. (First Interview)*

This vision also has been echoed by the mentors who were interviewed. From their experience in different versions of Ingenuity, a diverse composition in entrepreneurial teams allows better performance, reducing the teams' risk because they can share knowledge and distribute tasks among them. For example, mentor A pointed out:

> *If it's done right it is less risky, so reducing risk on a number of fronts is something you can do more easily in a team…I think in terms of the chance of success it's going to be greater if you've got the right team operating in the right way. (First interview)*

Regarding the dynamics that allow better collaborative work, some participants highlighted the importance of the commitment that members acquire with the projects' objectives. It is reflected in the involvement in the activities required to achieve the entrepreneurial goals. For example, from the experience of leading an entrepreneurial team, the founder of "Shells and Chitosan" commented that her team was adjusting its affiliation during a time when some individuals who participated in the initial stages of the idea generation later abandoned the entrepreneurial project. As a result, this allowed for a better performance of individuals who kept working on the venture because they could define tasks clearly and carefully with who were committed to developing the non-traditional new venture.

Regarding the leadership aspects of teamwork, some participants commented on the role of the leaders in their teams, who usually presented the idea to others and were, consequently, responsible for inviting others to join the project. For example, the founder of "*Entrepreneurship female toolkit*" reported:

> *I was the one who founded it and brought them together and managed it. I guess you'd call me the project manager.*

Finally, it is also worth mentioning that when remembering the competition and its different activities, some participants reported that being in a team facilitated their

participation in Ingenuity19, given that they could divide tasks according to individual strengths. Activities such as writing, reviewing and editing business plans, designing slides and the subsequent presentation of the entrepreneurial pitch were examples of those instances during which a team built its participation through individual features, even for participants whose teams reside outside the UK. For instance, the founder of "*Housing for Refugees*" said:

> *I was really struggling with speech. The idea of standing up and making a presentation was like, that's terrible, for me, but we did get one of our residents involved in it and I think that really worked well, just because she was able to give the lived experience perspective on what we do (First Interview)*

Considering that these findings could be observed only in those participants who work in a team-based way, the findings suggest that teamwork would be a critical enabler in facilitating the development of entrepreneurial projects. Consistent with the resource-based view and transdisciplinarity perspectives, teams with diverse human resources that possess a wide variety of knowledge, and professional or practical perspectives allow the delegating of tasks focusing on individual strengths. As a result, teams perform better.

Acknowledgement of the need for complementary/specialised knowledge

As a second element of the interpersonal factors, university entrepreneurs who worked as a team mentioned the importance of recognising the need for complementary and/or specialised knowledge to develop their entrepreneurial projects. In this regard, this category emphasises the importance that individuals who are developing an entrepreneurial project can identify the knowledge needs that are critical to be able to advance their non-traditional new ventures. For example, the founder of *"Outsourcing App*" commented:

> *My business partner had no experience in users or in understanding people's behaviour or when the idea was finalised, how that could finally turn*

> *out into usability terms… So, as we had already met with him, he knew that I was a designer, he knew that I was capable and that from an idea, I could transform this thing into something tangible or functional, so he considered that we could make a good pair / My business partner knew that he could advance the idea by himself, but to a certain extent. There were going to be many areas where he could not being able to tackle. Therefore, I play a role, each one had about half of the project.*

Similarly, in the cases working in science and technology fields, the specific knowledge they possess was relevant to progress in technological development. However, the need for know-how in business and management was also reported. In this sense, the relevance of this expertise was related to the capacity to translate scientific or technological projects ideas into attractive business plans. As mentioned in the institutional/organisational factor, advisors and mentors were vital to fulfilling these knowledge gaps. For instance, the founder of *"Vertical farming*" pointed out:

> *We received help from external person in aspects that we were unaware of or in aspects that we could not develop. First, we turned to a family member to develop a website and to develop a logo and to ... well, basically that. We received help from a person she knew for the accounting things, to help us make numbers about how much it would cost, what taxes would be involved, being as realistic as possible. (First Interview)*

In the same vein, some university entrepreneurs also commented that within their plans to incorporate new members to their team, individuals with a specific disciplinary profile were needed. This suggests that university entrepreneurs are aware of the need for specialised knowledge and look for alternatives to solve these gaps beyond the resources offered by Ingenuity and the entrepreneurial ecosystem. For instance, the director of "*Equine Repellent*" pointed out:

> *I need people from chemistry, engineering, like ergonomy as well, and yeah, because my product needs different elements, and each element needs an expert in each thing to be the best as a company. (First Interview)*

> *So I'm still the only person, but before Covid I was employing... well, it was a matter of two weeks since the contract was done and I started to employ someone to work more on the scientific part... but also just for brainstorming and stuff like that. It's much easier to be working in a team. So yes, I'm looking for... well, after Covid hopefully, if things go back to normal, for someone to work on the scientific part of things. (Second Interview)*

These findings suggest the relevance that a transdisciplinary context, such as Ingenuity19, could generate an appropriate environment that allows better access to these sources of specific knowledge, which was already reported to some extent in the organisational factors section. Even more, the competition promotes interaction between disciplines. For example, Mentor A pointed out:

> *I am a big fan of multi… diverse, multidisciplinary teams. It's one of the things I explicitly refer to and encourage teams to think about. (First interview)*

Communication among team members and interaction with other teams

As a third enabler element that emerges in the interpersonal factor, the communication between team members and other actors was highlighted as a central aspect of the interaction among participants. Through the experiences of the university entrepreneurs, it was possible to identify the communication mechanisms and strategies that were effective for facilitating the collaboration processes between the team members and generating progress in their projects.

Participants reported that the communication style among team members was key to creating better work environments. The method of conversation between the members was expressed through cordiality, with a friendly and pleasant tone and where an authoritarian language was not necessary. It allowed having a team with a horizontal and participatory management style. It was mentioned that the use of this communicative approach was promoted by those members who play leadership roles, which suggests intentionality in the communication mechanisms they use. The

generation of dialogue instances was also reported as a moment that facilitated team communication. In this sense, the team leader of "*Housing for Refugees*" mentioned:

> *I've always been very open on the communication side. We have a weekly team meeting and we update one another on what we're planning to do this week, and any challenges we're facing or anything we've learnt that we want to share… the style of how I manage the team is to have that very open communication. (First Interview)*

Even though some university entrepreneurs reported that the disciplinary diversity in the teams presented challenges at the time of interaction and communication (an element addressed in the section on barriers), it was possible to identify some strategies that some of them used to overcome these difficulties. Considering that there were individuals with different knowledge backgrounds in the teams, some of them experienced difficulties in the interactions because discussions of their arguments and suggestions for decision-making were conditioned to this disciplinary knowledge. In this sense, listening to the views of the other members and positively valuing those elements of the discussions was relevant to the interaction, facilitating the process of "negotiation" to reach an agreement. Another positive strategy was using quickly understood analogies and examples to explain complex science and technology concepts to individuals far from these fields of knowledge. For example, the founder of "*Shell and Chitosan*" pointed out:

> *I tell you this story, that I was… for me it is very easy to explain in a chemical or technical way how was the process. Like "do this [sounds agreement]" and I was explaining using exactly if I was speaking with someone of my field. "First you're going to use that enzyme, the enzyme is going to disintegrate the raw material…" so when I was explaining to the guy of the media he was like, "okay, just wait". Then I started using metaphors, and by using metaphors I was also changing the way I was making my pitch for him and he was making notes. "This is like that". He translated the chemical process into a media process, and to explain others he made a sketch, for example. It makes the idea stronger because it was seen with different eyes. Also, it happened when I explained it to the finance girl, okay I was speaking*

> *to her, "this is the process and this is the cost and this is the impact on the environment. Then this is our process, this is the cost and this is the impact"; so she translated that biotechnological process into finance sheet. (First interview)*

The analysis of this category makes it possible to show that communication processes are linked to the development stages of entrepreneurial projects and their context. For example, "*Social Supermarket*" is a case that has been running for a more extended period than the rest of the participants, and due to its nature of voluntary work presents a higher staff turnover. To overcome the challenges that present this issue, the non-traditional new venture implemented written protocols to new team members to easily access important information, allowing better staff inclusion. Using those documents, they know the procedures of the tasks that they must perform.

Concerning the communication processes from the entrepreneurial projects to other actors, it was possible to distinguish between communication at the moment of the entrepreneurial competition (Ingenuity19) and communication after this activity. First, communication between participants at the competition was reported as a barrier (explained in section 4.3.2.3). However, through the experience of one of the participants in a similar entrepreneurial intervention, the generation of dialogue with other participants was key to identifying a line of expansion to the primary activity. Therefore, in her opinion, this type of interaction within business plan competitions has been favourable for the project's development. Nonetheless, the evidence from Ingenuity19 suggests that it should be an element of work to increase the interaction among participants of future versions of the competition.

Second, regarding communication with other entrepreneurial projects or stakeholders, there is consensus on the importance of communicating with individuals and/or organisations they did not know and whom they have never spoken about, which is needed to develop the new venture. In this regard, it is essential to create networks with potential partners, clients, and access to new resources. Hence, these findings suggest that entrepreneurs should develop the

ability to communicate with other relevant stakeholders for their projects, which would benefit their companies. Concerning the above, the founder of "*3D Prosthesis*" mentioned:

> *I think people skills and networking are also quite key because a lot of the time, especially if you're by yourself, you need to be able to ask other people for advice, get in touch with people you've never spoken to before, and create a network around you. (Second Interview)*

In summary, the evidence suggests interpersonal factors act as facilitators to the entrepreneurial process in non-traditional new ventures that have been exposed to an activity such as Ingenuity19. In this sense, the importance of teamwork was widely highlighted, which allowed teams to build projects using individual strengths and where the commitment of each member to the new venture was key in generating teams showing good performance. It also emphasised the importance of acknowledging the need for specialised or complementary knowledge, which allowed the projects to advance successfully. Finally, communication is the basis of interpersonal interaction that must tend to create work environments that will enable disciplinary diversity as a positive factor for teamwork and facilitate communication with external actors to create networks that will help the progress of entrepreneurial projects.

4.3.1.3. Intrapersonal factors

Through the experiences of the university entrepreneurs participating in the study, it was also possible to identify intrapersonal enablers affecting the entrepreneurial process of non-traditional new ventures. Those are divided into three main categories: personality traits, individual commitment – proactive attitude and previous work and academic experiences (see Appendix 15a and 15b for illustrative quotes).

Personal traits

University entrepreneurs reported individual characteristics which they consider relevant to the success of a nascent entrepreneurial project. For example, in most cases under study, the participants reported that resilience would be essential in overcoming challenging moments in the entrepreneurial process and pursuing business goals. In this vein, behavioural determination complements this idea, which means the entrepreneur facilitates the process by establishing definitions, limitations, and concepts in his/her project, manifested through specific behaviours. They also state that it is important to maintain a positive and enthusiastic attitude, both with the venture and their self-performance assessment as university entrepreneurs, accepting that the entrepreneurial journey requires patience to not fall into anxiety when not seeing immediate findings. Some participants also commented that the entrepreneurial process was benefited by their desire to have complementary learning processes that, in the end, impacted the progress of their companies. In this regard, the founder of "*3D Prosthesis*" pointed out:

> *I think definitely resilience. The ability to be decisive and have like leadership skills, so you can make decisions and stick by them. I think motivation, especially self-motivation, and being able to continue working by yourself, even when there's no one else around. (Second Interview)*

Evidence also suggests that a vocation related to working independently or not associated with a traditional job career (subordinate employment) is an individual feature manifested among the participants. In this sense, entrepreneurs reported an intentional search for self-employment that gives them personal satisfaction and self-fulfilment. Regarding the last point, having a passion for what is done and perceiving that it has meaning, or purpose seems important to generate the intrinsic motivation to achieve objectives that allow new ventures to be developed.

Finally, and linked to aspects of the organisational/institutional factor, some entrepreneurs commented on how they individually handled the mentoring

processes, specifically when they were given feedback or constructive criticism of their ideas and projects. In this sense, there is evidence of successful cases where university entrepreneurs reported good practices to understand and use these external comments, facilitating their subsequent practical application. For example, participants reported that it was helpful to have a receptive attitude towards the suggestions provided by advisors and mentors, which helped to rescue positive aspects of the comments, on the basis that the feedback comes from individuals who want to help the development of the project. Then, the mentoring process should have a moment of internal reflection of the university entrepreneur or the team, where the aim is to objectively evaluate the comments and try to conclude how the feedback can be applied appropriately. For instance, the founder of "Equine Repellent" pointed out:

> *I think it was pretty easy, because it was coming from people that really wanted to help, that were genuinely interested. It was not coming from... everyone had a good mindset, even if some feedbacks were negative, it was always in the end to help. So with that in mind it's much easier to take the feedback and the criticism. (Second Interview)*

However, it is relevant to consider that some universities entrepreneurs also reported that mentors and advisors could be unaware of some elements of the projects, sometimes ignoring barriers that did not allow the implementation of the suggestions they made. For example, the founder of "*Social Supermarket*" pointed out:

> *I think that I am always open to receiving feedback. However, sometimes it is a bit difficult because our project may seem like it is just a store, so I think that many people do not understand all that is behind and all the food that we distribute to other projects, people homeless and children in schools, so sometimes people have a very good intention to give us comments and feedback. However, they do not realise that they do not understand the full scope of our project, so sometimes the comments are well intentioned, but they tell us impossible things to implement. (Second Interview)*

Individual commitment – Proactive attitude

In addition to the personality traits, the participants also mentioned individual commitment to the project's development as an enabler of the entrepreneurial process, manifested in a proactive attitude of behaviours that tend to carry out the necessary activities to progress the venture. In this sense, university entrepreneurs shared good practices from their experiences.

First, and as a critical feature in the most successful cases, participants commented that their commitment to the project was the engine that allowed their progress. Even though some of them have additional academic or professional responsibilities, they could allocate time and resources to their projects, reflecting their perseverance in the venture. Similarly, participating in a competition such as Ingenuity19, a programme that involved weeks of activities, suggests an initial commitment to a potential entrepreneurial project. According to their accounts, university entrepreneurs should be aware that involvement in these projects implies hard work, and participants must be willing to make the required efforts to achieve the entrepreneurial objectives. For example, the founder of "*Access to Water*" pointed out:

> *Before they (ideas) become businesses, they have... there's a lot of work that goes into that. There's a lot of work that is going into that. So, if you are discouraged by just the Ingenuity process, I'm sorry, you're not ready to run a business because there will be a lot of days that you have to put in the work and long hours that you have to put into the work and you will not see a return…In itself, the process sieves people out because there is required in every entrepreneur, that commitment. There has to be that commitment and anything you're passionate about, nobody forces you to do it. So, there's a difference between wanting to be an entrepreneur and actually being an entrepreneur. You know, so, wanting to be an entrepreneur because it's "cool", that's great, but it requires work, and a lot of people have dropped along the way because of the work, and I'm not saying... so, if Ingenuity is hard, man,*

> *running a business will kill you in six months. You will be out of it. (Second Interview)*

The commitment, in turn, should be manifested in a proactive attitude of university entrepreneurs, resulting in specific behaviours that facilitate successful performance. As mentioned above, the participants expressed the importance of allocating working hours on tasks directly related to their project. Besides, they reported that they had to allocate time for complementary learning needed to develop the non-traditional new venture, which was done without pressure from an external agent. Instead, there was a personal initiative in searching for the needed knowledge and resources. For instance, the founder of "*Equine Repellent*" mentioned:

> *I don't mind working hours on it, I don't mind not having my weekends and stuff, because that's something I like. It's not a chore that I go to work, it's just my life. (Second Interview)*

In addition, the search for the right individuals and networks that could contribute to filling the specific needs of each project is another example of this individual enabler. According to the participants, this can only happen by initiative and personal effort. For example, the founder of "Shells and Chitosan" said:

> *For me the difference (between an entrepreneur and someone thinking in developing a project) is really taking an active role from myself, taking the steps you need to achieve it from the point of view, such as, in my case, my business is more scientific, so getting closer to the people you need but not in a dreamy way, rather grounded, based and with goals. (Second Interview)*

Prior experiences

As the last element identified among the enablers who reside in the intrapersonal factor, some entrepreneurs reported that prior professional and teamwork experiences were facilitators of the entrepreneurial process.

At the level of professional experience, some university entrepreneurs reported that it was important for them to have specific knowledge of certain industries or activities that were strongly linked to the core of their project. This background allowed them to identify a potential entrepreneurial opportunity and, at the same time, to know the dynamics of specific industries that facilitate entrepreneurial development. So, through this previous knowledge and experiences, they could better refine their business plans and design appropriate business strategies. Finally, at the level of teamwork, some entrepreneurs reported that having prior experience in leading projects that involve teamwork allowed them to lead teams better, understanding which interactional processes they should attend. In this regard, the founder of "*Student Application*" pointed out:

> *It definitely is not easy to work with a team, you need to have experience. For example, if you have ... I have previous experience in the past, 4 or 5 years ago in my country. Then I learned how to manage and lead people. (First Interview)*

In conclusion, it was observed through the entrepreneurial process of the university entrepreneurs, both in accounting their experiences as participants of Ingenuity19 and after this activity, that personality traits, their commitment to their projects, a proactive attitude in the entrepreneurial work, and prior experiences were relevant for the development of their non-traditional new ventures. Thus, these findings support the idea that intrapersonal factors play a role in transdisciplinary collaboration spaces from an individual perspective, resulting in a positive impact for non-traditional new venture development.

4.3.2. Barriers to a Transdisciplinary Collaborative Process in an Entrepreneurial Competition

As reported by the accounts of the university entrepreneurs regarding their participation in Ingenuity19 and their subsequent work in their non-traditional new

ventures, there is evidence suggesting that elements of the entrepreneurial intervention and individual features of entrepreneurs and teams act as a barrier to the development of their entrepreneurial projects. It is important to mention that even though all the participants mentioned obstacles faced in their experiences, both at the competition and later in the entrepreneurial process, those who showed a lower level of development of their entrepreneurial projects mentioned these negative impacts with greater emphasis. In line with the previous section about enablers, the analysis is presented in three main factors: institutional/organisational, interpersonal, and intrapersonal barriers to the collaborative transdisciplinary process (Stokols, Misra, Hall, et al., 2008), which are described below.

4.3.2.1. Institutional/organisational factors

As stated earlier, a transdisciplinary collaborative process can be influenced by organisational factors that directly affect the effectiveness of these initiatives. This section analyses the context of a transdisciplinary entrepreneurial competition from obstacles to the entrepreneurial process. Based on the data of each case study, two categories were identified to describe this theme: (1) Weaknesses of the competition and the programme and (2) Organisational barriers in a university context (see Appendix 16 for illustrative quotes of these categories), and both of these are explained as follow.

Weaknesses of the competition and the programme

As a first barrier observed within the organisational factor, weaknesses of the competition and some aspects of the programme's design emerged as an element that hinders a collaborative process in pursuing entrepreneurial projects.

Some participants commented that even though in this intervention there was an open invitation to the entire local community of the city where it takes place (and surrounding areas), there is a lack of communication with potential actors that could be interested in being involved in this competition. Furthermore, although the program's design considers the participation of external actors to the university, which represents the public sector, companies, and other agents of the city's entrepreneurial ecosystem, they participate as judges, advisors, mentors, or sponsors. However, when evaluating competition participants' profiles, they mainly correspond to students or alumni from the university that organises the competition, while a minority of participants come from the external community.

It could be the case that the competition is perceived as a student–university activity, losing the transdisciplinary character it tries to implement. In this sense, the founder of the project "*Entrepreneurial Toolkit*", who is also a member of the university's academic staff, mentioned that she was involved in this activity because she heard about it through the universities' communicative channels. Nonetheless, she recognises a potential inattention of involving other social actors. She pointed out:

> *I am pretty sure that I wouldn't have applied to take part in Ingenuity had I not worked here as a member of staff. I think if you... they are serious about it becoming a community aspect then there is a definite need to possibly move away from it being a university thing, or whether Ingenuity joins up with the city council or Nottingham Trent University or something, to open its doors that little bit wider, because I think, if we're going to reach communities that aren't taking part in this kind of thing, we need to understand why, and that might be in learning some hard lessons, because some people may turn around and say, "Well I'm not doing it because I don't think the university wants me here"… So, it's going to be kind of, if we're to learn, we have to kind of really open some discussions, which I'm not sure is going to be that easy. (First Interview)*

There were also reports related to the methodology used in the contest. While most of the university entrepreneurs mentioned this aspect as one of the positive elements of the programme, a minority of participants commented that this would be a rigid

methodology that does not allow them to experience a fluid learning process. Also, it was mentioned that the speed with which the pedagogical contents are taught is high. Therefore, it would be challenging for some participants in terms of acquiring specific knowledge and learning effectively. On the opposite side, it would be more accessible for those who have previously studied entrepreneurship and creativity modules. Additionally, the relevance of considering each participant's background was also reported, thinking that not all individuals have the same resources (social, cognitive, educational), and individual differences could have an impact on the performance of the participants. For example, the founder of "*Outsourcing app*" pointed out:

> *These activities quickly seek to generate an effect. They seek to give you some knowledge and then evaluate that knowledge that was given to you through an evaluation as if it magically pretended that these contents are going to generate something, probably better than it would have been generated otherwise. They (mentors) tell you something like "you have to take up the knife, you have to turn on the stove, use trays and something called a saucepan and there is something that stirs and a clock and let's see what works best for you." But no one asks you what you have in your backpack because if you bring a "lobster" in your backpack, you are probably guaranteed success with the judges. If you bring a potato with rice, you will probably do the best you can, and that is what I mean by the background of each one that is not covered by these courses. (Second Interview)*

Related to the content taught in the competition's developmental stage, some participants reported that this did not significantly impact their learning since they had already learned similar topics in undergraduate and graduate courses. However, more than a barrier to the collaborative process, this issue was described as a challenge to solve in future competition versions.

Regarding the entrepreneurial projects and their level of entrepreneurial development before the competition, for those in more advanced stages, these activities might have a limited impact than projects in initial ones. Although a positive perceived benefit is widely reported among all participants, it was also mentioned

that it is difficult to identify the contribution of these types of interventions to help the growth of consolidated projects. For instance, the founder of "*Shell and Chitosan*" said:

> *I totally believe that every entrepreneur should at least have the experience to acquire these skills, but these activities reach a limit that, how to say, there should be more other types of competencies to grow, to help the entrepreneur grow the company, not only to devise it. That is where I feel that they stagnate. (Second interview)*

Two participants mentioned elements that could be evaluated as barriers to the collaborative process concerning the mentors and their interactions with participants. First, given that the competition called many participants, mentors must allocate their time across multiple projects, limiting the depth of the mentoring process. One of the entrepreneurs, leading a project in advanced stages, commented that due to this weak point, they were looking for an external mentor who could dedicate adequate time to their non-traditional new venture, while other participants manifested that they never had a mentor. Therefore, future competitions should consider a limited number of participants who can receive an adequate mentoring process or increase the number of advisors and mentors to resolve this issue.

Second, some participants manifested a big surprise, and at the same time mistrust, regarding the situation of mentors who were also participants and finalists of the competition. It caused disappointment in some participants, who stated that it would be desirable for this type of situation to be communicated from the beginning.

Related to the design of the competition and the instances of conversation that could be established between participants, some university entrepreneurs commented that although there was an invitation to carry out this type of interaction, the availability of time in the scheduled activities was somewhat limited, affecting the possibility of networking with other participants. It is consistent with the report of the enablers of the collaborative process, where one of the weak points was the interaction among participants of Ingenuity19.

It was also stated that the university does not provide a database as a potential source of networking that participants can use to contact other individuals at the university, specifically in other academic units that are available to generate collaborations for commercial/entrepreneurial purposes. This shows an important weakness in promoting a transdisciplinary environment in a university context beyond the competition and Ingenuity as an organisational structure.

Turning now to two of the main activities of the competition, summits and seminars, two main issues were identified. First, some university entrepreneurs mentioned that although these activities are positively evaluated, their impact on the development of the projects is limited. This is because the work dynamics are based on the allocation of participants in random groups who work on fictitious ideas, which would be useless for practical application into their projects. Consequently, summits could be perceived as an activity without a clear goal or achievement to reach. In this vein, the founder of "*3D Prosthesis*" commented:

> *On the first two weekend summits that we had, we were doing like a group project, but it didn't really seem to have like an end point, like there wasn't a reason for it…The other people that were there, I don't know, they just seemed to be there; there didn't seem to be a purpose for them. T combined with another team and so it just made it really hard to actually figure out what we were supposed to be doing. (First Interview)*

Regarding the dynamics of work in groups predefined by the organisers, this would create little dynamism in the interaction between the participants. In this sense, most of the time is dedicated to working with the individuals who make up their worktable, limiting the available time for generating dialogue with other participants. Something similar was reported concerning the seminars, which allowed few interactions as these sessions are similar to a traditional lecture, with a keynote speaker in a large room such as a theatre. Through the analysis of the video recording of these activities, it was confirmed, while the founder of "*Entrepreneurial toolkit*" pointed out:

> *I mean the barrier I suppose was like the limited time you had on your table. I think also you could meet people on your table but you couldn't meet*

> *people not on your table. It was almost like once you were in your group you were kind of only going to really interact and go through the Ingenuity process with them…There might have been someone two tables over there that was amazing and could have really been fantastic and it could have led to them being involved more, or us being involved with them but we wouldn't have met them. It's that element of not necessarily all knowing who everyone is and not being able to target who you wanted to network with. (First Interview)*

Finally, some participants reported the obstacle of assisting these activities due to the scheduled timing. For example, concerning the seminars, those were carried out during working days, which was a practical barrier for participants who have professional responsibilities. Similarly, summits were carried out on two weekends, both full days, bringing practical participation problems in those who have family responsibilities or who need to rest due to their work tasks during the week. Furthermore, it was reported for a minority of participants (non-students) that Ingenuity19 was a time-consuming activity for those with less time available.

Organisational barriers

As a second category that emerges through the participants' experiences regarding institutional barriers, some deficiencies are observed at the university level as the main sponsor of this activity.

Considering the university as a big community, Ingenuity19 could be perceived as an activity focused mainly on students. This perception limits the participation of the academic and administrative staff, which would create a barrier to the collaborative processes that could occur in an academic environment. Similarly, it was also commented that Ingenuity19 could be seen as an activity focused on participants from the business school, which could be why individuals from other academic units do not participate in the same proportion. Also, this issue could be related to a potential mental barrier for students outside the business school, who assume that

this activity does not fit their profiles. In this sense, the organisational barrier is related to the inability of the other schools to promote involvement within the entrepreneurial ecosystem among the individuals that participate in their academic programmes, which would align the entire academic community closer to these entrepreneurial interventions. In this regard, Mentor A pointed out:

> *I'm not saying it's a real barrier because it's perfectly possible for folk from across the university to get involved. I think there's a perception or a communication or some sort of barrier that stops the vast majority of students or members of staff at this university from engaging in something entrepreneurial…vast majority of students do not apply because they have an issue because it's got the word entrepreneur in it and they think you've got to be a business student or you've got to somehow be… "it's not me, it's not for me." (First Interview)*

Another barrier is that the university does not present an institutional platform that facilitates meeting points between individuals from different schools or faculties with entrepreneurial purposes. This means that any contact or network depends on the individual efforts of university entrepreneurs, as long as they can establish a connection with individuals or academic units that could collaborate in the development of their entrepreneurial projects. Therefore, it is seen as a weakness of the entrepreneurial ecosystem, resulting in a barrier to a fruitful collaborative process.

In conclusion, even though most university entrepreneurs reported broader agreement of the positive aspects of the institutional aspects that facilitated the collaborative process within Ingenuity19, there is evidence that the competition had some weaknesses in its design and implementation of its activities. Based on the idea that entrepreneurial universities are encouraged to create an appropriate environment for developing entrepreneurial projects, interventions such as Ingenuity19 should establish effective communication channels to include more academic actors. In the same vein, besides industrial experts, mentors, advisors, or guests' speakers, it would be desirable to involve a broad spectrum of non-academic

participants, which would foster a transdisciplinary collaborative context. Finally, regarding barriers to collaboration, future competitions that seek interaction between participants should pay attention to generating effective collaborative environments, both in terms of Ingenuity as an entrepreneurial programme and the university as an institution.

4.3.2.2. Interpersonal Factors

The following section presents the barriers to the collaborative process found at the level of the interpersonal factors (Stokols, Misra et al., 2008). According to the experiences of the university entrepreneurs participating in this research, mainly those barriers were reported by team-based participants. However, some cases carried out individually also reported barriers concerning interactions with other actors, both at the moment of competition and after this intervention. The categories of this theme are divided into three main categories: (1) Different priorities and additional responsibilities of team members, (2) Communication barriers and interactional difficulties, and (3) Disciplinary perspectives as a source of conflict (see Appendix 17 for illustrative quotes of these categories).

Different priorities and additional responsibilities of team members

As a first barrier within the interpersonal factor, different priorities and responsibilities of the participants were reported as one of the main reasons for conflict between team members, being a reason for resignation to the projects. In this sense, it is important to recognise that most participants in Ingenuity19 were students. Therefore, they have more available time to spend on entrepreneurial projects in the initial stages of development. Also, some of them do not have clarity about their future careers at the time of applying to the competition. However, months after

participating in the intervention, some participants have finished their studies changing their responsibilities and context.

This situation was reported mainly at the second round of interviews, where some participants mentioned that they were dealing with monetary issues that obligated them to resign to the entrepreneurial project to find a stable job. In the same vein, other participants were interested in pursuing a traditional work career, which was incompatible with developing a new venture. It was even more visible in entrepreneurial projects under voluntary enrolment without economic retribution. In addition, from the case "*Social Supermarket*", it was possible to know how academic responsibilities affected team members' dedication to the non-traditional new venture. Its director pointed out:

> *People stop being able to do (both) things, the studies and the project...If you are in the project, you have to be fully involved...If you are not able to have a balance between studies and the project, some people feel like they cannot do both, and they give up. If you invest a lot of time in the project, you can see that your academic performance will worsen. So some people end their participation in the project not in a good way because, in the end, they see that they have spent too much time involved and have stopped to concentrate on their studies. (First Interview)*

> *I'm going to stop doing this in January (2021) because the exams ... because I'm starting the third year and I want to focus on the end-of-year exams. (Second Interview)*

However, difficulties in the development of projects and involvement of individuals in teams were not only observed in the group of students. Projects involving team members with traditional jobs (subordinate employment) presented difficulties in dedicating time to the new venture's activities, negatively affecting team performance. It was reported as an issue within the competition and the subsequent development of the entrepreneurial projects. For example, those whose main activity was a traditional job could not participate in all the activities of Ingenuity19, which in turn overloaded the work of those members who had more time for the competition.

A similar situation was mentioned in one case where the team decided to continue developing the projects after the competition, and some individuals did not have the same commitment as at the beginning of the process, which affected the team interaction. As a result, some individuals resigned from the projects since the development of the non-traditional new ventures required a higher level of involvement. For example, the founder of *"Shell and Chitosan*" pointed out:

> *If there is not everyone's interest, then it is when they begin to leave the project, there is no good communication and conflicts begin. (First Interview)*

> *At the beginning when the idea came up, when we started working in the laboratory, we were a team of 8 people. Later, when we were moving forward, because it takes a long time to test and commit to the project, in the end, when we set up the company and we had to set rules, there were only two of us, and from then on we have always been two. (Second Interview)*

Communication barriers and interactional difficulties

As a second category within the interpersonal factor, communication barriers and interactional difficulties emerged as an element that hindered the collaborative process between team members and the interaction with other actors.

Considering previous research about difficulties related to communication in transdisciplinary collaboration (Jakobsen et al., 2004; G. Tress et al., 2007), communicational issues were reported in a minor way that could be assumed in this type of collaborative context. A plausible reason to explain this is that most of the projects participating in this research are homogeneous in their disciplinary composition or are projects developed individually, and the transdisciplinary collaboration is based on the interaction with academic and non-academic actors (mentors and advisors) who were not formally included in the teams. However, those projects that present disciplinary diversity in their team composition confirmed prior research findings on communication difficulties in a transdisciplinary context. In this

vein, the language was the primary communication barrier, where differences in words, lack of vocabulary, or ignorance of terminology made team interaction difficult. Even when the section about interpersonal enablers addressed how these teams resolved these conflicts, it is important to mention that these difficulties existed. Therefore, although communication was reported as a barrier, solutions were also reported.

Thinking about communication barriers that mainly affect the days of the competition, some participants reported that they were careful not to talk about their business ideas. It was mainly observed in early-stage projects because they assumed a greater risk of imitation. It creates a problem for effective communication in terms of establishing collaboration dynamics, losing the opportunity to receive advice and suggestions from other participants or mentors. This issue was also highlighted by mentor B, who said:

> *Some of them are really secretive about what they're working on, like they think somebody's going to steal their idea in the competition, because not many people are quite so open to talk about their ideas. (First Interview)*

According to mentor A, one of the most critical challenges for teams is promoting healthy interaction between team members to generate effective decision-making and project progress processes. The university entrepreneurs confirmed the difficulties for interaction, highlighting aspects of personality as a primary source of conflict. For example, sarcasm, intolerance towards other opinions, and individuals who are tactless when sharing comments to others generated an upsetting reaction in their interlocutors. Also, troubles related to egos were reported, particularly in how these traits generate difficulties in recognising the performance of another team member regarding their progress and achievements in the entrepreneurial projects. Similarly, negotiation processes and the generation of controversy were reported as sources of short-term conflicts when teams had to make important decisions to develop the non-traditional new venture. These difficulties caused damage to in-group relationships, which, as a result, negatively impacted collaborative processes. For example, the founder of "*Entrepreneurial Toolkit*" mentioned:

> *I guess there was a little bit of a personality conflict with "name of business partner", "name of business partner", and me, and it wasn't easy. It kind of felt like "name of business partner" and "name of business partner" and "name of business partner" and I were trying to help them in the middle, but I think in the end "name of business partner" was just kind of like… she had to do her own thing. It was an interesting dynamic. It's all fine now. I guess entrepreneurial women can be quite strong-minded and they stand up for themselves because they've had to in business. They're probably not the easiest people to manage, they're probably unmanageable, but I try my best. (First Interview)*

Disciplinary background of team members

As the last category of analysis within the interpersonal factor, disciplinary backgrounds were mentioned as a cause of discrepancy among the members of the entrepreneurial teams. Even though this characteristic was partially mentioned as a communicational barrier due to differences in language and vocabulary, this category focuses principally on how disciplinary diversity affected the interaction of the participants in the daily work practice.

Mainly, the focus of work of every entrepreneur was strongly conditioned to their disciplinary background and previous studies. Then, conflicts arose because everyone tried to defend their position. For example, team members with academic business backgrounds used to be interested in the economic impact of decisions to develop robust and financially viable business plans. At the same time, individuals from science and engineering emphasised developing ideas from a technological perspective, where business aspects could be less relevant. For example, the founder of "*Vertical Farming*" said:

> *I think our differences had a lot to do with our background. She commented on an idea (business perspective) to include and I analysed it from*

a technical point of view, and I said "This idea cannot be done" or "This idea is going to be very complicated". So, the conflict began. (First Interview)

In conclusion, through the experiences of the university entrepreneurs, it was possible to identify problems in line with interpersonal interaction dynamics that affected the projects' development. Different priorities or additional responsibilities emerge as the leading cause of project desertion. In the case of barriers related to communication and personality, the findings suggest that the difficulties are similar to those previously observed in transdisciplinary contexts. Concerning disciplinary backgrounds, as expected by previous research, the fields of expertise of everyone caused conflict in those projects with more diverse team members. Finally, according to the analysis stance, the three categories share the duality of being a barrier and enabler of the collaborative process since teams can generate interactions where diversity is an asset of the collaborative process and not a barrier that damages the final result.

4.3.2.3. Intrapersonal Factors

Through the account of the university entrepreneurs, it is also possible to identify elements that are barriers to the entrepreneurial process that reside at the individual level. Those are analysed as one category, "Personal traits and individual issues" described below (See Appendix 18 for illustrative quotes).

Personal traits and individual issues

This section presents the intrapersonal barriers that affected the participants in the competition and later in the subsequent development of their projects. Regarding the difficulties identified in the context of the competition, a first element reported by some participants was the challenge of applying the suggestions and feedback they

received from mentors and experienced entrepreneurs when the advice implied essential changes in their ideas, projects, and business plans. In this vein, the barrier is manifested as the difficulty of dealing with criticism and suggestions because university entrepreneurs have key concepts rooted in their entrepreneurial projects, which generate relevant prior definitions. When feedback is focused on less critical areas, they will be more willing to listen and apply it to their non-traditional new ventures. For example, the founder of "3D Prothesis" pointed out:

> *I think it's easier to receive feedback on the business plan and harder to receive feedback on the product. Just because I think I'm more, almost like attached to the product, because it's something that I've worked on a lot myself. Whereas the business plan is the bit I've had a lot of help with and the bit that wasn't my initial idea and initial thinking. (Second Interview)*

Other aspects of the individual traits which acted as initial barriers were exposed by some participants. Among them, the requirement for the finalists to present their project in public was a cause of stress for those who find it difficult to do presentations in public, explain ideas or be efficient in the use of time to communicate a message. However, as was reported in the section about the development of entrepreneurial and general skills, the competition activities help solve this barrier. In this regard, the participants highlighted the fact that one of the benefits of participating in Ingenuity19 was improving their communication skills, and this including those who recognised that they had a personal weakness in facing these situations.

A second problem reported by one of the participants was the feeling of being out of place because he/she did not meet the demographic characteristics (age) of most university entrepreneurs participating in the programme. According to his/her experience, he/she suffered from "impostor syndrome" due to being in a place full of young individuals and considering that he/she was older than the other participants. When asked about this feeling in the second interview, the participant indicated that he/she still feels that "syndrome" and finds it a challenging mental process to handle.

Concerning intrapersonal barriers whose impact is post-competition, a first feature that some entrepreneurs shared is the difficulty opting for self-employment, which implies a ceasing of receiving a permanent economic income. In this sense, the fear of failure and the need for a salary trigger this barrier. Although some participants mentioned that it was difficult to decide to be an entrepreneur due to the economic risks, they could finally achieve the success of their non-traditional new venture. However, other participants have not continued working on their projects because they opted for traditional job careers (subordinate employment), although they did not rule out taking up the entrepreneurial project in the future.

An element mentioned by some participants, who develop their projects individually, was the difficulty of dealing with the entrepreneurial process alone. In this sense, not having the support of a team to share tasks or the mere fact of working without human interactions caused a feeling of loneliness and increased the stress levels of the university entrepreneurs. However, one participant commented on his difficulties in implementing group work in his project. Although mentors from Ingenuity Lab have recommended including new individuals on his team, he is reluctant to make this decision because he prefers to work alone. Although he recognises that it is a problem to be improved, he also stated that this is not a weakness in his project, showing the difficulties that he presents to change this situation. Therefore, the issues related to individual work report obstacles to the development of projects, both from the need for support from a team and the difficulty of working with other individuals.

Finally, one of the competition's mentors, who has also worked for years in the university context where this competition takes place, suggests that students from other schools and faculties may have a mental barrier about participating in this activity. Following the argument of institutional barriers, at the intrapersonal level, this barrier would be related to the individual conceptualisation of being a university entrepreneur or being involved in activities such as Ingenuity19, which only fits students in business schools.

4.4. Chapter Conclusions

This chapter presented the data analysis and findings of this research project. Based on the research strategy and data structure reported in Chapter III, this chapter was divided into two main areas of analysis: (1) the development of entrepreneurial competencies and (2) enablers and barriers observed in an entrepreneurial intervention carried out within a transdisciplinary context. In doing so, the chapter grouped the empirical examination of five aggregate dimensions proposed to address the research question and research objectives.

The chapter began reporting the pre-competition context that helped understand the participants' antecedents in the entrepreneurial intervention. This aggregate dimension provided evidence supporting the idea that disciplinary backgrounds, professional/academic experiences, and personal events are inputs that triggered the identification of entrepreneurial opportunities. Concerning the motivations to participate in the competition, participants reported that the possibility to get funding and the external evaluation of the idea from individuals with entrepreneurial and business expertise were the main reasons to apply to Ingenuity19. Therefore, all this supports the idea that there are antecedents before the competition related to entrepreneurial competency development, where backgrounds and experiences can be seen as a starting point to ODC, and there is also an intentional search of elements of the competition that can be related to ODC and RAC.

As the second aggregate dimension, the chapter reported the findings related to the development of entrepreneurial competencies, providing evidence that the three competencies (ODC, RAC and CC) could be developed when university entrepreneurs participated in a transdisciplinary entrepreneurial competition. Related to ODC, the evidence supports the idea that during the period of evaluation of this research, most of the cases reported that Ingenuity19 was helpful to develop and improve business plans, identify complementary products or services, and transform ideas into an entrepreneurial project in those that were in the initial stages

of development before the competition. Similar findings were found regarding RAC, highlighting the fact that the competition was an important source of initial funding for the finalist projects of the year, and it was also a platform of branding and exposition that represented a non-monetary resource for the non-traditional new ventures. In addition, for those projects that could use the Ingenuity Lab facilities after the competition, this represented an essential physical space as a complementary resource to develop their entrepreneurial projects. Finally, regarding CC, the evidence suggests that Ingenuity19 helped develop this competence mainly from an individual motivational perspective. Therefore, all the evidence presented supports the argument that an entrepreneurial intervention within a transdisciplinary context such as Ingenuity19 provides a productive environment for developing entrepreneurial competencies.

Third, related to impacts at the individual level of university entrepreneurs, the evidence suggests that the entrepreneurial intervention's impact goes beyond the development of entrepreneurial competencies of the non-traditional new ventures. Instead, from the evidence reported by the participants, it could be observed that an entrepreneurial competition such as Ingenuity19 had a positive effect on developing entrepreneurial and professional skills that university entrepreneurs can use in future entrepreneurial projects or their professional careers.

As fourth and fifth aggregate dimensions, this chapter provides evidence supporting the idea that enablers and barriers presented in an entrepreneurial competition developed in a transdisciplinary context can positively and negatively affect the entrepreneurial process of non-traditional new ventures. From the evidence reported there, it was possible to observe that university entrepreneurs had experienced institutional, interpersonal, and intrapersonal enablers and barriers during and after the competition that facilitated or hindered the development of their entrepreneurial projects.

Finally, does all this evidence and findings contribute to understanding the development of entrepreneurial competencies as a research topic, academic entrepreneurship as a research area, and transdisciplinary collaboration as a

research context? In answering this question, the following chapter discusses the two main areas of the research findings, from the perspective of exploring how the development of entrepreneurial competencies is affected by enablers and barriers observed in an entrepreneurial intervention within a transdisciplinary context, addressing the research question and objectives and discussing the implications of the research findings for theory and academic entrepreneurship practice.

Chapter V: Research Discussion

Entrepreneurial Competency Development in a Transdisciplinary Context

Implications for Theory and Academic Entrepreneurship Practice

5.1. Chapter Introduction

The following chapter discusses the research findings previously presented in Chapter IV in relation to the extant literature on Entrepreneurial Competencies, entrepreneurial competitions (contests) and transdisciplinarity. This discussion aims to present implications of the findings for the academic entrepreneurship field, mainly how a transdisciplinarity collaborative programme such as Ingenuity19 can be a mechanism that facilitates the development of entrepreneurial competencies within an academic context. Furthermore, this chapter also discusses additional educational implications for academic entrepreneurship and policy. Section 5.2 summarises the research findings addressing the research question. Section 5.3 discusses theoretical implications for competency development as a research topic. Section 5.4 examines the implications for research and educational practices regarding academic entrepreneurship. Section 5.5 proposes additional implications of this research for policy. Finally, Section 5.6 presents the conclusions of this chapter.

5.2. Findings and Research Question

The following section provides an overview of the empirical findings of the research concerning the research question. The research question that this study addressed was:

How does a transdisciplinary entrepreneurial competition influence the development of entrepreneurial competencies and what are the enablers and barriers in this process?

As mentioned, this research question was examined from the perspective of entrepreneurial competencies, a theoretical framework that has been recognised as valuable in order to understand how entrepreneurs create and develop successful new ventures (Gümüsay & Bohné, 2018; Rasmussen et al., 2011), in

different stages and settings. From this perspective, three main principles were proposed to define how entrepreneurial competencies emerge (Chapter II):

1. Competencies are defined as a mix of knowledge, skills, personality traits (Hayton & Kelley, 2006) and material resources (Danneels, 2002) that bring the ability to complete something through the appropriate use of those resources (Danneels, 2002; Gümüsay & Bohné, 2018; Rasmussen et al., 2011), where entrepreneurs need abilities to use and combine the available resources to develop entrepreneurial projects (Gümüsay & Bohné, 2018).

2. The generation of entrepreneurial competencies is an evolutionary process highly influenced by "*idiosyncratic situations".* Distinctively, the development and acquisition of competencies within the academic entrepreneurship context require departures from existing development paths and the creation of new ones (Ahuja & Katila, 2004; Rasmussen et al., 2011).

3. The development of entrepreneurial competencies in an academic context is influenced by internal and external actors (Rasmussen et al., 2011; Rasmussen & Wright, 2015). Therefore, it is important to recognise the effect of different institutional levels and stakeholders in this evolutionary process.

As reported in Chapter IV, most nascent new ventures that participated in this research were able to develop entrepreneurial competencies. In general, the findings provide compelling evidence to support the three main principles aforementioned.

First, based on the definition of competencies, most university entrepreneurs identified various immaterial and material resources that allowed them to start and develop an entrepreneurial process. Immaterial resources were identified as essential elements in the initial phases, where prior knowledge and academic research were mentioned as inputs to the idea-generation process. Later, the evidence shows that academic entrepreneurs needed to integrate new resources into the entrepreneurial process, which allowed them to progress to an early

development phase beyond opportunity recognition. Hence, the findings support the notion of competencies as a concept that involves human aspects of the entrepreneurial process related to material and immaterial resources, their combination and a subsequent application to achieve a defined purpose (Rasmussen et al., 2011).

Second, the findings support the idea of an evolutionary perspective of the development of entrepreneurial competencies in non-traditional new ventures within an academic context. University entrepreneurs state that their surrounding environment influenced the development of entrepreneurial projects. Specifically, the findings confirm Rasmussen et al.'s (2011) findings, suggesting that those competencies were emerging as the projects progressed. In this vein, competencies were developed based on the initial context where the ideas and projects were generated, showing that it required a departure from existing trajectories. In this sense, the context of Ingenuity19 and the possibility of interacting in the Ingenuity Lab facilitated the evolutionary process previously proposed in the entrepreneurial competency framework.

Third, the research context facilitates exploring how a transdisciplinary setting affects entrepreneurial competencies. The empirical findings provide strong evidence that the interaction of entrepreneurial projects positively influences the emergence of the three competencies, specifically when university entrepreneurs engaging in collaborative processes with academic and non-academic actors.

In summary, as a first approximation to answer the research question, the evidence arising from the analysis allows arguing that the entrepreneurial competencies approach is an appropriate theoretical framework to explain how university entrepreneurs create and develop successful non-traditional academic new ventures. Moreover, the findings show coherence with the principles on which research about entrepreneurial competencies have been argued. Therefore, this research supports the idea that entrepreneurial competencies are developed in an academic context and contributes to academic entrepreneurship literature by explaining how those competencies can be developed in a novel research setting as a transdisciplinary entrepreneurial intervention. The following section discusses how the enablers and barriers reported by university

entrepreneurs who participated in a transdisciplinary programme impacted entrepreneurial competencies development.

5.3. Implications of the Findings for Entrepreneurial Competencies Development

This section discusses the implications of this study for entrepreneurial competencies as a research topic. The discussion is focused on understanding the role of a collaborative transdisciplinary programme in developing entrepreneurial competencies, where each competency is addressed individually. It examines the institutional, interpersonal and intrapersonal enablers and barriers that impacted competency development. Each of these factors is tightly bound to the others. Hence, there is certainly overlap in the discussion of the relation of each factor regarding each competency.

Throughout, the following research objective is addressed:

- To discuss how enablers and barriers observed in a transdisciplinary entrepreneurial intervention can facilitate or hinder the development of entrepreneurial competencies.

5.3.1. Opportunity Development Competency

By analysing the non-traditional new ventures that participated in this research, it is possible to argue that most projects developed the Opportunity Development Competency (ODC). Furthermore, the evidence allows identifying different mechanisms that favoured or hindered the development of this competence. Figure 7[5] summarises the main findings of enablers and barriers related to ODC.

In terms of institutional factors, in line with previous research about entrepreneurial competitions (interventions/programmes) (McGowan & Cooper,

[5] References are included to clarify where this research has supported prior work (Red font: Literature related to Entrepreneurship and Academic Entrepreneurship; Black Font: Literature related to Transdisciplinarity and collaboration)

2008; Treanor et al., 2020; Watson et al., 2018), Ingenuity19 was reported as an adequate environment to facilitate the identification and development of entrepreneurial opportunities. The findings suggest that this was done through a variety of learning procedures (summits, conferences), assignments (final submissions and presentations) and interactive activities (seminars, Ingenuity Lab) that enabled participants to move from the recognition of a potential idea to a framed business opportunity.

In the same vein, the evidence supports the idea that a transdisciplinary entrepreneurship programme helps develop ODC where university entrepreneurs' disciplinary background did not impede carrying out the entrepreneurial process and developing this competency. Therefore, it implies that these activities could be appropriate for individuals outside business and management schools, extending the scope of entrepreneurial interventions in universities.

As reported in Chapter IV, in line with scholars who argue that a transdisciplinary approach is a critical factor in designing solutions to real-world problems (Hadorn et al., 2008; Tejedor et al., 2018), the research findings provide evidence supporting the idea of the positive impact of the interaction of university entrepreneurs with mentors, judges and industry experts to improve their projects and find solutions to social challenges through better business applications. Mainly, non-academic actors' experience is a source of complementary information to fill knowledge gaps in the entrepreneurial project. Besides, the practical knowledge of advisors related to legal aspects, accounting, and management was essential to the transition from entrepreneurial ideas to formal business. Although similar insights had been previously argued within academic entrepreneurship (Hayter, Rasmussen, & Rooksby, 2018; Rasmussen & Wright, 2015), those findings suggest that the benefits of the interaction with external actors also apply to university entrepreneurs (students, alumni, community) and the development of their non-traditional new ventures. Moreover, in line with previous research on entrepreneurial competitions (Huster et al., 2017; Lyons & Zhang, 2018; R. Russell et al., 2008; Souitaris et al., 2007; Watson et al., 2018),

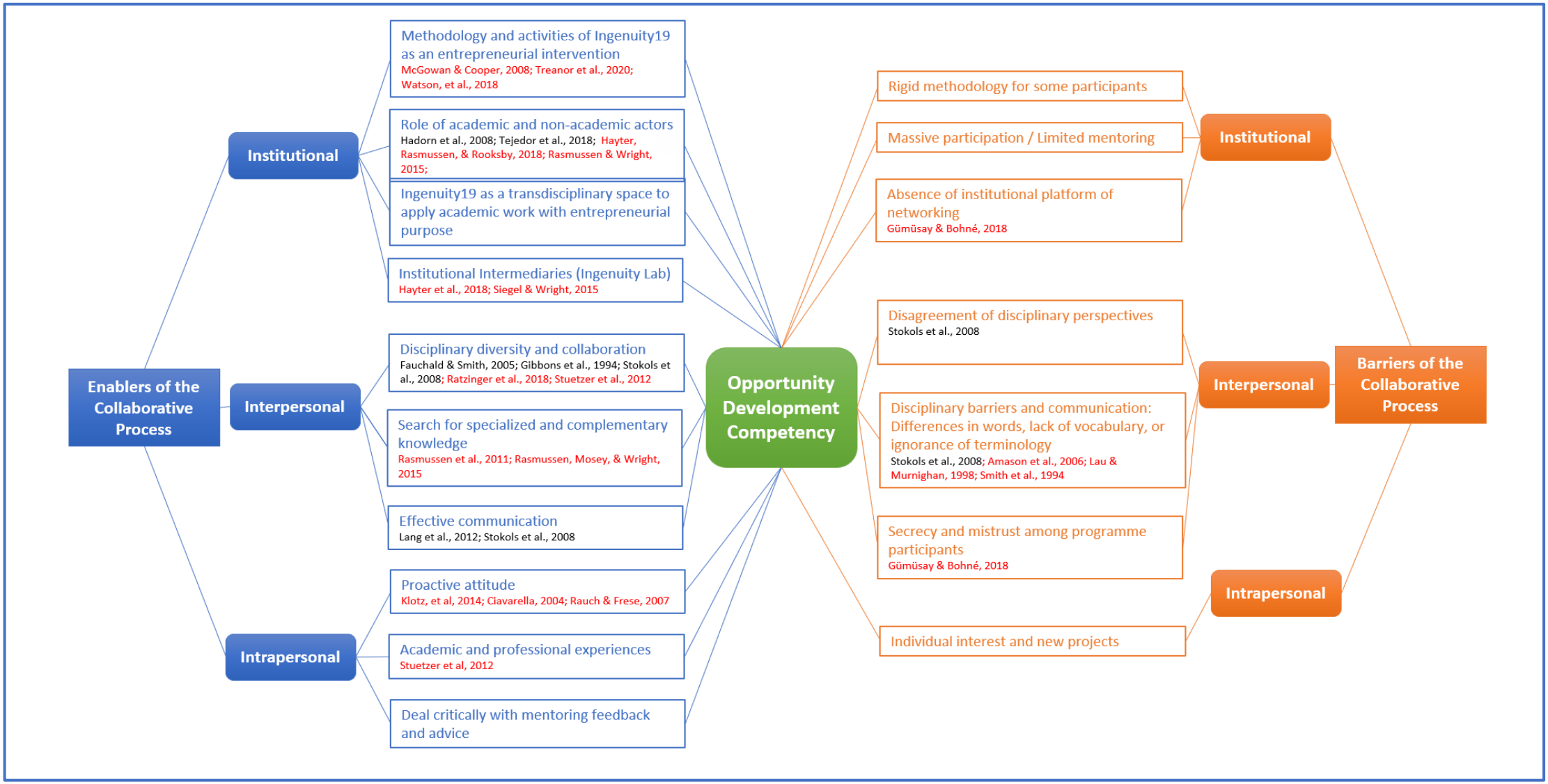


Fig. 7 Enablers and barriers related to ODC

this research supports the idea of these institutional interventions as an opportunity for university entrepreneurs for networking that later will be crucial for the progress of their projects. Hence, the generation of activities where university entrepreneurs can interact with non-academic actors and experienced entrepreneurs should be considered a plausible mechanism to facilitate ODC.

This competency was also affected by the possibility that Ingenuity19 gives students from different schools and faculties opportunities to apply academic work and research that they have developed before the competition. The findings highlight that some university entrepreneurs could find practical applications to the knowledge acquired in undergraduate and postgraduate programmes. Hence, activities such as Ingenuity can represent a reasonable bridge to identifying and developing entrepreneurial opportunities based on previous academic work.

As a neglected area in evaluating potential impacts after entrepreneurial competitions, this research provides evidence that institutional factors can impact ODC after the contest, particularly in competition winners. The university's institutional support manifested in other spaces as the Ingenuity Lab also contributes to refining and developing entrepreneurial opportunities. In line with previous research on academic entrepreneurship ecosystems (Hayter, Nelson, et al., 2018), the access to the incubator lab associated with the Ingenuity programme was essential in allowing academic entrepreneurs to participate in activities such as seminars, talks with experienced entrepreneurs and workshops. In those events, novice entrepreneurs in the lab share their experiences with those leading projects in early phases, improving the opportunity framing for non-traditional new ventures.

However, the findings also show institutional factors that hinder and inhibit the development of ODC. First, some participants reported that the contest's methodology was rigid, and as a result, it did not facilitate the learning process, which affected the refinement of entrepreneurial ideas. In the same vein, the type of activities limited the spaces and times of interaction, negatively affecting the participants' discussion and sharing of ideas. While the programme's impact on ODC was more visible in those non-traditional new ventures in the early stages

of development, it was difficult to recognise the contribution to consolidated projects. It suggests that the effectiveness of entrepreneurial competitions could be linked to the prior development of the projects that participate in these types of activities.

Second, a massive participation of individuals in the programme makes the mentoring process difficult for all projects, limiting its result in developing and improving ideas. Particularly in Ingenuity19, the competition received 750 applications, of which 215 were entered as business plans. In this sense, the high number of participants generated a problem related to the limited time that mentors and advisors have available to carry out individual mentoring. Therefore, some projects may have a partial impact from mentors in ODC, who cannot effectively assist all participating projects.

Third, as explained before, scholars have argued for the critical role of interactions between academic entrepreneurs and external actors who possess practical knowledge and experience to improve entrepreneurial opportunities (Hayter, Rasmussen, et al., 2018; Rasmussen & Wright, 2015). Complementary, it has been argued that there are structural and relational inhibitors to competency development related to non-integration and dis & misconnection of academic entrepreneurs (Gümüsay & Bohné, 2018). On the one hand, scholars have argued that structural inhibitors at the individual level are related to the difficulty of getting access to the necessary knowledge and capabilities such as information about finances, strategy, negotiation and communication skills to develop entrepreneurial competencies. On the other hand, relational inhibitors are related to barriers that academic entrepreneurs face to reach the “right” individuals and get protection from harmful contacts, as well as lack of organised linkages within universities that allow overcoming distance with experienced entrepreneurs, who could guide university entrepreneurs to develop entrepreneurial competencies. This research provides more detailed evidence supporting the idea that ODC is negatively affected by the lack of an institutional platform that facilitates meeting points between individuals from different schools and with people from outside academia. Although Ingenuity19 is a programme based on inviting individuals who can share different academic perspectives and

a wide variety of professional experiences, it was difficult for the participants to contact individuals outside the programme who could contribute to their projects.

Regarding interpersonal factors that were identified as mechanisms that facilitated ODC, the diversity in team composition emerges as a central element of impact in this competency. Similar to previous research on transdisciplinarity and the availability of different resources from the individual contribution in a project (Fauchald & Smith, 2005; Gibbons et al., 1994; Stokols, Misra, Hall, et al., 2008), it can be argued that new ventures can refine their entrepreneurial opportunities building in the disciplinary strengths of the team members. Findings confirm the perspective of collaboration related to creativity applied to the projects (West, 2002; West & Anderson, 1996), decision-making processes in teams (Martins & Milliken, 1996) and commercial success of new ventures (Kirchberger & Pohl, 2016). In addition, previous research on digital start-up creation has argued the positive effect of diversity in terms of disciplinary and educational background (technical, formal business and general higher education) in terms of better performance, resulting in a higher probability of reaching investment (Ratzinger, Amess, Greenman, & Mosey, 2018). Similarly, the findings show that the diversity of disciplinary areas regarding team composition and interactions with different actors helped enhance the process of opportunity refinement. The observed mechanism is based on two main ideas. First, a nascent non-traditional new venture performs better because individuals' expertise works as an essential input to carry out activities requiring specific knowledge. Second, team members' interaction with different disciplinary backgrounds allows identifying paths of improvement for the entrepreneurial project in areas of which university entrepreneurs have no experience or knowledge.

Building on the above, university entrepreneurs and non-traditional new ventures need to recognise their limitations in terms of knowledge resources. The findings show that knowledge gaps are related to technological/scientific knowledge and business and management expertise. While the technological/scientific inputs improved the entrepreneurial idea regarding the quality of "solution" (innovativeness), the interaction with individuals with business and entrepreneurial expertise was fundamental to frame the idea into a viable

entrepreneurial opportunity manifested in an attractive business plan. An effective practice observed on successful non-traditional new ventures was the search for complementary expertise outside the entrepreneurial team to fill those crucial gaps for project development. Therefore, confirming previous research highlighting the importance of access to particular expertise can contribute to refining the new venture (Rasmussen et al., 2011, 2015), and disciplinary knowledge diversity works as a mechanism to enhance ODC, as a result of the interaction between members of entrepreneurial teams and also through the interaction of university entrepreneurs with mentors and advisors from Ingenuity.

Concerning collaborative dynamics that facilitate the development of the opportunity competency, communication strategies were identified as valuable mechanisms to improve the entrepreneurial projects, particularly regarding the refinement of the entrepreneurial ideas. In line with previous research that highlighted the importance of promoting active and effective communication in collaborative transdisciplinary projects (Lang et al., 2012; Stokols, Misra, et al., 2008), non-traditional new ventures were also enhanced by similar practices. As reported in Chapter IV, applying analogies and examples to explain complex science and technology concepts to other team members or individuals advising the entrepreneurial project facilitates understanding for those far from these fields of knowledge. As a result, individuals are better positioned to contribute to enhancing entrepreneurial opportunities. In a complementary and overlapped manner with intrapersonal enablers, having an appropriate disposition to listen and value other members' views facilitates the interactional process and allows applying the best ideas to improve non-traditional new ventures.

However, in line with findings observed in transdisciplinary collaborative settings (Stokols, Hall, Taylor, et al., 2008) and managerial contexts (Amason et al., 2006), the mechanism of interpersonal enablers related to opportunity refinement can also act as a barrier if this is not managed correctly. For example, diversity in entrepreneurial teams can harm the project's progress, particularly ODC, because individuals tend to focus their efforts and ideas only on the areas in which they possess knowledge and confidence. It can cause disagreements between the members of a project to the point of stalling its development.

Besides, researchers have recognised that, in organisational contexts (Amason et al., 2006; Lau & Murnighan, 1998; Smith et al., 1994) and transdisciplinary settings (Blättel-Mink & Kastenholz, 2005; Jakobsen et al., 2004; G. Tress et al., 2007), diversity can cause communicative challenges. Similarly, this research provides evidence that disciplinary diversity can also trigger communication problems between team members or mentors of the project. Therefore, since interpersonal elements can be mechanisms that facilitate or hinder ODC, the challenges for non-traditional new ventures and university entrepreneurs are to know how to manage diversity and encourage interactional strategies that generate benefits for improving the project. What the findings suggest regarding ODC is that, in non-traditional new ventures in an academic context, the benefits of the heterogeneity outweigh the cost.

A final barrier observed is related to the secrecy that some participants had regarding the ideas they presented in the competition. As some scholars previously argued about mistrust as an inhibitor to competency development (Gümüsay & Bohné, 2018), the findings suggest that secrecy limited the sharing of the entrepreneurial ideas among participants, constraining the collaborative purpose that could be achieved in an ideal entrepreneurial intervention and restricting the improvements that could be made through interaction with other participants.

Regarding intrapersonal factors that influenced ODC, this research contributes to understanding entrepreneurial competencies considering individual features of university entrepreneurs. While scholars have argued for the important role that personality characteristics have in the identification of entrepreneurial opportunities (Klotz et al., 2014), particularly conscientiousness (strives to do best, does more than planned, hardworking, persistent) (Ciavarella et al., 2004) and proactive attitude (Rauch & Frese, 2007), the particular link between competency development and personality traits is still a neglected issue.

In line with Taggar (2002) and the idea of a working style conductive to persistence that positively affects creative processes, this research suggests that university entrepreneurs' proactive attitude was needed to get involved in complementary learning processes to improve the initial idea they had in mind at

the beginning of the competition. In this sense, university entrepreneurs need not only to acquire the necessary knowledge to progress the entrepreneurial project but also to actively seek individuals to fill the knowledge gaps required to enhance their ventures. Therefore, findings suggest that, in this setting, a proactive attitude should be important to developing ODC.

Complementary to other personality traits related to emotional stability (Ciavarella et al., 2004) and the context of an entrepreneurial contest where there is an external review by mentors and advisors (McGowan & Cooper, 2008), university entrepreneurs are permanently exposed to receiving feedback and constructive criticism of their ideas and projects. As a mechanism that facilitates ODC, the evidence supports the idea that it is necessary to have the ability to critically evaluate the suggestions that are made and then apply the changes that are required to improve the entrepreneurial project. Otherwise, the absence of this individual capacity is a barrier to acquiring this competence because entrepreneurs cling to initial presumptions that do not allow them to improve their projects.

In the same vein, it is important to recognise that personality attributes can affect ODC, considering different phases of the entrepreneurial process. For example, while scholars have argued that creativity usually is linked to traits related to openness to experiences (Feist, 1998; Taggar, 2002) and those individuals who possess such traits would be less conscientious (Feist, 1998), conscientiousness has also been associated with long-term venture survival (Ciavarella et al., 2004). Therefore, these findings need to be interpreted with caution, considering the research context and the characteristics of Ingenuity19 as an entrepreneurial intervention that requires conscientiousness (planning, responsibility, well organised) and emotional stability (not bothered by criticism) to handle the activities and requirements of the entrepreneurial contest. Nonetheless, solo entrepreneurs and teams should find an appropriate balance in terms of personal traits that enhance creativity processes.

From the individual level, it has been argued that scientific excellence and industrial experience have a key role in ODC (Rasmussen & Wright, 2015). The research's findings provide evidence supporting this idea, showing that academic

and professional experiences were relevant factors for ODC, manifested in three main aspects. First, related to institutional aspects, academic assignments and dissertations in undergraduate and postgraduate programmes were a source of inspiration for identifying potential entrepreneurial opportunities, which were at that time the basis of some non-traditional new ventures. Second, in line with Stuetzer, Goethner & Cantner (2012) and their findings confirming the positive effect of balanced skills manifested on the prior work experience as a determinant of market entry, the findings suggest that participants' professional experiences were vital in identifying and refining an entrepreneurial idea applied to the finalists business plans presented in Ingenuity19. Third, overlapping interpersonal enablers described previously, prior teamwork experience facilitates the collaborative process, resulting in fruitful interactions among non-traditional new ventures team members.

In summary, this research provides evidence explaining how institutional, interpersonal and intrapersonal factors in a transdisciplinary entrepreneurial programme affect ODC. From the enablers' side, the findings support the idea that the competition's environment was critical in enhancing the entrepreneurial projects' ideas. Thus, the methodological approach and activities carried out by the Ingenuity programme appeared to fit well with ODC. Findings also suggest that academic and non-academic actors' involvement helped frame the entrepreneurial opportunities into a project with commercial potential. Moreover, since most of the winners' participants could engage in the Ingenuity Lab after the contest, this organisational structure with the participation of both types of actors effectively provided support that positively impacted ODC. Moreover, findings also show that the development of ODC relies on how university entrepreneurs can create effective collaborative mechanisms within teams and involve external actors as non-formal members of their non-traditional new ventures that can contribute to ODC. Besides, university entrepreneurs should care about managing diversity in their new ventures because it can act as a double-edged sword to ODC. Finally, from an individual level, the findings of this research suggest that university entrepreneurs' personality traits could affect, positively or negatively, the development of this competency.

Three main implications regarding ODC can be argued in light of the research findings. First, ODC can be developed in a research context as an entrepreneurial transdisciplinary intervention such as Ingenuity19. It contributes to understanding opportunity identification and development from an entrepreneurial competency's perspective, considering traditional actors involved in academic entrepreneurship activities and new ones currently participating in those ecosystems (Siegel & Wright, 2015; Wright et al., 2017). Second, Rasmussen & Wright (2015) conclude that there are areas that appear to be important in developing ODC in an academic context, such as industry experience included on venture teams, interaction with external actors throughout the developmental process and an active search for different applications of the entrepreneurial idea under evaluation. It is analogous to the previously discussed findings regarding the institutional, interpersonal and intrapersonal mechanisms observed among the university entrepreneurs and their non-traditional new ventures, allowing to expand their application to a more integrated academic entrepreneurial ecosystem. Third, the research findings can provide plausible insights to address organisational inhibitors identified by Gümüsay & Bohné (2018) in developing entrepreneurial competencies in academic contexts. More specifically, the findings support the idea that entrepreneurial competitions help overcome relational inhibitors in giving appropriate networks and good contacts for improving ODC. Moreover, these interventions can provide plausible solutions to structural inhibitors related to access to entrepreneurial skills and knowledge processes that enhance ODC.

5.3.2. Championing Competency

By analysing the different non-traditional new ventures that were evaluated in this research, most entrepreneurial projects developed Championing Competency (CC). From the empirical analysis, it was possible to identify different institutional, interpersonal and intrapersonal mechanisms that favoured or hindered its

development. The main findings of enablers and barriers related to CC are summarised in Figure 8.[6]

From the institutional perspective, this research provides evidence that supports and expands the idea suggested by Treanor et al. (2020) that an entrepreneurial contest such as Ingenuity19 has several positive impacts on CC, adding that similar findings were observed in the neglected research context of an entrepreneurial transdisciplinary competition. Four main institutional mechanisms were identified as enablers to this competency. First, scholars have argued that entrepreneurial contests present an appropriate motivational context for participants, which is based on a competitive spirit (R. Russell et al., 2008; Treanor et al., 2020), prizes and awards, and the public exposition of successful projects (R. Russell et al., 2008). Considering the motivational character of Championing as an entrepreneurial competency (Rasmussen et al., 2011; Rasmussen & Wright, 2015), the findings support the idea that a highlighted performance of university entrepreneurs in the contest was crucial in developing CC. Moreover, while Brentnall, Rodríguez & Culkin (2018) have raised concerns about competitions as de-motivating activities for those losing in the contest, the research evidence suggests that those participants who did not receive awards in the contest (from the cases of this study) did not diminish their motivation to pursue an entrepreneurial venture due to this result.

Second, previous research has shown that the presentation of successful role models of entrepreneurs such as guest speakers and mentors has a positive effect in creating an entrepreneurial identity (Treanor et al., 2020) and in generating changes in attitudes and intentions related to entrepreneurship (Souitaris et al., 2007). Similarly, it has been argued that trust and respect enhance transdisciplinary interactions (Ray, 1998; Stokols, Misra, Hall, et al., 2008; White et al., 2009).

[6] References are included to clarify where this research has supported prior work (Red font: Literature related to Entrepreneurship and Academic Entrepreneurship; Black Font: Literature related to Transdisciplinarity and collaboration)

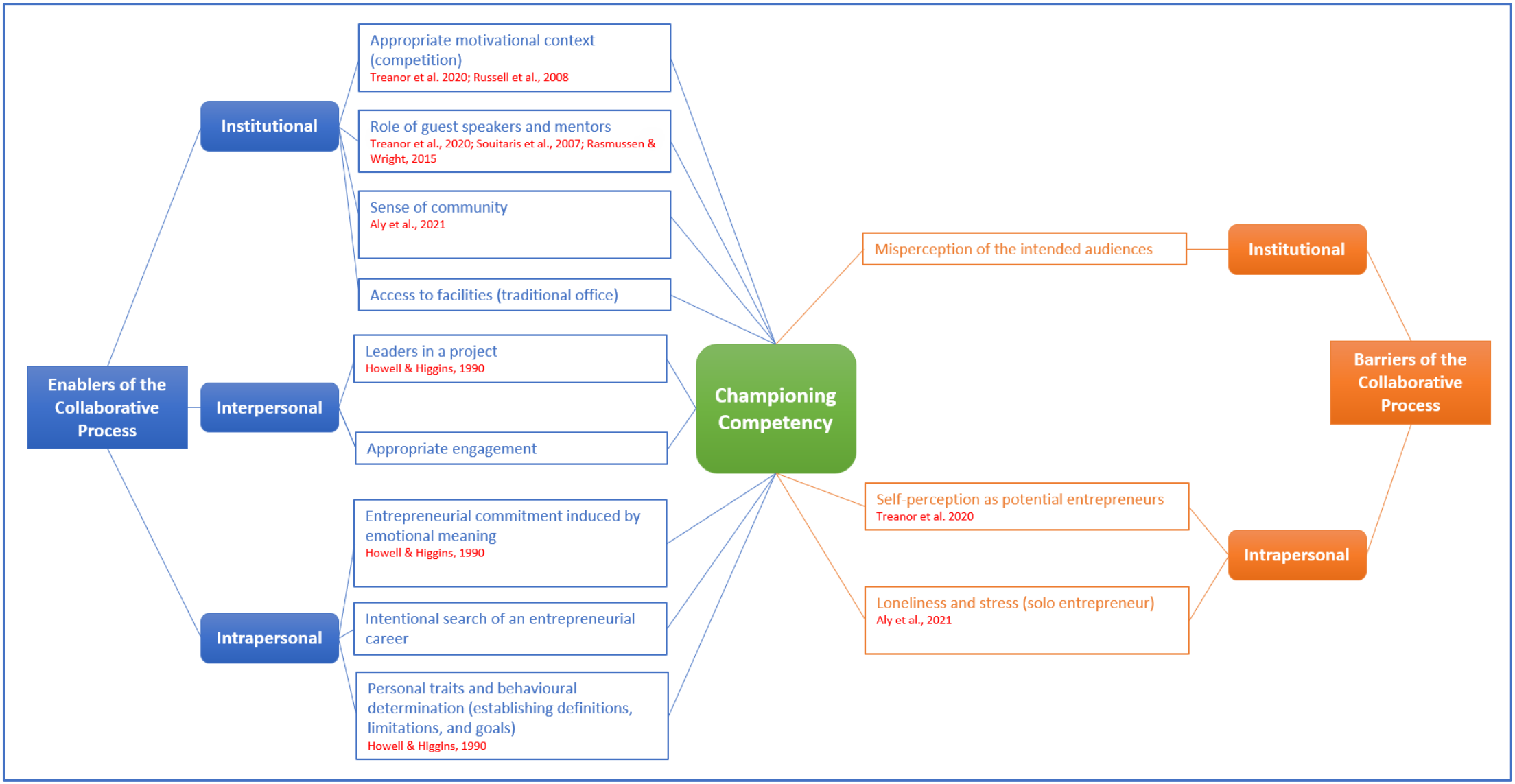


Fig. 8 Enablers and barriers related to CC

This research reports evidence that participants of Ingenuity19 who are (1) students from different academic disciplines or (2) individuals from the surrounding community were also inspired by guest speakers, mentors and advisors. In this sense, participants have confidence in the experiences of their interlocutors. Their roles and experiences helped overcome mental barriers regarding participants' self-confidence and identity as entrepreneurs and motivate and inspire university entrepreneurs to pursue an entrepreneurial venture. In the same vein, it has been argued the championing role can be played by several persons within the university or even by individuals from the external network of the institutions (Rasmussen et al., 2011; Rasmussen & Wright, 2015). This research provides more detailed evidence about the role of mentors and advisors later in the venturing process, highlighting the evolving character of entrepreneurial competencies and showing that the impact of their contribution goes beyond the days of the competition. Figures 10 and 11 illustrate the evolutionary aspects of competency development from pre-competition to post-competition.

Third, CC was also affected by the infrastructure available for university entrepreneurs after the competition. It has been argued that the entrepreneurial process comes with discouraging emotional challenges manifested as depression, loss of intrinsic drive, loneliness, self-doubt and fear of failure (Aly et al., 2021). The findings suggest the critical role of institutional facilities as a safe space where university entrepreneurs could feel a sense of belonging to a community and find emotional support in difficult moments of the entrepreneurial journey. Those insights expand the arguments of championing competency from an evolutionary perspective (Rasmussen et al., 2011), including the idea of champions providing emotional meaning and energy (Howell & Higgins, 1990) when university entrepreneurs can suffer from ups and downs in motivation. In those situations, the Ingenuity Lab helps overcome challenging psychological moments.

Fourth, related to the human agency aspect of CC (Rasmussen & Wright, 2015), the access to facilities providing an appropriate space to work generated a feeling of having a traditional job. As a result, those facilities contributed to defining

intentional actions as purposeful, goal-directed activities, manifested in university entrepreneurs designing work routines that facilitated the project's development.

However, the findings also showed some institutional barriers that affect the development of CC. While Ingenuity19 and the university as an institution have made efforts in promoting an entrepreneurial ecosystem with the participation of academic and non-academic actors, the engagement of external actors as participants in the competition is proportionally less than students from the institution hosting the competition. Although this is an expected finding, non-university participants and mentors report two significant weaknesses in generating a more effective participation mechanism. As an activity carried out in a university context and based on the opinion of some mentors and participants (see Chapter IV), it could be possible that individuals think that it is a contest made for students. In the same vein, it could be perceived within the university community as an activity for students from the business school and its related subjects because of the commercial focus. The barrier that arises is a misperception of the intended audiences and participants of the contest. In this sense, institutional efforts should generate effective communication strategies with all stakeholders who could participate in entrepreneurial contests, clarifying the openness to different participants' profiles to motivate a broader spectrum of participants.

Regarding interpersonal mechanisms that were observed in developing CC, the findings suggest that projects performed better when team members made thoughtful decisions concerning an appropriate engagement with the entrepreneurial project. In this vein, a mechanism that helped this competency was that those team members who were genuinely interested in developing the entrepreneurial idea kept actively working on the project. At the same time, those individuals who had other interests left the teams. In turn, the findings suggest that nascent projects in an academic context require a leader who fulfils the function of finding new members for the project, according to the resource needs that arise. In this sense, the findings support the idea that leadership behaviour plays a significant role in developing this entrepreneurial competency (Howell & Higgins, 1990).

This research also provides insights into intrapersonal factors in a collaborative process that affect CC development. First, the findings support the idea of Howell & Higgins (1990) and the perspective of entrepreneurial commitment induced by emotional meaning, showing that, in some university entrepreneurs, emotional or psychological factors triggered the decision to pursue an entrepreneurial opportunity. Likewise, as a human agency attitude, the intentional search for an entrepreneurial career seems to be distinctive in the successful cases under study. Second, extending the idea of personality characteristics affecting CC (Howell & Higgins, 1990), the findings suggest that university entrepreneurs' behavioural determination could positively impact this competence, which helps the entrepreneurial process. It is manifested by establishing definitions, limitations and goals in their non-traditional new ventures resulting in a specific behaviour that responds to that challenge. Third, nascent entrepreneurs' traits may facilitate the ability to engage and commit to the venture and, consequently, to overcome challenging moments in the entrepreneurial process. Hence, as a motivational aspect related to personality traits and human agency, those individual factors seem to play a role in ensuring that entrepreneurial projects continue working after the competition.

On the other side, this research also provides evidence explaining how CC was negatively affected by intrapersonal factors observed in this collaborative setting. First, in line with Treanor et al. (2020) and the idea of the threat to social identity, findings suggest that individuals may experience difficulties in self-perception as potential entrepreneurs, associated with a subsequent feeling of an imposter. Similarly, as explained before in the institutional mechanisms, the university context where this activity occurs could be a barrier for those individuals who do not belong to the academic community. The findings also provide evidence about the difficulties for those projects developed by a single entrepreneur. In this sense, the lack of support from a team generates moments of loneliness and stress, which hinders the development of this particular competence and, consequently, the entrepreneurial process. However, as previously discussed, an environment of collaboration and dialogue with other nascent and more experienced entrepreneurs contributes to counteracting this barrier at the individual level. Finally, after the competition, the motivation of some participants

to keep working on their ventures was affected by personal circumstances, such as the need for a permanent financial income, which forced them to abandon the projects.

In summary, this research provides evidence supporting the idea that CC can be developed in a novel evaluation context, such as an entrepreneurial transdisciplinary competition. Moreover, the findings explain how institutional, interpersonal and intrapersonal factors affect CC. This research extends previous findings on institutional mechanisms that enhance CC development (Rasmussen & Wright, 2015). The findings suggest that entrepreneurial activities with the involvement of a broader university community and its stakeholders, as well as subsequent access to organisational structures and intermediaries that assist university entrepreneurs, facilitate support processes from different academic and non-academic actors, who play the championing role at the initial stages of the new venture. Considering the non-static character of entrepreneurial competencies, the institutional assistance carried out through these intermediaries is also relevant to providing emotional support to university entrepreneurs. In line with Bergmann et al. (2018) on the importance of competitions in universities and their entrepreneurial ecosystems, the participants commented that all these institutional factors contributed to establishing a better entrepreneurial climate. From an interpersonal perspective and overlapping with intrapersonal factors, CC is highly influenced by university entrepreneurs' commitment, facilitating collaborative work within entrepreneurial teams and the development of non-traditional new ventures carried out by a solo entrepreneur.

The research findings have several implications for a comprehensive understanding of the development of CC within the current academic context. First, this combination of findings supports the premise that the current entrepreneurial ecosystem should consider a broader spectrum of actors involved in entrepreneurial activities (Siegel & Wright, 2015; Wright et al., 2017), particularly recognising a key role of students, graduates and individuals from outside the university in championing non-traditional new ventures developed within universities (Rasmussen & Wright, 2015). Second, considering

entrepreneurial contests as a novel research area for the study of entrepreneurial competencies, these findings are consistent with those reported by Treanor et al. (2020) about the development of CC. However, this research expands the findings beyond doctoral and postdoctoral researchers, including undergraduate and postgraduate students, graduates and participants from the community. Thus, it can be suggested that an entrepreneurial contest with a transdisciplinary approach allows the development of CC. Third, in line with the perspective of Howell & Higgins (1990), this research raises the possibility that the development of this competence could also depend on the individual characteristics of university entrepreneurs. Therefore, academic entrepreneurs' individual features should be considered when universities promote the development of entrepreneurial competencies among their communities. Finally, it is essential to recognise that according to the definition of CC as an entrepreneurial competence in an academic context (Rasmussen et al., 2011; Rasmussen & Wright, 2015), scholars have linked it to the ability to include new members to entrepreneurial teams. However, the evaluated projects' context did not allow for the inclusion of elements associated with this extended definition. Hence, the findings related to this competence are mainly linked to mechanisms observed in university entrepreneurs regarding motivation and human agency manifested as an impetus or a driving force in the evolving process of developing a non-traditional new venture (Rasmussen et al., 2015).

5.3.3. Resource Acquisition Competency

Scholars have argued that a resource-oriented perspective has expanded resource-based theory boundaries in the entrepreneurial academic context, mainly how academic entrepreneurs obtain and combine the needed resources to move forward academic new ventures (Gümüsay & Bohné, 2018; Rasmussen et al., 2011). This research provides a better understanding of how university entrepreneurs and their non-traditional new ventures can develop Resource Acquisition Competency (RAC) in the particular context of a transdisciplinary collaborative programme such as Ingenuity19. From the empirical analysis, it was

possible to identify institutional, interpersonal and intrapersonal mechanisms that favoured or hindered this competence development. The main findings regarding enablers and barriers and their links with RAC are summarised in Figure 9.[7]

From an institutional perspective, the findings support the idea that organisational structures and programmes have a pivotal role in the emergence of this competency in getting initial resources from within and outside the universities (Rasmussen & Wright, 2015; Wright et al., 2017), specifically to non-traditional new ventures in early phases of development. First, scholars have argued about the importance of access to financial resources to create new ventures (Jones et al., 2013; Treanor et al., 2020), which has also been highlighted as one of the main incentives and benefits to participants of entrepreneurial competitions (Fichter & Tiemann, 2020; R. Russell et al., 2008). This research confirms the importance of initial funds to the contest winners, in that such funds were essential for them to decide to participate in the competition and for further development of their projects. All new ventures that received a monetary reward reported that the prize was spent in activities directly related to the project, even though there was no obligation to do that. Thus, it can be suggested that the monetary awards fulfil the purpose of encouraging the development of non-traditional new ventures.

Second, as aforementioned, prior studies have argued the importance of organisational structures in entrepreneurial ecosystems such as incubators and accelerators in terms of providing a physical space to work, in addition to another immaterial resource that can be offered through these intermediaries such as managerial advice and entrepreneurial mentoring (Boh et al., 2016; Hayter, Nelson, et al., 2018; Lyons & Zhang, 2018; Mustar & Wright, 2010; Peters et al., 2004; Rasmussen & Sørheim, 2006; Wright et al., 2017). The findings are in accord with those studies, confirming that the impact of access to facilities is relevant to creating an appropriate workspace for university entrepreneurs, who

[7] References are included to clarify where this research has supported prior work (Red font: Literature related to Entrepreneurship and Academic Entrepreneurship; Black Font: Literature related to Transdisciplinarity and collaboration)

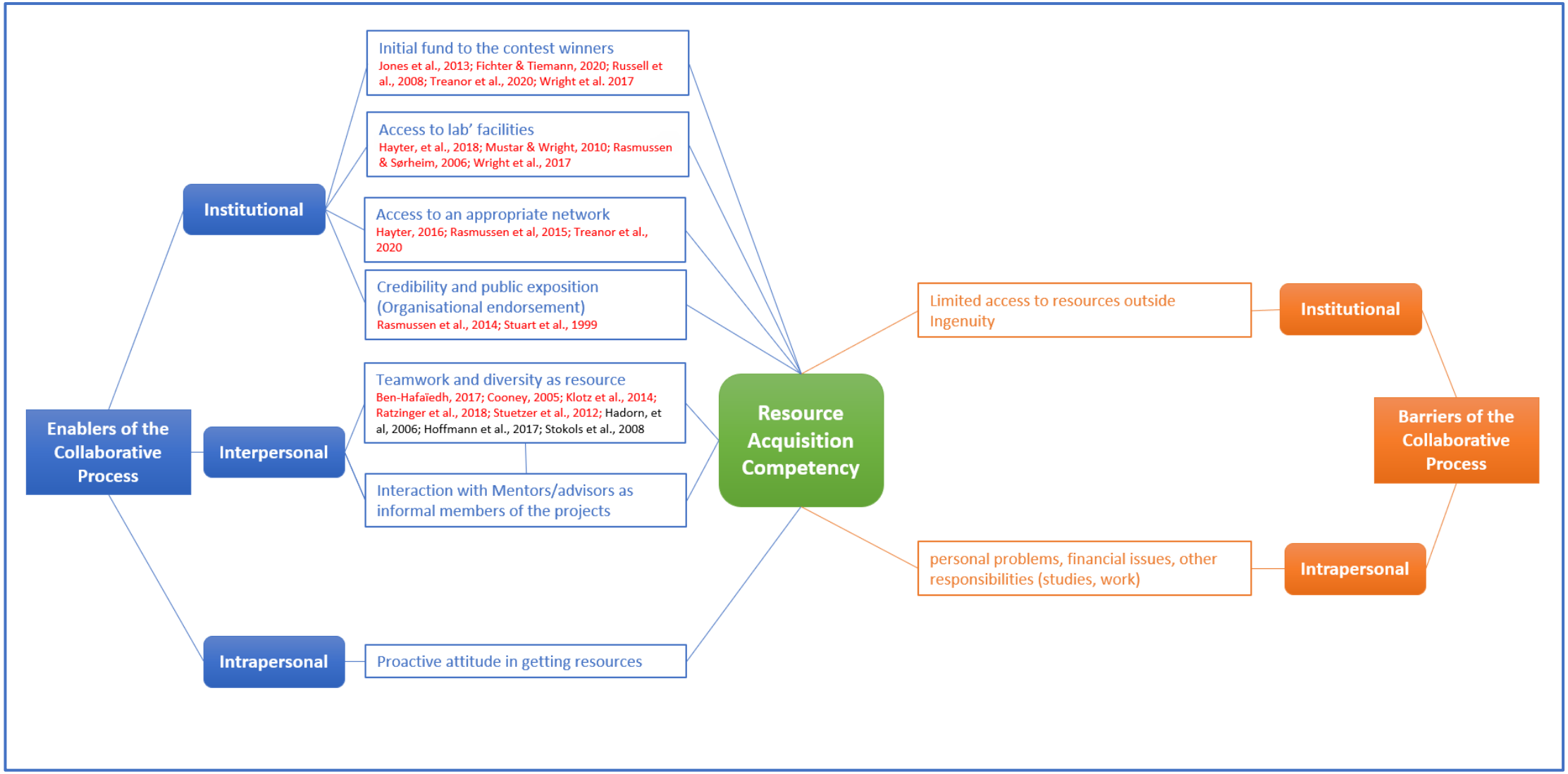


Fig. 9 Enablers and barriers related to RAC

value this space as a resource for the development of their non-traditional new ventures.

Third, recently scholars have pointed out the importance of competitions as entrepreneurial interventions that can compensate network deficiencies in nascent new ventures in an academic context (Treanor et al., 2020). Overlapping with the report on ODC, the findings support this idea, showing that Ingenuity as an organisational structure provides university entrepreneurs with networks that facilitate reaching the right individuals, acting as a relational enabler. As a result, it has allowed access to new sources of resources. The latter is essential given that it can be a plausible mechanism to counteract constraining relational inhibitors that have been previously identified in academic contexts related to nascent entrepreneurs and their connections to individuals with entrepreneurial or academic experience (Gümüsay & Bohné, 2018; Rasmussen et al., 2014).

Following (Hayter, 2016b), an institutional intervention such as Ingenuity19 (competition) and the Ingenuity Lab (incubator) allows university entrepreneurs to build a social network composed of academic actors such as staff from the university entrepreneurship ecosystem (the lab), graduate students and faculty researchers as well as non-academic actors as advisors and potential investors. Besides, this research suggests that this social network should also consider other university entrepreneurs who share the Ingenuity Lab's physical space, who through their recent practical experience provide advice related to the establishment and managerial operation of non-traditional new ventures in the initial stages of development

Fourth, this research also provides evidence on the relevance of institutional support to obtain legitimacy with external actors. Being one of the finalists of this programme generates a positive image of the projects among stakeholders regarding their potential for success. As a result, projects obtain additional resources or generate alliances with external actors that facilitate their developmental processes. Therefore, extending the idea of an inter-organisational endorsement (Rasmussen et al., 2014; Stuart et al., 1999), the evidence suggests that being a winner of these types of interventions plus the support of the lab (incubator) provides an endorsement that generates credibility

to establish contact with actors outside the university. Thus, projects can gain trust from non-academic actors that contribute valuable resources to non-traditional new ventures. However, from the findings, it is not possible to explain if those institutional structures facilitate access to resources from other university units (departments, schools, TTOs).

Regarding interpersonal factors that were identified as mechanisms that facilitated RAC, this research extends the arguments of scholars about the benefits of entrepreneurial teams in developing new ventures, highlighting the vital role that diversity and prior experience play during the entrepreneurial process (Ben-Hafaïedh, 2017; Cooney, 2005; Franke et al., 2008; Klotz et al., 2014; Ratzinger et al., 2018; Stuetzer et al., 2012). Nonetheless, it is important to recognise different positions about heterogeneity in academia because it is also associated with a complex relation of cost and benefits for team performance (Amason et al., 2006; Hambrick et al., 1996). What findings suggest is that for non-traditional new ventures in an academic context, RAC can be enhanced by access to heterogeneous team members formally included in the firm or mentors/advisors that indirectly are involved in developing the entrepreneurial project. However, new ventures must consider that diversity characteristics can be a double-edged sword in developing entrepreneurial projects. As reported in Chapter IV, in line with the resource-based view (Alvarez & Busenitz, 2001; Barney, 1991) and transdisciplinarity perspectives (Hadorn et al., 2006; Hoffmann et al., 2017; Stokols, Misra, Hall, et al., 2008), disciplinary diversity and prior experience provide a wide variety of knowledge and viewpoints, allowing teams to delegate tasks focused on individual strengths. As a result, teams perform better in executing tasks that require specific knowledge addressed by an educational or professional background of university entrepreneurs, for example engineers defining technical aspects of the project, students from the business school projecting financial viability or marketing strategies, or individuals from the school of English that can write and edit official documents or applications for entrepreneurial competitions/grants. Therefore, having greater human resources availability is crucial to generate an appropriate division of tasks focusing on critical activities to develop the new ventures' core needs. Furthermore, as already discussed in the institutional factors, the evidence

suggests the importance of a transdisciplinary intervention, such as Ingenuity19, to generate a context that allows better access to these sources of specific knowledge, improving interactional processes.

From an intrapersonal perspective and following a similar approach of individual characteristics that positively impacted the ODC and CC, the findings also support the idea that personality traits could affect the development of RAC, being significant for projects developed by a solo entrepreneur. Showing overlaps with the development of the competencies previously discussed, this research provides evidence suggesting that an effective mechanism in getting additional resources requires university entrepreneurs' proactive behaviours. Building on the definition of competency of Danneels (2002) and the stance of Alvarez & Busenitz (2001) on the role of knowledge in entrepreneurship, this research argues that knowledge is an intangible resource necessary for developing a non-traditional new venture. Thus, an intrapersonal mechanism that positively affects this competence was observed in university entrepreneurs allocating time to acquire that specific expertise. Similarly, when individual efforts cannot reach material or immaterial resources, university entrepreneurs need proactive behaviours to acquire them from external individuals or organisations.

However, the evidence also reveals RAC inhibitors at the intrapersonal level. As aforementioned, this type of intervention invites students or individuals outside the university to present entrepreneurial ideas. For example, personal financial needs and additional responsibilities (studies, work) were the main reasons for not keeping working on the projects. Therefore, the lack of financial resources at the individual level is critical for project desertion.

This research provides evidence supporting the idea that RAC can be developed by university entrepreneurs and non-traditional new ventures that emerge within universities. Three main implications regarding RAC can be argued considering the research findings. First, in line with ODC and CC's development, this research expands previous findings on institutional mechanisms that enhance RAC development (Rasmussen & Wright, 2015). The findings suggest that these novel forms of non-traditional new ventures, programmes and competitions that provide soft grants, physical resources (facilities) in the university and public exposition

(branding and legitimacy) have a direct and key role in developing RAC. Second, this research argues that these institutional mechanisms effectively create beneficial networking to participants, resulting in different potential sources of material and immaterial resources. Third, the findings suggest the important role of diversity in disciplinary and professional backgrounds, considered an immaterial resource to non-traditional new ventures. In this vein, this research confirms the stance of Treanor et al. (2020) regarding developing knowledge-based resources using cross-disciplinary approaches in entrepreneurial competitions. In this sense, a transdisciplinary programme seems a plausible way to encourage the interaction of university entrepreneurs with academic and non-academic actors who can contribute with their knowledge and expertise as a valuable resource to fill the lack of entrepreneurial experience and technical/managerial knowledge.

In summary, the findings support the idea that the transdisciplinary context of an entrepreneurial contest generated enablers and barriers for the entrepreneurial process related to the development of entrepreneurial competencies. Building on Rasmussen et al. (2011), ODC, CC and RAC were impacted by institutional, interpersonal and intrapersonal factors. This research confirms the stance that entrepreneurial competencies can be developed within an academic setting and that it is an evolutionary process where the contribution was the identification of mechanisms that can facilitate and inhibit their development. Based on the above, Figures 10 and 11 offer an illustrative guide to the implications argued for each competency. Two principal insights from the discussion are proposed. First, the developmental mechanisms are bound to the three factors (institutional, interpersonal, intrapersonal) that shape entrepreneurial competencies development. Second, different mechanisms are observed in different stages of the entrepreneurial contest and the entrepreneurial process on university entrepreneurs within an academic context after their participation within the entrepreneurial intervention. Therefore, these findings support the evolutionary and multilevel perspective of entrepreneurial competency development (Gümüsay & Bohné, 2018; Rasmussen & Wright, 2015), which are discussed as follows.

5.4. Implications for Academic Entrepreneurship for Research and Educational Practice

This section discusses the implications of the findings for academic entrepreneurship research and entrepreneurship education as practice.

Regarding the evolutionary aspects of competency development observed in this context, evidence supports previous research findings of competencies being developed in parallel, where different interactive processes impact their later result (Rasmussen et al., 2015). In this regard, Figures 10 and 11 illustrate no particular order in how those competencies were developed in the entrepreneurial projects, and the multiple factors (institutional, interpersonal, intrapersonal) that affected their creation and development.

Concerning ODC, the findings show that entrepreneurial ideas mainly emerged under two circumstances: academic work that students carried out as part of their academic programmes and personal/professional experiences that trigger the identification of potential entrepreneurial opportunities. However, this initial conceptualisation was not strong enough to start an entrepreneurial process. In all cases, Ingenuity19, based on the entrepreneurial methodology and the access to the mentoring process with academic and non-academic actors, played a key role in the early stages to frame the idea into an entrepreneurial opportunity. At the same time, this competence was also affected by teamwork dynamics that contributed to refining the initial idea, where disciplinary aspects related to knowledge diversity are highly recognised as a central enabler of the process. In parallel, evidence supports the idea that an intentional search for specific knowledge was also required as the project progressed. Later in the process, for those projects that had the opportunity to be accepted into the Ingenuity Lab, the interaction with mentors that materialised in close professional relationships was essential to continue improving participants' business projects. Concurrently, this organisational infrastructure was important to allow the initial bridges with actors outside the university that also affected the development of ODC.

Regarding the evolutionary aspects of CC, as a starting point of this competence, the evidence shows that before Ingenuity19, some participants reported an emotional involvement with the idea.

This is mainly related to individual experiences that motivated them to find a solution for a particular issue as well as an intentional search for an entrepreneurial career. In some cases, the emotional aspect is highly connected with an entrepreneurial project with a social impact (access to water/food, solutions to individuals with disabilities or psychological illnesses). The importance of those individual factors resides in the fact that they are present during the entire entrepreneurial process. At the moment of the competition, CC is affected by the motivational context of Ingenuity19, which can be explained by the competitive spirit of the intervention and the different activities, where participants are exposed to successful entrepreneurial models. Mainly, a good performance in the competition (becoming finalists) encourages university entrepreneurs to keep working on the projects. In terms of teamwork, under the activities of Ingenuity19, CC is positively impacted by a clear leader who can encourage an adequate engagement of team members. Later in the process, this competence keeps evolving, influenced by the Ingenuity Lab as a support community, where university entrepreneurs find emotional assistance. Moreover, the evidence supports the idea about mentors and advisors as external individuals of the projects that can provide CC indirectly (not formally as members of the entrepreneurial projects).

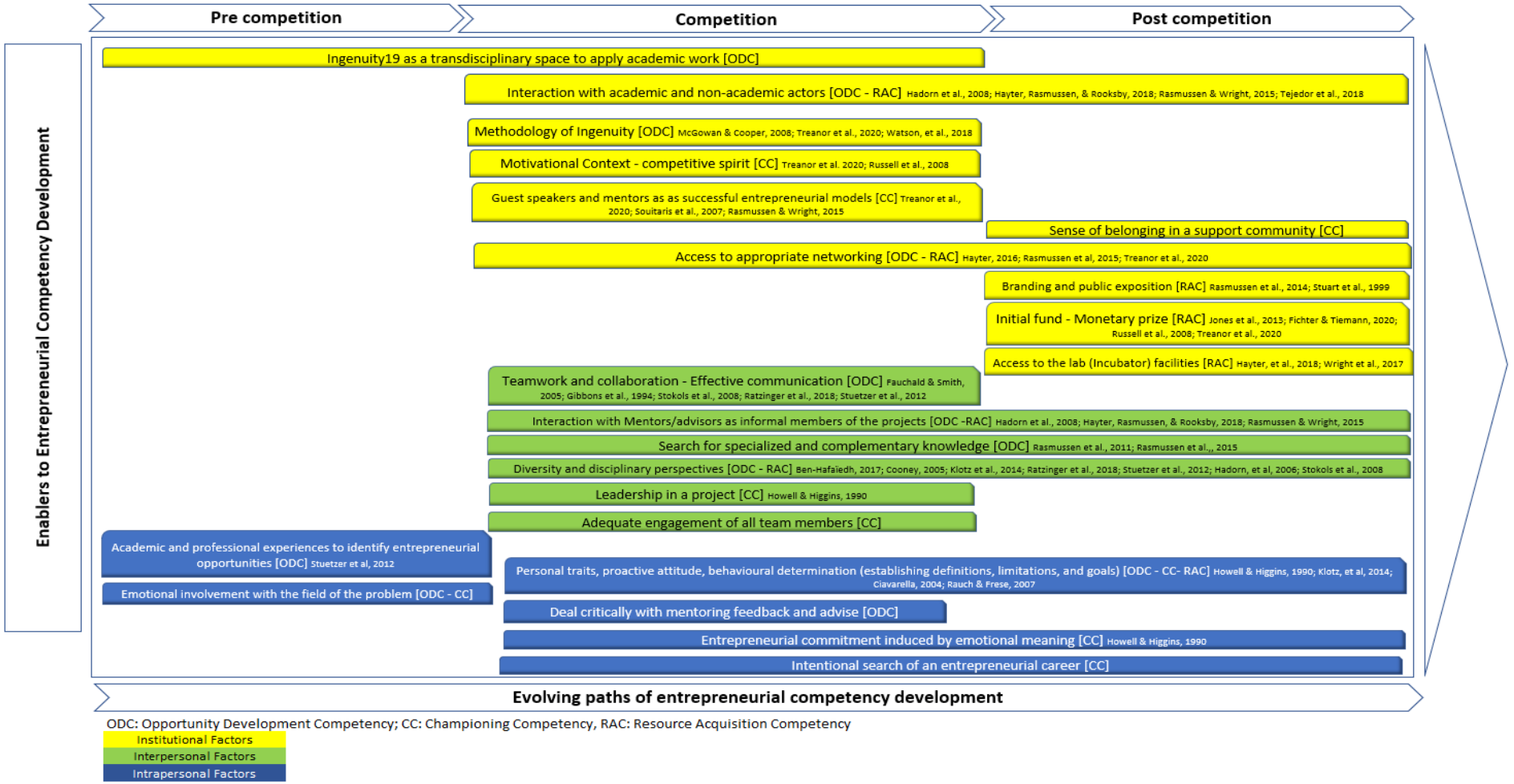


Fig. 10 Evolving paths of entrepreneurial competency development (Enablers)

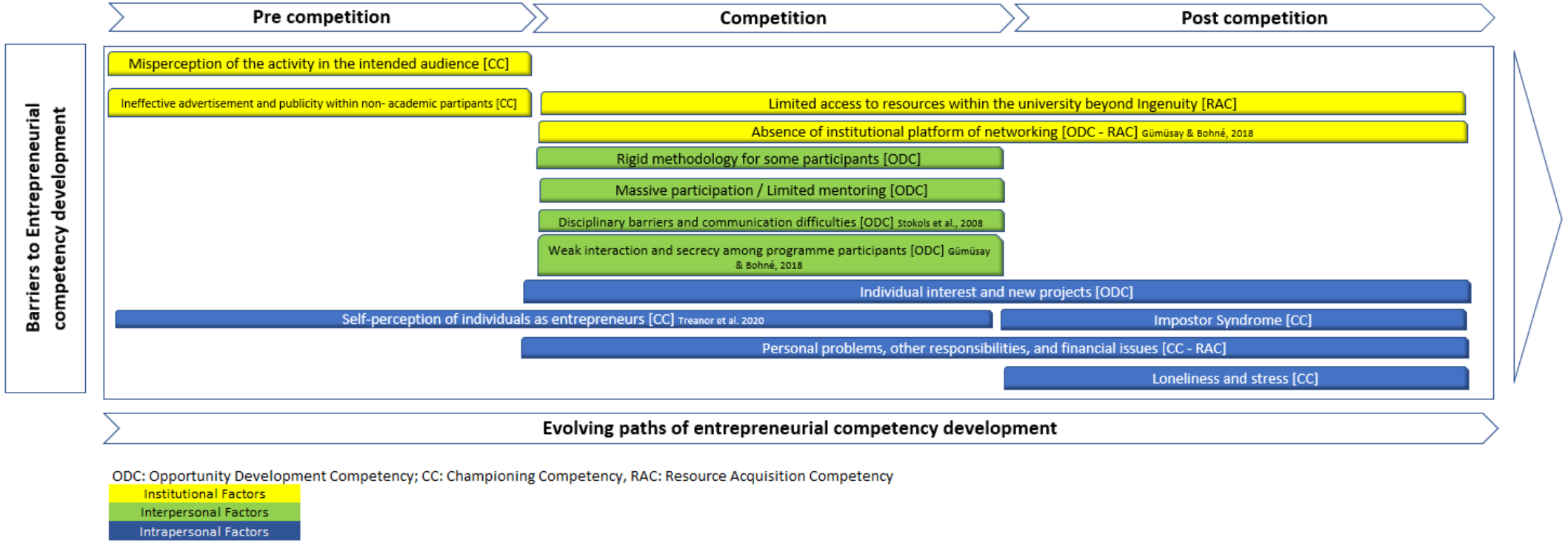


Fig. 11 Evolving paths of entrepreneurial competency development (Barriers)

Related to the evolutionary paths of RAC, and different from the patterns mentioned above, the evidence shows that this competency has emerged since Ingenuity19 started. University entrepreneurs did not report any information linked to RAC development before the intervention. Nonetheless, once Ingenuity19 began, this competence started to be constructed through interactive mentoring and professional advice processes that work as an immaterial resource to the project. At the same time, those activities also nurtured this competency by giving access to networks outside the university that will be fruitful to get new resources for the non-traditional new venture. Finally, after Ingenuity19, RAC was positively impacted by three main elements. First, once Ingenuity19 finished, the year's winning projects received a monetary prize that was the initial fund for new ventures for most of the winners. Second, the increase of credibility that ventures obtained after their highlighted performance in this intervention (public exposition and branding of the project) allowed the possibility that some projects could obtain additional resources or generate new alliances with external organisations to develop their non-traditional new ventures. Third, access to the Lab facilities was key in providing the entrepreneurial projects with an appropriate free-of-charge space to work professionally.

Comparing those findings with previous longitudinal research evaluating the evolving paths of entrepreneurial competencies within academic contexts (Rasmussen et al., 2011, 2015), it is possible to find meeting points. For example, those studies argued that the ODC could be influenced over time by establishing weak ties with industry partners or individuals with industry experience who can provide valuable insights to find potential market opportunities, while strong ties are essential later to refine the opportunity. This research shows similarities in terms of the evolving process. However, the role of industry partners is played by mentors and advisors, who are part of the Ingenuity environment. The evidence supports the idea that university entrepreneurs and mentors' relationships increase as the project progresses. As a result, the role of those actors and their contribution to the entrepreneurial project becomes more visible and relevant.

Regarding Championing, those findings support previous studies that have conceptualised this competency as a driving force that induces commitment and emotional meaning to the idea (Rasmussen et al., 2011, 2015). From an evolving perspective, this research supports this stance, considering the driving force as a motivational pattern manifested from the beginning of the entrepreneurial process. Moreover, the findings show that external individuals, as third parties outside formal members of the entrepreneurial projects, are needed to reach a sustainable CC as the non-traditional new ventures reach maturity (Rasmussen et al., 2011). In this sense, mentors and advisors of Ingenuity played the role of *godparents,* as noted by Rasmussen et al. (2015), who at the beginning of the competition represented weak ties of the network of the non-traditional new ventures, but later in the process became informal champions of the projects. Finally, related to RAC, these findings further support the idea of getting initial resources from familiar sources within the university context and later obtaining new ones from external actors as the non-traditional new venture is gaining credibility (Rasmussen et al., 2015).

In sum, the findings show similarities in terms of the evolutionary aspects of the three entrepreneurial competencies within an academic context. However, it is important to highlight some differences between non-traditional new ventures developed within a transdisciplinary academic context and the traditional ones. When it comes to ODC, it has been argued that university researchers have a central role in the early phases of entrepreneurial development and industry partners are more relevant later in the process. In this context, academic entrepreneurs possess networks with the industry, which evolve to become stronger ties at the end of the process (Rasmussen et al., 2015). The differences with the current research context could be explained partly by the lack of business experiences and networks that participants of this study had at the beginning of the entrepreneurial intervention. Nonetheless, Ingenuity19 helped overcome those deficiencies, where mentors emulate the role played by industry partners. In the same vein, and unlike with previous studies, this research shows that university entrepreneurs did not have strong ties in the university context, making it challenging to access complementary resources, in addition to those

provided by Ingenuity (competition and Lab). Likewise, it limited the possibility of recruiting new members for the non-traditional new ventures, who in turn could play championing roles.

In this sense, it is relevant to acknowledge the profile of the university entrepreneurs to understand the potential evolving path for competency development. Instead of being contrary to prior research (Gümüsay & Bohné, 2018; Rasmussen et al., 2011, 2015; Treanor et al., 2020), the findings shed novel light on offering complementary pathways to competency development in an underexplored group of university entrepreneurs. In doing that, this research argued that an environment such as Ingenuity19 and the later support of the Ingenuity Lab could offer plausible solutions to the weaknesses presented by university entrepreneurs by giving access to mentors that could contribute to the improvement of the business opportunity and champion the project and also by providing resources that would be difficult to obtain within the academic context. A synthesis of the research findings is delineated in Figure 12. This typology is based on the literature review presented in Chapter II, the description of the transdisciplinary research context of the University of Nottingham and Ingenuity19 presented in Chapter III, the data analysis presented in Chapter IV and the discussion mentioned above in this chapter. Building upon Wright & Siegel (2017) and their framework of the current ecosystem for student start-ups (P.911), Figure 12 proposes a new outlined framework of an entrepreneurial ecosystem for non-traditional new ventures linked to enablers and barriers for entrepreneurial competency development (Rasmussen et al., 2011; Rasmussen & Wright, 2015).

So far, it has been argued that this research provides evidence supporting the idea that in the current context of academic entrepreneurship (Siegel & Wright, 2015; Wright et al., 2017), a transdisciplinary and collaborative approach applied to entrepreneurial interventions is a plausible mechanism to enhance the development of entrepreneurial competencies. Moreover, a transdisciplinarity perspective allows the proposal of implications to academic entrepreneurship in three main areas. First, while little research has evaluated transdisciplinarity empirically within the academic

entrepreneurship context, scholars have pointed out this feature as a requirement for entrepreneurial universities (Urbano & Guerrero, 2013). In the same vein, the academic community has recognised universities' need to translate the generation of knowledge into economic and social development (Roux et al., 2017) and also to transform traditional academic entrepreneurial outcomes to results with societal impacts (Fini et al., 2018). As such, academic entrepreneurship represents a plausible bridge to reach that objective (Etzkowitz, 2003a), where a collaborative transdisciplinary approach can contribute to giving answers to significant social challenges that society is facing.

Bearing in mind the collaborative features of transdisciplinarity and the social concerns that it tries to solve (Lang et al., 2012), it seems reasonable to argue that it is an emerging area of practice (Lawrence, 2015; Stock & Burton, 2011) that could yield new insights to the field. Furthermore, in providing a definition of transdisciplinarity within academic entrepreneurship and empirically exploring the potential impact of this collaborative mechanism in an entrepreneurial intervention, this research raises the possibility that academic entrepreneurship develops activities under this approach to encourage the societal impact of its outcomes.

A second implication to the field is the acknowledgement and inclusion of new actors as university entrepreneurs. This research broadly supports that transdisciplinarity is an appropriate approach to address scholars' call to include a greater scope of actors currently involved in those types of activities within entrepreneurial ecosystems (Siegel & Wright, 2015; Wright et al., 2017). Building on Hayter et al. (2017), this research is a contribution to the field, considering that *"academic entrepreneurship research can no longer focus primarily on faculty. Instead a more encompassing view of entrepreneurial actors within a university context is required…*" (Ibid., P.1252), confirming that there are different agents of academic entrepreneurship, where students and alumni play important roles in developing new ventures within an academic context.

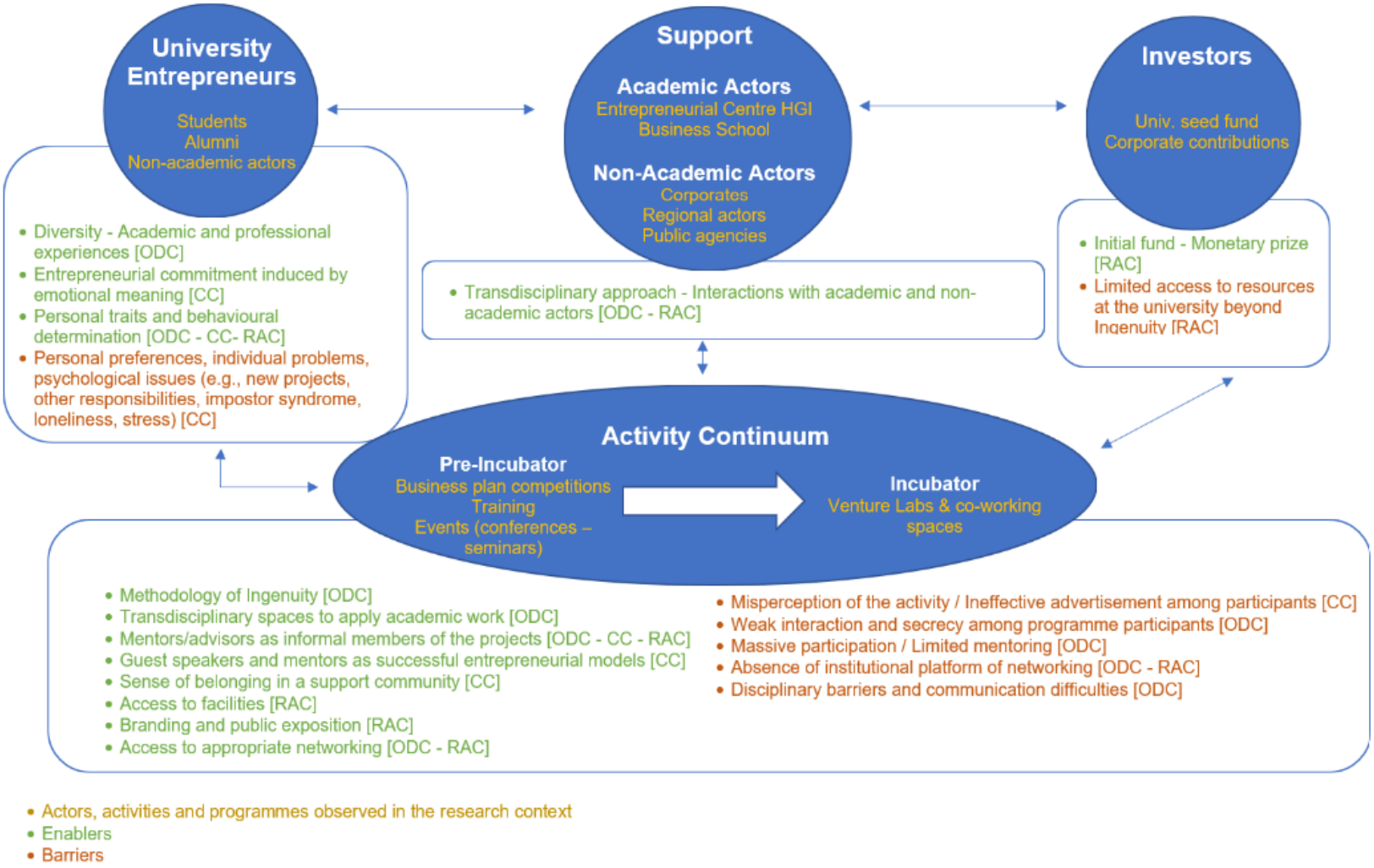


Fig. 12 Entrepreneurial ecosystem for non-traditional new ventures and its link with enablers and barriers for entrepreneurial competency development

Following Nabi et al. (2017) and the suggestion to explore the impact of academic entrepreneurship activities on different stakeholders, this research also argues that the novel context of transdisciplinarity allows the evaluation of the potential effect of entrepreneurial interventions in external agents of higher education institutions. As a result, a better comprehension of academic entrepreneurship as an embedded phenomenon in local and national contexts can be developed.

Third, based on Hayter, Rasmussen, et al. (2018), who called for expanding the research agenda on university technology transfer, this research helps to answer those research gaps, particularly in understanding how transdisciplinarity and entrepreneurial contests can act as an emerging pathway of technology transfer through personal interactions as well as to evaluate broader outcomes of these activities, regarding long-term impacts and the effect on multiple stakeholders.

The findings also have implications for educational, entrepreneurial practice. First, they suggest that an entrepreneurial competition could complement traditional entrepreneurial university training. Scholars have pointed out the relevance of entrepreneurial competitions to foster entrepreneurial thinking within universities, mainly to inspire the student community to develop entrepreneurial ideas and engage in entrepreneurial activities (H. Bergmann et al., 2018). As a possible answer to the research suggestions of Treanor et al. (2020) and Goethner & Wyrwich (2020), this research explored a non-compulsory entrepreneurship intervention, with a particular methodology and activities considering different disciplinary backgrounds at undergraduate and postgraduate levels and participants from the surrounding community. The findings offer an invitation to think about how programmes such as Ingenuity can be considered an alternative departure (voluntary enrolment) from traditional ways of entrepreneurial training in universities.

Second, previous research has shown a positive impact of entrepreneurship education in developing entrepreneurial skills and capabilities at different academic levels and disciplines (Muñoz et al., 2019; Munoz et al., 2011; Nabi et al., 2017). Similarly, scholars have pointed out the positive effects on entrepreneurial skills

development on the participants of entrepreneurial contests (Huster et al., 2017; R. Russell et al., 2008; Treanor et al., 2020; Watson et al., 2018). The research findings align with those studies, suggesting that those activities have also impacted participants' entrepreneurial skills. It is particularly important to argue that those types of interventions can effectively develop such skills as opportunity identification – evaluation and development, confidence, communication skills (pitching and public speaking) and business plan production, which can be helpful in future professional careers.

Third, traditional academic research, academic collaboration and academic entrepreneurial projects rely heavily on networking. However, postgraduate research students have few opportunities to develop these links within a conventional setting, which has been considered a neglected aspect within postgraduate education (Bienkowska & Klofsten, 2012; Lahenius, 2012). Moreover, it has been argued that postgraduate research students are under an isolated training process where they mainly build academic relationships with their supervisors but weak ties with other university actors (Wisker et al., 2007). This research provides evidence suggesting that activities such as Ingenuity can serve as a space for transdisciplinary collaboration that can nurture postgraduate research projects with entrepreneurial networks offered by those programmes that successfully help in the initial stages of development. Such programmes can also act as an open space to explore and develop entrepreneurial opportunites for applied research projects, contributing to spreading a vision of entrepreneurial science and technology that helps improve entrepreneurial universities (Bienkowska et al., 2016).

5.5. Implications for Policy

Policymakers and national governments have called for universities to be relevant actors in the design of national innovation systems (Carayannis & Campbell, 2009;

Grimaldi et al., 2011), having high expectations about the role of higher education institutions to become entrepreneurial organisations (Grimaldi et al., 2011; Gümüsay & Bohné, 2018; Siegel & Wright, 2015). In doing so, new venture creation within an academic context has been recognised as a visible form of academic entrepreneurship playing an important economic role (Gümüsay & Bohné, 2018; Rasmussen & Sørheim, 2006). Nonetheless, it is challenging for universities to provide adequate support for academic new ventures (Rasmussen & Wright, 2015). It is reflected in the United Kingdom figures, where the creation of spin-offs or academic new ventures is mainly concentrated in the top 50% of the country's universities, and showing a significant decrease during the last 15 years (Wright & Fu, 2015), which invites the academic community to think about better strategies to encourage new venture creation and development in the higher education system. In this context, the development of entrepreneurial competencies has been recognised as a valuable approach to understanding how academic entrepreneurs create and develop successful new ventures from universities (Rasmussen et al., 2011). Therefore, in the light of the research findings, it seems reasonable argue that there are implications for policy in terms of how universities can facilitate the acquisition and development of entrepreneurial competencies for university entrepreneurs and non-traditional new ventures.

Considering that the entrepreneurial competency framework is based on three different competencies, universities should not apply the same strategies to each to encourage development (Rasmussen et al., 2011). While it has been argued that ODC is indirectly influenced by policymakers (Rasmussen et al., 2011, 2015), this research suggests that an entrepreneurial intervention such as Ingenuity should be promoted in universities because it is fruitful in generating the interactions of university entrepreneurs with academic and non-academic actors who can contribute to their entrepreneurial development. It is because ODC relies on strong connections with other individuals (costumers, industry experts, other academics) who can provide insights into the projects. Nonetheless, beyond making a call for a specific activity such as Ingenuity, this research strongly supports the idea that

universities should define transdisciplinary collaboration policies, where the invited actors represent not only academia and industry but also the public sector and social organisations, which together can provide the necessary insights for better identification and refinement of entrepreneurial opportunities.

Regarding Championing, this competency has been associated with cultural factors that affect academic entrepreneurs (Rasmussen et al., 2011). In light of the findings, university policies should be focused on three main areas. First, improve internal communication mechanisms, generating an effective promotion capable of breaking down potential mental barriers of students outside business schools or programmes with a commercial emphasis. Second, improve the activity's promotion with the different stakeholders that could participate in this activity, transmitting a clear message that invites individuals outside the university environment to participate in an activity different to the framework of formal academic processes. Both suggestions could help establish a transversal culture of entrepreneurship within the university and show the institution as an open space for the community in the regional entrepreneurial ecosystem. Finally, in line with recent suggestions about implementing institutional strategies related to creating internal communities for emotional support during the entrepreneurial process (Aly et al., 2021), universities should also establish collaborative places where university entrepreneurs can work permanently. The purpose is to create a solidarity network with other individuals who are living the same experiences in order to generate not only a community where relevant information is shared for the development of their projects but also a place where they can find emotional support that allows them not to give up their entrepreneurial goals.

Regarding Resource Acquisition, this research further supports the idea that this competency is backed more directly by different university actors (Rasmussen et al., 2011). Furthermore, the findings provide evidence that Ingenuity, as an entrepreneurial intervention, and the Ingenuity Lab as a support unit (incubator) to the prize-winning projects in the competition, is well placed to facilitate the access and acquisition of resources, for example, by giving soft funding and providing

physical space to work. Therefore, in line with Rasmussen et al. (2011), universities should consider entrepreneurial activities such as the Ingenuity programme from a RAC perspective, to develop strategies to ensure access to material and immaterial resources that are key to the development of non-traditional new ventures under the current academic entrepreneurship context.

The findings also provide evidence that interventions such as Ingenuity can help decentralise entrepreneurial ecosystems in universities (Gümüsay & Bohné, 2018). Technology Transfer Offices have been recognised as a central point to access entrepreneurial competencies in institutions of higher education (Fini et al., 2017). However, due to the mixed evidence in the literature regarding the role of these units, it has been suggested that universities should diversify their entrepreneurial ecosystem, building capabilities within the entire organisation (Fini et al., 2017; Gümüsay & Bohné, 2018). Moreover, scholars have argued that the organisational size of universities is negatively related to the perceived support for entrepreneurial activities because it could be more challenging to find information or get support from mentors and advisors for non-traditional new ventures (H. Bergmann et al., 2018). Considering the research context as a large traditional university in the UK, the findings suggest that a platform such as Ingenuity can work as a complementary intermediary within an academic context (Hayter, 2016a), facilitating access to entrepreneurial resources, resulting in a more appropriate climate for entrepreneurship.

5.6. Chapter Conclusions

This chapter examined the research findings and their implications for entrepreneurial competencies as a research topic and academic entrepreneurship practice. This chapter argues that this research provides evidence confirming that the entrepreneurial competencies approach is an appropriate theoretical framework to explain how university academic entrepreneurs create and develop successful

non-traditional new ventures. Moreover, the findings support the idea suggested in previous studies that entrepreneurial competencies can be developed within an academic environment (Rasmussen et al., 2011; Rasmussen & Wright, 2015). Furthermore, the findings also provide new evidence to the academic entrepreneurship field from a neglected research context such as a transdisciplinary entrepreneurial competition summarised below.

In the light of the findings, it was possible to argue that this research provides insights for understanding better institutional, interpersonal and intrapersonal mechanisms that influence entrepreneurial competencies development. First, institutional factors are essential in providing an appropriate environment for the entrepreneurial process to flourish. From a transdisciplinary perspective, activities that promote academic and non-academic actors' interaction, generate a competitive motivational context within an entrepreneurial contest, provide entrepreneurial projects with the initial soft fund and give further support to the prize-winning projects after the competitions seem to be key to entrepreneurial competency development. Second, interpersonal factors related to collaboration, diversity and teamwork generated mechanisms that were beneficial for developing the three competencies. Third, from the individual level of university entrepreneurs, this research suggests that intrapersonal factors, such as personal traits and proactive attitudes, should be considered in a comprehensive understanding of entrepreneurial competencies development. Based on the above, and following Rasmussen et al. (2011), this research provides evidence that supports the idea that the development of entrepreneurial competencies is affected by several actors, complementing prior research on competency development that was mainly focused on the individual characteristics of entrepreneurs.

This chapter also discussed implications for academic entrepreneurship as a research area. The transdisciplinarity approach used to examine the research question and objectives responds to the call of contemporary scholars to evaluate novel research contexts in academic entrepreneurship, considering the current features of this phenomenon in academia (Fini et al., 2018; Hayter et al., 2017; Nabi

et al., 2017; Siegel & Wright, 2015; Wright et al., 2017). Regarding educational practice, it was argued that the research findings provide evidence that transdisciplinary perspectives can complement traditional entrepreneurial training in universities, helping to integrate the academic community as a whole to develop individual entrepreneurial skills.

Finally, the findings allowed discussion regarding implications for policy in higher education institutions. From the policy perspective, promoting entrepreneurial competitions and the subsequent support of an institutional structure as the Ingenuity Lab can contribute as additional intermediaries in diversifying entrepreneurial ecosystems in universities.

The following chapter presents the main conclusions of this research. Furthermore, research limitations will be recognised, and potential areas for further research will be proposed.

Chapter VI: Research Conclusions

The development of Entrepreneurial Competencies within an academic entrepreneurial intervention from a transdisciplinary perspective

6.1. Chapter Introduction: Research Overview

There is a growing body of literature that recognises the importance of entrepreneurship as an economic activity. In this sense, universities have emphasised that entrepreneurship is one of the main activities harmonising the traditional educational character of higher education institutions with their role of active actors in regional and national economies (Grimaldi et al., 2011).

In this context, the study of academic entrepreneurship as a research area has been focused on providing a better understanding of the role of modern universities in activities that go beyond the generation of knowledge, specifically in those that contribute to creating a productive entrepreneurial ecosystem (Guerrero & Urbano, 2012). Thus, the study of entrepreneurial competencies has emerged as a research topic in academic entrepreneurship to explain how entrepreneurial activity, manifested in the generation of new ventures, is developed.

In this vein, several scholars have pointed out the relevance of entrepreneurial competencies as a theoretical framework and examined it empirically. Much attention has focused on this research topic as a specific set of competencies that are relevant to the exercise of successful entrepreneurship (Mitchelmore & Rowley, 2010). In this sense, research has addressed the phenomenon of entrepreneurial competencies in practising entrepreneurs (Chandler & Jansen, 1992; Hayton & Kelley, 2006; Man et al., 2002) or those who are carrying out entrepreneurial activities in an academic context (Gümüsay & Bohné, 2018; Rasmussen et al., 2011). As a result, the theoretical framework of entrepreneurial competencies has provided insights into how entrepreneurs can create successful new ventures in traditional or academic settings.

Regarding the study of this field within educational settings, research on the subject has been mostly restricted to a limited inclusion of the traditional actors historically involved in academic entrepreneurship, providing evidence that those competencies can be developed and where the academic context can positively affect the

developmental process. Nonetheless, there is still a lack of research into exploring how those competencies can be developed by actors and projects that have recently been considered to be part of entrepreneurial ecosystems in universities (Hayter et al., 2017; Siegel & Wright, 2015; Wright et al., 2017). In doing so, this research defined those new actors as university entrepreneurs and their entrepreneurial projects as non-traditional new ventures.

Following recent studies that have considered those actors in the study of entrepreneurial competencies (Treanor et al., 2020), this research focused on exploring how those competencies can be developed within a novel transdisciplinary context, an emerging area of practice that encourages interactive mechanisms of collaboration among academic and non-academic actors. Therefore, the research question that this research examined was:

How does a transdisciplinary entrepreneurial competition influence the development of entrepreneurial competencies and what are the enablers and barriers in this process?

This research question was defined to address the following gaps found in the literature, grouped into three main areas. First, scholars have recognised that the current scenario of academic entrepreneurship has experienced significant changes in terms of actors and collaborative activities that should be considered in research exploring this entrepreneurial ecosystem and that have been neglected in prior studies. In this sense, there is a call to re-think how academic entrepreneurship is understood (Siegel & Wright, 2015), which should include a broad spectrum of stakeholders involved in the generation of new ventures (Marzocchi et al., 2019).

Second, and derived from the first gap, this novel context allows evaluation of how this scenario could affect a particular topic of academic entrepreneurship: the development of entrepreneurial competencies. Based on Rasmussen et al. (2011), it was possible to argue that the research gap related to the non-commercial nature of higher education institutions that was one of the main reasons to explore the generation and development of academic competencies under this particular context

still has some elements that have been neglected in later studies. For example, while prior research has mainly focused on traditional university spin-offs, this research considered a broad spectrum of entrepreneurial projects in the initial stages of venture formation, defined as non-traditional new ventures developed by university entrepreneurs, who are recognised as part of university entrepreneurial ecosystems. In doing so, entrepreneurial projects evaluated in this study represent wider industry and market settings, such as education, environment, medical/orthopaedic, fashion, chemical veterinary, tourism, food stores, farming and building industry. Similarly, university entrepreneurs are founders of those non-traditional new ventures, represented by students, alumni and individuals who are not directly involved in academic activities of the University of Nottingham. Therefore, this research argues that an empirical examination of this phenomenon, considering the current context of academic entrepreneurship, could contribute to a more comprehensive understanding of entrepreneurial competencies development.

Third, in reviewing the recent literature regarding the institutional determinants of entrepreneurial activity in higher education institutions, scholars have argued for the importance of evaluating alternatives for decentralising entrepreneurial capabilities within universities (Fini et al., 2017; Gümüsay & Bohné, 2018). Considering an entrepreneurial intervention based on a collaborative programme involving entrepreneurial training, a business plan competition and subsequent support for the incubation process that goes beyond the idea generation phase, this research explored how university entrepreneurs developed non-traditional new ventures within a transdisciplinary context, supported by different academic and non-academic actors, activities, and collaborative mechanisms. Therefore, this research argued that by exploring this entrepreneurial intervention, it was possible to expand the understanding of entrepreneurial competency development and, at the same time, include the new context of academic entrepreneurship, resulting in an empirical examination of potential pathways of entrepreneurial decentralisation capabilities.

Considering the research gaps aforementioned, five research objectives were defined in order to contribute to the knowledge and practice of academic entrepreneurship:

1. To conceptualise transdisciplinarity in the context of academic entrepreneurship.
2. To identify and examine the potential impact of an entrepreneurial intervention carried out in a transdisciplinary context in developing entrepreneurial competencies, focused on non-traditional new ventures led by university entrepreneurs.
3. To identify and examine the potential impact of an entrepreneurial intervention carried out in a transdisciplinary context at the individual level.
4. To identify and examine possible enablers and barriers observed in a transdisciplinary entrepreneurial intervention that can affect the entrepreneurial process of non-traditional new ventures led by university entrepreneurs.
5. To discuss how enablers and barriers observed in a transdisciplinary entrepreneurial intervention can facilitate or hinder the development of entrepreneurial competencies

The following sections review the main conclusions of this research. Section 6.2 summarises entrepreneurial competencies as the theoretical framework, research design, and findings. Later, Section 6.3 summarises the research implications for theory and practice. Then, Section 6.4 discusses the research limitations, and Section 6.5 presents potential areas of further research in light of the results of this study. Finally, Section 6.6 concludes this chapter.

6.2. Research Framework, Research Methodology and Findings

The research question was examined from the perspective of entrepreneurial competencies development, based on Rasmussen et al. (2011), a theoretical

framework presented in Chapter II which defines three main competencies: Opportunity Development Competency (ODC), Championing Competency (CC), and Resource Acquisition Competency (RAC).

Entrepreneurial competencies development as a research topic has helped understand the generation and development of new ventures considering different business contexts (Chandler & Jansen, 1992; Hayton & Kelley, 2006). Particularly in the area of academic entrepreneurship, the studies of entrepreneurial competencies development have been relevant in order to obtain knowledge about how academic entrepreneurs create and develop successful new ventures working in an academic setting, considering the university as a complex organisation, where different organisational levels impact the developmental process (Gümüsay & Bohné, 2018; Rasmussen et al., 2011; Rasmussen & Wright, 2015). Three main principles of the entrepreneurial competency framework were proposed from the literature review. These principles are:

1. Competencies were defined as a combination of knowledge, individual skills, and personal traits (Hayton and Kelley, 2006) as well as material resources (Danneels, 2002) that generate the ability to achieve a goal through the appropriate use of those resources (Danneels, 2002; Gümüsay & Bohné, 2018; Rasmussen et al., 2011).

2. The generation of entrepreneurial competencies is an evolutionary process highly influenced by "*idiosyncratic situations"* (Ahuja & Katila, 2004). Consequently, the development and acquisition of entrepreneurial competencies within an academic context require departures from existing development paths and the creation of new ones (Ahuja & Katila, 2004; Rasmussen et al., 2011).

3. The development of entrepreneurial competencies in an academic context is influenced by internal and external actors and different organisational levels (Rasmussen et al., 2011; Rasmussen & Wright, 2015).

Then, the operationalisation of the empirical examination of those principles was argued in Chapter III, while the empirical examination was presented in Chapter IV. Finally, Chapter V discussed the implications of the findings of this research for entrepreneurial competency development for theory and academic entrepreneurship practice.

The research methodology of this research followed a qualitative approach. As described in Chapter III, a longitudinal multiple-case study research design was applied, and 13 entrepreneurial projects were analysed after their participation within an entrepreneurial intervention developed by the University of Nottingham. The entrepreneurial intervention in which the entrepreneurial projects were involved was the annual entrepreneurial programme called “Ingenuity19”, a transdisciplinary activity carried out by the Haydn Green Institute for Innovation and Entrepreneurship.

The Ingenuity programme is based on the open invitation for the community of the University of Nottingham, the public and third sector organisations, partner universities, as well as Nottingham’s individuals and businesses who are interested in entrepreneurial training to develop an entrepreneurial idea, with an emphasis in resolving crucial challenges that society is facing. The activity concludes with a final stage of a competition where the prize-winning participants obtain monetary awards and later support from the institute to develop their entrepreneurial projects further.

The data collection process was divided into two stages: from October 2019 to March 2020 and from September 2020 to October 2020. Following Eisenhardt (1989, 2021), the entrepreneurial projects that participated in this multiple-case study were selected based on theoretical sampling, according to the working definition of transdisciplinarity within an entrepreneurial academic context (presented in Chapter II) and seeking diversity concerning disciplinary backgrounds, professional experiences, and industrial sectors represented among the cases. Furthermore, the theoretical sampling also pursued the inclusion of the new actors that can be found in entrepreneurial activities in higher education institutions, defined in this research as university entrepreneurs. As aforementioned, the cases

were selected because founders of the entrepreneurial projects represent new actors of academic entrepreneurship who are not directly involved in the academic activities of the University of Nottingham. The data was collected through semi-structured interviews, documents and public information of the entrepreneurial projects as archival data, documents and video recording of the entrepreneurial intervention and direct observation of the support programme implemented after the entrepreneurial competition.

The research findings showed that after the participation in Ingenuity19 and complemented with the support of the Ingenuity Lab to the prize-winning projects of the year, most of the cases analysed reported that this entrepreneurial intervention helped improve the development of entrepreneurial competencies. Thus, the findings of this research provide evidence that helped to address the research objectives. In this sense, the analysis focused on accounts of university entrepreneurs about their experiences within this entrepreneurial programme and how this activity affected the development of competencies. Furthermore, these accounts were contrasted with public data of the entrepreneurial projects, the observation of the recorded activities from the competition and direct observation of the later support of the Ingenuity Lab, which consists of business advice and mentoring from experienced entrepreneurs and expert professionals, desk space for the daily work and networking opportunities based on a community of university entrepreneurs and other actors of the entrepreneurial ecosystem.

Regarding the first research objective, after an extensive review of the literature about collaborative mechanisms and their relation to entrepreneurship (Chapter II), it was found that scholars have recently recognised transdisciplinarity as a practical approach to be applied in innovation processes (McPhee et al., 2018), and it has also been suggested as a pedagogical model to teach entrepreneurship (Martínez & Muñoz, 2021). In addition, and related to sustainable entrepreneurship studies, transdisciplinarity has also been defined as a methodology of sustainable development that facilitates the transition of the roles of modern universities to the generation of knowledge “for and with society” (Scholz, 2020). In this vein, this

research contributes to academic entrepreneurship by offering a conceptualisation of transdisciplinarity as a collaborative mechanism in this research area and recognising it as a plausible pathway to develop entrepreneurial activities within higher education institutions. As mentioned in Chapter II, the working definition of transdisciplinarity in the context of academic entrepreneurship was "a *collaborative process to address societal problems, bringing together scholars from different disciplines and non-academic actors from society, whom integrate their knowledge to find transferable solutions to society, which can be exploited through entrepreneurial activities".*

Concerning the second research objective, the findings provided strong evidence supporting the idea that an entrepreneurial intervention such as Ingenuity19, carried out in a transdisciplinary context, positively impacted the development of the Opportunity Development Competency (ODC), Championing Competency (CC) and Resource Acquisition Competency (RAC). Related to ODC, the findings suggest that the entrepreneurial projects were enhanced after participating in the competition, manifested in changes that improved business plans. For example, participants reported that after Ingenuity19, some were able to transform an idea into an entrepreneurial project, identify and implement new business strategies and identify new entrepreneurial applications (products or services) related to the core of the projects. Therefore, it can be argued that the impact on ODC is related to the initial phases of venture formation.

The findings also support the idea that participation in Ingenuity19 positively impacted CC. It was manifested mainly in motivational aspects of university entrepreneurs, who reported that the involvement in this entrepreneurial intervention, its competitive spirit and the public acknowledgement of their successful performance were relevant elements in terms of the motivation to keep working in the entrepreneurial project. Moreover, the later support of the programme through the Ingenuity Lab provided university entrepreneurs with an appropriate motivational environment for their daily work. The role of the Lab relates to three main areas. First, it gave them a sense of belonging to a community of

entrepreneurs. Second, they had access to dedicated mentors, which allowed them to interact permanently with someone who encouraged them not to abandon the project and become surrogate champions of the projects. Third, they were able to interact in a supportive peer network, wherein they found assistance and advice in moments of emotional or psychological difficulty that allowed them to overcome these challenging situations.

Regarding RAC, the findings showed that this competency was also developed mainly by giving monetary prizes that were key in the later stages of the venture formation. Also, this competency was developed by providing branding and legitimacy to the prize-winning project of the competition, generating credibility in local industries and facilitating access to new sources of resources. Finally, the findings suggested that the further support of the Ingenuity Lab was important in terms of getting access to facilities and advisory surgeries in areas such as accounting, marketing, law and brand development, which were monetary costs that entrepreneurial projects could save and were assigned to other business activities.

Regarding the third research objective related to the impacts of participation in the entrepreneurial intervention at the individual level of the university entrepreneurs, the findings showed that activity as Ingenuity19 enhanced entrepreneurial skills such as the identification and evaluation of potential entrepreneurial ideas that they could explore in the future. Also, the evidence showed that these activities could improve general skills mainly manifested in aspects of communication that can contribute to their future careers. Therefore, this evidence demonstrated that the impact of these types of supportive programmes goes beyond entrepreneurial competency development.

Concerning the fourth research objective, and following the approach of previous studies on transdisciplinarity and contextual influences that can affect this collaborative mechanism (Stokols, Misra, Hall, et al., 2008), the evidence indicated that there were institutional, interpersonal and intrapersonal factors during and after the entrepreneurial intervention that facilitated or inhibited the entrepreneurial process for the development of non-traditional new ventures. For example,

regarding institutional enablers, university entrepreneurs reported that the competition design and activities of Ingenuity, the role of professional advisors to develop an idea and improve business plans, the further supportive programme offered by the Ingenuity Lab for the prize-winning projects of the year, as well as the possibility that some participants had to find help from other university actors to develop their idea were enablers of the process. Furthermore, in terms of interpersonal enablers, university entrepreneurs reported that teamwork and task division, the acknowledgement of the need for complementary/specialised knowledge joined to effective communication among team members, and other relevant actors were critical elements for fruitful interactions. Finally, in terms of intrapersonal enablers, the evidence showed that personal traits related to a proactive attitude towards the venture's success and prior personal or professional experiences related to the entrepreneurial projects facilitated their further development.

It was also possible to observe barriers regarding the three contextual factors. For instance, regarding institutional factors, some university entrepreneurs pointed out that the competition presented some weaknesses in its implementation that harmed their effective participation, such as a rigid methodology that does not allow them to experience a fluid learning process. Similarly, it was observed that the entrepreneurial ecosystem in the university is not fully aligned to provide adequate support to university entrepreneurs. For instance, they reported the absence of an institutional platform (different to Ingenuity) that facilitates meeting points between individuals from different schools or faculties, showing an organisational barrier to developing entrepreneurial projects. Moreover, as opposed to the interpersonal and intrapersonal enablers, evidence showed that, in some cases, difficulties in teamwork, communicational issues, and individual aspects as personality traits or priorities conditioned by the personal context of university entrepreneurs harmed their entrepreneurial process.

Related to the fifth research objective, the evidence arising from the analysis shows how those contextual factors observed in transdisciplinary intervention positively or

negatively affected the development of each entrepreneurial competency. In this regard, the evidence showed that institutional, interpersonal and intrapersonal factors impacted ODC, CC and RAC. Moreover, it could be observed that the impact on the competency development was before, during and after the entrepreneurial intervention, reinforcing the idea about the evolving nature of entrepreneurial competencies (Rasmussen et al., 2011).

In sum, considering the evidence that supported the empirical examination of the research objectives, it can be concluded:

- It was possible to observe the actors and the new modes of academic entrepreneurship that scholars have called to recognise as players in entrepreneurial ecosystems. Moreover, these findings showed that transdisciplinarity could be considered an appropriate framework for designing entrepreneurial interventions within universities.
- Evidence supports the idea that entrepreneurial competencies (Opportunity Development Competency [ODC], Championing Competency [CC] and Resource Acquisition Competency [RAC]) can be developed by non-traditional new ventures led by university entrepreneurs who participated in a transdisciplinary entrepreneurial intervention. Moreover, this framework helped explain the performances of these entrepreneurial projects.
- It was possible to identify that a transdisciplinary setting, as observed in Ingenuity19 and at the University of Nottingham, presented contextual influences that acted as enablers and barriers to the entrepreneurial process of non-traditional new ventures, which were grouped as institutional, interpersonal, and intrapersonal factors.
- Institutional, interpersonal, and intrapersonal factors observed in a transdisciplinary context played different roles in facilitating or inhibiting the development of ODC, CC and RAC.

6.3. Implications of the Research

The theoretical implications of this research shed new light on a more comprehensive understanding of entrepreneurial competency development within the current context within higher education institutions. First, the findings provide evidence to support the idea that entrepreneurial competencies can be developed in academic settings (Gümüsay & Bohné, 2018; Rasmussen et al., 2011; Rasmussen & Wright, 2015). Furthermore, this research considered the emerging perspectives of academic entrepreneurship, such as the inclusion of new actors (students, alumni, external actors) (Siegel & Wright, 2015), non-traditional new ventures led by those actors (Wright et al., 2017) and the current institutional support that is offered to enhance the entrepreneurial activity within universities, such as garages, incubators or business plan competitions (Ibid.).

Second, in line with previous research about competency development in an academic context, the findings support the evolutionary aspect of competency development (Ahuja & Katila, 2004; Rasmussen et al., 2011), where competencies were developed in parallel with some overlaps between them. More specifically, within the context of this study, this research provides evidence indicating that the development of competencies began before the entrepreneurial intervention and continued its developmental process during and after this activity.

Third, this research provides new insights into how a transdisciplinary context such as Ingenuity19 affects the development of competencies, identifying institutional, interpersonal and intrapersonal factors (Stokols, Hall, Moser, et al., 2008) that can affect some competencies more than others. Regarding ODC, the evidence supports the idea that a transdisciplinary context helped in giving the chance to present a broad spectrum of ideas with both social and technological emphasis, which were identified previously under traditional academic activities or by personal experiences of nascent university entrepreneurs. Moreover, the possibility that a transdisciplinary setting offers to interact with non-academic actors, such as experienced

entrepreneurs or industry experts, who can provide complementary and specialised knowledge, confirms the relevance of these interactions in refining an entrepreneurial opportunity into an entrepreneurial project (Rasmussen & Wright, 2015).

Regarding Championing, this research supports the idea that this competency can be understood as a driving force that induces emotional meaning to the idea and commitment to the entrepreneurial project (Rasmussen et al., 2011, 2015; Treanor et al., 2020). This research is in line with this perspective and provides new knowledge by arguing that entrepreneurial contests with a competitive spirit can be essential for generating the necessary motivation to actively work on an entrepreneurial project in the initial phases of ideation and development. In addition, this research argues that CC is positively affected by external individuals, as third parties outside formal members of the entrepreneurial projects, who are needed to reach a sustainable Championing Competency as the new venture reaches progress in a further phase of venture formation (Rasmussen et al., 2011). In this vein, a transdisciplinarity context was critical in interacting with mentors and advisors who later became “godparents” of the projects.

Finally, regarding RAC, the research findings provide strong evidence related to the relevance of university seed funding in emerging entrepreneurial ecosystems (Wright et al., 2017). In this vein, entrepreneurial interventions within a transdisciplinary context offering monetary awards to the prize-winning projects is critical in developing this competency in non-traditional new ventures. The research findings also support the idea that those prize-winning projects of these competitions obtain legitimacy, good reputation and public exposure (branding), which acts as an intangible resource that facilitates the acquisition of additional resources. Finally, later support of the university after the end of the competition is also important for the development of RAC, specifically by providing facilities and an appropriate place for the daily work for nascent university entrepreneurs (Hayter, Nelson et al., 2018; Wright et al., 2017).

Fourth, the findings also have implications for academic entrepreneurship as a research area. As mentioned, scholars have argued that there is a need for an encompassing view of entrepreneurial actors within a university context (Hayter et al., 2017; Siegel & Wright, 2015). Also, universities have been called to transform traditional academic outcomes by considering the social impacts of their activities with the purpose to address crucial social challenges (Roux et al., 2017; Fini, Rasmussen, Siegel, & Wiklund, 2018). In this sense, the evidence of this research supports the idea that transdisciplinary can be a plausible mechanism to develop academic entrepreneurial activities that can reach those objectives, reinforcing the idea that transdisciplinarity is a requirement for entrepreneurial universities (Urbano & Guerrero, 2013),

Fifth, regarding implications of this research for entrepreneurial education practice, the research findings provide evidence supporting the idea that these types of entrepreneurial interventions, such as transdisciplinary business plan competitions, can complement the traditional perspectives of entrepreneurial training in universities (Treanor et al., 2020). Therefore, it is possible to suggest that universities should develop activities based on voluntary enrolment inviting a broader profile of potential university entrepreneurs, considering students from undergraduate and postgraduate levels and alumni from different disciplinary backgrounds and participants from the surrounding community. Moreover, this research also supports the idea that these types of activities can effectively develop individual capabilities that can be useful for the professional career of participants, such as communication skills, confidence and opportunity identification, evaluation and development (Muñoz et al., 2019; Treanor et al., 2020).

Concerning the implications that this research can have on policy, the evidence confirms that entrepreneurial competency development within an academic context should consider different and complementary strategies for each one (Rasmussen et al., 2015). For example, from a public policy perspective and in line with the perspective of Mode 2 of generation of knowledge (P. W. Balsiger, 2004; Gibbons et al., 1994; Hessels & van Lente, 2008), transdisciplinary activities should be

encouraged by national and local governments, focusing on creating meeting points between academic and non-academic actors representing different disciplinary and professional backgrounds, who can interact to identify and enhance entrepreneurial projects (ODC). Similarly, building upon Wright et al. (2017) and the idea of a potential negative connotation of the word “entrepreneurship” in areas of humanities and social sciences, it could be beneficial for the entrepreneurial ecosystem to define effective communicational strategies that can break down barriers about who can be involved in entrepreneurial activities in universities and reach all the stakeholders that potentially can be interested in participating in those activities (CC). In addition, the evidence supports the idea of institutional strategies that encourage the creation of supportive emotional communities where university entrepreneurs can find psychological assistance during the entrepreneurial process (CC) (Aly et al., 2021). Moreover, the findings of this research also support the idea that universities should consider the allocation of resources to entrepreneurial interventions that can provide soft initial funding and later support through institutional infrastructures (e.g., incubators, garages, labs) that in turn facilitate access to the needed resources to move entrepreneurial projects forward (RAC). Finally, the research findings provide evidence that entrepreneurial interventions such as Ingenuity19 and organisational infrastructures such as the Ingenuity Lab can act as complementary intermediaries within entrepreneurial ecosystems, helping decentralise the entrepreneurial activity and the access to entrepreneurial resources in higher education institutions (Fini et al., 2017; Gümüsay & Bohné, 2018; Hayter, 2016a).

6.4. Limitations of the Research

As reported, this research contributes to the literature on entrepreneurial competency development, based on the theoretical framework of Rasmussen et al. (2011), by examining the entrepreneurial process of non-traditional new ventures that participated in a transdisciplinary entrepreneurial intervention at the University

of Nottingham. The contribution was made by identifying the evolving paths of competency development linked to enablers and barriers observed in the transdisciplinary context. Nonetheless, as with any research, this study has some limitations which are acknowledged as follows.

The first limitation of this research is related to the impossibility to explore the potential reasons why some participants of Ingenuity19 could not develop entrepreneurial competencies, which was not the emphasis of this research project. Ingenuity19 convened 215 business plans for the final stage of the competition, which might suggest that participants may or may not develop entrepreneurial competencies. However, the focus of the research question was to provide an in-depth understanding of how entrepreneurial competencies are developed within a transdisciplinary context rather than explain why those competencies are not developed. In this sense, the research design considered the finalist projects of the entrepreneurial intervention, which could be examined longitudinally to explore the developmental process of those competencies. Therefore, it is important to recognise that this case selection restricted the evaluation of participants that were not selected among the finalist projects or others that could cancel their participation at any moment of the programme before the last stage of the competition. Despite that, this research provides insights into institutional, interpersonal, and intrapersonal barriers that some university entrepreneurs and their non-traditional new ventures experienced as they attempted to develop entrepreneurial competencies during and after an entrepreneurial intervention.

Second, this research has focused on the initial stages of the venture process. Building upon Vohora, Wright, & Lockett (2004), the findings of this research provide evidence to contribute to the theoretical model of Rasmussen et al. (2011) regarding entrepreneurial competency development and the process leading from opportunity recognition, entrepreneurial commitment and the credibility threshold, defined as "*ability to gain access to and acquire an initial stock of resources, which are required for the business to begin to function*" (Vohora et al., 2004. p. 164). Nonetheless, more research is needed to understand the entire entrepreneurial developmental

process of the non-traditional new ventures, with the purpose of identifying additional influences on competency development manifested in later stages of growth and survival of those projects.

Third, the findings of this research showed a novel perspective of competency development by exploring a transdisciplinary context observed in an entrepreneurial intervention carried out in an academic setting. In doing so, the evidence allows identifying institutional, interpersonal, and intrapersonal contextual influences mentioned by university entrepreneurs, which impacted the development of entrepreneurial competencies. Nonetheless, as the data collection was focused on the finalist of the entrepreneurial intervention, there was no opportunity to explore the perspective of other university levels defined by Rasmussen & Wright (2015), such as central university management TTOs and the different academic departments of the university that are involved in entrepreneurial activities.

Fourth, since this research was exploratory and its design followed a qualitative methodological approach, there are limits to the generalisability of the findings. However, the main goal of this study was to explore how the development of entrepreneurial competencies can be impacted in a novel context, such as a transdisciplinary entrepreneurial intervention, and the use of this methodological perspective has provided strong evidence to understand the development of entrepreneurial competencies in non-traditional new ventures in the initial phases of their entrepreneurial process. Moreover, the selection of cases was made using theoretical sampling, a logic suggested in case studies (Eisenhardt, 1989, 2021) which allowed the researcher to cover a broader spectrum of non-traditional new ventures emerging within an academic context, giving confidence that the evidence found during this research provides a good idea of the similarities that may be found in other entrepreneurial projects developed in similar entrepreneurial ecosystems or analogous entrepreneurial interventions regarding the development of entrepreneurial competencies (Merriam & Tisdell, 2015).

6.5. Future Research

As already mentioned, this research contributes to a better understanding of how entrepreneurial competencies can be developed within a transdisciplinary setting by considering essential elements of analysis that scholars have suggested to comprehend the current context of academic entrepreneurship. Moreover, considering the research implications for theory and academic entrepreneurship practice and the limitations presented earlier, it is possible to suggest insights into several potential areas of further research avenues.

First, even though this research provides evidence regarding barriers observed in a transdisciplinary context for developing entrepreneurial competencies, this study did not focus on the reasons that can explain why some participants did not develop those competencies. Following the approach of Gümüsay & Bohné (2018), who empirically explored individual and organisational inhibitors of the developmental process of entrepreneurial competencies within a traditional perspective of the academic entrepreneurship context, future research could consider unsuccessful entrepreneurial cases to provide new insights to a better understanding of competency development on non-traditional new ventures. A detailed analysis of those potential issues could explain contextual influences that hinder competency development.

Following the argument of Rasmussen et al. (2011), there is an opportunity to empirically explore the potential impact of a transdisciplinary context on non-traditional new ventures, emphasising entrepreneurial growth and survival. From a competency perspective, it could be relevant to know how ODC evolves to effectively reach the threshold of economic sustainability (Vohora et al., 2004), how CC goes beyond motivational aspects of university entrepreneurs and how they can be able to include new champions to the entrepreneurial project, or how RAC can be further developed showing the integration of external and internal resources needed in those phases of venture formation. In doing so, it could be possible to recognise

relevant actors, influences, and factors to each competency in different stages, where different mechanisms and strategies can facilitate its development.

While this study considered a transdisciplinary entrepreneurial intervention as the research context, it was not easy to fully explore the different actors in an entrepreneurial ecosystem within universities. It has been argued that entrepreneurial competency development is promoted by different university levels such as central university management, TTOs, departments, lab or research groups, individual researchers, students and alumni (Rasmussen & Wright, 2015). However, for the nature of the research context, it was not possible to include some of them in the analysis. Nonetheless, as an avenue for future research, it could be plausible to examine how higher organisational levels of the university, such as the central university management and TTOs as well as departments or divisions different to those related to business schools, are integrated into transdisciplinary activities, to evaluate their roles and potential impacts in this phenomenon.

Finally, further validation of the findings is needed because this research was limited to examining 13 cases exposed to the same entrepreneurial intervention. Therefore, the proposed model of enablers and barriers to competency development should be longitudinally tested in other universities, considering different regional and national settings. It could be possible to gain insights into contextual influences that could explain differences in the proposed model and propose alternative strategies to effectively enhance entrepreneurial competencies development.

6.6. Chapter Conclusion

This chapter presented the main conclusion of this research project which addressed how university entrepreneurs develop entrepreneurial competencies in a transdisciplinary entrepreneurial competition. In light of the current context of academic entrepreneurship, the importance of recognising the new modes and new actors involved in entrepreneurial activities is argued, where the entrepreneurial

competency framework is an appropriate approach to explain the emergence and development of non-traditional new ventures.

The research evidence supports the idea of changes in the context of academic entrepreneurship that should be considered in the understanding of the entrepreneurial ecosystems in universities, where a transdisciplinary perspective is an appropriate approach to design and implement entrepreneurial activities. Moreover, the evidence showed that non-traditional new ventures led by university entrepreneurs could develop Opportunity Development Competency, Championing Competency and Resource Acquisition Competency. In addition, the transdisciplinary setting of this research was useful to explain contextual influences, grouped as institutional, interpersonal and intrapersonal factors that facilitated or inhibited the developmental process of entrepreneurial competencies.

The implications of this research were summarised into four areas. Regarding competency development, it was argued that: First, entrepreneurial competencies can be developed by those new modes of academic entrepreneurship; second, it was an evolutive process manifested before, during and after the entrepreneurial intervention; and third, every competency was influenced by different factors of the transdisciplinary context. Concerning academic entrepreneurship, it was argued that transdisciplinarity could be an appropriate approach that can address scholars' call about the transformation of traditional academic entrepreneurial outcomes looking for the social impacts of their activities. In terms of the practical implications for entrepreneurship education, it was argued that entrepreneurial interventions such as the programme Ingenuity19 could be a plausible complement to the traditional training in universities. Regarding policy implications, it was argued that the research findings provide evidence to address the need for the decentralisation of the entrepreneurial activity within universities, where activities such as Ingenuity19 and the later support of infrastructures as the Ingenuity Lab can be alternative intermediaries in entrepreneurial ecosystems. Further, limitations and avenues for further research were suggested.

Thinking about the future of the study of the development of entrepreneurial competencies in particular and academic entrepreneurship in general, the findings of this research offer insights to address the challenges that the world is currently facing through entrepreneurial activity in institutions of higher education. In this vein, this research has made some progress toward advancing our knowledge concerning collaboration strategies' impact on entrepreneurial ecosystems.

Since 2016, the international community has defined a sustainable development agenda with 17 objectives that imply that all civil society organisations generate strategies to reach practical solutions to these global problems. In this sense, as has been recently suggested by the OECD (2020), universities are called for action to promote transdisciplinary collaboration by generating interactions between all stakeholders that can contribute to solving these challenges and integrate different perspectives in the definition of their strategies. In doing so, academic entrepreneurship emerges as a plausible alternative to contribute from the academy to this purpose.

The non-traditional new ventures that were part of this study show that these types of projects and support programmes can help to solve the challenges of sustainable development, and the evidence from this research suggests that the critical role of transdisciplinarity in developing entrepreneurial competencies for these projects lasts over time, remains active and is in continuous progress

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Appendix 1: Information for Research Participants

Thank you for agreeing to participate in the research project. Your participation in this research is voluntary, and you may change your mind about being involved in the research at any time, and without giving a reason.

This information sheet is designed to give you full details of the research project, its goals, the research team, the research funder, and what you will be asked to do as part of the research. If you have any questions that are not answered by this information sheet, please ask.

This research has been reviewed and given favourable opinion by the Nottingham University Business School Research Ethics Committee.

What is the research project called?

TRANSDISCIPLINARITY IN ENTREPRENEURIAL TEAMS: THE EFFECT OF COGNITIVE DISTANCE IN THE DEVELOPMENT OF ENTREPRENEURIAL COMPETENCIES IN AN ACADEMIC ENVIRONMENT

Who is carrying out the research?

Mauricio Guerra Velásquez is carrying out this research as a part of his PhD research project in the University of Nottingham Business School

What is the research about?

The present research project aims to explore the effects of transdisciplinary teams, defined as a way of collaboration among people from different fields, unrelated disciplines and the non-academic environment, in an academic environment. Mainly, the focus of this research is looking for the effect of diversity in the development of entrepreneurial competencies in the team and in the performance. This research aims to be a contribution in the understanding of the development of entrepreneurial competencies in the context of academic entrepreneurship.

What groups of people have been asked to take part, and why?

Entrepreneurial collaborative projects from the University of Nottingham, where there are members from different fields and with different background. It is because that kind of groups fit with the definitions about diversity in teams that this research is studying.

What will research participants be asked to do?

The participants will be asked, in different moments, about their experience in team-work linked to a specific project. The main topics in the interviews will be related to team interaction, team coordination, perspective taking, knowledge hiding, cognitive integration and cognitive distance. In addition, some questions regarding to entrepreneurial competencies and team performance will be part of the interview.

What will happen to the information I provide?

The record of the interviews will be used for academic purpose. It will be transcript, codified and analysed using a qualitative analysis software (Nvivo). All the data will be used under anonymity. However, some quotes could be used in the thesis. Only the researcher and the project supervisors will have access to the information from the interviews.
Recorded files will be password protected and kept safe in the University of Nottingham (Microsoft One Drive) servers for two years prior deletion.

What will be the outputs of the research?

The main result expected in this research is the PhD thesis of the researcher. In addition, it is also probable that some peer-reviewed articles could be published. Findings, recommendations and other outputs of this research will be available to you on request.

Contact details

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Complaint procedure

If you wish to complain about the way in which the research is being conducted or have any concerns about the research, then in the first instance please contact Dr. Simon Mosey and Dr. Christopher Carter

Or contact the School's Research Ethics Officer:

Dr. Davide Però
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Appendix 2: Interview Guide – First interview – University entrepreneurs

- I believe that you have received a consent letter from me that described your participation in this study. Is that correct? Do you have any questions about the consent letter? 3. I need to ask you a few questions about your personal background. Is that all right with you?
- May I have your permission to record this interview? Would you like a copy of the transcript?
- Demographic Information: Education? Years in this industry/professional Experience? Prior entrepreneurial experience?
- Please briefly describe your business.
- Who discovered this idea? When was it discovered? Where was it discovered? How was it discovered?
- Are you working with a team or alone? If team: Who are the team members? Solo entrepreneur: Why are you working alone?
- If team: What is the field of specialisation of each member? Education, professional experience? How did the team meet?
- Did you have any help of other people to develop your idea in the initial stages of the project?
- Talking about your participation in Ingenuity19? - Why did you decide to participate in Ingenuity19?
- What was you looking for in this programme?
- Could you tell me what has changed in yourself and in your mode of thinking since Ingenuity19? How did it manifest before and after Ingenuity19?
- Were there new members after Ingenuity19? Why were they included in the project?
- Has any member left the team? Do you know the reason?
- Could you tell me what has changed in the project / new venture since Ingenuity19? How did it manifest before and after Ingenuity19?

- Thinking on your project/company, could you tell me what the positive effects or impacts of a programme as Ingenuity are? And the opposing side? Negative aspects?
- Any advise that you would give for any activity like Ingenuity19?

Appendix 3: Interview Guide – Second interview – University entrepreneurs

- May I have your permission to record this interview? Would you like a copy of the transcript?
- When did you think about creating a company using the idea that you presented in Ingenuity19
- Do you consider yourself a risk-taker? How did this affect the decision to carry out this project?
- What are the differences between working on an informal project (not legally registered or just an idea) and a company where you are the director/manager?
- How important is the personal attitude to work on a project like yours? What are the personal traits that you think are important to work on a project like (Name of company)?
- Do you think Ingenuity helped you to acquire skills for this role of an entrepreneur? How it is manifested in your daily work? And outside the project?
- How has the specific knowledge of the project, in terms of technology, been complemented with the commercial aspects of starting a business? / How have you tried to fill the knowledge gaps over time?
- Could you mention any difficulties or barriers that you have lived in your entrepreneurial process?
- What kind of factors has been facilitators or enablers of your project?
- How was/has been the interaction with mentors and advisors in Ingenuity19/Ingenunity Lab?
- How was the initial entrepreneurial idea affected after you participated in Ingenuity? How the feedback from mentors and advisors impacted on it? changes in the business model? Did you realize something different? A new application of the idea?
- How did you handle criticism/feedback to improve your project?
- Do you think that Ingenuity helps you develop other individual skills important to your project?

- In the first interview, you mentioned … (follow up questions to clarify or confirm data collected in the first interview)
- Did Ingenuity19 affect your project in terms of getting credibility/legitimacy as a business? How?
- From your experience, a context like the Ingenuity19 help university students, in your case in a UG / PG level, to apply the knowledge they learn? How?
- In terms of the demand for personal effort, do you think that Ingenuity19 was a time-consuming activity?
- What impact has the possibility of using a physical space such as the Ingenuity Lab had on your project?
- To what extent was the fact that the competition gave out prizes a factor that motivated you to participate in Ingenuity19?
- Did you remember how the prize was used in your project?
- Did you get additional sources of founding after ingenuity? From who? How did you get it?
- Did you have interactions with other teams/participants in Ingenuity19- did you exchange ideas with them? How did that help the project? Are you still in contact with them?
- Do you think that the university, beyond the people or departments that participate in ingenuity, facilitates and encourages collaboration between different areas to generate better projects? did you find additional internal support for your project? How?
- What were your plans before Covid-19 with your company? What were your goals this year?
- Covid affected the achievement of these goals?
- Yes> How has that affected project development? No> Why do you think this happened?
- What have you done, in your role as director, to overcome the barriers or obstacles that have been presented this year?
- In the first interview you mentioned these goals to work in the short term "… (follow-up question)
- Have you found new business partners, new deals, etc?
- Do you have new entrepreneurial ideas to develop soon?

- After Ingenuity, did you get more confidence in terms of feeling as an entrepreneur? How it is manifested?
- The results that you get in Ingenuity19 were a factor of motivation to keep working on the project? How it was manifested?
- Finally, What are the objectives of (company) for the next months and next year? What do you think you have to do to reach those goals?

Questions for team based projects

- How the team was formed / who was the team leader in the beginning
- How personalities / trust among members affect team work
- How has the communication been among the team members? / which have been barriers and which have been facilitators for effective communication?

Appendix 4: Interview Guide – Interlocutors Ingenuity

- I believe that you have received a consent letter from me that described your participation in this study. Is that correct? Do you have any questions about the consent letter? 3. I need to ask you a few questions about your personal background. Is that all right with you?
- May I have your permission to record this interview? Would you like a copy of the transcript?
- Could you tell me about your educational (disciplinary) background and professional experience? Do you have practical entrepreneurial experience?
- Can you tell about your experience in Ingenuity? What is your role in the competition?
- When did you start working in the competition? Why did you decide to participate there?
- What do you think are the reasons because teams or individuals participate in a programme as Ingenuity19?
- Considering your experience evaluating projects in Ingenuity19. Which are the main sources of inspiration to participants to develop an entrepreneurial project?
- If you compare the projects before and after the Ingenuity competition. Have you observed changes in the proposals? How those are manifested?
- Thinking at the individual level. Have you observed changes in people after their participation in Ingenuity. How it is manifested?
- How do you interact with the participants?
- From your point of view...How is the interaction in teams with members coming from different disciplinary or professional backgrounds? Positive and negative aspects.
- If you compare the teams before and after Ingenuity. Have you observed changes in team interaction or in team composition?
- What do you think about developing entreprenuerial projects based on teams? Which are the main difference in developing a project by an individual?

- Thinking in the context of Ingenuity... What do you think are the main barriers in developing an entrepreneurial project?
- From your perspective, which factors can act as facilitators or enablers to develop an entrepreneurial project?
- What do you think is the impact of your contribution to the projects that are participating in Ingenuity?
- Thinking in the University of Nottingham as an entrepreneurial ecosystem. How this context influences the development of entrepreneurial projects? Are there barriers or enablers to the collaboration in order to develop an entrepreneurial project?
- In your opinion. What is the best of Ingenuity as a programme and also as a lab/incubator? What aspects could be improved? Could you give me an example?

Appendix 5: Professional - Disciplinary background and personal experiences - illustrative quotes

Case	Disciplinary background	Previous training in business and entrepreneurial topics	Previous academic work that can be applied in an entrepreneurial project	Professional experiences that can be applied in an entrepreneurial project	Individual experiences in the field or with the problem
Students Applications	Well, so I've done an MBA, my cofounder has done his undergrad in computer science and he's working with us for the last two years. We have a marketing director who did the Entrepreneurship in practice, an Ms in Entrepreneurship (1)		So, it all started when I was doing my MBA and we had this course called BIDE; Business Intelligence and Digital Economy, and then we were asked to come up with an existing managerial problem, and find a SaaS-based solution to it (2)		It all started from our own experience (as international student), but then later we wanted to quantify whether what the problem and the challenge we think are real challenges, we spoke to more than a thousand international students we spoke to more than 200 researchers and, you know, higher education professionals with the institution' agencies, everybody validated our hypotheses and then we slowly slowly slowly pile the product (1) The thing that occurred to me was the challenges that I faced when I applied from ” “ and my entire enrolment journey for six months, it was quite a daunting experience. So, I thought, you know, when an MBA student pays a very hefty price of £25,000 a year for an MBA post, I thought they should be treated, you know, something different than undergraduates, a bit better than other postgraduate students, as well / But that was not the case and I thought that yes, even though all the universities promise us that, you know, they give extraordinary care in terms of nurturing students and moving up through the stage, on the contrary, I had quite a different experience with dealing with the agents and then communicating with the university, the entire engagement model, and I thought that’s something I want to

Case	Disciplinary background	Previous training in business and entrepreneurial topics	Previous academic work that can be applied in an entrepreneurial project	Professional experiences that can be applied in an entrepreneurial project	Individual experiences in the field or with the problem
					explore more. So, that was the basic start of this idea (2)
Equine Repelent	Mi background is in Management / My master was in Entrepreneurship (1)		I was doing my master here, in the university, and as part of the programme- many people do have to do a dissertation because my master was in Entrepreneurship and you have to do a business plan (Same project presented in Ingenuity) (1)		So, I do a lot of horse riding... I was trying to find a novel idea like a problem that can be solved in an area that I like and it was like, what problem was there here that I could work on, something that needs to be solved and that was as I got the idea / I've just been riding since I was ten I know a lot of horses, I have been work with it because is my passion (1)

Case	Disciplinary background	Previous training in business and entrepreneurial topics	Previous academic work that can be applied in an entrepreneurial project	Professional experiences that can be applied in an entrepreneurial project	Individual experiences in the field or with the problem
Access to water	My background is in energy engineering so I did that in my undergrad (1)		But that time we weren't even a team, it was just me and my thesis and something else	That was great because it was the basis for writing a business plan, such that when I came to do my master's in 2015, I already had a fully written out business plan and I also had a background on the ground, information, I had done the work in the market, I had installed several systems, we had closed several deals ...I kind of took my whole salary, dumped it into marketing and then went out there and basically kept doing the same job I'd been doing for my employer, only this time round I was targeting customers that we had kind of priced out of our product range, or buy our products or something / I think basically the reason I jumped out the first time into entrepreneurship was simply because that's all I knew and I was like, if they can do it, I can do it too, and they were an entrepreneur from ...they were Dutch and so I was like, they're not from this country, I know this country better than he does, I know the market better than they do and if they can do it, I can do it too; and all the difference, the things that they had that I didn't have was engineering background and I was like, not engineering background but that sustainability expertise, otherwise the designing of the system and everything was already there /that made it very easy for me to be confident enough about that, but here's the thing, right. Just because I was confident that because I'd seen it done, I could do it, that is not a guarantee, though, that's not a guarantee, I found out (2)	There's something called authentic power. When your purpose comes to fully meet your personality, or like, it's like, for me, it's the one thing that I realised after the one-and-a-half-year mark where we were not making money, I had to go and just stop doing the dynamics of the business and just ask myself, why am I doing what I'm doing? Why me? Why should I run this business? Why not somebody else, who has the same skill, the same, you know, find an engineer somewhere, give them the same product, let them go sell it, let them go run it, right, right? At that point, me and any other engineer you'd have picked up would be the same, except one thing; they never walked to water work, so how they would have solved the same problem is not how I would have solved it, and that breaks the mould (2)

Case	Disciplinary background	Previous training in business and entrepreneurial topics	Previous academic work that can be applied in an entrepreneurial project	Professional experiences that can be applied in an entrepreneurial project	Individual experiences in the field or with the problem
Shells and Chitosan	I studied biotechnology in Mexico and a MSc in Applied Biopharmaceutical Biotechnology and Entrepreneurship at UoN (1)	I swear, I was in biotechnology and the class was in "science", so it was like you went to the laboratory, you worked with enzymes, and it's like, you have to do a project for a company, create a fictitious company, in this scientific field. And there you thought ... how do I start a company? starting by thinking of a name, looking for an idea for the market. Then you want it or not, in every module we had at the university (Mexico) they made you develop that skill (1)	Actually, the idea was born when I was studying my undergrad in Mexico, because I participated in a big competition called the iGEM, which is Genetically Engineered Machine. For that competition we were studying the need of biopolymers, or biomaterials. My tutor at that time was an expert on chitosan. At the beginning we were working with chitosan for a technical application. For example, for making artificial skin, which is used for that. We realised that there was a need of importing that product into Mexico (1)		

Case	Disciplinary background	Previous training in business and entrepreneurial topics	Previous academic work that can be applied in an entrepreneurial project	Professional experiences that can be applied in an entrepreneurial project	Individual experiences in the field or with the problem
3D Prosthesis	I'm a product design engineer. It's like mechanical engineering and design (1)	I did an enterprise module as part of my degree but that was it; I haven't done anything before that / I did an enterprise module and, then, in September last year my university had like enterprise workshops that you could go to, so nothing formal but I had been to some of those for maybe, like, four months before Ingenuity (1)	Yes so my degree was an undergraduate master so I only graduate once and so my dissertation was my bachelor's year and then I could do an extended project in my master's year which was the same thing (the base of this entrepreneurial project) (1) / In the moment, when you received that advice, that maybe you have to formalise the project, how did you feel yourself as a researcher person. I don't know if you understand me, so in which way could affect your own personality, as how you deal with the risk of being an entrepreneur (2).		I met somebody that needed a prosthetic and (she) didn't have access to one. So I did my dissertation project to design a prosthetic for her (1)

Case	Disciplinary background	Previous training in business and entrepreneurial topics	Previous academic work that can be applied in an entrepreneurial project	Professional experiences that can be applied in an entrepreneurial project	Individual experiences in the field or with the problem
Accommodation Booking	I did a bachelor's degree here at the Uni of, in German and Philosophy and other than that I went to high school, did A-Levels, GCSEs (1)				I've never been homeless. My dad had been homeless but I didn't know this when I started, I only found this out recently so it wasn't because of that either. The same with my auntie, she had also been homeless / I was trying to think, how can you help the homeless and then I just thought wouldn't it be cool if, every time you book a night in a hotel, you get to stay in a big comfy bed, someone else also gets to spend a night off the streets. It's developed a bit since then because just providing someone with temporary accommodation for the night isn't going to end homelessness (1)

Case	Disciplinary background	Previous training in business and entrepreneurial topics	Previous academic work that can be applied in an entrepreneurial project	Professional experiences that can be applied in an entrepreneurial project	Individual experiences in the field or with the problem
Housing for Refugees	I've got a degree in social policy and I've also got a master's degree in charity resource management (1)	I've also got a master's degree in charity resource management (1)		I've worked... the year 2000 I started working with asylum seekers and refugees, so that was as a support housing officer for a housing association. Then I left there, went to Refugee Action, which is a national charity, and then I worked for a couple of local authorities but not for any length of time. Then I got a job at a regeneration charity, just up the road and became a trustee here and I was on the board for about a year (1)	Principally NN in the very early days was hundred percent faith leaders, Christian background, all Church of England. We now don't have anybody that's Church of England so we've done a full circle (1)
Platform for designers	Yes sure. So I've got a degree in Business Studies / I didn't really have a background in fashion or any training, I just kind of had this idea that popped up in conversation (1)	I've got a degree in Business Studies / we did have a module in Level Two Business and Entrepreneurship. It wasn't very practical, it was quite theoretical workshops, but it was just beginning to seep into kind of higher education at that stage. It wasn't quite a pillar of business studies as it is today (1)			

Case	Disciplinary background	Previous training in business and entrepreneurial topics	Previous academic work that can be applied in an entrepreneurial project	Professional experiences that can be applied in an entrepreneurial project	Individual experiences in the field or with the problem
Entrepreneurship female toolkit	I did a masters here in the university and that at the time was MSc in Tourism Management / I did that degree and then got more involved and interested in research (1)	I did a couple of business modules on that like marketing, general management, so that was a four degree and I went to work for an outdoor company in France for a year abroad, like a placement year (1)		Based on my academic knowledge... All that research was kind of signalling there was something missing, that women weren't finding what they needed as entrepreneurs quick enough and they were left feeling kind of vulnerable as a consequence (1)	
Support for Anxiety	My educational background is I'm postgraduate at Nottingham Trent. So I have two humanities degrees, so a BA joint honours in English and Social Theory and then a Master of Research in English Literary research (1)			I was doing my Mental Health First Aid Instructor training, which means that I go into organisations and businesses and I train them on how to create a better environment for people living with mental health conditions / see it more as an extension of my... so my... obviously my business, my training business, my... I deliver training, I do talks and those sorts of things, that's where the paid work kind of comes in and if people ask me about that, I will totally 100% say yes, business, sorted (1)	Since I was, I'd say about 15, I had... I have a long term anxiety condition, so I've lived with it for over 20 years and it's just part of my life now I manage it in different ways, but what that did was it gave me an outlook that I wouldn't necessarily have if I'd just kept sort of plodding along as I had done...So it is is something that was borne out of my experiences living with an anxiety condition (1) / I always laugh, I always laugh because I think about Ingenuity 19 and I still... I still kind of think, how did I do that, and the reason I was able to do that is I kind of, I talk about my experience; I talk about kind of the ability to do something like that when you live with a long term mental health condition and it's not about saying, "I had it so much worse than everybody else", but it's about saying, you know, when you live with something like that, it can make obstacles seem bigger than they actually are / I can talk about anxiety because

Case	Disciplinary background	Previous training in business and entrepreneurial topics	Previous academic work that can be applied in an entrepreneurial project	Professional experiences that can be applied in an entrepreneurial project	Individual experiences in the field or with the problem
					I'm practised at it. I know that I've talked to people before and I'll talk to them again but for some people, talking about anxiety is just something they've never even wanted to do (2).
Vertical Farming	I studied Environmental Engineering as my bachelor and afterwards I spent around five years in the construction industry, specifically in safety, health and environmental protection. After that I decided to make a turn in my career and I decided to study sustainable energy and entrepreneurship at UoN (1)	I decided to make a turn in my career and I decided to study sustainable energy and entrepreneurship at UoN (1)	She used this idea for her dissertation in the master (the other team member) (1)		
Social Supermarket	I am studying "International Management" (1)			Related to work experience, in the German system you are forced to do an internship while you are in school, so I did them in a company called Sodexo, / it is a catering company and also schools, hospitals, all those things. I did some rotations so I was in Marketing, I was in HR and in other areas. So I was inolved in some deparments of the company (1)	

Case	Disciplinary background	Previous training in business and entrepreneurial topics	Previous academic work that can be applied in an entrepreneurial project	Professional experiences that can be applied in an entrepreneurial project	Individual experiences in the field or with the problem
Outsourcing Services App	I am an industrial designer, that is my academic background. Currently a doctoral student of human factors in engineering (1)	I worked on this idea with NN, a Master's student, specifically from the programme of Innovation and Entrepreneurship (1)		He was closely linked to the world of construction (founding partner). He is a Structural Civil Engineer. He worked for many years in construction companies, developing all kinds of projects, small and large, and also because he built his own house, so he lived through the process of needing many people for specific tasks and it was always difficult for him to find specialized people in certain areas, and also responsible with the work…So that's where the idea comes from. If you had been in that industry for a long time and he realized the shortages in the type of workers and an application could gather them, classify them and act as intermediaries in the hiring process (1)	

Appendix 6: Reasons to participate in Ingenuity19 – Illustrative Quotes

Case	As a source of funding	External evaluation of the idea - Business perspective	A learning experience - Entrepreneurial knowledge
Students Applications	(they applied to Ingenuity) for two main reasons: branding and cash…The second thing is, you know, every entrepreneurial team, you know, looks for various kinds of source of funding (1)		
Equine Repellent		I wanted to have feedback and, I was probing in the lab and yeah there was this develop programme that was really cool / I did my business plan for the master, but it was in an academic thing, from an academic view. Then I was a part of a competition in France that was just for the equine sector and I was a finalist, so I mean that from the equine people that were ok with the idea but I wanted to have the point of view of business people on it, so yeah I was really just to the business side what can be improved (1) /It wasn't important because I didn't even think I would win prizes. I was far from thinking that ... but also more importantly to get feedback on my idea. And yes, that was it. That's what I wanted (2)	So there was, I think, around 400 participants and I really wanted to be selected in the top 50 because I wanted to pitch, first for practice ...And then when I was selected in the top 10 I was like, "Oh, right. Cool. It's another practice." So then because I was in the top 10 I imagined I would get a prize, but to be honest I thought I would get one of the Santander ones, of the £2,000, because I was in the top 10, so it would have been a bit weird if I didn't receive anything. But other than that, it was not important at all. I really didn't think I would get a prize. It was not the reason why I did it, basically (2)
Access to water	The prizes are important. They're important. They make you work for it. Right, it's motivation. It's motivation and every year it just grew and grew and grew. So, the prizes are really important. It's not some... and then I like that the prizes are not in kind. Okay. So, it's not some voucher somewhere, it's not some... it's real money that you will get to spend and it will make a difference in your business (2)	So it's one being to be thinking and thinking and thinking about something. It's another thing to put it on paper and have been judged by somebody external, independent, who has never stood interested whether, you know, or does not know you at all...and that then for me was like our way that we can validate our idea. So, if it's a viable idea then somebody can put money behind it... So that process of validation for me it's like really key (what they were looking for participating in Ingenuity) (1) / I think I had an idea then, I was still doing my Masters. I wanted to validate the idea. I was like, okay, I already had a business plan and then I had been looking for business background, or at least surrounding environment where I could actually just develop it a bit further. Then when I put it, I went to Enactus and then,	

Case	As a source of funding	External evaluation of the idea - Business perspective	A learning experience - Entrepreneurial knowledge
		in Enactus, there wasn't such good support and then I went to the lab and I found better support and then there was that competition, I put it in there (2)	
Shells and Chitosan	I think it motivates (the awards). I heard from other teams this was a motivational factor because it is what you need to advance. Generally you do not have resources or it is difficult to get the first resources so it is a good activity to make an effort and do all the research and development well so that you can win that award and finally develop your idea. I believe that in my case it was not so much out there but it definitely motivates, because otherwise you have no other way to obtain the monetary resource (2)	I was being focused on the science and I realised it is very important to know also the other part of an idea, like the business side, the entrepreneurial, to take your idea out of the ground and make it grow... to share of your idea, to receive feedback of what you did / it was more like testing my idea and enriching it more through feedback from people outside the project (1) / In my case, particularly with Ingenuity, it was, I really did not participate for one of the awards. I was going with the purpose of expanding the idea of our project (2)	
3D Prosthesis	I was looking for funding at the time, so it worked quite well (1)		I was hoping to find a bit more on what to include in a business plan and where you should be at different stages in business development (1) / I went into Ingenuity19 hoping to learn more about enterprise and develop my own business (documentary records)
Accommodation Booking	For the money. I was at a stage where I thought the business needed an injection of cash to do marketing (1)		

Case	As a source of funding	External evaluation of the idea - Business perspective	A learning experience - Entrepreneurial knowledge
Housing for Refugees	they will need to have a winner that is from an established community organisation and other people just might not spot that (option to get a monetary prize) (1)		
Platform for designers		I wanted to develop this idea and bring into fruition but at the same time I want to really look at it from an outside-in lens and to see whether it's worth investing in to. That's really what got me intrigued into doing Ingenuity (1)	
Entrepreneurship female toolkit	It was "" in an email, I think. It was like what are we going to do, shall I bid for some more money, yes Isobel can bid for some more money, how can we do it / "" had suggested it because she saw it as a route to possibly winning a prize and getting some money / The decision to get involved was can we get a bit more money so that we can keep… so that		I mean "" did… I remember "" as well saying I'm doing this for personal development as well. I want to do more pitches and put myself out there / "" was challenging herself…I kind of thought it would be a nice opportunity as well and yes, to walk the talk a little bit, live it and see where it could go (1)

Case	As a source of funding	External evaluation of the idea - Business perspective	A learning experience - Entrepreneurial knowledge
	we could run some workshops and do something with this (1)		
Support for Anxiety			I did think about applying the previous year but I didn't have anything that I could fit or anything that made any sense because, as I say, a lot of my projects are kind of, you know, I always say a bit fluffy, a bit fluffy around the edges. They're nice, they're nice things to do but they're not necessarily business. But what I found with Ingenuity 19 in particular was the framing of it, the social and the corporate or, they used a lot about community which I really enjoyed, and the fact that the two conferences, so at the beginning of the training you had the two weekends so you could go on the community one (1)
Vertical Farming	The awards were relevant and we considered Ingenuity as a possible "investor" or a way from which we could obtain the necessary founding, the seed capital to start this project (1) / the monetary prize did influence (motivations to participate in Ingenuity), of course, but I saw it as, well, that they could help you start your project, that it would be a support to start, something that will accelerate you, that will make it easier for you to start it, I saw money like that, I said "that money is used to start it", I saw it in that way (2)		I went to Ingenuity mainly because of the people who would give the talks, I was very struck by the person from Google who was going to be presenting and I'm going to be honest, at first I only attended to have the experience of being in a talk like that level (1) / I initially participated in Ingenuity for the talks that were going to be given that day (2)

Case	As a source of funding	External evaluation of the idea - Business perspective	A learning experience - Entrepreneurial knowledge
Social Supermarket			I think I wanted to have an idea of how the real world works, of how a real business works, because I am studying international management and they (lecturers) can tell me many things, but if I do not know how it really works, if I do not apply what that they are teaching me, it will not be useful for me. So, I wanted to understand how the real world works and how to connect the academic world with practice, and which concepts you are going to apply and which are more theoretical and you are not going to apply them (1)
Outsourcing Services App	The competition, well, personally, I don't know if we were looking for it, but it was a good opportunity because it was a limited time, it was very well structured and there was a real possibility from the results of past Ingenuities to get seed capital (1)	in fact when we started the process we thought that it would be super valuable to hear how British people can see this idea and how, with their cultural reality here, they could see things that we had overlooked and that we basically brought back from the Chilean experience. We wanted to adjust the idea to the English cultural reality and that was going to imply making decisions that we would never have considered (1)	The reasons why we applied were because the Ingenuity was super well structured as an idea, it had super defined steps in which it was almost impossible to get lost (1)
W Mentor	Some of them see the dollar sign, some of them see the potential for cash (1)		Some of them see the potential to try something out and know that that experiential learning, if they don't explicitly know this, they know they will get something from it by trying to take part / Some of them are interested in the training (1)

Case	As a source of funding	External evaluation of the idea - Business perspective	A learning experience - Entrepreneurial knowledge
Z Mentor			I believe it's just to match a need for skills they don't have / Talking about entrepreneurial skills. Most of the competitors come from let's say real science areas, so they are mostly biotechnologists, pharmacists, software engineers, mechanical engineers, so they do know and they can have ideas about how to make change in a field, but they don't really know how to package that and how to sell it. I believe those are the ideas they want to… the knowledge they want to acquire (1)

Appendix 7: Opportunity Development Competency – Illustrative Quotes

Case	To develop and enhance business plans and improve products or services	To identify or develop more products, services and applications based on the initial entrepreneurial project	Transform the idea of the project into reality
Students Applications	In the original idea we were planning to do a lot bigger product and, as an entrepreneur, you know, you're quite optimistic about getting things done and like I said, these surgeries really helped us to narrow down and minimise the product to a level that, you know, we could demonstrate value and it has been a long journey and during this journey we identified, okay so, the product that we're thinking is quite big, we need to narrow it down and then we narrowed down the product and then we felt that this is quite narrow then we had to scale back again / Initially we had one-to-one business model, wherein we were trying to sell to universities, and now we are trying to focus on selling it to another company, by bringing some good market partner for us, some really credible people in the market. So, we've been in discussions with, you know, a couple of globally ranked institutions who provide outsourcing recruitment activities to institutions and we're currently working with them. So, what we have done is, we have changed our sales strategy, we have changed our marketing strategy. The product and services still remain the same but the way we provide information about it has changed. The people that we connect with has changed. We are trying to adapt to a new strategy and I think it's working for us at the moment; let's see how it goes in the future (2)		That's definitely useful. For me, Ingenuity has been one of the greatest stepping stone towards my success. everything started in that platform (1)

Case	To develop and enhance business plans and improve products or services	To identify or develop more products, services and applications based on the initial entrepreneurial project	Transform the idea of the project into reality
Equine Repellent	I think Ingenuity has really, really helped with the business aspects...By giving me the opportunity on the business side of things, that the idea was commercially viable. And in terms of the feedback, a lot was to do with the legal aspect, so the IP etc. Think about the next stage. It was, 'Okay, the idea is great. If you can implement it, it's great. But what is the next step?' I was, I guess, too focused on right now, developing the product (2)	I am developing a second product that is still innovative but it's much quicker to make, so it's not directly from the competition, the more from the fact that people believed in the product (project presented in Ingenuity 19) (1) / I had just started then to think about another product and I was like, "Oh, that would be cool." So it was a horse-riding legging. So then I started to work with a freelancer, who designed the leggings, started working on it, prototype it. I think that took quite a while, because I was more working on the other side of the business, so maybe I started working in January. We found the material, everything, and end of March she sent me an email saying, "Yes, I'll finish the prototype..." (2)	In 3 months (period of the competition) I had a product. I was with ideas and stuff and people believed in it ... I could go to the horse riding sector (1) / So when I pitched for the Ingenuity competition, I hadn't started any research or anything, it was just an idea on paper and I was trying to find contacts to help me develop my network and do that. So I think that Ingenuity19 gave me that opportunity by showing that even if it was just at the idea stage there was something behind it (2)
Access to water	So this particular one (Ingenuity19) has been more useful because after you figure those things about your idea, you know about viability and you know that figures, so apparently you know exactly what people will keep asking you / we have to make money for us to be a sustainable business, we have to...but also at the same time because of the causes that you are going for how we've structured the business is quite different, so we run like a purpose driven company (1) / for example, so different businesses, because different businesses target different markets and you will never be one person who's conversant with all the markets. I think the fact… so taking part in all the Ingenuities, what it does is it exposes you to a broad range of markets and how different businesses are using different business models to solve the problem. I don't think... I don't necessarily think that technology, per se, is the unique thing...If it's an app, it's... an app is made the same way. If it's engineering, I mean, you can't reengineer a pump, you can't reengineer... like, you're not Archimedes, you're not going to come up with something new under the sun. I think a lot of things have been on that end. I'm not saying there's no new territory to be conquered, I'm just saying, right now, I think that the new territories appear, how you think, and for the business... for Ingenuity, for me, per se, it's just listening to all those speakers and how they solved the problems and why they solved problems and how they managed their time, how successful they are, why they are not successful. We never get the ones who are not successful, but by kind of just, I don't know, it just helps you / For me, it's the story and because of that then you will find a lot of people believe me; I'm legitimate; there are a lot of people who buy into what I am saying not because I am just trying to solve the water crisis, it's how I am	we created... we branded water bottles, stainless steel water bottles, and so we were selling those on our shop during Covid and stuff like that. So, it is just one of the ways that we've been using the money to kind of just accelerate... either accelerate the projects or keep the company alive because during Covid there wasn't much you could do, not in terms of instalment, not in terms of installation, sorry, not in terms of deploying pumps; everything was on lockdown so…and even now, it seems like people come out of lockdown and then they go back to lockdown and then you never know. So, like, the status is not necessarily completely out of lockdown (2)	What it offers is like the opportunity to bring an idea from your head to the real world / before Ingenuity it was in my head, now it's a company that's running and people putting money and people behind this... Now it has life, you know, so that's I mean it's like it's day and night / So yeah if you ask me the difference before ingenuity, it's like you have an idea but... but you never see it until you start doing it (1) / By giving me the opportunity on the business side of things, that the idea was commercially viable. And in terms of the feedback, a lot was to do with the legal aspect, so the IP etc. Think about the next stage. It was, 'Okay, the idea is great. If you can implement it, it's great. But what is the next

Case	To develop and enhance business plans and improve products or services	To identify or develop more products, services and applications based on the initial entrepreneurial project	Transform the idea of the project into reality
	solving the water crisis, but due to the fact that the problem I am talking to, I am also authentic to it / our marketing strategy right now is a tribe. So, we are building a tribe. The question is how we are going to build that tribe is by creating trust online, and how do you get trust online, you have to be authentic online, you have to be, you know, authenticity is the risk... no, transparency is the risk, authenticity is the reward... no, trust is the reward but authenticity is what you do in between. So, for me, it's just making sure that whatever we are putting online, one, is in line with our vision, which is solving the water crisis, but it's actually realising that, one other thing is that I have to become the face of our marketing, because my story seems to be very, very powerful when I tell it to people... for me, my tribe are people who want to solve the water crisis, they are change-makers, they are problem-solvers, they are innovators, they are people who think... early adopters, if they had a... if you have the adoption card, they will be early adopters and innovators and those people are the people who have a mind-set that I want to work and that mind-set is the one that says, "we want to solve the water crisis once and for all" / it was just looking at the market again and realising where people are.... the early, the innovators and the change-makers are the ones who are going to get our vision easily / I'm not saying that the validation I got in the previous Ingenuities was not the same, it's just that in this particular one, we had changed; that's the first time we had featured the story. That's the first time we had featured the story. So, I got a front... like, a front experience of like understanding what a difference a story can make. It makes you stand out from everybody else and that's what I'm saying; the process was not working, not because the technical part was not good, the development part doesn't work, the engineering part or the business model was no good; no, that's not why the business was not working. The business was not working, one, because we didn't have a vision; two, I didn't understand why I was doing what I was doing. When I figured those two and combined them, it just like, "pfft" (2)		step?' I was, I guess, too focused on right now, developing the product (2).
Shells and Chitosan	I realised that the approach of what I want to do for that technology it was not the best and that was after Ingenuity. During the competition they ask you some questions and with those questions, I realise this is not my…my market but I'm not going to make profit with this strategy. So, I change it (1). I believe that they generate skills (activities such as ingenuity as facilitators of skills for entrepreneurship), but only in the first stage, because you are in the part of literally testing the idea, and I believe that all these competitions work to ask for advice / it helps, definitely, to create many fine skills, even synthesize ideas, be, expose your proposal, expose it to the public so that they can criticize it and improve it, I totally believe that every entrepreneur should at least have the experience to acquire these skills / I could also see specific aspects that I had not considered either, such as patent strategies. I had always left it, because my work was more focused on the		

Case	To develop and enhance business plans and improve products or services	To identify or develop more products, services and applications based on the initial entrepreneurial project	Transform the idea of the project into reality
	part of creation, not so much on patent and they made us a lot of emphasis on this "look for this business model, if it works, if it exists, here you have a better option" or "You have the other option to sell it directly." But yes, there was a chance for us to see other alternatives…during Ingenuity I identified a strategy that we could apply to what had already been done. Not so much as to keep working and working, but to exploit what has already been done. And then that was the strategy, as in the technological part that had already been developed, to exploit it commercially, in a business way (2)		
3D Prosthesis		We've got some potential ideas that we might pivot into but we're not set on any of those yet, but we have got other ideas, branching out of the same company rather than a new company. We have got some new ideas that we're looking into (2)	
Accommodation Booking	So the approach has changed and now the money we raise isn't use for temporary accommodation, it goes to families who have children who are experiencing homelessness, because I think that's more effective and it's a bigger problem. But yes, so it just developed from there really...when I look at the stuff that I was doing a year ago, when I look at how the website was back then I think ah, that was crap, you know, it was rubbish / I've realised since then that it's not realty worth it, I need to be targeting businesses because we can put a lot of work in to getting you to book your holiday, but you might only book two or three times a year and you might forget, and I put a lot of work into getting you on board, whereas if I get one business on board, they'll be booking every single week, they might be doing five or 10 bookings a week, and once I've got them on board, they're on board for the year then; I don't need to keep advertising to them, I don't need to put in more effort to get them, so it's like I'd say just efficiency (1)		

Case	To develop and enhance business plans and improve products or services	To identify or develop more products, services and applications based on the initial entrepreneurial project	Transform the idea of the project into reality
Housing for Refugees	One of the things we were critiqued on was not having a budget for the project. It was like okay, I've got to come up with a budget (1)	I have got another idea but I've not done any work on it so far, which is a refugee social enterprise doing maintenance work. Kind of like a step up from what we're currently doing (1)	
Platform for designers	Yes. Absolutely. I think prior to... I had an idea of a particular business before the competition, which was basically just an ecommerce platform, bog standard e-commerce platform with a consignment business model but I think now I'm exploring a lot more avenues in terms of what this business could end up being, it can be a lot bigger, obviously everything is step-by-step (1)	now It can move on from just being a fashion retail business into potentially a technology, a technology business; and, rather than just sell products, we can sell information and we can actually be a solution to making the value chain of the fashion industry that little bit more sustainable and a little bit more friendly to the environment, a little bit more kinder to people…it's one of the things I'm trying to explore in my business at the moment is, is how can technology help build a sustainable fashion business model that can bring real value to the market (1)	
Entrepreneurship female toolkit	We redeveloped a toolkit so it was earlier stage (1)		

Case	To develop and enhance business plans and improve products or services	To identify or develop more products, services and applications based on the initial entrepreneurial project	Transform the idea of the project into reality
Support for Anxiety	When I first started Ingenuity I kind of... it's difficult because I knew I had an... I knew I wanted to do something with anxiety, I knew that that was important to me. I knew that the mental health training I was going to deliver to people covered a lot of different topics. So, it covered depression, anxiety, bipolar, eating disorders, you know, lots of different conditions, which is what it should do. But for me, with Ingenuity in particular, it was important that we looked at how anxiety fitted in to all of that, and it was important to me that it wasn't just about awareness raising, which is vitally important, but that it was about the practical side of anxiety, how living with anxiety affects our lives. That was something that was really, really important to me because I knew that there was certain aspects of my life that were held back because of the condition that I lived with. So, when I first started that was my idea, that was the... I didn't know what it looked like, what it felt like, but I knew that it was something along those lines. If we take that from then, then it became, I want to have an app, which was a very structured technology, I want an app, that's it, nothing else, to then having discussions with people around my delivery skills. So, I knew that I can talk about anxiety for months and months and months and, you know, tell anybody about anxiety and say, you know, "let's talk about it, let's be open, let's be honest", but an app, although it's a good practical idea, it didn't... and somebody said this to me, I met with somebody from Experian and they said to me, "you... the thing about that is that it's very, you know, it's a button, you press it, brilliant, great, you know, that's fantastic" / the way Mind Map has taken shape now, is it still has that technology aspect to it. So, the idea will be that when we start to list facilities in the new year, we will have a Google Maps layer so that people... anybody can download Google Maps onto their phone, put the layer on top and find the network of venues. But, what became really, really important was the community of Mind Map. So, bringing people... like we've just talked about, bringing people together, bringing people in. So, for me, it was always about anxiety but for me, I kind of thought, well, if it was something practical, we press a button and it helps us, great / since the idea of Ingenuity, it went from a very practical, "I want to do something that helps people", to, you know, Mind Map in particular never ceases to amaze me, the new things that come from it every day, the new ideas that come from it every day, and I have to ground myself very much because I can go away and be like, "oh, let's do this and let's do this and let's do this", when actually, we need to build the foundation which is a community of people, a community of businesses and then we kind of go out and out and out, and then that will mean outsourcing or becoming a CIC, whatever that looks like. So yes, it's changed a lot since Ingenuity, a lot. But, I think it's changed for the better. I don't know. So yes, that's where we're at / what I found quite interesting is that Mind Map as a model does not generate income itself, and I've had to think about how that works. So, the next step for that is that we'll be looking at generating training. So, what I mean by...	I see what I do now as about looking at how organisations, businesses, can embed mental health approaches as they have done with physical health approaches (1) / "Support for Anxiety" is a programme that I run as a self-employed person. So, if you imagine, I always say a family tree but I don't know if that's the right analogy, but I have Training at the top, which is my business, and then I have three programmes that I run underneath that, which is I run Mind Map, The Anxious Exercise Club and then I run a programme called The Free Period, and so those, they all sit underneath and they're all programmes that I run but don't necessarily make money, whereas what we're seeing with Mind Map in particular is that there are avenues for that to become a company in its own right, where it generates income and generates investment and things like that / In terms of commercial partners, not necessarily directly for Mind Map. So, I've been talking to different people about training opportunities, about developing training opportunities. I think for me it was always a case of, "oh I can deliver training but I can't write it", and now that's changed somewhat because, you know, the kind of the idea behind Mind Map is creating spaces for people. Businesses can sign up and say, "yes, we can do that", but actually, they need training on how to do that. So, I think the commercial opportunities then start to look at training companies, mental health training companies in particular, around, "okay, I want to write this training programme and I want to learn how to be able to do this properly" / out of Mind Map came its sibling project, the Anxious Exercise Club. If you think about Mind Map creating a network of venues, the Anxious Exercise Club creates a network of exercise and fitness instructors who are committed to supporting people with anxiety. So, that's	So I went in there with an idea that I've had for a long time but I kind of was a bit unsure about it, and Ingenuity just enabled me to kind of crystalize that process and say, you know, "this is what I want to do, this is how I want to deliver it". / If I'd just gone ahead and thought about it, I wouldn't have done it because it seemed like such an overwhelming task. Whereas now Ingenuity has given me that starting base of saying, "well you're here, but if you take these steps you'll be here, and then you take these steps and you'll be here" (1)

Case	To develop and enhance business plans and improve products or services	To identify or develop more products, services and applications based on the initial entrepreneurial project	Transform the idea of the project into reality
	not generating sorry, developing training, so that actually, the training that I currently deliver is about raising awareness of different mental health conditions. However, what I really want to do is develop training opportunities for business to look at how their workplaces are placed to support people living with anxiety, and that can be things like what are they doing in their businesses, how do their businesses support people, you know, in terms of communications, accessing the building, all those sorts of things. So, that will be one way of generating income for Mind Map itself / Mind Map has kind of grown very quickly. So, Mind Map now has... the website is now up and running. So, it's mindmapnottingham.com and we have five venues listed. So, we have five venues that are committed to supporting people living with anxiety which is really, really great...and we've got another four that we're talking about it with / Actually Mind Map on its own, what I envisage is I want it to be replication in other towns and cities. So, in order for us to do that, it needs to stand on its own. Whether that's as a charity or a community interest company, not quite entirely sure just yet, but kind of just sort of looking at it from a holistic point of view because we have had people say, "this would be really good in Sheffield", or, "this would be really good in Leeds", or whatever, and I have no doubt that it would, particularly as some of the companies that are interested have branches in other parts of the country; but for me at the moment it's about getting Nottingham on its feet, making Mind Map Nottingham the kind of the pilot, the success, and then looking at how it can be moved to other cities and towns / I think if Mind Map is a company in its own right, rather than just a programme that sits amongst others, it kind of has a bit more gravitas and a bit more... people identify with it more, and it also means that we have different... we'd have different things available to us in terms of employees, in terms of different ways of generating revenue because, obviously, as a community interest company there are different pots of funding available that aren't available to self-employed people like myself, so yes, there's lots to think about but I hope to have at least the status finalised by January 2021, that's the goal (2)	something that I've also set up. The interesting thing with the Anxious Exercise Club is that it does provide opportunities for working with organisations that will automatically... which will ultimately feed in to working with Mind Map, so it does kind of feed in, in some way / I think, for me, for me to... what I envisage is having Mind Map as a standalone entity, and then for me personally in terms of my self-employment level... self-employment business, is to be able to write and deliver my own courses and train and teach people about mental health. That can be either that I become an instructor for a company such as Mental Health First Aid England, which I already am but if there's something along those lines, or whether I actually write and develop those courses myself and then deliver them and train other people to go out and deliver them. That's, you know, a bit further down the track / I hope in the sort of following year or so we might be able to look at how Mind Map might be applicable to places like football grounds or, you know, music venues or things like that (2).	

Case	To develop and enhance business plans and improve products or services	To identify or develop more products, services and applications based on the initial entrepreneurial project	Transform the idea of the project into reality
Vertical Farming	In my opinion, or at least in my experience at Ingenuity, it was a platform that helped me develop a business idea…after the competition we even further developed the idea, my founder partner reviewed quite a few things, we corrected quite a few things (1) / I evaluated carrying out the project in my native country, but in Mexico it would be a project that would have no future, because the value of this product goes to a market that is ... no, a market that does not have many areas to grow vegetables, where there are extreme climates, where most of the vegetable products are imported from European countries like Spain. Mexico has an excellent climate, where you drop a seed and something grows. So, there wasn't, it wasn't a viable project for a country like Mexico, unfortunately (2)	In fact, I'm working with two additional ideas in addition to this one (1)	Yes, of course (Ingenuity as a platform to develop the project), because it was the place where we developed the essence of the original idea to something real and that is the thing we had been working for time (1).

Case	To develop and enhance business plans and improve products or services	To identify or develop more products, services and applications based on the initial entrepreneurial project	Transform the idea of the project into reality
Social Supermarket	When we did the presentations, I think that, in that last phase, it was very interesting. We got in touch with the judges, especially after the Q&A, which they made us to see some problems that we had not identified, why do and they made us see some problems that we had not identified because when you are very involved in a project, in the end, you want to think that everything is going well. You try to ignore some things that maybe are working, but that are not going to work in the long term / but simply the feedback they gave us and the problems that they showed us that we had and that we did not think we had, it helped us a lot. In fact, we have changed the strategy / Yes, also in terms of the strategy we had, we thought that when the business was stable, give it to the council so they could take it. But one of the judges, I remember clearly saying to us: "If you are having discussions with the council, why do you plan to give them this gift later if now they are not making life easier for you?" ... for us that strategy was the easiest, the most obvious, and after that suggestion made us think that other people might be interested in taking this project and that they really had that passion / We are trying to be more sustainable, that it does not depend so much on the temporary team, but that all operations like that ... now we are generating standard operations processes. Basically, if we are all on a bus and we have an accident, then another team can take it (1) / Now we have reached the point where we are evaluating our business model and other ways to achieve revenues. We are considering making a subscription to boxes of fruits and vegetables with which we could target people who are more concerned about the environment and that could give us money to finance other projects, such as the one we have with the school and give them more variety, we're considering that kind of thing now./ We are now working on it. We have taken the summer to review our strategy and one of the points that the mentors and judges mentioned was that our exit strategy was not appropriate, let's put it that way. We have been reviewing that and right now ... They told us that it did not make much sense if we were basically fighting with the city council for the money we are paying for the store, that our exit strategy is to give the store to the city council, because the relationship was not so good. But right now we are ... we have thought to go in other direction, looking for another organization in the same area of Nottingham that they may want, when we decide to finish this project as part of Enactus, they want to lead the project and add it to their regular activities. So we are looking for a local institution that understands the need that the community has for this project because we believe that this way is much better and could make it grow / there was a year of preparing business plan and all those things and just before opening the store it was formalized as a company / We are now finalizing the details of the strategy and we want to make it quite clear so that the people who then take on the project ... we have already recruited for the Team Leader position and we have a plan that is something that had not previously been done. We	There is a problem in the food industry which is that too much bread is produced, in huge quantities. So with that we made a (new) spin-off is that we are producing beer with bread. That started very little time, a year, because it started in a competition in September 2019 and now they are formalizing as a limited company / National Lottery, they gave us money to convert our van into a mobile supermarket that opens and we will be able to go to nursing homes and other areas of the city that we do not reach right now and they gave us £ 9,000 to completely convert our van into that / we had another project called "Drial apples miles" that we were going to do in collaboration with a charity. We wanted to give experience to people with disabilities who were going to make apple snacks that we have in the store, using food that supermarkets would otherwise have thrown away but also giving them experience and then we were going to redistribute these apple snacks to breakfast clubs, children who go to school before it starts to have breakfast there / we only sell food without cooking but we are collaborating with a lot of people who turn that into a dish, people who cook and give it to people already made, foodbanks, many local projects that we have been collaborating with. So I think yes, we get many more partnerships in our distribution network than people offering us food (2)	

Case	To develop and enhance business plans and improve products or services	To identify or develop more products, services and applications based on the initial entrepreneurial project	Transform the idea of the project into reality
	already have a plan until next year, 2021, now we are waiting if we can define the exit strategy, because we believe that the project has already reached a point that cannot grow much more based on all volunteering. We need a person who works, a person who is dedicated at least part time to really have more impact and grow...I think we will define the exit strategy and we will see how we start working to reach that goal because there are many things to fix. If you want to give a project to someone else, everything has to be perfect, and that is what we are doing (2)		

Case	To develop and enhance business plans and improve products or services	To identify or develop more products, services and applications based on the initial entrepreneurial project	Transform the idea of the project into reality
Outsourcing Services App	The idea had two stages of feedback and it had changes. One of the main changes was that it had to be associated with a bigger company, that we as natural persons was going to be more difficult for the person to consider it. For example, being associated with B&Q, there are retail stores for construction and home products, linking with that brand and generating local trust. Why make an application that would rest on the trust of people with us, even though we were not going to exist visually for them, but it was good that they had the support of a company that had already earned that trust. It was basically taking advantage of the time that this march had remained in the minds of people here and justly linked to the world of materials, construction, home repair, that kind of thing. The second stage was in terms of costs and how this was going to be sustained because we argued that at first we wanted to generate a database and the application was going to have to be almost free and only subsist from the delta that is charged the person for sending that worker home, then the worker assumed it was a loss because we were the ones managing his career. So from there it was discounted a little and that was going to be the financing. The eggs were laid in the next stage, where there was already a lot of data, a lot of information and that was being sold to related companies and interested parties, so they told us that if we could find other sources of financing that were not just the fact of taking that commission from the worker would be quite convenient for the future viability of the project. We couldn't just depend on income, basically (1) / There was change (in the project), but they were basically cultural changes. In our case we had to modify certain things because the idea was previously xx, so things that in Chile could have been done in one way, here in the UK had to be done in another way and things that Chile could have been a business in the UK they were no longer business. Because society is much more independent, much more educated, with greater access to things, therefore there are things that here no longer have the same value as they would in Chile. Therefore, it is a cultural adaptation and a further push forward because in Chile we could have implemented, for example, version one, which was the initial version, this could work in Chile but here (UK) it did not work because it was already out of date in time , the one here (UK) could be applied in the 80s 90s. So the idea had to be pushed a little further, taking as a reference previous English experiences in relation to the design of services, basically / it's like when in Chile the airbag was optional, here it was basic, then it is more more less the analogy that occurs in this type of much more evolved economy, especially speaking in the world of services (2)	We continue working together, but not the idea of Ingenuity. We worked on another idea with Miguel, also for product innovation. We continue to work together outside of the contest and outside of Ingenuity, not the idea itself. The idea was saved (1) / Miguel had the desire, because he studied entrepreneurship and had resources, he had saved money for that, so he later began to contact investors but not necessarily with this project, but with other ideas, like with 3 or 4 people for different projects. That means that Miguel had the motivation, he had the money and he started doing it and he started to move and he managed to manage several things but with another idea / Yes, I have four ideas, but none have to do with my PhD ... uh no, one is related to my PhD...It is a study center, related to the design of human factors with the most relevant problems such as transport, education and health (2)	

Case	To develop and enhance business plans and improve products or services	To identify or develop more products, services and applications based on the initial entrepreneurial project	Transform the idea of the project into reality
W Mentor	There's (changes in the projects) for those who have taken an active part, and that's a key thing, for those who have engaged in the Ingenuity event programme /For those of them who have done the homework or the extra work we suggest in the evening classes, for those of them who've asked for help and support and mentoring and listened to it and applied it, you absolutely see an enhanced business plan that's more credible / I hope I've kept them sane and put in perspective what they're doing. At the end of the day it's very important but it's not actual life or death. I hope I've helped facilitate some clarity of thought and whether that's to do with a business contact, or a business plan, or a financial model, what next. / Those are all useful independent of whether they win anything on the competition or not. It might be that it shows that the business isn't viable but then they know (1)		Even if they don't win a prize those who actively engage with it will, in a timely fashion over a few month period, have to have produced an up to date business plan, financial forecast, effective pitch (1)
Z Mentor	It is something that when they arrive to the competition they don't really know who their customers are or their potential customers are. That's something that really sets apart the teams that make it to the finals or win one of the awards and the ones that doesn't....of course it improves many of the ideas because some of them are going to become a business. Many of them are incubated at the university Ingenuity Centre (1)		

Appendix 8: Championing Competency – Illustrative Quotes

Case	Motivation through the interaction with mentors, speakers and other entrepreneurs	Performance increasing motivation and confidence to grow the entrepreneurial project
Students Applications		Yeah, definitely, it gave us confidence and boots and also you know motivation but as you know we could achieve something big it fills our dreams and hopes. / It helped us to grow the company by, you know, fearlessly like giving us a maximum boost / the kind of platform that the ingenuity gave us to be able to connect with big stakeholders in the market and getting the confidence, speaking to them and looking them in the eye and then, you know, close the deal (1) / Winning the award and getting the recognition was quite overwhelming, you know. Receiving an award in front of so many distinguished guests and high quality people was quite a motivational factor, not just for myself but I would consider my team as well... I think it has helped us overall in terms of getting in front of people, confidence in talking to other people (2)
Equine Repellent	because of everything that's put in place with the Ingenuity Lab. It makes things so much easier. Maybe not like... no one does anything for you, but the environment and if you want something you can find it there with all the mentors and stuff. So even if you're alone you're actually not really alone (2)	I could go to the horse riding sector and it was really motivating in the sense that like that I have something that has been developed by data and people trust in it...so is optimistic to make it happen and yeah / it's still it' still the same project the only thing is the...I think it gave a boost in the sense that people believe in the project (1) / So definitely if the Ingenuity Lab would not have existed, not definitely, but if the Ingenuity Lab had not existed, I'm not sure I would have started my business / with the competition, yes, it gave me a sort of more... I was not the only one believing in my project, there were other people backing me up (2)

Case	Motivation through the interaction with mentors, speakers and other entrepreneurs	Performance increasing motivation and confidence to grow the entrepreneurial project
Access to water	I think, for me, it was not necessarily the money more than the learning, because you see, the experience is invaluable because you get to see how people respond to your business, authentically and if they believe in it so much that they put money on it then that really is really good enough to kind of make you say, " keep going, and even on the bad days, keep going", right? So, that's motivation enough to make you keep going / It doesn't matter if we win anything else, what I do all myself is to keep telling this story until I see traction, until I see traction in this field, until I see traction in the SDG6 (2)	the year I got shortlisted it was top 20 and I was like, "oh, okay", so it kind of like gave me an idea that the thoughts in your head are valid, they're not, you know, you can think an idea is good but unless you get outside feedback from somebody who does not know, has never had a view before, it just sometimes... it isn't that, I don't know, validated, exactly, if you know what I mean. So, that was good because it was outside confirmation that, actually, I had a good idea (2)
Shells and Chitosan	What are these activities helpful for? ... for me to realize if the idea that you are doing that you think is good is really good. For example, it happened to me that when I began to have good results or to receive these comments of "it's worth it, exploit it, I would like to work with you, I want to support you, I want to see how you go" it gives you a boost ... more people who believe and who see potential, then it is just that, legitimacy, something you are doing well because you are competing with other very good people then they are seeing you, there is something good (2)	
3D Prosthesis		Definitely, knowing that I've been chosen multiple times for different awards as the company they like the most, or they thought had the most potential, I think was a huge amount of motivation. That combined with the finance that actually made being able to run the business possible I think was huge. That really gave me the motivation to carry on and continue working by myself for the next year (2).

Case	Motivation through the interaction with mentors, speakers and other entrepreneurs	Performance increasing motivation and confidence to grow the entrepreneurial project
Accommodation Booking	The summit was also motivating and just gets you engaged and thinking about ideas (1)	
Housing for Refugees	When “” and “” walked in and they saw us sat down they were like, guys you’re brilliant, you’ve done really well. I was like “”, I think we’ve got something (1)	

Case	Motivation through the interaction with mentors, speakers and other entrepreneurs	Performance increasing motivation and confidence to grow the entrepreneurial project
Platform for designers	You suddenly expose yourself to a whole new network of other entrepreneurs and dynamic people and you kind of feed off them and you see the way they think and the way they approach things, and it was also good to hear from industry leaders, opinion leaders, thought leaders during that process and to see what they're thinking and the ideas that they are investing in or harbouring about the future of entrepreneurship. So that invariably encourages you to expand your mind and expand the way you think and to... so I think yes, in terms of myself, I definitely feel like I grew during the process as a businessperson, as an entrepreneur, yes. / I think it's nice to be in an environment where somebody like me is encouraged to be like me, where my entrepreneurship is not questioned, it's not... I'm not going to impress anybody here, and nobody's going to suppress me / you're just trying to juggle life and juggle this business and it's a bit crazy and it's really stressful and you're down but then you speak to someone and you suddenly feel encouraged because they're going through and, they're finding a way to make it work and you're encouraged to dig a little deeper, I'll find a way to make it work, and you share ideas, you share networks; that, for me, has been invaluable, invaluable, I can't even put a price on that (1)	Look, our platform has this, at this early stage has been validated, has been given encouragement to keep going and we're onto something / we won a prize, so it's nice to say at such a fledgling stage, you know, we have an award-winning business. So the prize was great / I think it's finding a community; finding a community of like-minded people. Be challenged by but also encouraged, you know, that's... if I was to sum it up in a sentence (1)
Entrepreneurship female toolkit		

Case	Motivation through the interaction with mentors, speakers and other entrepreneurs	Performance increasing motivation and confidence to grow the entrepreneurial project
Support for Anxiety	When I went in there and when I pitched... when I found out I'd got to the final 40, and then I pitched my idea, it was this very strange feeling of, "oh, they are actually interested in what I have to say" (1)/ I've found that over periods my motivation dips very significantly, and that's just... I mean, that can be a multitude of factors, that can be things like your own physical health, your... things that are going on in your personal life, things that are going on in your professional life, and sometimes I found that, because I was working on so many different projects, that Mind Map kind of became a bit knocked to one side. And you do... and unfortunately, even in my life, you do meet people who are kind of like, "well, it's too big, it's too big of a project and you, you know, you live with anxiety", and, you know, "you shouldn't expect too much". I think, for me, the motivation comes from not listening to that. So, sometimes when people say to me, "that's too much for you, you can't do that", I have to kind of go, "yeah, no, I'm going to show you that I can", and it's almost a motivating factor in itself / The reason I do that is because, not just for people with anxiety, I don't want to make this about an anxiety versus non-anxiety thing but I think with particularly people living with mental ill health, your motivation can dip significantly and you can think to yourself, there's no point because I'm not very good so I'm not going to do it anymore. So, it's really, really important for me in particular, that when I... when my motivation does start to dip, that I have those visible reminders / I don't have my award on display, you know, permanently, 24/7, but the idea of... so, the idea is that, at some point, I will have a, whether it's a cabinet or whether it's a framed picture on a wall, but something that, when I walk out of the house every day, will be a visible reminder that you have done this and you will continue to do this; and Ingenuity is one of those visible reminders, because it's so easy to tell yourself that there's no point because you're a bit rubbish. I try not to. I try and tell myself every day, "I know you're having a bad day, I know your brain's gone a bit wobbly, but think about that time when you..." I wish, more than anything, I wish somebody had got a picture of me bidding... pitching to the panel. I really do wish. Obviously, I haven't got that picture but if I could, that would be the one thing I wish. So, yes, motivation is not always available. Motivation is sometimes hard to find. So, I like to have visible reminders of why I do what I do, and my Ingenuity photos and, hopefully when I get my own place, my trophy, will be those visible reminders. (2)	

Case	Motivation through the interaction with mentors, speakers and other entrepreneurs	Performance increasing motivation and confidence to grow the entrepreneurial project
Vertical Farming		having my first try and reaching the top 21 made me think that I can go very far or just as far to try two or try three. If it gave me a lot of confidence that I can be a good entrepreneur and if I made a switch in my head that said "you see, if you can do it, do it" and from that moment if I have it in my head, maybe not in a period of time immediate but if I plan to do it and if it is in my plans in the medium term or in a longer time. But something changed inside me when I was there, when I reached the top 21 (2)

Case	Motivation through the interaction with mentors, speakers and other entrepreneurs	Performance increasing motivation and confidence to grow the entrepreneurial project
Social Supermarket	When we went to the USA or when I spoke with people from India and that people there almost know our project and admire what we do and they want to do something similar, and you don't realize that people really think that it is really a very successful project until you leave. I think that when you've been around for a while you say "that's what I'm doing ... I'm going to university but I also do this activity" and when other people really tell you the things you're doing well or ask you if you can help them, it's like " Wow" (2)	I think that sometimes we are like in a small bubble and we think "if we know that we are helping people and we are doing things well" but when that is recognized by other people who are not there every day and who do not know the project, you realize that you are not the only one who believes in the project. Other people also believe in the project, they also believe that it can be successful, so I think that gives you a lot of confidence that what you are doing you are doing well and that you can continue and make it grow, so I think that is the most important It has affected me positively (1)
Outsourcing Services App		I don't see a cultural or motivational impediment in the sense that we would have said "no, the idea was not good." Not because we believed in the idea, we believed that it could work, it would work in Chile and here (UK) / XX had the desire, because he actually studied entrepreneurship and had resources, he had saved money for that, so he later began to contact investors but not necessarily with this project, but with other ideas, like with 3 or 4 people for different projects. That means that XX had the motivation, he had the money and he started doing it and he started to move and he managed to manage several things but with another idea / It did not affect negatively (result in Ingenuity and effect on motivation), because ... no, not personally and Miguel less because he kept insisting and also because we participated with an attitude that was not to win, we went with the attitude of learning and It was fulfilled, it was completely fulfilled. Winning would have been a divine gift and it would probably have been unexpected and too much, because we did not expect it then if we had won it would have been "how nice, we won" but later it becomes more difficult because we acquired a new responsibility (2)

Case	Motivation through the interaction with mentors, speakers and other entrepreneurs	Performance increasing motivation and confidence to grow the entrepreneurial project
W Mentor	They sometimes just need that external confidence, “Sounds great, get on with it”. I don’t know. I’d be interested once the tape player’s off of what they say to you. Sometimes it’s… it’s really just being there as a… not as a friend in the sense of let’s go for a beer but just for them to feel safe enough to open up about their concerns, some of their challenges, some of the bits they’re not sure about and see if we can’t work together. To either say “yes, looks good, get on with it” or “actually have you thought about…” / I hope I’ve kept them sane and put in perspective what they’re doing. At the end of the day it’s very important but it’s not actual life or death (1)	
Z Mentor		I believe more than to the project is to the person, not even to the teams, it comes to each individual, that they are encouraged and they feel empowered and they believe that they can do something, especially if they make it to the finals or they win awards, because that means they have somebody telling them that their idea is good, or that their skills are good enough to make something like this happen (1)

Appendix 9: Resource Acquisition Competency – Illustrative Quotes

Case	The competition as a source of capital	Branding and legitimacy as a resource after Ingenuity	Use of facilities and support of the Ingenuity Lab as a complementary external resource provider
Students Applications	The biggest impact, definitely, the cash that was given to us. It helped us to grow the company fearlessly, giving us a maximum boost (1) / All of the money was completely put into the business, in terms of managing the resources, getting new components for the business itself, making marketing and sales, some for legal activities, as well. So, we have used that small amount of money for quite a lot of activities (2)	The second one is like I already said it's about the branding, the press release and it's the kind of platform that the ingenuity gave us (1) / winning a recognition in this competition was getting recognition on a live international stage and you have a tonne of audience who sees you for the first time and everyone wants to interact with you. So, that stage, that visibility that we got was quite important for us, and that's where we started to build our prime recognition. So, I think this competition has not only helped us with, you know, the cash prize money that we won during the award, but also, more importantly, it has enabled us to connect with mentors, who then see us as credible in the market. When you win an award, that's a validation that someone has assessed your business and has awarded you with any kind of reward, and that's what makes you more credible, more likeable and it slowly increases your market recognition / Obviously once you win an award, a recognition, then you also start getting blog posts on various different companies, as well. So, I think it worked well. We also used this recognition when we went to our sales meetings as well, to tell them that, you know, this product, this concept, has already been validated by industry experts and then they are recognised and we've been awarded for that same (2)	In terms of the programme itself, the Lab itself had entrepreneurs who already had an existing business that they were running from 3-5 years. There were start-up... there were new people joining the lab. The support services that they provided, the marketing push that they provided in terms of pushing it on their network because their network already had quite a few followers on their social media pages. The surgeries that we had with different experts in terms of accounting, marketing, sales, business development and raising capital, legal surgery. So, you know, it was quite helpful for us to be engaged with so many different people and it's not always quite easy to start a business in a new country, coming from " " and trying to set up a business in the UK comes with its own challenges but when you're based in a community like the Ingenuity Lab, it makes life quite easier and by having so many likeminded people and experts and to try to navigate you, and try to let you know what other pitfalls that might come if you take a certain route and, you know, we can probably deviate it as quickly as we can / as an international entrepreneur to UK, we had basically no network and Ingenuity served us as a prime centre, space and then we spoke about all the processes and services that Ingenuity Lab provides and supports to help entrepreneurs. I think that's been fantastic for us (2)

Case	The competition as a source of capital	Branding and legitimacy as a resource after Ingenuity	Use of facilities and support of the Ingenuity Lab as a complementary external resource provider
Equine Repellent	(The fund prize) it was used for some research. It was used for... I applied for trademarks, so it was used for the trademark, and then for some contracts with the legal firm (use of the prize) (2)	when I was looking for contacts, all the people I knew were talking about me to get contacts, were always saying that I'd won prizes at Ingenuity 19, because it gives that legitimacy. Maybe it didn't affect them, maybe it did. I can't say. But definitely I think it's something that is really important, because I think when you speak to the different schools, they... I don't know if they really care, but when you speak with important investors, when you try to describe your idea or whatever, it's people that are not from the business side of things, people that are not from the equine sector either, saying that you won prizes, makes them, 'Okay, so it was a good idea,' I guess / when I was going to someone saying, "Yes, I'm doing that product for horses," first I'm quite young, but I look younger than what my age is, so it's not that easy when you go see people that are older than you. They're just like, "Okay, yes, she just loves horses, go play with your toys" basically. So the fact that I've won prizes and stuff, as I said, gave me that legitimacy that I think people believe, "Okay, she's young, but she has things to talk about.'"(2)	I think at the time when I registered it, I didn't realise how important it was (having an office), but it's so convenient when you receive mail, packages, and just easy to... when you speak to someone, say, "Yes, my office is registered to that place, it's an incubator. It's not registered at home and I don't work in my kitchen." So yes, it's more of a real office space / I love going to the Ingenuity Lab because, as I said, it's more like an office. It's a place where everyone has the same mindset of working on their business and then I guess it's just for me, but if I work from home I'll be distracted really easily, doing cooking, cleaning, things like that. But I know that when I'm at the Lab I'm working. Maybe I'll be speaking with other people, if I need help I can actually go and see these other people, but yes, I love working from the Lab, because it's quite salute, there's a lot of space, and you get help / Yes. I have two (new) partnerships with two French start-ups...The reason why I closed these partnerships or I started these partnerships was because all my marketing was ready and I wanted to experience the market. So go to events, progress the product, started to have the website known and stuff. So that was... we closed the deals in January, end of January, something like that, so it turned out everything is on the website, it was probably February...it's a few things, it's just little things, but that are important to know and that you keep learning. And because it's a different side of just research, this time it's selling and contact with consumers, etc., it's really developing that and that part of the business that I was looking at when I secured these partnerships (2)

Case	The competition as a source of capital	Branding and legitimacy as a resource after Ingenuity	Use of facilities and support of the Ingenuity Lab as a complementary external resource provider
Access to water	in 2017 I won £4.000 and we used that to basically buy 10 pumps and deployment. With the money that we won this year around, we can go to 50 -40 pumps and deploy those (1) / the other thing I did was put... was actually now start thinking of putting it into creating a business to run it and because of Ingenuity, I had already reached a proper cash flow, which is something I've never done before on a serious note. So, this time I did it. And then, what else did I do after that? Yes, so I did it and then, in 2017, I had to consider whether I wanted to stay here and pursue that as an idea as well, as a company, that is, and then that's what I did / The prizes are important. They're important. They make you work for it. Right, it's motivation. It's motivation and every year it just grew and grew and grew. So, the prizes are really important. It's not some... and then I like that the prizes are not in kind. Okay. So, it's not some voucher somewhere, it's not some... it's real money that you will get to spend and it will make a difference in your business / we were doing a lot of the developments, so let's say for example we were doing a data platform which would help us to bring every pump online so you can track it, you can maintain it, you can monitor its performance and if you can track all of them then you can really track the progress of SDG6, that's something I want to do. So, having access to data, it's something that everybody else is picking up on in terms of internet of things and stuff like that. So, that is one thing I just wanted to go after and a lot of that money was being used to develop that platform / a lot of that is what we did with a lot of the winnings, between the pumps, the data platform in that one. So, those are... and the bottles, those are the most of the things I have been working on throughout / Not yet	A lot of people like the idea, yes, because, you know, there are words behind it, there are the people who validated it, there are other people who say, "yes, this is valid", and stuff like that / I think a lot of people keep calling it the project. It's not a project, it's a business. I keep telling people that. No, but that's the thing. The fact that a lot of people think it's a project, the fact that it won validated that it's not a project, it's actually a business, it can make money and I know how we can make money. (2)	It kind of just legitimises you in your brain. You take yourself seriously besides being taken seriously by other people, right, because you have a physical address, you have a place of existence where you can go get your mail. For me, it is also the place where I knew if I am quitting my job I'm going to go here / So, what Covid has revealed to me is like, staying at home, running my business from home, is not something I would have loved to do at all, not because I am not structured, not because there's a temptation of walking around and, you know, going to the fridge whenever you want, or being easily distracted because you are around the things that you... your own things and you like them. It's just the fact that there's that community in the lab, and that makes a whole lot of difference, a whole lot of difference, because when you want somebody to bounce ideas off of, they're there. You can get anybody. If you want mentors, they are there in plenty. You can get anybody. When you want to talk to somebody who's totally not in the business community but they teach or they do something, they're there. It's that community. It's not the physical address; it's the community. So, I could have a different physical address but without the community, but it's not the same (2)

Case	The competition as a source of capital	Branding and legitimacy as a resource after Ingenuity	Use of facilities and support of the Ingenuity Lab as a complementary external resource provider
	(additional source of founding) and it's not like we haven't tried, I think we have tried, it's just that we haven't found exactly the right one. Okay, yes. So, the competitions we're taking part in, like one, we were this close, we didn't win anything but we won the award; we didn't win the money but we won the award. (2)		

Case	The competition as a source of capital	Branding and legitimacy as a resource after Ingenuity	Use of facilities and support of the Ingenuity Lab as a complementary external resource provider
Shells and Chitosan	Once we finished our participation in the competition, we got public founding with the support of my local university (Mexico). I think it was key (1)	A lot, totally, is part of the things that we have also used or have helped us attract more people. When they say "Ok, I see the technological development and it is not all, then what else? Where else have you been? Who else have you faced, what has challenged you and have you advanced? Then when you put these activities, as for For example, "must challenge" which is another one that is in the USA draws a lot of attention. It also drew a lot of attention in England. I mean, something ... if you are winning something good bring, "let's listen to you, I'll listen to you." a good cover letter when you want to get closer to someone in particular (2)	We work in an incubator at the university (Mexico)...The fact that you are in an academic environment, a university environment, and that you have a designated space to work helps a lot to give formality to the project, so that you see it ... to stop seeing it as "what I do after of my work, what I do after school "," what I do "character. Even only the physical space gives this aspect of formalization, that "here I work", this is my full-time job. When you don't have it, you are literally occupying non-formal spaces and it seems that it is the extra activity to what you do. So I think it's elementary / They have been of own investment and of public funds...At the beginning it was used only as investment in elements that would help us to test it and then we already included a salary, but once we could, when it was already giving results / Well, since you can develop, you can have a salary, there you can already say that most, in many cases of entrepreneurs it happens that they have an extra job, you can say "I can leave this job", I can say I have economic security and I can dedicate myself 100% to the other project. So it is how he happened to give all the effort to what you are doing, because when you do not have it, you have to be dividing times and that is when it can also be like the factor of "I need money, I have more financial need than what I am getting with the company "so I think it does influence (2)
3D Prosthesis	I think the most important effect was very much like the funding that came with it, just because of the amount of funding that I got like; that was amazing (1) / I had some funding from Medilink. I had some funding from Loughborough University. I had some funding from EIT Health and also from Sainsburys Management Fellows (2) / The pinnacle of the evening was being awarded Experian's Entrepreneur of the Year, the money from this prize alone would allow me to cover patent and manufacturing costs for the next year ...The funding will allow me to work full time on my business for the next year, with the aim of beginning sales in 2020" (Documentation record)	The publicity that I got because of it (other impacts after partipating in Ingenuty 19) (1) / Yes, I think just being able to, one, have the funding and to say that we've had this much that's been backed. Then having a series of companies that also got behind us has increased our credibility. It then just gave us a lot of opportunities because we could label ourselves as winners of this many prizes, that we could share that on our website, and whenever we were doing any news articles it would almost always get featured. Like the number of awards that we'd won or the amount of money that we'd won, so it definitely gave us a lot of credibility to have some well-known companies and universities that had backed us All of the funding came through after Ingenuity, but I think some of the funding I had from Loughborough University and from Medilink	I've been able to use the university facilities (1) / Yes. Loughborough has its own incubator, so I've got a desk in there and I work in there… before lockdown I was in there five days a week. I'm now in there maybe one or two days a week / I think they're really helpful. It's good to be around other people that are also working on start-up businesses, doing similar things to you, and it's very helpful to just have that working environment. Especially when you would be working by yourself, maybe from home, just being able to have that dedicated space where you go into work, and you have a work environment surrounded by other people. And you've got people to ask questions of, like I'm looking for insurance, has anyone else done that recently, or I'm thinking of doing this, could someone give me some advice. Being able to have those conversations very naturally I think is one of the big benefits of being in a co-working space, with other start-ups (2).

Case	The competition as a source of capital	Branding and legitimacy as a resource after Ingenuity	Use of facilities and support of the Ingenuity Lab as a complementary external resource provider
		I'd applied for at the same time as I was applying for Ingenuity (2).	
Accommodation Booking	We knew we just needed a little bit of money to do some marketing, then the £2,000 was sort of perfect for that, so it's not like we needed £40,000 to develop a website and create... build a team of staff, so I think maybe that's why the prize was appropriate / I got a little bit of money and we tried a bit of marketing for individuals, targeting individual holidaymakers (1)		
Housing for Refugees			
Platform for designers	The funding really helped us; we managed to do some test marketing from the funding. We did a pop-up shop in London for example which was great during Fashion Week and, you know, that helped us understand what kind of marketplace, how people respond to new designers, are people willing to spend money on the products as well, which is a good example of how it can help...a really simple change is winning that prize gave us a little bit of injection of cash (1)	I also think in terms of the credibility and exposure it brings to the business as well / just kind of putting that on our Instagram to say, "look, our platform has this, at this early stage has been validated, has been given encouragement to keep going and we're onto something", and being able to share that journey with people who follow us (1)	I think it's good to have somewhere to come and work, you know, so I think the actual space is a great space, it's well-designed, it's a well-designed space for all the creativity and study, the way they've set up the centre (1)

Case	The competition as a source of capital	Branding and legitimacy as a resource after Ingenuity	Use of facilities and support of the Ingenuity Lab as a complementary external resource provider
Entrepreneurship female toolkit	We won £10,000 to run a project but it seems like… you've got to do a project for lower income women in Nottingham specifically and we want you to… it's almost like run a mini Ingenuity for them. We want them to go through a course, My Business My Way, like you normally do, but at the end they could apply for some small grant funding. We thought we might as well take that because it's something. We could have said no, we don't want your £10,000, we're not going to run a project like that but it was a really valuable thing and "" and "" both said in December, because we finished… we did this… we ran it November, once week November through to mid-December. "" and ""'s end of year social media posts and LinkedIn posts were like this has been the most amazing thing I've done in 2019, running this course for lower income women in Nottingham. I'd say there were various highlights for me in 2019 but that was definitely one of the top two or three. / We spent £10,000, we redeveloped a toolkit so it was earlier stage because we had a strong suspicion that lower income women, they wouldn't already be running their business, they'd be exploring their idea (1)		

Case	The competition as a source of capital	Branding and legitimacy as a resource after Ingenuity	Use of facilities and support of the Ingenuity Lab as a complementary external resource provider
Support for Anxiety	For me personally, it bought me time. So I was able to go part time at work, which is just the hugest relief ever. So, I was working five days a week at the university at the time when I applied for Ingenuity. So I was able to actually go down to three days a week in September of last year and that was just a huge feeling of relief, you know, that I was able to do that. In a way, it bought me time because it was able to kind of almost pay me a salary to be able to work those two days a week on my project rather than in HR (1) / I've just received £1,500 worth of funding from Ingenuity, which is fantastic, and the way it's looking is that Mind Map was always part of my sole trader business, so I am a Mental Health Trainer, I'm a... now, I now no longer work for the University of Nottingham, I work two days a week at Nottingham Forest Community Trust. I work as a Mental Health Programme Lead for them / I work for two days a week as a Mental Health Programme Lead, so the money that I generate from that, some of that is going into Mind Map; and also I have sourced some funding from Ingenuity (2).	Yes, without doubt, without a shadow of a doubt, yes. I... the amount of people that I have met since Ingenuity that have said, "oh, I spoke to so-and-so about you, like you saying today, "I've seen your product", I'm like, "what, how have you known that?" That network is there, because, again this is going to sound rather cynical, but the Ingenuity name carries weight, you know / I don't think I would have the opportunities I have now had I not taken part in Ingenuity, because when I say to people I took part in Ingenuity 19, even if they don't know specifically what that is, when they realise that it's part of the university, that it's part of, you know, a network of Ingenuity programmes across the country, well, soon to be, you know, that it has weight, it has, as we'd say in Nottingham, it has clout and that's a good thing and you can use that to your benefit (1) / I think Ingenuity is an incredible tool for working, it's an incredible tool for almost carrying weight to your programme so if you, you know, if you're able to say, this was part of Ingenuity 19, or Ingenuity 20 or whichever one you want to say. Also the doors it opens. So, as part of Ingenuity 19 I was then asked to present at a Santander showcase, I was asked to present at Enactus UK, the Nottingham... they had a Nottingham Summit Weekend and they asked me to come and present there, and those are things that, you know, you don't do every day and you wouldn't necessarily have the opportunity to do that again in the future, if I hadn't, you know, took part in Ingenuity 19 (2) .	I haven't, no (to use the Ingenuity lab as an working place). I did think about it and it is something that I would consider in the future. I think because I was working until the end of March I was working three days a week at the university and then two days a week at home, I didn't necessarily need the space, and then of course, at the end of March, everywhere went into lockdown. So, I think, up until now it's not been really something that I've thought about. However, I think it might be something I look at in the future (2).

Case	The competition as a source of capital	Branding and legitimacy as a resource after Ingenuity	Use of facilities and support of the Ingenuity Lab as a complementary external resource provider
Vertical Farming	I presented it in Mexico and they gave me the financial support for the project, I got the seed capital there…it was after the competition (1) / They covered with everything necessary. There was no need to turn to other investors (2)	Totally, a lot of credibility, totally. More because, well, we also know that there were not only 50 participants, but there were hundreds of applications and to be within that top 21 if it gives the project enough credibility, a lot. That is what we have used, what I used when raising capital and you immediately notice that people are convinced by that, that it gives credibility to your project (2)	
Social Supermarket	When we needed more money to start the project, we won 1,000 pounds, it helped a lot to develop the project (1) / For example we got £ 10,000 from the city council and now we are thinking about the most effective way to spend that money and have an impact on people because we don't want to spend it without knowing exactly what ... for example, we don't want to start another project spin-off and that is not ... that later nothing of it comes out. We want it to really have an impact / every time we apply for money we have to make sure that we have something to spend, because otherwise we end up with money that we don't know what to use for. Many times you cannot spend it on costs such as rent or paying someone, it has to be something very specific. So that's what we're trying to maximize ... maximize profits / National Lottery, they gave us money to convert our van into a mobile supermarket that opens and we will be able to go to nursing homes and other areas of the city that we do not reach right now and they gave us £ 9,000 to completely convert our van into that / it is very good that people trust us and give us money, but then we must show them that we have had impact and that this money has really helped us and is helping other people, because otherwise ... you have to form that relationship with them / we have achieved third places in several ITCs ... which are individual topic	Yes, being part of these activities gives us a lot of visibility with sponsors, with many people, many people already know the brand. Many people in other universities are developing similar projects and they ask us how we do things and we have already reached the point where they want feedback from us and they want advice so that is quite surreal. I spoke to someone at Enactus India who wanted to do a similar project and it is totally ... you don't believe it when you think they know you in India, it is not a small thing that we are doing here. Well yes, definitely and also for ... we reached a point that Enactus sponsors know the brand and it is a project that has been exhibited in several competitions so it is a product that many people know about it / we reached a point that Enactus sponsors know the brand and it is a project that has been exhibited in several competitions so it is a product that many people know about it (2)	

Case	The competition as a source of capital	Branding and legitimacy as a resource after Ingenuity	Use of facilities and support of the Ingenuity Lab as a complementary external resource provider
	competitions, one was Sodexho, another was Unilever, then there is a platform called Universitas21. With them they gave us money to do a renovation of the store, because right now it is a little old / National Lottery, which is what I said before for the van, Universities21 to do the renovation and then the individual topic competetions, yes ... I think those are the sources that we have had in the last year / because a company gave us... I think it was £ 500 or £ 1,000 ... they gave us money to do this project. So there, when we had to apply, we had to find an idea in the time of coronavirus and that was what happened to us, and now we are seeing if they are going to give us a second round of funding to do the same a second time (2)		
Outsourcing Services App		Yes of course. When I usually see movies when I see the prizes on the cover, I'm super ... I say "if this movie won the contest, the golden bear in Berlin, the Cannes or something, it is definitely good." I am quite confident in that sense of the expertise of those who make up and evaluate that kind of thing. Now I am not English, therefore I do not know how long Ingenuity has been, if it has been 5 years, if it has been 10 years, if it is a non-profit institution, if it is private law, if it is a single person that is like David's Ross who finances this, I don't know but I would still trust and I know this because since I have been into these things, I know that they are not a lie and that I thtat it is not a game (2)	

Appendix 10: Networking and the development of entrepreneurial competencies – Illustrative Quotes

Case	Networking and the development of entrepreneurial competencies
Students Applications	We found an advisor for us, a mentor, so that was great. We were able to get a mentor and an advisor, you know, from the same technical field, So that was the biggest influence we were able to connect with multiple people who then introduced us to, you know, the decision-makers for our product because it's a b2b business, right? so they were, you know, we were able to meet the chief marketing officers of Brazil group institutions / the kind of platform that the ingenuity gave us to be able to connect with big stakeholders in the market and getting the confidence, speaking to them and looking them in the eye and then, you know, close the deal (1) / the network and the relationship that you have with your peers and with your mentors and advisers on both; they try to then help you navigate you or connect with other people who can help you to fix those (knowledge) gaps / it's just a mentor that was assigned to us after the Ingenuity. And I think we're still in touch with them and they provide us with their contacts sometimes. (2)

Case	Networking and the development of entrepreneurial competencies
Equine Repellent	For the vet school, it was an entrepreneur, Mentor A (formal advisor of Ingenuity) put me in touch with the vets (School of veterinary - UoN) (1) / Actually, a girl I met, that was in my team, she was doing agriculture and business and that was quite interesting, because she gave me her point of view, she gave me contacts with some of her professors. So in that sense it was... actually, yes, the networking / By being in the Ingenuity Lab I was able to do that, because as a start-up the university gives you and part of that...of the university. So you have that relation already with the university that allows you to access more easily some... maybe contacts. Yes. And then once you make a contact it's much easier to reach others / It's more through the Ingenuity Lab that I really meet people and speak with them / the most important is people that I meet through the Ingenuity Lab / with the Ingenuity Lab it's so much easier to create connections, because everyone is from different backgrounds, so if you have any questions or anything, they can orientate you to who to go to speak to / at the Ingenuity Lab there's a lot of entrepreneurs in residence. So I have made use of it, I've made use of the university, but I know, for example, if you go and speak to MENTOR1, MENTOR 2, anyone, they can help you and give you advice on maybe associations or people that work within Nottingham and could help you. Also there's a lot of start-ups that come from the Ingenuity Lab and that work in the East Midlands, so there's connections through there. Yes, there was something else that I wanted to say, but I can't remember, so maybe I'll come back later (2)
Access to water	I can actually legitimate it just go to see around and say like an introduction to this people if you have access to them and will be perfectly, you know it's just opening those doors where you otherwise never happen in and that is amazing / With Experian, we're now talking to them about helping us with the data that we are collecting in their platform (1)

Case	Networking and the development of entrepreneurial competencies
Shells and Chitosan	What helped us exponentially was having an advisor or people who help us. They guide you, but actively, how to solve problems or how to move forward (external advisor from Mexico). This advisor, in our case, he is the owner of another company, so he told us "you need to develop the legal part" and he contacted us with a person who specializes in that legal part, or "you need a notary, well here goes the notary ", even for the legal formalization " you need to go to a legal office, here is the office", (the advisor) is a person who has enough experience since creation, in handling, like, literally what you have to do. That was in both aspects, both of the administrative part... also advisors in the technological part that said "let's see here you have to put more " In a way, there were these two guides that helped us to push the company forward / When they saw us participate in these competitions (potential advisors or other entrepreneurs), which was also another advantage, they approached us because they were interested in the technological part / they were interested in coming closer and helping us to be observers of how it progressed, how far this technology could go even with their help, for, I imagine, at some point, also to be able to make an alliance with us, because they were specifically interested in the subject. One of the advisors was an owner "Alquisbiopahrma" who is a food company, so he said "Well, honestly now I have no interest in the company, but I like to see what they are doing and I want to help it get out and when it comes out I want to be among the first to ... if there is already something interesting to do, do it with me ". So that was the strategy / They are from different competitions, not just Ingenuity (networks they met in competitions). One is from a competition in Mexico, another in the USA and another in England (2)

Case	Networking and the development of entrepreneurial competencies
3D Prosthesis	I got a lot of contacts out of it and a lot of sort of like really helpful advice. So although the product stayed the same I understood what I was doing a lot more and got a lot more connections just generally into the industry and into enterprise / I got put in touch with a lady called “” who was really helpful, so she put me in touch with people at Nottingham University Hospital and so I got to speak to some people there, and just a lot of information. I also got passed on to Bio City and I’ve been on their accelerator programme now because of that / So the funding, combined with the people that I met and the publicity that I got because of it, all just sort of threw me out there is an actual business / I spoke to “” from BDO; he was really useful. I kept in contact with him like as I was applying, he checked over my application, things like that / I’ve ended up going through the Bio City accelerator, I got quite a few contacts there with the Academic Health Science Network and they’ve been able to help me with more of the regulatory stuff that I haven’t done at university or there aren’t other businesses I know that are going through that, so that’s been really helpful (1) / getting involved in things like accelerators and knowledge transfer schemes. Those are kind of grouped where you’re more likely to come across a broader range of people, some of which are likely to have had experience in whatever area you’re looking at...Not specifically because of that accelerator, but because of the work that I was doing I did speak to a lot of people. I think I spoke to about eighty/ninety people during the course of that accelerator / What I was part of in Nottingham was a specific accelerator scheme, so they were looking to see you do just a lot of interviews with potential clients, and just developing your business plan very quickly over a short period, of maybe like eight weeks. That was the specific focus of that, and so there were only eight companies that were there, and we would meet once a week and just present our findings from each week. We’d have a small session on something new and then at the very end we’d pitch to everyone else. That was the purpose of that accelerator. It was more just developing alongside other companies (2)
Accommodation Booking	The networking was really good as well and I met a few people there that were useful contacts / there were lots of useful talks, good networking opportunities, so the whole experience was really good in terms of meeting people / I know it can be; network is everything. So that’s my resolution for this year is to get involved, try and hopefully network a bit better, connect more (1)
Housing for Refugees	I kind of had this thing in my head that no corporate organisation is going to support this work because it’s a bit of a political hot potato, because it’s around immigration and socially that’s been a dominant narrative for 20/25 years really. I kind of had a closed mind but actually the second panel had “” from Nottingham Forest and I think “” from Experian was on the first one, but both of them were like please, get in touch with us, we want to work with you and we won one of the Experian prizes as well / “” from Nottingham Forest over one of the summits, I think the first one, he was our mentor of the group we were working with. When I walked in he was like yes, I remember you guys. I said earlier about the idea of corporates, that for me was the most enlightening thing I think that I experienced, was that willingness of Experian and Nottingham Forest to say we want to do some work with you guys (1)

Case	Networking and the development of entrepreneurial competencies
Platform for designers	You suddenly expose yourself to a whole new network of other entrepreneurs and dynamic people / I was able to visit London Fashion Week and go to the shows and while I was at the show I met the CEO of the company we were partnering with to develop our educational programmes on our platform, so that's a chain of events that happened because I was only in the position to do that, because of Ingenuity, you see; so that's a change I see that's actually brought genuine value to the business and helped us get to where we are today / I think that probably the biggest benefit is the network that you have, you have a good peer group, so it's not just mentors; peers are important as well, because you've got people walking the same journey as you /I'll find a way to make it work, and you share ideas, you share networks; that, for me, has been invaluable, invaluable, I can't even put a price on that (1)
Entrepreneurship female toolkit	We did meet… that's more about the panel. We met "" from Experian, "" from Experian, "" from the Smallwood Trust which is obviously the biggest thing, because you know we won the Innovation prize for Smallwood (1)

Support for Anxiety	I've been talking to people from Experian and I've been talking to people from Santander who I wouldn't necessarily, you know, have that opportunity to talk to had I not gone through Ingenuity / Yes, without doubt, without a shadow of a doubt, yes. I... the amount of people that I have met since Ingenuity that have said, "oh, I spoke to so-and-so about you, like you saying today, "I've seen your product", I'm like, "what, how have you known that?" That network is there.../ it opens doors that were never open to me, so you can kind of talk about mental health for a long time and you can chip, chip, chip away at it, but actually for sometimes it does feel a little bit like you're not getting anywhere. So what it does is it allows us... it opens doors for people that maybe weren't there before and it creates a network, a network of support, a network of contacts and just feeling like you're being supported (1) / I've been talking to this amazing group of women called We Are Radical, so they are a group of female entrepreneurs, a community where we all join in together and we all talk about our businesses and get help and there's webinars and all kinds of things. And I've been looking at other women who work in business. There's one... there's a fantastic organisation in Nottingham called Blue Stockings Society that's run by "" and it's just, it's a fantastic... I think in Nottingham we're very lucky because we have these amazing people that are helping entrepreneurs to get where they need to be / I'm able to make networks quite quickly and I... what I find about making networks is that I am able to kind of think, 'well, that person would be good with that person and we could do this and we could work together and we could pull this is and do all these things'. So, that is a huge benefit to me because I am able to go to those networks and say, "look, I've got this idea, how do I do this, what do I do", and pull them in. So, that is a huge source of kind of inspiration or, you know, a lot of those people that I'm in are, as you say, enablers, they help just because Nottingham is... I know that I'm incredibly biased because it's my home city, but I just think that the way Nottingham works, particularly in terms of the creative scene, we do network very easily, we do know people. So yes, it's... sometimes it's hard, sometimes you feel like you're banging your head against a brick wall, but then other times, you know, somebody will message you and say, "oh, I've done this and I think you should do this", and it just opens doors you didn't necessarily know were there / I know that I talk to people on there and that it was really encouraging actually, to talk to others and know that people were forming networks / the work with Nottingham Forest is really interesting because I actually met the CEO of the Community Trust through Ingenuity, so that's really nice. So my work with Nottingham Forest is actually through my training, so it's my training business. They're really interested in Mind Map because of how it impacts people accessing the ground / In terms of commercial partners, not necessarily directly for Mind Map. So, I've been talking to different people about training opportunities, about developing training opportunities. I think for me it was always a case of, "oh I can deliver training but I can't write it", and now that's changed somewhat because, you know, the kind of the idea behind Mind Map is creating spaces for people. Businesses can sign up and say, "yes, we can do that", but actually, they need training on how to do that. So, I think the commercial opportunities then start to look at training companies, mental health training companies in particular, around, "okay, I want to write this training programme and I want to learn how to be able to do this properly"(2).

Case	Networking and the development of entrepreneurial competencies
Vertical Farming	Precisely in the networking sessions of the talks I was talking to many people, many people already had ideas, other people did not, but a student from the business classes that she did "Management, Innovation and Entrepreneurship" (master), I talked with her and she was very interested in all the projects that have sustainability and a social impact also on people. So we talked a little about our interests, I told her "I am an environmental engineer and this is what I am most passionate about" and well, she told me that of all this social and environmental branch what she is most attracted to is that we do not have a good management of food waste and that many problems are coming, because of agriculture, methods, and how we are going to supply future generations. So starting from them, we said "well, it seems that our interests are quite aligned, and why not do something". In this talk, vertical farming with hydroponic techniques emerged / I saw people who were focused on finding someone to develop an idea that fit what they were looking for, and I think I was not the only one, I seemed to see other people who met there . Maybe they already knew each other, but they talked about a business idea right there and they, like us, also started to develop something (1) / I think it is something that I have not thought about because the ideas are different. With other participants we thought about executing an entrepreneurial project, I did think about it, I discussed it with them. It was another team that I think did not reach the final but they did compete and they also took some modules with me in the area of renewable energies and we talked: "Well, let's do this project"(2)

Case	Networking and the development of entrepreneurial competencies
Social Supermarket	Talking to the judges, especially because they have contacts, for example, with the Nottingham City Council and other organizations, contacts that really helped us a lot (1) / I think in the end last summer was quite difficult for us because many of the team members graduated, so there were four or five people left covering what ten or more were doing before, so I think that was the reason why which we couldn't use the contacts as much as we should have, because we were very busy with day-to-day things, with the orders arriving, with the store being open, so I think last summer was quite difficult and we don't use them that much. But I think we are now in a much better position where we only need three or four people that we are going to look for now between September and October. We have a team that is already working for a year or more, so I think we are in a quite different situation and now Ingenuity is going to be in Autumn and I think that now we could use the connections, because we are not so concerned with covering the things of the day to day / there were some people who had been in Enactus when they were in the university and then they had already done their projects. “” is one of the people in Nottingham that we have contact with at Ingenuity. She was the president of Enactus Nottingham and now she has her own social enterprise and is doing quite well. So we always want to have ... give us advice because she knows quite well what our weak points are / I think at least five new organizations that we have been working with while all this has been happening (pandemic period)(2)
Outsourcing Services App	
W Mentor	A secondary benefit is the networking, the opportunity to liaise with peers, with other companies, with mentors. There’s a broader networking opportunity / I don’t know if any of them formed teams or professional connections from that event. I would imagine it would be an opportunity to if they don’t / I don’t think personally Ingenuity has made that happen. I think it might have helped facilitate it. It might be that it’s put them in touch with other likeminded people and I know some of the companies you mentioned earlier on, as a result of Ingenuity are talking to people they otherwise might not / I continue to mentor some of them after they’ve won (1)
Z Mentor	

Appendix 11: Impact at the individual level / Entrepreneurial Skills Development – Illustrative Quotes

Case	Development of entrepreneurial skills (Opportunity Identification, evaluation, and development)	Entrepreneurial impact in people without business background	Way of looking reality
Students Applications			
Equine Repellent		From my view for students (Non - Business students) it is really good (Ingenuity) because it gives you that kind of macro real-life experience obviously it's already fast-paced but you get all the help (2)	
Access to water	It becomes very easy for me to see a gap in the market, but once you see a gap in the market it also becomes easy for me to see one more don't work for it. So that's key because in the future when I'll have other projects to do or I want to start any business / They introduced a development program and so with the development program everybody gets like a crash course in business. so this is a cash flow in order to write one, if it's a business plan you know what parts that look, if it's a target market you know what that means and you know how to kind of, you know, address that, and if you're looking for an addressable market you can't just say oh there are billion people / that is the beauty of.. of ingenuity, at the beginning you don't know whether your idea is viable. The longer I've done, the more cycles that I've gone through, the best have become and judging viables ideas so if I come up with something I think oh that's actually a good idea or that's actually a bad idea and I know what it needs to hit criteria for me / So, when I talk to the people then...because they will buy something they need that's the thing. Demand is not demand that's created in my head or from reading like a like an article somewhere, no, demand is driven by its customer centric. So for me I will only ever work in businesses, even invest in businesses or even develop ideas that are that I have actually gone and aks somebody (1) / that learning experience, that knowledge, that shifted the whole game. It just shifted it and because it did that, then it's kind of actually opened up other business ideas for me / I'm focused on Sustainable Water but it doesn't mean that I'm not aware of other markets that I see where we can do something about where I can actually make a difference. For example, one of the things I want to do is create an app for hair, right? So, you may say, that is so far removed from what you're doing, right; but if you think... like, if you think about it, so, just a snapshot of it is like,		

Case	Development of entrepreneurial skills (Opportunity Identification, evaluation, and development)	Entrepreneurial impact in people without business background	Way of looking reality
	in this... for example, in Nottingham, if I wanted to go get my hair done, that is very hard to do because I'm black and my hair has a different texture, right? So, not a lot of salons can do my texture. Not a lot of stylists are taught how to treat my hair, and so when it comes to most black people, they find special stylist... so, for example, if I know how to do my hair, I go do it for my friend. I have done that so many times and my friend, who may not know how to do hair, will end up telling somebody about me who did her hair. I'm not saying I will go... start doing people's hair; what I am saying is that very many people, like me, who have had to figure out what to do with their hair because they are, one, black, because two, mainstream hairdressers don't know how to do our hair or they don't know how to treat it so, at the end of the day, it's just... see, it's a gap that is there and it's something I can speak authentically to (2)		
Shells and Chitosan	I only speak about science, science, science and come on, science, without a good business plan it will never go outside to the market (1)	That difference between us give us a lot of enrichment; for example, we also learnt about at that time about business terminology that help me explain myself, about the impact of the technology / At the moment I do not have a business idea but I would like to start another company, but it is part of my personal goals. I would like to work on the creation of different companies because there are other topics that also interest me and that I developed more in the master's degree, but for the moment as an idea idea, no. I would like to do it and I will work in the medium term to do it (1)	The way of thinking... Absolutely creativity because I started like with the idea long before and you sometimes forget about the creativity or the innovation. I got stuff like "we need to make this, to make money, to make profit to make…" and you forgot about like creativity to make the change. In my personal change was like stop / The process of work with… yes with tools but also have creative to make it different, to make things different, is what I tried to do after Ingenuity and after my master's. Everything I do has some creativity and something there is different from what is done. Yes, I can say that. By doing many things, for example reading, speak with people or… what else… dancing, listen to music, that kind of things helps me, write or draw helps me with… (1)
3D Prosthesis			

Case	Development of entrepreneurial skills (Opportunity Identification, evaluation, and development)	Entrepreneurial impact in people without business background	Way of looking reality
Accommodation Booking	In a year I'll probably think what I'm doing now is rubbish as well, but at the moment I think it's going well, I think it's good, but in a few months I'll look at it again and be like, "that needs changing", or "reword that", so it's just learning as you go really, because I was new to it all, I mean I've always done business things (1)	it's trying to see things from other people's perspective, and especially with this business, because it's... there's nothing else like it, so it's not like you can just be... you can just say, "oh it's another version of Tesco" or whatever, it's brand new and it's... it's not complicated, but people don't always understand what it is straight away (1)	I try and see things new from a different person's point of view, because when you're working on your own project and it's something you've created, it can be very easy to back it and to see it, just your vision for it, instead of how it might look to an outside person / a weakness was that I was trying to do it all on my own. Now I ask a lot of people for advice first. I think you've just got to learn as you're going along / I try and see things new from a different person's point of view, because when you're working on your own project and it's something you've created, it can be very easy to back it and to see it, just your vision for it, instead of how it might look to an outside person (1)
Housing for Refugees		I had the idea that you're either an individual that's looking at a corporate kind of development, in terms of private sector, or you're a charity / a charity has to be a business. You can't operate a charity without managing it as a business, it just doesn't work, and that's really helped me. When I've had new staff coming in and I've said we're a business, we are a business, and they're no, no, no, we're a charity. I'm like yes, we're a charitable business. If we don't act like a business we're not going to work, we'll go under. Simple (1)	I think actually recognising how I look at things from a creative angle and kind of like looking… I'm always looking for inspiration from other things and going / I've not recognised where I am being creative as being entrepreneurial, but it is, and now I connect the two (1)
Platform for designers	I remember we were looking at the technology summit and I think I've never really been a technical person, but I think I have an understanding now of what technology can do, things like AI, things like the block chain, you know, data science, how those applications can be leveraged and extrapolated into other industries, potentially my industry, and just having the knowledge of what they can do. I'll never able to crunch code, my mind just doesn't work like that but, I can have an understanding of how that can be used in my business, which is I think key for the future / in terms of my professional development that was an important stage because you learn all these new skills (1)		You kind of feed off them and you see the way they think and the way they approach things, and it was also good to hear from industry leaders, opinion leaders, thought leaders during that process and to see what they're thinking and the ideas that they are investing in or harbouring about the future of entrepreneurship. So that invariably encourages you to expand your mind and expand the way you think (1)

Case	Development of entrepreneurial skills (Opportunity Identification, evaluation, and development)	Entrepreneurial impact in people without business background	Way of looking reality
Entrepreneurship female toolkit	""a and I… certainly I'd never written a business plan. I marked them and looked at other people's but I had to learn how to do a cash flow again. I'd probably not done that since I was about 17 at college because it's not a side of entrepreneurship I teach or get involved in at all / I'd worked on the finances and projections so I guess I did learn a little bit more (1)		
Support for Anxiety	What Ingenuity has done is allowed me to change that mind-set into sort of saying, "I have this idea, I think it's a good idea but I also want to modify it so that you can feed into it as well", and so it creates that mind-set of belief in yourself but also yes, there's room for manoeuvre, there's room for improvement (1)		What Ingenuity has done is allowed me to change that mind-set into sort of saying, "I have this idea, I think it's a good idea but I also want to modify it so that you can feed into it as well", and so it creates that mind-set of belief in yourself but also yes, there's room for manoeuvre, there's room for improvement (1) / it's weird and wonderful and I'm still not used to it, what is it, six months in being fully self-employed. And, if I'm being completely honest, it's terrifying, because at least when you work for an organisation you know you've got a monthly income coming in and you know when that's coming in and you know your payday whereas this, the responsibility lies with you and it's quite a heavy weight. But I would... I can't... I mean, never say never in the current climate, but I can't see myself going back to organisation work any time soon... life is a lot different, a lot, lot different...it's quite possibly been the best thing I've ever done, if I'm honest. (2)
Vertical Farming	When I see a potential idea for my first filter, I ask myself, what is needed, and when I see that I can do what is needed, let's say it goes to a second stage in my head (2)	I have had business ideas, I don't know if it was the course, as well as the entrepreneurship part of Ingenuity or a combination of both, but now I see an opportunity, something that is missing, a need and then I have a thought that I could. ..a thought perhaps not only of what it would take, but I think it implies and how I can carry out that idea. However I have not developed them / Yes, and I have advanced some ideas, mainly now in the real estate sector (2)	maybe you don't come up with the most innovative idea, but it makes you think that you don't need to discover "the black thread", I don't know if you know that expression, in all this, but it helps you, because it is, if it helps you to form a different thought, a new way of thinking ... as it is called. ... well, critical thinking that also helps you see things you have and put them together and if not what you are looking for remains, then put them together in a way that works. It seems like a good process to me, I think that it works, perhaps not to reach the best innovation but to reach something very good, very good (1)

Case	Development of entrepreneurial skills (Opportunity Identification, evaluation, and development)	Entrepreneurial impact in people without business background	Way of looking reality
Social Supermarket	The most recent memory I have are the talks. I think that seeing projects that have been successful does help to devolop a more critical eye and for example these Enactus competitions you can see projects that are starting and now I am able to identify if some projects have a future or I think they should change because I think it won't work like that…I think that at the beginning (before Ingenuity 19) I did not have it, but now I have developed it. I think that now I can identify "that really has a market need" or "you want to establish this project, but really there are no people behind it who want it." I think that is the greatest thing I have learned. People may have a passion and want to start something, but if really there are no people who demand it, you are not going to get anywhere (1) / I think that during the coronavirus, yes, sometimes I thought "how are people still not doing this?" and then I saw someone on Facebook or elsewhere and said ... okay, if they are doing it. So, I did have ideas but they were ideas that arose out of need and everyone knew about the needs that existed (2)		
Outsourcing Services App	So at least I as a designer did not care so much about that, but a very good product could fail due to not having considered these variables that now I am aware (1)	At least I as a designer, I have the market in third or fourth place, it is not one of my essential considerations despite the fact that it is at a certain point because each product arises for a particular market but not necessarily at the level that is in this type of activities, mainly the positioning of the product in the market, how people are going to respond and how the product is finally going to live in this ecosystem of buying and selling, of competition, of staying within a category, Porter's 4 P's. Although I see that information, here it must be fully addressed, you cannot leave it to chance. It is not only the product, it is not only the idea, but this what comes after the product (1)	I believe that the most important thing and that it has a lot to do with the degree that was studied is when you begin to demolish the prejudices of things, such as the immobility of things / nothing is permanent, nothing is absolute, nothing is rigid, everything is totally moldable and malleable, so if it doesn't work, we know that there is infinity that is in line that could work (2)
Mentor A	Some will win and that's lovely, have a prize, most will not and so actually giving them some training, making their business submissions better will help them anyway, whether they win or not / I would actually be called on that. If we do not provide them with tools that can be used in any context, business, commercial, charitable, social, we have let them down / We've absolutely failed them if we don't give them underpinning skills (1)		

Appendix 12: Impact at the individual level / General Skills Development – Illustrative Quotes

Case	Improve communication and "sale ideas"	Developing confidence
Students Applications	It help me with my personal communication skills, how to be a better leader, it has made me communicate with people more efficiently, so effective communication (1)	the kind of platform that the ingenuity gave us to be able to connect with big stakeholders in the market and getting the confidence, speaking to them and looking them in the eye and then, you know, close the deal (1) / I think it has helped us overall in terms of getting in front of people, confidence in talking to other people (2)
Equine Repellent		
Access to water	The other thing the ingenuity does very well is teaches you how to pitch ... presentation skills, pitching / One lesson that I learnt is really important and has seen me a good far than anything is like a presentation slide it not supposed to have information, okay. It's a tool to help you present. You are always going to be the presentation...I have more icons now and like singular words and I connect still each icon and less words under slides or words…I will have a script in my head, so every slide becomes a reminder...that for me has helped me especially coming from that Engineering background where you think everybody wants to hear the juggle. So, if I start talking they'll be like oh yeah we used DC pumps instead of AC pumps okay, or like because if we use DC pumps it reduces the size of the RA and blah blah bla, but the more I keep saying that, the more you float if your background is not engineering, and that hinders my communication, that hinders my presentation, that hinders the point I'm trying to make / using an analogy I can use like, so I think one example I used to explain the problem is...I used a spray bottle, So, I was using that to kind of explain how hand pumps work and why they break and why they are a sustainable solution and then I tell them why we have developed the solution that we have developed and how it hits all those problems at this pumps / it is how can I communicate my idea more adequately to you in such a way that you get my point without me saying these are businesses because of course there are audiences don't want to hear this (1)	
Shells and Chitosan	the way to pitch, for example, or the way to ask for advice or… I think mainly my pitch changed, I think. I was more concentred more focused / Then I was using metaphors and by using metaphors I was also changing the way I was making my pitch for him and he was making notes / It was easy to when we compete to use that vocabulary with numbers, with images, with molecules (images) so the idea was stronger (1)	
3D Prosthesis	Oh yes (improvement of comunication skills), because you have to... if you apply for the competition especially then you have to do presentations (1)	

Case	Improve communication and "sale ideas"	Developing confidence
Accommodation Booking	Because I work with it all the time I would just assume in the past that everyone knows what it is, if I just said it's a non-profit charity booking website, but that's not actually very clear...So I've learnt to try and explain things simply. Elevator pitches, trying to perfect them and learn how to convey my message in a simple way for other people to understand / The biggest effect for me probably was the pitching actually, because that was my first pitch ever, and because it went well it gave me confidence in public speaking (1)	
Housing for Refugees		
Platform for designers	I had to pitch to some judges, so that was... I mean, I've applied for business funding before, but that was the first time I mean, I remember I pitched to funders but that was over the phone, but never face to face, so going through that process and developing the poise and the presence of mind to speak your mind in front of judges and to deal with the pressure and things like that, that's a key skill and I think that's something that you will always be doing as a business, as an entrepreneur; you will always be pitching your ideas to people. So that was a really important skill I had to develop. I actually look forward to doing that again because I quite enjoyed it, funnily enough. It was scary but it was fun as well. So that was great (1)	
Entrepreneurship female toolkit		

Case	Improve communication and "sale ideas"	Developing confidence
Support for Anxiety	I talk to people in a different way. So, when people speak to me and say, “I’ve read about your work”, or, “I’m really interested to learn more”, I don’t go, “oh yeah, no, I’m all right thanks, I don’t want to...”. I shake their hand, I smile, I say, “thank you so much, that’s really lovely to hear”, and I have that conversation / I’ve been a Forest fan for years and years and years; to go into the City ground and to be talking to them about their physical spaces, I was just sitting there going, “what’s going on?” Inside I was like jelly, but on the outside I was able to go, “oh, really nice to meet you, thank you so much” (1)	I can’t explain it without sounding like, you know, some kind of motivational speaker, it’s changed my life; completely, 100% changed my life, to the point where I did a talk this morning to a group of 60 people and yes I was nervous, but I knew... I believed in what I was talking about; I understood what I was talking about. The whole Ingenuity process has enabled me to have that belief in myself, which I didn’t have before, you know. Even when I was running events, I was constantly checking all the time, is this okay, you know, should we be doing this, oh it’s not that good is it, you know, that constant sort of checking, imposter syndrome all the time. Whereas Ingenuity, the support you get, the contact you get / it creates that mind-set of belief in yourself / you know, and I think that was the game-changer for me, when I started to think differently about what I was doing because I was able to think, “right, okay, my ideas have worth” / can’t explain it without sounding like, you know, some kind of motivational speaker, it’s changed my life; completely, 100% changed my life, to the point where I did a talk this morning to a group of 60 people and yes I was nervous, but I knew... I believed in what I was talking about; I understood what I was talking about. The whole Ingenuity process has enabled me to have that belief in myself, which I didn’t have before, you know. Even when I was running events, I was constantly checking all the time, is this okay, you know, should we be doing this, oh it’s not that good is it, you know, that constant sort of checking, imposter syndrome all the time / he changing of a mind-set is just huge, because if you’re constantly going around thinking, “well nobody’s really going to listen to me, you know, it’s not worth listening to me, I’ve not got any good ideas”, then of course when you meet people that’s going to be what you present / for me in particular, my feedback was about self-belief, it was about believing in your idea and taking that idea and keeping to your values (1) / if you look at the... I mean, I don’t expect you to have looked at this, but if you... the photos that I have of my award ceremony when I pick up my award, I am by far the oldest person in that cohort. You can see all of these people and I’m thinking, “I’ve probably got about 15 years on you lot”, but I felt incredibly proud that somebody my age was doing it, because it’s important that whatever age you’re at, if your idea’s good, your idea’s good (2)

Case	Improve communication and "sale ideas"	Developing confidence
Vertical Farming	Of course I improved my communication skills (1)	having my first try and reaching the top 21 made me think that I can go very far or just as far to try two or try three. If it gave me a lot of confidence that I can be a good entrepreneur and if I made a switch in my head that said "you see, if you can do it, do it" and from that moment if I have it in my head, maybe not in a period of time immediate but if I plan to do it and if it is in my plans in the medium term or in a longer time. But something changed inside me when I was there, when I reached the top 21 / No, it wasn't like that (negative impact for not being awared with a prize), just thinking when we arrived ... because we developed the idea from scratch, completely from scratch. So just looking at 750 or a lot of participants and reaching that top 21 made us feel good (2)
Social Supermarket	Definitely I improve my communication skills. Above all, because previusly in my school, it was very interactive and I made many presentations, but I never faced people who were truly influential. So the first time I made a presentation in front of these judges who have a lot of experience, that is always a little intimidating but Ingenuity have given me more ease (1)	So the first time I made a presentation in front of these judges who have a lot of experience, that is always a little intimidating and Enactus and also Ingenuity have given me more ease. I am no longer afraid to say "that person is very important" "what happens if I do it wrong or I do it well"(1)
Outsourcing Services App	Absolutely, especially in a different cultural environment. forces you to consider which are the formal communication structures within this context / The ability for the individual or the team to communicate their story is absolutely enhanced / Even if they don't win a prize those who actively engage with it will, in a timely fashion over a few month period, have to have produced an up to date business plan, financial forecast, effective pitch (1)	I realize that although there may be limits that may be given by the financing or by the ecosystem generated by a particular country or organization, the possibility that we all have and the potential that we all have is the same. Only the different ones start to be created later (1)
W Mentor	The ability for the individual or the team to communicate their story is absolutely enhanced (1)	Yes, because the skills and confidence they gain for those who benefit from it, and you've got to take part actively, etc., that is independent of the immediate project that they are developing or submitting (1)
Z Mentor	It's just about those skills, they might not enter to win the competition but just to learn how to present their business idea / They become better at doing an elevator pitch of their idea because they know what the problem is now. They know that the solution it has to be the follow up for that statement (1)	I believe more than improving the idea… of course it improves many of the ideas because some of them are going to become a business. Many of them are incubated at the university Ingenuity Centre but more than having an effect on the idea I would say it has an effect on empowering the people (1)

Appendix 13a: Institutional/Organizational enablers – Illustrative Quotes

Case	Competition Design and activities of Ingenuity	Prizes and funding	Professional advisors to develop an idea - Improve the project
Students Applications		The biggest impact, definitely, cash that was given to us. It helped us to grow the company by, you know, fearlessly like giving us a maximum boost (1)	Everywhere, every area like, for example at the start of what happens is a founder in the initial periods does everything, right? it's like being a jack-of-all-trades and that in...particularly, we all know that one person cannot excel in all the areas, right? everyone has strengths and weaknesses. So, these surgeries (interaction with advisors) help to reduce the uncertainties and the weakness, you know, that one possesses in a particular area and helps to keep the right foot ahead because it's (the advise) coming from an experienced people. So in the initial period that's always helps to your company skills (1) / the network and the relationship that you have with your peers and with your mentors and advisers on both; they try to then help you navigate you or connect with other people who can help you to fix those (knowledge) gaps / I think this competition has not only helped us with, you know, the cash prize money that we won during the award, but also, more importantly, it has enabled us to connect with mentors, who then see us as credible in the market / t's just a mentor that was assigned to us after the Ingenuity. And I think we're still in touch with them and they provide us with their contacts sometimes (2)

Case	Competition Design and activities of Ingenuity	Prizes and funding	Professional advisors to develop an idea - Improve the project
Equine Repellent	Also all those learning things really quick but they give resources on the side so I think it's a bit fast paced for the non-business student but it's understandable (1) / actually, a girl I met, that was in my team, she was doing agriculture and business and that was quite interesting, because she gave me her point of view, she gave me contacts with some of her professors. So in that sense it was... actually, yes, the networking / You just learn by listening to stories and that's also what there was at Ingenuity 19, a lot of people came and told us their stories of how they'd started their business, maybe sometimes their failure, what they'd learnt from it. So yes, it's a lot of learning by listening to stories, looking at people and doing yourself, seeing what works and what doesn't work / They'd invited entrepreneurs who had the time to speak and tell their stories and I think that's where you learn the most. So that was good that there were these two things at each of the sessions / Then for the develop programme and the summit, it's not that demanding. It was a few hours a week and it was really to help you refine your idea. So if anyone is interested in entrepreneurship I think it's a great opportunity. Yes, it takes a bit of time, but some students they have 16 hours of lectures a week. If they're motivated it won't stop them from doing anything else. Maybe from watching a bit of series, but that's it / I would encourage anyone that is interested in entrepreneurship to do that, because it's a bit of time, but it's not lost. They can just learn from it, they can't lose their time (2)	Yes, so it was used for some research. It was used for... I applied for trademarks, so it was used for the trademark, and then for some contracts with the legal firm (use of the prize) (2)	I think it was pretty easy, because it was coming from people that really wanted to help, that were genuinely interested. It was not coming from... sometimes you'll speak about whatever with someone and you'll say, "Yes, I bought a water bottle yesterday," and they'll give you their opinion without you asking for it and they'll just do a negative criticism of your activity with no reason behind it. But there, everyone was a good mindset, even if some feedbacks were negative, it was always in the end to help. So with that in mind it's much easier to take the feedback and the criticism (2)

Case	Competition Design and activities of Ingenuity	Prizes and funding	Professional advisors to develop an idea - Improve the project
Access to water	I took part in Ingenuity 17 and 18, and then 19, so every process is like learning learning learning (1) / for example, so different businesses, because different businesses target different markets and you will never be one person who's conversant with all the markets. I think the fact… so taking part in all the Ingenuities, what it does is it exposes you to a broad range of markets and how different businesses are using different business models to solve the problem. I don't think... I don't necessarily think that technology, per se, is the unique thing / If it's an app, it's... an app is made the same way. If it's engineering, I mean, you can't reengineer a pump, you can't reengineer... like, you're not Archimedes, you're not going to come up with something new under the sun. I think a lot of things have been on that end. I'm not saying there's no new territory to be conquered, I'm just saying, right now, I think that the new territories appear, how you think, and for the business... for Ingenuity, for me, per se, it's just listening to all those speakers and how they solved the problems and why they solved problems and how they managed their time, how successful they are, why they are not successful. We never get the ones who are not successful, but by kind of just, I don't know, it just helps you... (2)	The other thing I did was put... was actually now start thinking of putting it into creating a business to run it and because of Ingenuity, I had already reached a proper cash flow, which is something I've never done before on a serious note. So, this time I did it. And then, what else did I do after that? Yes, so I did it and then, in 2017, I had to consider whether I wanted to stay here and pursue that as an idea as well, as a company, that is, and then that's what I did / The prizes are important. They're important. They make you work for it. Right, it's motivation. It's motivation and every year it just grew and grew and grew. So, the prizes are really important. It's not some... and then I like that the prizes are not in kind. Okay. So, it's not some voucher somewhere, it's not some... it's real money that you will get to spend and it will make a difference in your business / we were doing a lot of the developments, so let's say for example we were doing a data platform which would help us to bring every pump online so you can track it, you can maintain it, you can monitor its performance and if you can track all of them then you can really track the progress of SDG6, that's something I want to do. So, having access to data, it's something that everybody else is picking up on in terms of internet of things and stuff like that. So, that is one thing I just wanted to go after and a lot of that money was being used to develop that platform (2)	The mentors around here they're very good at just being honest with you and also if you're ready to hear the advice / The relationships have been amazing, especially, so... one of the advisors I was talking to you about is "", is he's a regular venturer, bla bla bla, I can shoot him an email any day any time now and he answers it or even if he is driving in his car going somewhere to the airport you'll be like on the phone and we're talking and he's advising (1) / when you get taught by somebody who has not done it, it's different, and also, if you have a lecturer who has ran a business... Of course, if you've run a business you know how hard that is, you know how hard it is to have traction, you know how the long hours, you know all of these things. You have to motivate yourself, you have to get up, you have to set up your own time and schedules and blah-blah-blah, and then all of it comes down to you've got to make a profit and maybe you don't have any other backup, so everything is on the line / I think the other thing personally has been to kind of realise when you're stuck, yes. So, to realise when you're stuck. That for me is a barrier. I don't know. I had a... I had to get a mentor I think by year one, year one-and-a-half, because I was stuck; it was a good business, it was not making money, there was no traction, there was no nothing, and I was at a point where I was like, "okay, we've worked on this for one-and-a-half years, we've given it everything we've got, it's not working, it's not doing anything and I need to kill it, either it works or I need to kill it". So, in short I was stuck, so that was a barrier and I think, as much as I like learning, I also need to get out of my own head and ask people for help. So, getting mentors kind of got me out of that one (2)

Case	Competition Design and activities of Ingenuity	Prizes and funding	Professional advisors to develop an idea - Improve the project
Shells and Chitosan	I liked the workshops because they were preparing you step by step. Sometimes I think if you are like a beginner, because it happened to friends of mine who it was their first time in this type of competition, they got lost because there were so much information and the idea was not mature. They were dealing with the process of getting an idea or started with an idea and they were working on developing, using all the technique they teach you / I did like the information they gave you about, for example, how to make a business plan, where to obtain a business plan, what is the canvas. I love that and I think it was very enriching for all the teams (1) / I believe that they generate skills (activities such as ingenuity as facilitators of skills for entrepreneurship), but only in the first stage, because you are in the part of literally testing the idea, and I believe that all these competitions work to ask for advice / It helps, definitely, to create many fine skills, even synthesize ideas, be, expose your proposal, expose it to the public so that they can criticize it and improve it, I totally believe that every entrepreneur should at least have the experience to acquire these skills / in Ingenuity from the beginning they searched and focused on "Where are you going to locate?". It was more of a global aspect, not so much local (UK only). At the beginning they said like "try also, if you want, to implement this also in England, if you want to get into the incubator with this", but the advice, even the objective, was always "think about your market". They made it very clear. If you are going to be in England, center in England, if not, center where you are going to carry out your project. Because if someone works with teams from all over the world, then if they tried to, even without knowing the market, at least they gave you the light from "just check that it is your market, that it is your country and change if necessary"/ No (difficulties to manage the demanded tasks), I even think it was well organized in that sense. Well, many of us were studying masters or doctorates. Then it was a short time that they asked you to be in person. Then it also depended on how advanced you were with your research and with your idea to meet the requirements. In my case, it was not so much, I imagine it was heavier for those who were testing their idea, but I do not consider that it is ... that there is a gap between what the competition demands or what the participants can do. They also gave us all the resources. I think it was well done (2)	At the beginning it was only investment in elements that would help us to test it and then we already included a salary, but once we could, when it was already giving results... Since you can develop, you can have a salary, there you can already say that most, in many cases of entrepreneurs it happens that they have an extra job, you can say "I can leave this job", I can say "I have economic security and I can dedicate myself 100% to the other project". So it is how it happened to give all the effort to what you are doing, because when you do not have it (investment and money), you have to be dividing times and that is when it can also be like the factor of "I need money, I have more financial needs than what I am getting with the company "so I think it does influence (2)	One of the main ones (influences to formalize a company) was that when we started doing the research, from the technical side, more about the process and when you submit it ... when we submitted this project to a contest, competition, a fund, they (judges and evaluators) always highlighted a lot the relevance of the technology once it came out to the market. So there were too many comments about "you must follow to the next staghe because it has potential" because also of things it must be potential not only technological but in the market and evaluators in both, the technical part specifically with chitosan and in the administrative part and the business part. The evaluators said "the idea has this match, the next step for this project, which was initially like something academic, the next step is to formalize". Then it was like the precise moment to say: "we will detach ourselves from the academic part to continue advancing and that we can build something more than a purely academic project" That's how it went / what helped us exponentially was having an advisor or people who help us. They guide us, but actively, how to solve problems or how to move forward / when you are starting you do not know sometimes or what you need (in answer to the impact of the role of advisors) / Yes, a lot (relevant feedback for the development of the project). Just when we went to the final we had to make a much longer presentation. And there I received interesting comments from the people who were doing the evaluation, including new technologies that were being made in England, of which there were some companies that even I did not know, where the advice was that I approach them. So it did help me. I could also see certain aspects that I had not considered either, such as patent strategies. I had always left it, because my work was more focused on the part of creation, not so much on the patent and they made us a lot of emphasis on this "look for this business model, if it works, if it exists, here you have a better option" or "You have the other option to sell it directly." But yes, there was a change for us to see other alternatives / I keep in touch with one of my advisors if Ingenuity, who was also my teacher (2)

Case	Competition Design and activities of Ingenuity	Prizes and funding	Professional advisors to develop an idea - Improve the project
3D Prosthesis	It was just one, one hour session a week, which was very manageable (time of seminars) / I think after that point it was pretty easy (being involved in the semminars after summits), very manageable, easy to fit in with other things I was doing. Also, because I could watch the recordings afterwards, I didn't have to watch them live, that meant I could fit them in better with schedule (2).	The funding has been used to pay me as an employee. To buy products and materials. It's also been used for patent funding to buy trademarks, to buy a 3D printer. Lots of other things like that, just generic business expenses (1)	

Case	Competition Design and activities of Ingenuity	Prizes and funding	Professional advisors to develop an idea - Improve the project
Accommodation Booking	I guess maybe from like if you're studying entrepreneurship or business then it sort of is, but from my academic background, German and Philosophy, or the subjects that I typically think are academic, that's more writing an essay about camp or something, then it's not traditional academic in that sense for me (Evaluation of Ingenuity as a non-traditional academic activity). But it's still really, really useful and it still has its place in the university I think. It's a bit like doing sport; I wouldn't say that's traditionally academic but I still think you should do that while you're studying / it wasn't just the competition, there were also two like seminar days, event days where there were lots of useful talks / I think it was really good. I know some people might have concerns, you need to focus on your studies and whatever, but even the best students are spending a few hours a week doing... watching TV or doing nothing, whereas this is a project you get engaged with and it's useful for your future, it develops skills, you're still... it's good to have a break from your studies I think, and concentrate on something else that's productive, and also it's a safe environment to practise a sort of thing of, it's not like the real thing (1).	We knew we just needed a little bit of money to do some marketing, then the £2,000 was sort of perfect for that, so it's not like we needed £40,000 to develop a website and create... build a team of staff, so I think maybe that's why the prize was appropriate / I got a little bit of money and we tried a bit of marketing for individuals, targeting individual holidaymakers (1)	You're not doing it for some big company and there's not that much at stake, so it's much more... you've got lots of support as well. So I think, you know, you should do it while you're here because it's just much more cushioned and you're more supported, you get more useful contacts so, yes (1)
Housing for Refugees	I found really good, and the summit was also motivating and just gets you engaged and thinking about ideas (1)		

Case	Competition Design and activities of Ingenuity	Prizes and funding	Professional advisors to develop an idea - Improve the project
Platform for designers	if my memory served me right, we were encouraged to go into groups and go through these different processes, which is the interview process, and I think what I remember taking away from that was, really taking time to understand the problem and having a clear idea of just where the pain point is in terms of your target market, really understanding what your idea does or the problem in the market, really, really clarify that and going back and going back and going back and going back and going back, and really stressing that, that theory through to a point where you really understand the problem to the point where it is really clear what the solution would be, that's something that has really stuck with me from that / It's good to also work in groups of strangers as well. I think that was good because you don't have any biases so you're just literally going off each other's instincts, instinctive ideas (1)	The funding really helped us; we managed to do some test marketing from the funding. We did a pop-up shop in London for example which was great during Fashion Week and, you know, that helped us understand what kind of marketplace, how people respond to new designers, are people willing to spend money on the products as well, which is a good example of how it can help...a really simple change is winning that prize gave us a little bit of injection of cash (1)	So I got to... as I said I kind of developed a good work, you know, mentor-mentee relationship with "". She's been great (his advisor); as I said, she's got years of experience of the industry and one thing she really showed me was really appreciating and understanding the financials and understanding margin, and having a very clear and concise structure in terms of how you price your products, understanding how much they really cost, not how much you want them to cost but how much it really costs to produce your product and your service and relaying that to the designers that we have (1)
Entrepreneurship female toolkit		We won £10,000 to run a project but it seems like… you've got to do a project for lower income women in Nottingham specifically and we want you to… it's almost like run a mini Ingenuity for them (1)	

Case	Competition Design and activities of Ingenuity	Prizes and funding	Professional advisors to develop an idea - Improve the project
Support for Anxiety	Yes I do, I do (Ingenuity as a programme that had an impact in developing personal traits to help an entrepreneur). I think... I always laugh, I always laugh because I think about Ingenuity 19 and I still... I still kind of think, how did I do that, and the reason I was able to do that is I kind of, I talk about my experience; I talk about kind of the ability to do something like that when you live with a long term mental health condition and it's not about saying, "I had it so much worse than everybody else", but it's about saying, you know, when you live with something like that, it can make obstacles seem bigger than they actually are. What the Ingenuity programme did is it broke those obstacles down. It kind of made you feel that nothing was impossible and yes, I kind of felt very, very looked after, if that makes sense? (1) / what I really enjoyed was that there were people at that summit who were sharing ideas and talking about things, and that could possibly then have gone on to delivering something incredible. I actually met my friend, Michelle, there now. I mean, I hadn't met her before then and now we're friends and, you know, every so often we kind of catch up online, and it was really lovely to kind of have that base (2)	For me personally, it bought me time. So I was able to go part time at work, which is just the hugest relief ever. So, I was working five days a week at the university at the time when I applied for Ingenuity. So I was able to actually go down to three days a week in September of last year and that was just a huge feeling of relief, you know, that I was able to do that (1)	

Case	Competition Design and activities of Ingenuity	Prizes and funding	Professional advisors to develop an idea - Improve the project
Vertical Farming	The times for me, seemed good to me, the times to submit your idea, the times you had to generate it, the level of work that they asked you to be able to compete did match, it was not very tight times (1) / In the networking session I started talking to other people, I started to get to know other ideas, I started to see, let's say, what it was that other people were looking for and the reasons why they were there and to hear other ideas / I believe that Jessica, who was looking for someone to do the project with, she signed up alone... we were in a group activity and we all made a presentation to the other participants to know a little about us. She commented that she was interested in social and environmental projects. So when I said "hey you know I'm an environmental engineer" she told me ... "Well, you and I have a pending talk" and that pending talk took place in a place in Ingenuity (2)	This was a real motivation that made us work very hard in a very short time because the awards were quite attractive to us and fit perfectly with what we need to start our project (1)	They also helped us in the clarity of our idea and how to make it understandable to others. They helped us to materialize our idea / before entering the session I was lost and it was as if they gave you a bucket of cold water and said "let's see, wait". It was quite shocking. What they told us was short, it was precise and they helped us to also ground the idea to a project. Yes, those mentoring sessions there were high impact (1) / The entrepreneurship part, there if we had a lot of support. Particularly with "" (Ingenuity Mentor), he supported us a lot, he believed in this idea, I think he was the only one who had a fairly sincere feedback and who was committed to helping us (2)

Case	Competition Design and activities of Ingenuity	Prizes and funding	Professional advisors to develop an idea - Improve the project
Social Supermarket	I think that you can do something like Ingenuity without any problem (activities and method) (1) / All or many Enactus teams participated in Ingenuity in the days that it was not the competition but it was more like people giving talks on different topics and there I remember that there they assigned you to a table and you did not know which table you were going to be at. So there you talked to people from all walks of life and I think they weren't teams, I think they were people from the social field, professionals from that field and I do remember that we had quite a few constructive conversations with them (2)	When we needed more money to start the project, we won 1,000 pounds, it helped a lot to develop the project (1)	We have one (advisor) who is the one we have the most contact with, called “”. He is quite involved in NUBS and he has a lot of experience. So he always has this role as the devil's advocate. So whenever we have to make a decision that is relevant, we talk to him and he always makes us realize things that we had not seen. The same things that we thought we could not, but then we realize that we can change. Or things that we thought were too risky but that we can do. He always has that function of making us reflect more (1) / There were some people who had been in Enactus when they were in the university and then they had already done their projects. “” is one of the people in Nottingham that we have contact with at Ingenuity. She was the president of Enactus Nottingham and now she has her own social enterprise and is doing quite well. So we always want to have ... give us advice because she knows quite well what our weak points are (2)

Case	Competition Design and activities of Ingenuity	Prizes and funding	Professional advisors to develop an idea - Improve the project
Outsourcing Services App	The deadlines, although limited, it was enough to make the corresponding submissions and tasks / it was free and we had the possibility of being university students participating in the competition. Therefore, we only saw benefits in participating / I believe that the organization, the structure, the way the competition is designed is a facilitator because there is no way to to get lost along that path / with a little order, the deadlines given and also they were warning you in advance "they are missing three weeks for delivery, they are missing two, one is missing", then no, they gave enough warnings to schedule and consider those time limits.get lost along that path. / all those who apply to Ingenuity do not apply, they are there voluntarily, because they want to be there, therefore, there is a voluntary decision and there is a global energy that is generated that is not forced. They are all there of their own free will and that already generates a much more receptive and enriching environment to what can be generated from that place. So for me it was all enriching within Ingenuity. Even the hours, the duration of the activities, if you were there of your own free will (1) / The way we were arranged at the tables forced you to socialize (summits). I actually have two cards from two people who were at Ingenuity that neither was a student at the University, but both were entrepreneurs. They were already entrepreneurs and they wanted to know more about entrepreneurship. One had a company that was already selling services to the University of Nottingham... and I remember a girl who was a kindergarten teacher, who wanted to design toys for children and I remember that there I offered her help as I was a designer since I have already designed toys. I offered to help him and we had a couple of contacts by mail...yes that is generated super spontaneously / the expectations were precisely to learn that experience first in a different world, culturally different, multicultural, because people from all sides appeared, people from different countries, then it was in a different culture, multicultural with the high-end of the knowledge, basically the entreprenuerial context in England (2)	I believe £ 1000 or £ 3000, £ 3000 is enough for me, three thousand is enough if you think about a limited time, no more than three months, considering a thousand per month. In this case there were two of us in the project but I am sure that if we had received that money we would not have left it for ourselves, but we would probably have hired the person who was going to help materialize the idea. In this case it would have probably been a computer scientist, we would have considered to pay that person (1)	I remember that the advisors, they are each owners of their own companies and they were quite kind in the sense of giving their information and offering help. I do not know if the university pays them or not, if it did not pay them, the fact that they had this willingness to do so was even more valuable (2)

Case	Competition Design and activities of Ingenuity	Prizes and funding	Professional advisors to develop an idea - Improve the project
Mentor A	Even if they don't win a prize those who actively engage with it will, in a timely fashion over a few month period, have to have produced an up to date business plan, financial forecast, effective pitch / My role has evolved over recent years. Although I joined the university April 2018 and have been more involved on delivering training, before then for many years I was one of the judges at the earlier stages when we were filtering the original ideas on the submissions down to get it to the final stages, who would then pitch and present. I was doing that early activity and one of the reasons that I moved away from that is I was getting a bit frustrated with a lot of effort being spent by a lot of people that was wasted effort. Without any training or skills many of the submissions I was judging were quite poor. This wasn't just from me but there were a number of us I think saying actually, is there something we could give to these applicants, for Ingenuity applicants, who are… this is a competition, to actually give them outcome skills independent of whether they win...(the training sessions) It makes the judges life a bit easier and nicer that you're not just judging application after application that misses the point or doesn't understand it (1)		If you find the right cultural environment within your team and the mentors around you can accept challenge and identify potential problems or risks before they occur, or at least mitigate them (1)
Mentor B			I believe it's really interesting (the role of mentors) because they (participants) get people from support services areas; so they get people who are lawyers, they get people who work as fund managers or there are shares in different funds in the region. They get accountants, they get entrepreneurs who have made their own companies and are somehow still engaged with the university. I think something important for these people because these mentors help them to see their ideas in a different light they sometimes might not consider / They will engage with the likes of me and other entrepreneurs in residence, or other professors of practice, or other businesses or other corporate partners / They will engage with them. They will find ways of persuading them to support whatever their initiative is and that's a thread you can see through most of the winners. They do that actively (1)

Appendix 13b: Institutional/Organizational enablers – Illustrative Quotes

Case	Ingenuity as a space to find applications to academic knowledge	Work environment and activities after Ingenuity19	Organisational bridges and support from the university
Students Applications		the Lab itself had entrepreneurs who already had an existing business that they were running from 3-5 years. There were start-up... there were new people joining the lab. The support services that they provided, the marketing push that they provided in terms of pushing it on their network because their network already had quite a few followers on their social media pages. The surgeries that we had with different experts in terms of accounting, marketing, sales, business development and raising capital, legal surgery. So, you know, it was quite helpful for us to be engaged with so many different people and it's not always quite easy to start a business in a new country, coming from " " and trying to set up a business in the UK comes with its own challenges but when you're based in a community like the Ingenuity Lab, it makes life quite easier and by having so many likeminded people and experts and to try to navigate you, and try to let you know what other pitfalls that might come if you take a certain route and, you know, we can probably deviate it as quickly as we can (2)	
Equine Repellent	I was doing my master here, in the university, and as part of the programme- many people do have to do a dissertation because my master was in Entrepreneurship and you have to do a business plan (1) / Yes, definitely, because that's where you learn how to pitch a business plan, to create a business plan, all the parts that a business plan should contain are taught in the master's. There's not that much practice. There is a bit of practice, obviously, but not as much as when you have your start-up. Before everything there's pitching, really understanding the different theories, and you've got to plan everything when you have a business, is definitely, I would say, not necessary, but it helps a lot (2)	I guess because in the Ingenuity Lab there's loads of different start-ups at loads of different stages, when I just arrived at the lab, for example, I needed to register the company. I didn't even know how to do that. So there's always people to go to and ask / And then you just... you know, a bit like monkeys that look at their parents eating a banana and opening the banana and they learn how to do it. I guess it's a bit similar, you look at others that already know how to do the things and then you learn by doing. I think I've learnt much, much, much faster with the Ingenuity Lab than I would have on my own, just because there are so many people you can go to ask for help or sometimes just speaking. "Oh yes, what are you doing? Oh, that's very interesting. How did you reach that goal?" / I love going to the Ingenuity Lab because, as I said, it's more like an office.	I was working with the engineering side and now I am working with a professor, so I was looking for an engineer but now I don't have an engineer as part of my team but I am working with a professor from the Engineering school / The chemistry school, they have a department that works with businesses, So it was really easy, I just literally know them and said what I wanted and was very quick because they are dedicated for it (1) / by being in the Ingenuity Lab I was able to do that, because as a start-up the university gives you and part of that...of the university. So you have that relation already with the university that allows you to access more easily some... maybe contacts. Yes. And then once you make a contact it's much easier to reach others / I think it first depends on the schools. So chemistry school has a department

Case	Ingenuity as a space to find applications to academic knowledge	Work environment and activities after Ingenuity19	Organisational bridges and support from the university
		It's a place where everyone has the same mindset of working on their business and then I guess it's just for me... if I need help I can actually go and see these other people, but yes, I love working from the Lab, because it's quite salute, there's a lot of space, and you get help. It's just the environment, it's great / It's more through the Ingenuity Lab that I really meet people and speak with them / the most important is people that I meet through the Ingenuity Lab (regarding the networking platform of Ingenuity) / I was part of the scale programme from the Ingenuity Lab that was in July. So it's not really mentoring, but sort of. It was still a lot of people coming, that was through Teams, but people were speaking and telling their stories. It was more aimed for entrepreneurs, which was really interesting. So that still happens, I know there are still seminars and mentorship online. I think I did two or three, because I had things to do here as well. I'm not able to do all of them. But yes, so that still happened and I think it was great / just because of everything that's put in place with the Ingenuity Lab. It makes things so much easier. Maybe not like... no one does anything for you, but the environment and if you want something you can find it there with all the mentors and stuff. So even if you're alone you're actually not really alone / with the Ingenuity Lab it's so much easier to create connections, because everyone is from different backgrounds, so if you have any questions or anything, they can orientate you to who to go to speak to / in the Ingenuity Lab there's a lot of entrepreneurs in residence. So I have made use of it, I've made use of the university, but I know, for example, if you go and speak to "", "", anyone, they can help you and give you advice on maybe associations or people that work within Nottingham and could help you. Also there's a lot of start-ups that come from the Ingenuity Lab and that work in the East Midlands, so there's connections through there (2)	that works with businesses but, for example, engineering school doesn't. So for chemistry school, your business, you approach them, you pay, you get your things done. Or you can get European funding to get your things done (2)

Case	Ingenuity as a space to find applications to academic knowledge	Work environment and activities after Ingenuity19	Organisational bridges and support from the university
Access to water	For sure, because it's putting theory to practise. Right? Everybody can talk a good game, everybody can say they've got an idea. Okay, tell them to write it down. So, if I have 1,000 people and I tell them okay, they say, "oh yes, we all have great ideas", awesome, write it down. You've just halved that 50, you now have 500 (2)	It kind of just legitimises you in your brain. You take yourself seriously besides being taken seriously by other people, right, because you have a physical address, you have a place of existence where you can go get your mail. For me, it is also the place where I knew if I am quitting my job I'm going to go here / So, what Covid has revealed to me is like, staying at home, running my business from home, is not something I would have loved to do at all, not because I am not structured, not because there's a temptation of walking around and, you know, going to the fridge whenever you want, or being easily distracted because you are around the things that you... your own things and you like them. It's just the fact that there's that community in the lab, and that makes a whole lot of difference, a whole lot of difference, because when you want somebody to bounce ideas off of, they're there. You can get anybody. If you want mentors, they are there in plenty. You can get anybody. When you want to talk to somebody who's totally not in the business community but they teach or they do something, they're there. It's that community. It's not the physical address; it's the community. So, I could have a different physical address but without the community, but it's not the same / it's the community that makes the difference. Otherwise, this would have been really hard, really demoralising, a lot of the time you just go... sometimes you just go, just so you can check in, you know what I mean. Like, just so you can go in the office and people know you're around, but maybe that day you just do not feel like coming to work but you've got to go because you've established a routine, you just like, you know, and when you have people around you that you might somehow be accountable to, you show up for other people. It's like exercise; it's hard when you're alone, to exercise, but when you're two people, you show up because there's another person expecting you to show up, yes (2)	because my expertise is engineering, I can like cover it, but also my host tutor my formal host tutor from my MSc, he's always there to just keep giving me you know advice and everything else that I need technically (1) / I have mentors who are in the School of Business but that, the School of Business Haydn Green Institute is, you know, the Ingenuity lab comes under that. So, I have mentors in the School of Business, and that's great. I think in terms of engineering, the production side of it is already done. I think the only other time I might need to go back again will be when we are assessing the data platform from a development side (2)

Case	Ingenuity as a space to find applications to academic knowledge	Work environment and activities after Ingenuity19	Organisational bridges and support from the university
Shells and Chitosan	I totally agree, completely (Ingenuity as an activity to apply academic knowledge) (2)	We work in an incubator at the university (Mexico)...The fact that you are in an academic environment, a university environment, and that you have a designated space to work helps a lot to give formality to the project, so that you see it ... to stop seeing it as "what I do after of my work, what I do after school "," what I do "character. Even only the physical space gives this aspect of formalization, that "here I work", this is my full-time job. When you don't have it, you are literally occupying non-formal spaces and it seems that it is the extra activity to what you do. So I think it's elementary (2)	
3D Prosthesis	I think… well, when you're doing anything related to your business you're having to apply it practically and so I think being able to apply it to a real business is the easiest way to figure out if you understand it. When you're just doing something like building a hypothetical business or a hypothetical business plan it's very easy to miss things, and it's only when you start working on something real that you realise, we haven't actually thought about that, that's important, or we should talk about this... I think just being able to go through that process with my own business I think really helped. I think I would have… I don't think I would have found it as helpful if I was just working on a hypothetical idea (2)	it's been helpful like being able to go to the different talks and stuff whenever they've had people coming in, so I'm able to go to those, which is useful (1) / ... getting involved in things like accelerators and knowledge transfer schemes. Those are kind of grouped where you're more likely to come across a broader range of people, some of which are likely to have had experience in whatever area you're looking at / Yes. Loughborough has its own incubator, so I've got a desk in there and I work in there… before lockdown I was in there five days a week. I'm now in there maybe one or two days a week / I think they're really helpful. It's good to be around other people that are also working on start-up businesses, doing similar things to you, and it's very helpful to just have that working environment. Especially when you would be working by yourself, maybe from home, just being able to have that dedicated space where you go into work, and you have a work environment surrounded by other people. And you've got people to ask questions of, like I'm looking for insurance, has anyone else done that recently, or I'm thinking of doing this, could someone give me some advice. Being able to have those conversations very naturally I think is one of the big benefits of being in a co-working space, with other start-ups (2)	

Case	Ingenuity as a space to find applications to academic knowledge	Work environment and activities after Ingenuity19	Organisational bridges and support from the university
Accommodation Booking			
Housing for Refugees			
Platform for designers		So I think it's an amazing programme, it's an amazing facility and, yes, it is like an incubator for entrepreneurship, and some of the things that the guys... some of the guys are doing here are fantastic, some of the businesses here are brilliant. All the guys here are brilliant, everyone here is super bright and super nice as well / I think it's good to have somewhere to come and work, you know, so I think the actual space is a great space, it's well-designed, it's a well-designed space for all the creativity and study, the way they've set up the centre / I think that probably the biggest benefit is the network that you have, you have a good peer group, so it's not just mentors; peers are important as well, because you've got people walking the same journey as you. As you may know, may or may not know, entrepreneurship is, it is a lonely journey and the buck stops with you, you are the marketing guy, the sales guy, the finance guy, the admin person so you're trying to do all these things and you're on your own and it's nice to then bump into somebody saying like, "oh yeah, I'm going through the same thing", or "oh yeah, I have to get a part time job to pay my bills" and, you're just trying to juggle life and juggle this business and it's a bit crazy and it's really stressful and you're down but then you speak to someone and you suddenly feel encouraged because you say okay well, you know, they're going through it and, you know, they're finding a way to make it work and you're encouraged to dig a little deeper, I'll find a way to make it work, and you share ideas, you share networks; that, for me, has been invaluable, invaluable, I can't even put a price on that (1)	

Case	Ingenuity as a space to find applications to academic knowledge	Work environment and activities after Ingenuity19	Organisational bridges and support from the university
Entrepreneurship female toolkit			
Support for Anxiety			I think what was really interesting was the reaction of the university in terms of supporting me to be able to do it, because obviously, with Ingenuity there was a lot of time that needed to go into it. So, things like, it might sound a bit frivolous but, you know, going to a photo shoot or going to your pitch or, you know, all of those sorts of things. And what I found with the university is that they were incredibly supportive in enabling me to do that...the night of the award ceremony I was allowed to go home from work a little bit earlier to be able to go and get ready and those sorts of things (2)

Case	Ingenuity as a space to find applications to academic knowledge	Work environment and activities after Ingenuity19	Organisational bridges and support from the university
Vertical Farming	As part of our module in the master, specifically "Entrepreneurial Creativity" is the same process, it is the same information shown in the talks. The Ingenuity process is the same that we saw within the class, so as such it did not impact the process as much. Rather it was like putting into practice / Yes of course 100%. Initially, because although I had seen this process in class, it was like practice. What I saw was theoretical. And although we did it as an exercise, it was not the same. This was exactly like a lab. By having the practice, I obviously reinforced the knowledge and put into practice what I knew. Of course my communication techniques improved, of course I learned. You know what remains very engraved from Ingenuity were the networking sessions that, although I had previously had in different conferences or other events, I had never noticed the importance of those networking sessions until Ingenuity. I think I could summarize it in what I was saying at the beginning. This is like practice, this is like the laboratory that made me reinforce all the knowledge I learned in the master (1) / I was taking a course that was renewable energy and entrepreneurship, well everything I saw in one term was explained in four days. So, if I think it helped me to reinforce it quite well / I would say yes (Ingenuity as an activity that helps students to apply academic knowledge)...maybe you don't come up with the most innovative idea, but it makes you think that you don't need to discover "the black thread", I don't know if you know that expression, in all this, but it helps you, because it is, if it helps you to form a different thought, a new way of thinking ... as it is called. ... well, critical thinking that also helps you see things you have and put them together and if not what you are looking for remains, then put them together in a way that works. It seems like a good process to me, I think that it works, perhaps not to reach the best innovation but to reach something very good, very good. I would recommend it (2)		

Case	Ingenuity as a space to find applications to academic knowledge	Work environment and activities after Ingenuity19	Organisational bridges and support from the university
Social Supermarket			
Outsourcing Services App	The best thing in this case was that Miguel was applying exactly what he was learning at that time in the Master of Innovation and Entrepreneurship, he was applying it to our project (1) / I think that more than useful it is necessary, because it is different with "a guitar in hand". So If Ingenuity is able to be in line with the contents that are being delivered in an academic degree or in some particular subject and is able to test us with the approval of the whole set, it would be basically two for one, that is you are receiving the theoretical content, you are becoming an expert in that area, but at the same time you were becoming an expert in the application of this and you will be able to ... finally you will be able to apply there in real time / It is necessary because the academic contents could be verifiable, you could discriminate the contents that effectively, for both parties also not only for the student but for the academic who is teaching, and also for the academic who is applying what is taught. If they had a communication it would be a wonderful triangle there between the three of them. Because the academic would know that what he is teaching in the background is or is not applicable in practice or is more applicable than he believed, therefore he can put more emphasis on it. In turn, the academic who is applying it could realize that in reality the industry is migrating to other things, therefore it provides valuable information to the professor, the academic, to reconfigure their cotenudis and the only beneficiary is going to be the student (2)		

Appendix 14a: Interpersonal enablers – Illustrative Quotes

Case	Teamwork	Task division and roles
Students Applications	Positive aspect of teams...we can build upon strengths in a more agility (1) / Barriers is getting people to consistently work for you when you don't have enough money to pay for them. So, being an entrepreneur, you always start with less cash and the first barrier is how to motivate people to work for you, you know, with hoping that the returns would come soon enough for them. So, one of the barriers is that; getting consistent quality of work because, if you don't pay people well, then all the time their motivation loses and that's been the biggest barrier, I feel (2)	it's a combined effort right so in order to win a competition everyone has to be work equally hard / Similarly, when we're running a company everyone has to work their own departments so that's... that's like, you know, the culture is built, the motivation, the aligning everyone's, roles and responsibilities and then that's, that's like the biggest impact (of Ingenuity19) (1) / (6 months later) We have (now) a designer. We have a content writer, now. So, I think the designer was working part-time before and now she's converted into full-time. We have a content writer and she is working with us now (2)
Equine Repellent		
Access to water	I am working with a team. I can't do this alone. I have a team in " " / the team that I'm bringing it is also people to deal with marketing and to do social media and people to do all those other things are taking me away from the things that I love do or the things that I am really...only me can do (1)	
Shells and Chitosan	when we saw who were interested in continuing the project, there were only two of us, it was like ... "well now let's form a company." I think that was very smart, like until really, because we were a very big team, then until we saw how you know that the only ones that are always there, that we are interested and we are going to be in spite of everything, we are the two of us and we both did (1) / the other is that you must have a good team, maybe it is not exactly the question, but this versatility between the team members , because one always compensates the other. A person with a more flexible character, like taking these risks, and another person more focused on meeting the objectives, like a maker and a dreamer, that is a good match (2)	In this case (Ingenuity 19) for example she prepared me: "okay this is what you need to say; this is where I obtained this information, the calculations". She prepared me in order to… me to be able to answer all the questions that sometimes she answers when we are together. (she was presenting alone in the UK and her business partner was in Mexico) (1)

Case	Teamwork	Task division and roles
3D Prosthesis		
Accommodation Booking		
Housing for Refugees	I was really struggling with speech. The idea of standing up and making a presentation was like, that's terrible, for me, but we did get one of our residents involved in it and I think that really worked well, just because she was able to give the lived experience perspective on what we do (1)	
Platform for designers		
Entrepreneurship female toolkit	I feel like I sowed the seed and have brought… I realised I didn't have necessarily… we didn't know where it was going to go but I wouldn't have produced the toolkit on my own. Mine would have been like a summary briefing document with some things in it but I think bringing the team together made me feel like the founder of it. I wouldn't have done it without the team around me. It was, like I say, that coproduced, things evolve and change. It wouldn't have been where it was now if it had just been me. It's like a joint / I think there's loads of potential for people to do this kind of coproduction approach which may or may not lead to entrepreneurial activity endeavour (1).	I was the one who founded it and brought them together and managed it. I guess you'd call me the project manager / I think I wrote the application first of all to get involved and then I wrote the business plan thing. I think "" and "" had a glance over it (1)
Support for Anxiety		
Vertical Farming		We began to discuss all this and that was guiding us towards a solution that was vertical farming. So once we had that on the table, we said, how can we do it? I had an engineering background, because I was beginning to see the project as an engineer: "we need a water system, we need artificial light, we need a controlled environment" and she on the other hand began with "well that we can sell to the schools, we can teach the children that we can grow our own vegetables because there are some who do not even know how they grow, so these two parts were complemented (2)

Case	Teamwork	Task division and roles
Social Supermarket	(In a traditional company) you have your area of expertise and you do that and you do not see everything else. But in a start-up it is a very collaborative work. If a person gets sick and you have to do marketing for a week then you do it. In the end you end up discovering many areas that I think also complete you as a person because you discover more than one area. You end up having experience collaborating with people who have different knowledge and in the end you end up I think it completes you quite a bit as a person / We have some people studying Management, another who studies English. The director studies Economics. We have someone who studies Geography, we have a girl who studies Law, another who studies Maths. Another boy who studies Finances, Accounting and Management. Then someone who is studying a postgraduate course in Nursing / So, I think there is enough balance between the features and characteriscs that different people have and how that leads us to be better (2)	There are people doing marketing, people doing HR, people doing ... well now we have a mobile supermarket, store operations / our project depends a lot on money given to us by companies that are our sponsors. So they do small competitions, you have to make applications and you have to make presentations. So we have a girl who is studying English, because she is very good at writing. Well, this year that has been when she has joined the team, we have obtained an amount of money from these competitions because she is great at writing projects. There you see that it is a very strong point (1) / I believe that the disciplines that one chooses in the university also go quite together with the character of a person and his strongest traits. So for example, the person who is doing English knows very well how to transmit messages. So for us, for example, there are many people who are doing business and we are not so good at transmitting a message in a way that is impressive or that excites the reader and that helps us when we are sending applications for grants and we want money so we have to explain very well the impact we have but it is a bit difficult for us / Then there are also two members who study economics, they have a different mentality. I don't know if it's the case of the two people who are on our team or the people who study economics in general, but they are much more goal oriented and doing things efficiently and writing processes and making sure everything is documented. They are not strict but they want things to be done well and they want the rest of the team to do things well and formally as well. So I think there is enough balance between the different types of people we have (2)
Outsourcing Services App	Miguel had that super fresh knowledge, so it was valuable to recognize that kind of knowledge that I was away from / For Miguel too, when I was talking about usability, product accessibility, interfaces, they were also new things for him. Each one was looking for the space that was not covered, that both of us could not cover, because although between the two we covered a fairly wide spectrum, he had things that I did not know and at the same time I had the same, then we had a good base and then each one began to delve into their area and began to generate this transfer of knowledge / we have any conflict because another important thing in these group works is recognizing the value of the other disciplines, the horizontality of this, leaving any prejudice about a career or discipline aside and just starting to be delighted with what they can offer. Basically it is to be surprised by what another discipline can offer (1)	In this case there were two of us, the idea was from Miguel, I knew it was from Miguel and he had a little more control over the idea, therefore, my role was became a support (1)

Case	Teamwork	Task division and roles
Mentor A	If it's done right it is less risky, so reducing risk on a number of fronts is something you can do more easily in a team, you can share out activities, you can share knowledge and cover for each other /I think in terms of the chance of success it's going to be greater if you've got the right team operating in the right way (1)	
Mentor B		

Appendix 14b: Interpersonal enablers – Illustrative Quotes

Case	Acknowledgement of the need for complementary/specialised knowledge	Communication among team members and other actors
Students Applications		
Equine Repellent	I need people from chemistry, Engineering like ergonomy as well, and yeah, because my product needs different elements, and each element needs an expert in each thing to be the best as a company (1) / So I'm still the only person, but before Covid I was employing... well, it was a matter of two weeks since the contract was done and I started to employ someone to work more on the scientific part... but also just for brainstorming and stuff like that. It's much easier to be working in a team. So yes, I'm looking for... well, after Covid hopefully, if things go back to normal, for someone to work on the scientific part of things (2)	
Access to water	You can have your idea and it's awesome and this is what a lot of engineers where they get stuck. So, they have awesome ideas but because you never have the skills to articulate that idea or communicate that idea then you get stuck, you know, or with the guest duck, developing the design and then they were looking at the market, and the market does not influence their design because they never talk to the people who had the problem in the first place (1) / I had my friend who was the technical manager of the same... of the company I was working for, so when I got fired he didn't get fired, he stayed there, right, but when I started my company and ended up installing a lot of systems, I used to call him to come and help me go to the field, to the site work and do the work, and he was like, "man, if you can do it, I can do it too", right. So, I kind of led him to jump, even though he had... he was more qualified in terms of engineering expertise and in terms of even the capital, he had more capital than... he had access to way more capital than I had, first he was older but still, he... given the fact that he had been in that industry way longer than I was, I think for him, the fact that I had jumped, was just the catalyst that pushed him to like, "well, if you can do it, I can do it too" (2)	
Shells and Chitosan	She helped me, her background is business management. When we work for competitions we focus… for example there is always forms. She focus on the business part of the forms and my focus is on the technology side of the project. I work with that and then she work on the business and then together we make it / For making the presentation, for example she always present… when we present we present together. She always is more confident and more into the business terminology (1) / My colleague, Itzel, she has a background in	I was the leader of my team, give them the freedom, because you are not the expert on that field. When you are like trying to make orders or push them never works. This is… "we all have the same objective, right, this is our objective so this is your task. Do it in the best way you like and if you need my help I will do it". That kind of help because sometimes they ask me "okay, I forgot about how was the process, can you explain again?" Of course. That

Case	Acknowledgement of the need for complementary/specialised knowledge	Communication among team members and other actors
	business, she studied business administration, but there are aspects, mainly legal, that neither she nor I could solve, and what helped us exponentially was having an advisor or people who help us / (the advisor) is a person who has enough experience since creation, in handling, like, literally what you have to do. That was in both aspects, both of the administrative part... also advisors in the technological part that said "let's see here you have to put more " In a way, there were these two guides that helped us to push the company forward (2)	working together with that flexibility and that freedom and help to each other, like “yes, you help with this" / For example, I tell you this story, that I was… for me it is very easy to explain in a chemical or technical way how was the process. Like “do this [sounds agreement]” and I was explaining using exactly if I was speaking with someone of my field. “First you’re going to use that enzyme, the enzyme is going to disintegrate the raw material…” so when I was explaining to the guy of the media he was like, “okay, just wait”. Then I started using metaphors and by using metaphors I was also changing the way I was making my pitch for him and he was making notes. “This is like that”. He translated the chemical process into a media process, and to explain others he made a sketch, for example. It makes the idea stronger because it was seen with different eyes / I was working with a guy of the media. For him it was completely new, he didn’t know what was bacteria, so I had to make like animations, like a Pac-Man, “this is the bacteria”. The bacteria eats the shrimp shell and release something called chitin. That strategy I think helped us win / Also, it happened when I explain it to the finance girl, okay I was speaking to her, “this is the process and this is the cost and this is the impact on the environment. Then this is our process, this is the cost and this is the impact”; so she translated that biotechnological process into finance sheet. Also, when she was explaining to others she was using for example instead of images, numbers. It was easy to when we compete to use that vocabulary with numbers, with images, with molecules so the idea was stronger and also helped me to realise this is so expensive (1)
3D Prosthesis		I think people skills and networking are also quite key because a lot of the time, especially if you’re by yourself, you need to be able to ask other people for advice, get in touch with people you’ve never spoken to before, and create a network around you (2)
Accommodation Booking		
Housing for Refugees		I’ve always been very open in communication side. We have a weekly team meeting and we update one another on what we’re planning to do this week, and any challenges we’re facing or anything we’ve learnt that we want to share. We’ve been doing that for years. I would say our… the style of how I manage the team is to have that very open communication (1)

Case	Acknowledgement of the need for complementary/specialised knowledge	Communication among team members and other actors
Platform for designers		
Entrepreneurship female toolkit		
Support for Anxiety		I don't know if you've noticed this about me, but I talk a lot, and because I talk a lot, I'm able to make networks quite quickly and I... what I find about making networks is that I am able to kind of think, 'well, that person would be good with that person and we could do this and we could work together and we could pull this is and do all these things'. So, that is a huge benefit to me because I am able to go to those networks and say, "look, I've got this idea, how do I do this, what do I do", and pull them in. So, that is a huge source of kind of inspiration or, you know, a lot of those people that I'm in are, as you say, enablers, they help / I've been talking to this amazing group of women called We Are Radical, so they are a group of female entrepreneurs, a community where we all join in together and we all talk about our businesses and get help and there's webinars and all kinds of things. And I've been looking at other women who work in business. There's one... there's a fantastic organisation in Nottingham called Blue Stockings Society that's run by "" and it's just, it's a fantastic... I think in Nottingham we're very lucky because we have these amazing people that are helping entrepreneurs to get where they need to be / I do believe that a lot of these things are because of networks and communications, and that's why I'm so passionate about bringing people in. So, I'm not about keeping people at a distance, but saying to them, "everybody has place". So, I don't believe... you know in all this kind of, you know, "oh, you know, competition and we must be this and we must be that", yes, obviously it has its place, but I'm a great believer in bringing people in, because the more people we have, the more networks we have (2)

Case	Acknowledgement of the need for complementary/specialised knowledge	Communication among team members and other actors
Vertical Farming	We received help from external person in aspects that we were unaware of or in aspects that we could not develop. First, we turned to a family member to develop a website and to develop a logo and to ... well, basically that. We received help from a person she knew for the accounting things, to help us make numbers about how much it would cost, what taxes would be involved, being as realistic as possible / we worked together precisely because she had more experience in administration and business, she was more involved in the business part and also she is local, she is British, so in a way an advantage and maybe, well, she had more knowledge of all the regulations and how to approach people and how to work in the business field more than me (1) / What she could offer was the other part, because she is very ... she is a good leader, she likes to be involved in social matters, she has that part ... how could I say it? ... well yes, of networking. It is easy for her because apart from her that she is British, it is her world, her culture, because for her it is easier. So ... but she didn't know anything technical, her background was purely social, she studied languages and I don't remember if she studied entrepreneurship and she didn't know anything technical. For her the technical was a black box that nothing else came out a result and in my case it was the opposite. My background is very technical (2)	She exposed her arguments, from her background which is more business. These arguments were stronger than mine and it had good points that convinced me. I also analyzed from a technological point of view and said, well, I think that, in this way, if we change a little of this, it may be feasible over time. And this is how we reached the agreements (1)
Social Supermarket	The person we just recruited who does Finances and Accounting. Our finances had always been ... had been a bit ... we had never been too aware of all the weaknesses we had, and all the things we had to do in that area and now he is trying to fix everything we had not done so far (1)	It is very difficult for me to sit down one afternoon and start writing about a process that I do every day. That when we do recruitment are the things we are looking for in a person, or when we have to take cash from a store and deposit it in the bank, as we do. Then I realize that if we didn't have those things written down, if one day I'm sick, someone else could take that document and know step by step what we have to do / In guiding people and having learned how to connect with people through a screen. What we have done lately, especially because it burns our motivation, and this was a pretty big problem. When we are in Nottingham we go to the store frequently, that always motivates us because we see the impact we are having. But when you have not gone for months, you kind of forget all the impact you have and all the things you do become a bit routine. So, I think that reminding him that really all the impact we are having and how we have helped people during this time has been quite important because otherwise you dissociate yourself a bit from the project itself. You think ... this week I have to do the shifts for the volunteers and next week I have to do it again, but you don't realize how many people you are helping for doing that. So I think that was quite important (2)

Case	Acknowledgement of the need for complementary/specialised knowledge	Communication among team members and other actors
Outsourcing Services App	My business partner had no experience in users or in understanding people's behavior or when the idea was finalized, how that could finally turn out in formal or usability terms / So, as we had already met with Miguel, he already knew that I was a designer, he knew that I was capable that from an idea transform this thing into something tangible or functional, he considered that we could make a good pair / My business parter knew that he could advance the idea by himself, but to a certain extent. There were going to be many areas without being able to tackle, therefore, there I entered, therefore, each one had about half of the project / Recognizing that the disciplines have narrow fields and that they definitely cannot address all the elements of a complex problem is a good strategy to start from there. Basically to start from humility (1) / the project could have been done because it was light, in aspects such as business structure it was light, we did not require many things. We probably only required a computer scientist / I am sure that if we had received that money we would not have left it for ourselves, but we would probably have hired the person who was going to help materialize the idea. In this case it would have probably been a computer scientist (2)	I asked him to explain certain things about the business world to me basically. I was closer to innovation and entrepreneurship, but not necessarily to business ideas and how a finance manager thinks. for example. So I was interested in knowing so that the ideas that I could think about eventually did not contradict that line that we had previously defined. So that was it, basically a clarification of the general idea of the way forward.
Mentor A	My experience, and I believe there's literature to support this, but I don't know what it is, this is my instinct but I know it's true, is that more diverse groups in terms of technical background, cultural background, even age background will produce, with the right way of challenging each other, a more successful outcome / I am a big fan of multi… diverse, multidisciplinary teams. It's one of the things I explicitly refer to and encourage the teams to think about / I'm not saying this is an easy path but the outcomes for the business and for those involved I think are better (1)	I'm not sitting there with my suit and tie behind a big mahogany desk and they get 36 minutes and they have to come in and they sit in their little chair. That would never work. It's a chat, it's a discussion and if the context for that is a meeting room, great. It might be you go for a walk with them, it might be… whatever is appropriate to enable that relationship and that activity to evolve appropriately for the benefit of them personally and their business / there has to be a degree of distance. I don't go out socially with these folk. It's more a… it's a professional adviser relationship but there has to be a degree of communicating effectively / It can be done via the phone but there is no replacement for being able to have the dialogue like we're having here. Through a typed chat it would not be the same. Understanding somebody's body language, what are they actually not saying, which are the bits they're actually feeling stressed about or actually are sitting there quite confident about and just need a bit of a nudge. After a while you can do that by phone or video but perhaps I'm old-school, I do like to have the one to one, face-to-face contact. I don't think it would be the same with a simple online solution or sitting there via Skype and just answering a couple of typed requests. I don't think the level of depth of understanding, or relationship, or support or trust would be there / I don't think that's as a result necessarily of Ingenuity. I think that's a result of they are more inherently likely to be successful and more inherently likely to communicate and work with others

Case	Acknowledgement of the need for complementary/specialised knowledge	Communication among team members and other actors
Mentor B		

Appendix 15a: Intrapersonal enablers – Illustrative Quotes

Case	Personal traits / personal experiences	Manage and use of feedback
Students Applications	First one is being persistent, and I think that's the key one. Being persistent has always had... because when you want to be a director or run a company or start-up that basically has no goals, no credibility, no portrait or financial backup, all you have is an idea in mind; then it's born, you know, out of 100 people, maybe 90 people / being persistent is a trait than an entrepreneur must have. At the same time, being persistent in terms of exactly, you know, most of the people that you meet will not give you positive responses. You will not always find the answers that you're looking for, you know. Things won't move at your plan and then it continuously requires you to adapt to newer models every time. So, I think being persistent, the ability to listen, as well, because sometimes when you think of a start-up, you might be quite fixated on the idea...So, being persistent, the ability to listen and act on it, so not being fixated on an idea. The third one is the act of continuous learning. So, listening but learning as well (2)	we had to, you know, communicate with not just mentors, but also prospective clients as well, with respect to what they want and not always you find positive responses; you also find negative responses. You'll find a lot of people who say, "this is not going to work; you don't do this; you don't do that", and it's by being continuously in touch with them and trying to... because marketing is always about what is, you have to identify other people's needs and then how the product can solve that need. So, that marketing message was always incorrect from our end, and to fix that marketing message and to find exactly what our customers need, I think we struggled a lot with that initially, and then slowly, slowly, we overcame it (2)
Equine Repellent	I don't think I'm that much of a risk-taker, but I like challenges and I like problem-solving and I have the chance that my family can support me, so it's a whole process where I'm learning a lot of things and for me basically that path I chose is easier than, for example, having a normal job, because it's something that I really enjoy / the fact that I wanted to do what I enjoy, that basically in my life I don't want to be the person that thinks, oh, I'm going to work, but then I'll do what I like. I'm having a job just to earn money that will allow me to do what I like. I want to do work, if I have the possibility, to work in something I really enjoy / I will give all I can to do that, that's why I'm quite hard-working and I don't mind spending hours and hours, because even if it's long, even if I'm not spending time with my friends and stuff, I'm also doing something I enjoy that will be beneficial for my future / the good thing when you're an entrepreneur is that you can schedule your time as you want. Of course you have meetings and stuff, but then if you don't want to work on the Monday morning because you don't have any meetings, you decide to work on the Saturday and the Sunday, you can schedule the work as you want and then it's up to you to organise yourself to make your business succeed or not. Obviously if you take five days off and just work two days it's less likely that your business is going to grow than if you work more. So that's one good thing when you're an entrepreneur / I guess that goes back to personality traits. Some people, they will want to just chill at home, watch a movie, go out. I'm someone who likes to move. So for me I would say as an entrepreneur it's really important to have another activity that takes your mind off work, whether this is finding some sports, by having fun with some friends / Resilience. I guess that comes with it, but being proactive. Organisation. Pushing yourself. So I guess it's all the same. I guess they're all saying the same things. But yes, it's so easy to be in your comfort zone / what traits are important? Oh, well,	I think it was pretty easy, because it was coming from people that really wanted to help, that were genuinely interested. It was not coming from... sometimes you'll speak about whatever with someone and you'll say, "Yes, I bought a water bottle yesterday," and they'll give you their opinion without you asking for it and they'll just do a negative criticism of your activity with no reason behind it. But there, everyone was a good mindset, even if some feedbacks were negative, it was always in the end to help. So with that in mind it's much easier to take the feedback and the criticism (2)

Case	Personal traits / personal experiences	Manage and use of feedback
	being an enthusiast with what you do. I guess every entrepreneur is / I think it's just seeing that it's not because something frustrating happens that everything stops. You can get another opportunity. Doesn't mean that you're going to... that your old idea will be gone forever, but just put it on hold for a year or something and then you go back to it stronger. Yes, I'm not someone who's really negative and I have to change that... yes, the Covid has impacted my start-up, but I'm good. My family's good, I'm good, the business is not dead. So yes, it's just about taking other opportunities and that's it (2)	
Access to water	I am working with them (team) because I've known them for a long time, and we meet just came down to trust. I trust them...I trust them so and that is something you don't just do over the Internet… (For the issue that the team is working in different countries)… that's basically because of the relationship was developed before I arrived to this country. So I trust them. So, I still using the people I used to know before I came to the UK and did the master and everything else (1) / I think the trait of being an entrepreneur, one I would say is you must want to solve a problem. So, being a problem-solver kind of comes with the territory, such that for me, I can look at different markets at the same time and be like, "okay, these are good, these are good, these are good, these are good", and get to that point where I don't think other people think that way. It's not a mind-set that you find in a lot of people. They don't go analysing markets, although they can see a [inaudible 06:56] didn't go in analysing things that way. I think that, for me, is the entrepreneurial mind-set. It's wanting... it's being able to spot problems that are worthwhile solving / For me particularly, one of the traits I would say is being a learner. Being a learner is really key to being an entrepreneur. You have to love learning, because one of the things... to me, learning is the end, it's not a means to an end / so learning is the end. So, that means I will take on a lot of things to do, so I can learn. I will participate in a lot of things, so I can learn, not necessarily because there's something else that is of higher benefit. So, for me, because I value that, there will be... I will take part in processes that I've taken part in over and over and over again, just so I can learn something new; and, even if you've heard it before, there's always opportunity for you to hear it from a different mind-set or in a different way. Sometimes it depends on how you're hearing or sometimes, when you come to something, maybe it's a classroom or a lecture, you have selective hearing depending on what you've been doing. So, maybe the next time you hear the same thing, it flips something different / I will never exhaust learning. So, if there are 20 Ingenuities, I might just take part in all of them, not... even if I'm not being like a... putting a business in, just to hear the developed sessions, for me, are amazing, just to learn. Everything is always new every year. Like, you will always find something different in the market, somebody else is doing something very interesting, all these things / So, only then was 2014 and I was I " " and that was the first time I went into entrepreneurship and how that happened was out of necessity because I got fired out of my job. So, I didn't have an option, I didn't have a choice / but the jump was out of necessity and I think there's this saying in English that says necessity is the mother of invention / there's something called authentic power. When your purpose comes to fully meet your	

Case	Personal traits / personal experiences	Manage and use of feedback
	personality, or like, it's like, for me, it's the one thing that I realised after the one-and-a-half-year mark where we were not making money, I had to go and just stop doing the dynamics of the business and just ask myself, why am I doing what I'm doing? Why me? Why should I run this business? Why not somebody else, who has the same skill, the same, you know, find an engineer somewhere, give them the same product, let them go sell it, let them go run it, right, right? At that point, me and any other engineer you'd have picked up would be the same, except one thing; they never walked to water work, so how they would have solved the same problem is not how I would have solved it, and that breaks the mould (2)	
Shells and Chitosan	Another aspect is determination. Itzel (business partner) is very determined, responsible, studious so our personalities are similar. We are neither conflicting. It's like when you get married, when you do a business you marry the person / So that also helped us both to stay in the project, with which I was willing to do something like that with her, with a person with those characteristics, who was responsible, dedicated, someone I could trust and I was not others, then that's why I said just like that (1) / I consider that yes, I like risks, I seek to take risks, I don't like being in routines, so in that sense I think I have a tolerance for risk. Nor is it very high, something like I'm not going to leave a job for just an idea, but for something formal / at the beginning I also said "let's formalize". So while I made the decision to formalize or leave my job just for the idea, then I can say that it is not so much my disposition because of the risk / So once, for example, that we tested, when we knew we had a viable project, applicable results, I made the decision, I sat down and said "what's next? can I take the risk of leaving my job and doing the company?" in that moment I decided. Well, if it was a process of meditation and once I set the goal of ... when I already have results and if those results are viable and can be applied, I take the risk and then I quit my job and dedicate myself to the company / The first I think is more about taking risks and being tested (viable project results), literally being very tolerant of failure. Because it also happens that there is a lot of iteration of the idea, that the idea does not work and what leads you to really do it is persistence, because the idea ... what I notice from the beginning, at the beginning is a lot of energy, you You have the idea, that you like it, that you think it will work, during the process that energy goes like (non-linguistic sound and gesture showing that the energy varies), then you have to, like, that it changes, at the beginning it was as more of a dreamer, until you land it more, then you become more mature and put aside a bit, what they say "the dream of the entrepreneur" and focus more on how to run the company, how to manage it / I think a basic one is the risk that is also known to be associated. In other words, I'm going to take an idea, but from my point of view, what makes the difference between just "playing" or "trying" to be an entrepreneur and actually being one is pure persistence, because sometimes it also happens that normally now everyone wants to be an entrepreneur. So having an idea, everyone wants to be an entrepreneur (2)	I don't think it is a bad thing (receiving constructive criticism and feedback), I even think it is an advantage, you always see your project as good, so you need someone to challenge you to really become "good". So, personally I take it as something very positive, both (constructive criticism and feedback) / when they (advisors, mentors and judges) attack you only negatively is when you can reach the bottom, that you wonder that maybe you are doing it wrong, but generally I take it very well and if I try to satisfy or remove these negative aspects that they tell me to do ... how. ..I don't take criticism badly, on the contrary, I look for it (2)

Case	Personal traits / personal experiences	Manage and use of feedback
3D Prosthesis	I think definitely resilience. The ability to be decisive and have like leadership skills, so you can make decisions and stick by them. I think motivation, especially self-motivation, and being able to continue working by yourself, even when there's no one else around / I think creativity and resourcefulness, like problem solving, those kind of skills, where you're able to look at something and it might not be right at the moment, but you can do some research, have a go at creating some solutions, and then come out with it the other side / I think I've almost just had to develop them. I've taken on interns which has meant that I've had to develop a lot more of a managerial style, develop a bit more leadership and planning, because they want to know what I want them to be doing, and how they're working well, or how I view them as working well. Having to set out deadlines for them and plans of work has definitely made me a bit more organised, things like that. What else? I think I've gotten a lot better at organising my time as well and knowing how long things should take. Future planning of things, going okay, it looks like I'm going to be quite busy this week, and this task isn't super important but if I don't do it now then I won't have a chance to do it for another three weeks, and then it will be past its deadline. Planning out things like that and just being more aware of what has precedence and what is most important (2)	
Accommodation Booking		
Housing for Refugees		
Platform for designers		
Entrepreneurship female toolkit		
Support for Anxiety	Yes, it's been very busy, you know, working with Nottingham Forest Community Trust has been an absolute dream, but it is hard work because obviously you're juggling quite a lot of things, but Mind Map is just... it's a joy. I'm so happy that I've done this so, yes / It's a huge difference. I always remember when I worked at... when I worked part-time, so worked for an organisation part-time and then worked on everything else part time and you just... it felt very much like I was sort of, you now, running 15 steps ahead of myself. I never had any time, I never had any kind of freedom in terms of what I was doing. It was just, it felt very, you know, everything felt very kind of boxed in and I only had like two days a week to work on it and that was all it was, and I think the beauty of going fully self-employed, of kind of understanding and learning a little bit more about business, what has been invaluable to me since starting this, is joining entrepreneurship programmes / Patience. I don't have a lot of it and the ability... I don't know if this is a trait or not, but the ability to deal with uncertainty, particularly in my field of work, you will find	I'm getting better at it. I'm getting better. Feedback is difficult for me. So, criticism I... I think this is a tendency with people with anxiety is that we tend to take the criticism on and go, "yes that's right and I am...", you know, or, "yes, you're right and yes I wasn't very good at that", and, "oh, yes, you're right, I'm wrong, but I'll do everything you say", and actually, with criticism, you need to be quite savvy with it because you need to kind of think to yourself, you know, 'are there bits of this that I can take on board and bits of this that I can use in a different way' / actually what I should be saying is taking that feedback on board and looking at it critically and saying, how do I use that feedback, and not just as a way to boost my own ego, but to inform the business going forward, that's the way I look at it and it's hard, because sometimes we just want to go, "oh yeah, whatever", and then move on, but you've got to start looking at feedback (2)

Case	Personal traits / personal experiences	Manage and use of feedback
	people don't do well when they are uncertain about things...I like to know what's happening, where it's happening, what are we doing; and being self-employed you don't necessarily have that certainly all of the time. You can minimise it, you can minimise the impact of uncertainty; you can't get rid of it completely / I think the ability to deal with uncertainty, patience and I think compassion. Compassion not only for others but for yourself, because what you're doing is so much bigger than just kind of going, you know, thinking, 'oh, okay, I'm going to do this, this and this and then that's it, I'm going to go home and work.' I think sometimes we, as self-employed people, or anybody who's running a business, tend to kind of go, "well if I don't get this 100% right, I'm a failure". Actually, I think that if we had a little bit more compassion for ourselves, we wouldn't be as hard, you know, I think we'd feel better if we were a little bit more compassionate to ourselves (2).	
Vertical Farming		
Social Supermarket	I think that more than anything is curiosity, I think that many people enter Food Print without knowing too much about what we were doing but they had that curiosity to do something beyond their studies, to be more involved with other people who also have that curiosity and wants to learn more. I think that's the most important thing. Now we are doing recruitment and we say that we are not looking for experience, we are looking for people who want to gain experience, that is, it is that desire to learn new things and also learn from other people because also many people in the team, most of the roles you have so much work as you look for yourself. I mean, if you want you can do the minimum, but if you want you can do much more, because there is no one who is going to tell you "you have to do this, you have to do 10 things this week, you have these goals." That is, you are going to learn from the project what you want to learn and you have many opportunities to learn but you also have to know a little how to look for these learning processes/ As a Team Leader I am legally the director of the company, so now there is even a legal element if something goes wrong, I am responsible, so you have as an element of reality if I am a university student but that does not mean that I can say " I didn't know "or" I'm too young. " I think it gives you a lot of responsibility...if it is a project then you can think of it as more ... "it is something I do in my free time, it is not so serious", but as we are already an established company we know that we have responsibilities (2)	I think that I am always open to receiving feedback. However, sometimes it is a bit difficult because our project may seem like it is just a store, so I think that many people do not understand all that is behind and all the food that we distribute to other projects, people homeless and children in schools, so sometimes people have a very good intention to give us comments and feedback. However, they do not realise that they do not understand the full scope of our project, so sometimes the comments are well-intentioned, but they tell us impossible things to implement. For example, because we are all volunteers or I just think that it takes a little time to understand the project and then be able to give feedback that we can use later. But yes, it is always good to have a perspective but I think that the ones we have used the most have been people who are professionals but already have a relationship with us that has existed for some time, because that way they have already been able to learn a little about how we work and what are the things that go wrong and what are the things that go well. So they can give more targeted, more focused feedback (2)
Outsourcing Services App	the most important thing and that it has a lot to do with the degree that was studied is when you begin to demolish the prejudices of things, such as the immobility of things...flexibility is essential more than aversion to failure or risk or wanting to take risk, wanting to win, competing to win. It is basically knowing that competing, accommodating, cooperating (2)	Feedback was always valued, it was always well received mainly due to the cultural aspect, because there were things that we were overlooked due to ignorance, due to ignorance of how business works here (UK) / In the aspects of the core of the idea, more than corrections they were hypothetical questions that sometimes subjected us and made us think of an answer, because if they had question it was because it was not clear or there was an obvious contradiction at some point. So we assume that this question was for us to reveal something, give an answer to kind of internal conflict of the project, or something to pay attention to (2)

Appendix 15b: Intrapersonal enablers – Illustrative Quotes

Case	Proactive attitude	Prior experiences
Students Applications	what I did was straightaway we went to the International Office, just unannounced without a meeting, and just went there and I was like, "listen, we're just doing this project and I thought, maybe, we think that, you know, there must be some managerial issues with the International Office that international students don't feel that the experience that they expect is not up to their level, so what do you think about that? " / So, that was the first question that started and then when we did that, we thought about all the different kinds of problems prospective students face. So, what I did was I conducted a small survey with students from 21 different nationalities and made a quick survey and then found out that it's not just me but, you know, there's a lot... a whole bunch of international students who face these issues in one or the other form. So we started collecting all the WhatsApp chats we had, everything, and then we went to the International Office with quite a bit of data and started asking them these questions / and the final one is the networking capabilities, because when you start a company, you need to speak to as many people as possible(2)	Definitely is not easy to work with a team, you need to have experience. For example, if you have... I have previous experience in the past, 4 or 5 years ago in my country. Then I learnt how to manage and lead people but I would say it's still not the most, it still it's still different because, you know, entrepreneurs work in a different way (1)
Equine Repellent	It was by myself just like contacting assistants and stuff (1) / I don't mind working hours on it, I don't mind not having my weekends and stuff, because that's something I like. It's not a chore that I go to work, it's just my life, sort of / For the chemistry side of things, I think it's more me going and asking people for help (Try to find help to fill knolwedge gaps) /I'm someone that doesn't really like speaking to people I don't know, but as I'm working a lot on my project I have to push myself and constantly go and try to speak to people, because I can't do everything myself. So yes, for some people it would be much easier to speak to others (2)	

Case	Proactive attitude	Prior experiences
Access to water	For me, it just meant that I want... for every opportunity I had to learn, I went to learn; that's how I filled the gap. I listened to a lot of people I admire, I get a lot of mentors, I am not afraid of asking questions, they will be stupid, they will be obvious to other people; I don't care. I think, at the end of the day, if I get to learn what I need to learn, I'll be confident enough to say, "that's a good idea, I'm not killing it just because it's not making money after one-and-a-half years", or, "it's a good idea, I'm not going to...", "that's not a good idea, I'm going to reshape it until I can see it's a good idea, and if I am convinced it's not viable, I'll kill it very fast" / I read a lot. I read a lot. I have a lot of business books I read, yes. So, I have a bunch of business doctors who are my friends. I ask them a lot of questions; we could spend hours on the phone or on Zoom or whatever. So, because learning is my mind-set, learning is a means to an end, I get a lot of advice that way and I get a lot of experience that way that I can then apply to fill those gaps / in the business is the day-to-day emails, talking to... in terms of talking to whoever, partners, pushing product, whatever it is that we do. Working on the business will be like, okay so how are we expanding, what's the next... what's the plan for the next five years, what does the capital look like, what is our, you know, capital outlay, where are we going to get that, how many things? So, it is like doing the overview versus being in the business and I think you need to do both for it to be a... to work on the business and in the business, for it to be healthy. That, for me, is one of the things I do that I think has given me a lot of return / here's the thing about ideas. Before they (ideas) become businesses, they have... there's a lot of work that goes into that. There's a lot of work that is going into that. So, if you are discouraged by just the Ingenuity process, I'm sorry, you're not ready to run a business because there will be a lot of days that you have to put in the work and long hours that you have to put into the work and you will not see a return…In itself, the process sieves people out because there is required in every entrepreneur, that commitment. There has to be that commitment and anything you're passionate about, nobody forces you to do it. So, there's a difference between want entrepreneur and actually being an entrepreneur. You know, so, wanting to be an entrepreneur because it's "cool", that's great, but it requires work, and a lot of people have dropped along the way because of the work, and I'm not saying... so, if Ingenuity is hard, man, running a business will kill you in six months. You will be out of it (2)	So, I kind of took my whole salary, dumped it into marketing and then went out there and basically kept doing the same job I'd been doing for my employer, only this time round I was targeting customers that we had kind of priced out of our product range, or buy our products or something / I think basically the reason I jumped out the first time into entrepreneurship was simply because that's all I knew and I was like, if they can do it, I can do it too, and they were an entrepreneur from (2)
Shells and Chitosan	For me the difference (between an entrepreneur and someone thinking in developing a project) is really taking an active role, taking the steps you need to achieve it from the point of view such as, in my case, my business is more scientific, so getting closer to the people you need but in a not in a dreamy way, rather grounded, based and with goals (2)	

Case	Proactive attitude	Prior experiences
3D Prosthesis	just a lot of asking other people and searching on the internet to see if anyone else knows (filling the knowlgedge gaps in the project) (1) / I think networking and trying to find people who already have experience in that, or just in a relevant sector, that they might have come across it, either directly or indirectly (2)	
Accommodation Booking	I know some people might have concerns, you need to focus on your studies and whatever, but even the best students are spending a few hours a week doing... watching TV or doing nothing, whereas this is a project you get engaged with and it's useful for your future, it develops skills, you're still... it's good to have a break from your studies I think, and concentrate on something else that's productive, and also it's a safe environment to practise a sort of thing of, it's not like the real thing (1)	
Housing for Refugees		
Platform for designers		
Entrepreneurship female toolkit		
Support for Anxiety	I've worked hard. I've worked harder than I've ever worked in my whole life because I want this to be a success (2).	
Vertical Farming		I think overall it was pretty simple. And I don't know if it has influenced that we worked on a previous project and that we already knew a little about our way of working (1)
Social Supermarket		But I think that people who want to participate in Ingenuity and do not have this platform that we as Enactus have, for them it may be that the work is higher.

Case	Proactive attitude	Prior experiences
Outsourcing Services App	all those who apply to Ingenuity are there voluntarily, because they want to be there, therefore, there is a voluntary decision and there is a global energy that is generated that is not forced. They are all there of their own free will and that already generates a much more receptive and enriching environment to what can be generated from that place. So for me it was all enriching within Ingenuity. Even the hours, the duration of the activities, if you were there of your own free will (1) / I probably fall for what all entrepreneurs say, that if people really feel that what they are doing they like, they do not mind working 10 hours, a working day or working the weekend. Times while one is enjoying what one is doing, times pass ... time is super relative. When you are dedicating your energy and your own working time to your own idea, that perception changes (2)	The truth is that we did not have those problems because I have been linked to the world of construction for many years and Miguel to the industrial world (1)
Mentor A	I think those who are interested in doing it already have the mind-set and will find means to make it happen. I think by dint of applying to join Ingenuity Lab or the competition they've already proved themselves that they want to do this and they can do this / Certainly my aspect of it, I'm not explicitly saying to them in the evening class, for example, or the mentoring, "go and do this" and then watching them do it. / For those who actively engage with it, it provides a focal point of getting some good things done by a deadline / They will find ways of persuading them to support (mentoring or help with specific tasks) whatever their initiative is and that's a thread you can see through most of the winners. They do that actively / For those of them who have done the homework or the extra work we suggest in the evening classes, for those of them who've asked for help and support and mentoring and listened to it and applied it, you absolutely see an enhanced business plan that's more credible, it's more grounded in real market data (1)	
Mentor B	I believe that's one of the biggest things, like those who are self-aware that their idea needs improvement are the ones who actually make it to the finals or to get any award (1)	

Appendix 16: Institutional/Organizational barriers – Illustrative Quotes

Case	Weaknesses of the competition and the programme	Organizational Barriers
Students Applications		
Equine Repellent	But I think that's something that lacks attention in the Lab, is some sort of database that would relate all the organisations' help that could be within the university, which is anything. For the chemistry school, for example, that works with businesses, unless you go to the chemistry school and ask for their help, you wouldn't know that. Or there's a lot of European funding as well with loads of different schools. We don't know that. It's really by the entrepreneur going out there and asking for what exists / I did my bachelor and master's at the University of Nottingham, most of the content of the lectures I already knew them and because it was usually taught by the same people that I already had in my master's. Yes, that was not really important in my learning or whatever it's called, the development of my learning. I was still going every time, because they did that quite well / So it was at the summit that I was in a team with others. We didn't work on my project; we chose one of the projects that was fictive. So in that sense it was not doing anything to my own project (2)	If you're going to the engineering school, first you need to email an assistant... not an assistant, like you need to email… Basically just send loads of emails to all the people you can find on the website and hope that one or two will come back to you saying that yes, they can help you, and if they can, do they actually have the time for it? Stuff like that... there's the fact that people don't know you, so they're reading an email from you, they're just like, Okay, whatever. They won't read it. So if you know someone that knows someone, then they can say, "oh, by the way, yes, I know that girl, she set up a business, she needs help with that." It's so much easier to get the contact with the person and... yes, so I don't think the contact is easy for any other school than the School of Chemistry, simply because academics are really slow to reply to emails and they're really busy. And why would they do something they don't even know about from someone they've never heard of? So it's a lot of time. A lot of time. But then by time and effort you start to meet people that are actually interested in your project and know other people and that makes things easier (2)
Access to water		I'll find the most sceptical people are the people in my industry like the engineers, So the sceptical ones are the ones who don't think this is, you know, and blah blah blah, but it's because again, they never think from a business perspective. They never think like for that, for a larger perspective, they never think like that, they think what is the principle…You learn, learn that the value of your idea is not based on somebody who doesn't get it (1)

Case	Weaknesses of the competition and the programme	Organizational Barriers
Shells and Chitosan	The summit they were less dynamic because they were just one person speaking in tables and the tables were fixed. You never changed to meet other teams (1) / I do believe that the culture of the country has a lot to do with it and how they develop it. Sometimes yo can see something as I voluntarily approach as an advisor and that occurs more in the USA, they are more open and have more initiative. In England I did not really see it that way. I do not know if also because the competition did not lend itself to that, but they were more like teachers who helped you but it was more limited. You had to get close to them, they didn't get close to you, as I told you, it happens in the USA and it also happens this way in Mexico. There it's like in two directions. Both you get closer and they get closer, but in England it was different. I had to get closer and punctual, like "what do you need, how can I help you" and it is all very punctual, so if I can say that it is a disadvantage that I see. Because also, when you are starting you do not know sometimes or what you need. So if it was an advantage that I saw in the others with respect to Ingenyity in England / Within Ingenuity (seminars) there was little time to do it. It was once a week during the three months of preparation and in that hour of the week they gave you a topic, so there was, the truth, little interaction to be able to have communication with others / Later when the summits were held, it was when they were specifically destined to this interaction of an already more formal idea, because literally many participants just had only the idea, so they had not seen other aspects and I feel that the idea was that they had more solid the rest / I can also say that there should be a little more space for this interaction, because it was, you had to do, you had to develop something so you had to be focused on that and there were spaces as invitations to "communicate with others" but it wasn't something ... I think it would have been nice to have a little more time to have that networking with other teams. Yes, there was time, but it was not as long as it could be / I totally believe that every entrepreneur should at least have the experience to acquire these skills, but these activities reach a limit that, how to say, there should be more other types of competencies to grow, to help the entrepreneur grow the company, not only to devise it. That is where I feel that they stagnate / I believe that they generate skills (activities such as ingenuity as facilitators of skills for entrepreneurship), but only in the first stage, because you are in the part of literally testing the idea, and I believe that all these competitions work to ask for advice, but this type of competitions such as Ingenuity that are about entrepreneurship help only to get the idea off the ground, but where I feel that it is like the blow of the entrepreneur is after this, in growing it, raising it and I think that is there, from my point of view, that it was one of the reasons why I went to study the master's degree / Well (the organizers) also did some small polls to ask us our opinion of the competition, but I think it stayed that way. There was no more traceability (2)	I think no, because since she is very far it's very difficult in my case to… because of the distance but maybe if she will have been here (1)

Case	Weaknesses of the competition and the programme	Organizational Barriers
3D Prosthesis	Yes so on the first two weekend summits that we had, we were doing like a group project, but it didn't really seem to have like an end point, like there wasn't a reason for it. We'd be discussing and developing things and then at the end it was like, "okay, you've had a go", that was all, and because not everyone was there for both of the days, half of our team wasn't there on the second day and so we go / But the other people that were there, I don't know, they just seemed to be there; there didn't seem to be a purpose for them. t combined with another team and so it just made it really hard to actually figure out what we were supposed to be doing / The first weekend I was there we didn't have a mentor either, and so we were just quite lost (1) / I think the weekends felt quite time consuming, the two big events, just because they were all day and you were working on things all day, and because it was on a weekend it meant that you didn't have your down time. I think those initial two weekends were quite intense but after that I was quite normal. It was just one, one hour session a week, which was very manageable / I think definitely the weekend events, because it was two weekends back to back as well, both of the summits, was quite intense / Not too much in Ingenuity. I think I didn't really know anyone when I came into the competition. I'd come in with my own business idea, and so in the summit sessions I'd spoken to quite a few other people, given some feedback on other people's ideas. But after that point I think it was just like generically talking to a few of the other entrepreneurs if I recognised them, but nothing more formal in terms of giving feedback / Not really. There's one or two people that I probably have spoken to or emailed in the past couple of months. Then the majority of people I might just have on LinkedIn but I haven't really spoken to them (2)	I think it's been like medical regulation and just not knowing what steps need to be completed when. So if it was just a normal product it would be very easy, you don't really have to get regulated, I could just start marketing and selling it, and all I need to figure out is the design and then how I manufacture it, but because I've got to do like intermediate stuff like user testing and making sure it's safe, that's the bit that I don't really know about and it's hard to find someone that does and that has the experience that's still working in like a university context or in a mentoring context / It's great for the support, but in terms of intellectual property you need to make sure that you understand what your university's policy is sort of before you start, otherwise I think things can get a bit risky / I'd be wary of starting a business during university or through university, just because of the IP side of things; I think you'd have to be really careful (1)
Accommodation Booking	But the seminars, they were also good but I think a lot of it was a little bit basic and I don't know if they were as useful as the summit, which I found really good / I never got a mentor unfortunately. I would quite like one though / Yes and I did try. There was a guy who was working here called, I'm not sure, quite short, bald guy, he used to run it but then I think he's moved on, and I did mention a mentor and he was going to look into it but I think he was busy with other stuff and it didn't go anywhere, but it's something I would definitely like for this year (1)	

Case	Weaknesses of the competition and the programme	Organizational Barriers
Housing for Refugees	One of the barriers is the summits being all day, two days running, so that for me was hard. I've still got the five days of the week I'm running the charity so effectively… then because the timing of having to apply for things, and I came back after writing my dissertation right at the end of January and I was completely exhausted / For us as a charity trying to within ten days develop a business plan is quite challenging, and then also with the presentations / (sug) Get the business plan out earlier because if you know what you're going to be asked to develop you can start working on developing it but if don't know until right at the end (1)	
Platform for designers		
Entrepreneurship female toolkit	I think she did come to the first boot camp weekend, we all did, but then in terms of what happened after that. Then the development session was all in the evening so that didn't really work for any of us / We really should have had a mentor for our team then maybe a few people could have joined us and bounced ideas around. Everyone was put in different groups so it was a missed opportunity to really have… we could have had an amazing day that Saturday when we really nailed some things but it was a bit…It didn't really work for me but I think it's that serendipitous element of who's sat on your table, in a way, in those summits / I mean the barrier I suppose was like the limited time you had on your table. I think also you could meet people on your table but you couldn't meet people not on your table. It was almost like once you were in your group you were kind of only going to really interact and go through the Ingenuity process with them/ There might have been someone two tables over there that was amazing and could have really been fantastic and it could have led to them being involved more, or us being involved with them but we wouldn't have met them. It's that element of not necessarily all knowing who everyone is and not being able to target who you wanted to network with / Other suggestions, I know they're doing it over a longer period of time this year so that might let organic things happen a bit more. People find their own processes / I am pretty sure that I wouldn't have applied to take part in Ingenuity had I not worked here as a member of staff. I think if you... they are serious about it becoming a community aspect then there is a definite need to possibly move away from it being a university thing, or whether Ingenuity joins up with the city council or Nottingham Trent University or something, to open its doors that little bit wider, because I think, if we're going to reach communities that aren't taking part in this kind of thing, we need to understand why, and that might be in learning some hard lessons, because some people may turn around and say, "well I'm not doing it because I don't think the university wants me here"… So, it's going to be kind of if we're to learn, we have to kind of really open some discussions which I'm not sure is going to be that easy (1)	

Case	Weaknesses of the competition and the programme	Organizational Barriers
Support for Anxiety	I remember them opening it up to the wider community in Nottingham and I remember hearing some people say, “oh yes but it’s not for us; they wouldn’t want my ideas”, so there is some work to be done around reaching out to different parts, if they want to, to go out into the city, there’s more work to be done in that area / what worries me somewhat is the reputation of the university as being this elite, you know, a kind of island on the hill mentality, puts people off, and that’s not to say that, that reputation is true, it’s not, but it puts people off. People think, “actually that’s not for me / I’m not saying it’s just Nottingham, but I think there is a feeling of how, if you want to reach, so things like Ingenuity want to reach wider parts of the community, then does it have to step out of that university bracket? / Does it have to be an entity in itself so that, yes, students can apply, yes staff can apply, but also does it need to have a community arm that goes out? / I think the dark side of it is how we frame it. Is it a community initiative, is it a university-only initiative? I am pretty sure that I wouldn’t have applied to take part in Ingenuity had I not worked here as a member of staff. I think if you... they are serious about it becoming a community aspect then there is a definite need to possibly move away from it being a university thing, or whether Ingenuity joins up with the city council or Nottingham Trent University or something, to open its doors that little bit wider, because I think, if we’re going to reach communities that aren’t taking part in this kind of thing, we need to understand why, and that might be in learning some hard lessons, because some people may turn around and say, “well I’m not doing it because I don’t think the university wants me here”, or da-da-da-da-da. So, it’s going to be kind of if we’re to learn, we have to kind of really open some discussions which I’m not sure is going to be that easy / For the people organising it, keep doing what they’re doing but also start to think about how we have those discussions with communities that aren’t being represented (1) / I also wonder around communicating that this is for them, because when you see something like Ingenuity, it’s beautiful and it’s wonderful but it’s also very... it can appear very student-focused because it sits within a university. So, how do we reach out to people and say this isn’t just for students, this is for staff, this is for general public. I know that some of the people I’ve sat with on my table when I was at the summit were saying... some were from Nottingham City Council, some were from different areas of the city, some were from the county so, it is possible, it’s just how do we do it? (2)	when I got through to the final 40, I will always remember people sort of saying, “you’re the only staff member”, you know, because I was working fulltime at the university then, “oh, you’re the only one, nobody else did it, you did it”, and it was a bit of a kind of badge of honour, really. But I felt there was a bit of sadness in it because I know that within the university’s workforce in particular there were, you know, there are brilliant people within that organisation who have fantastic ideas and I think to myself, wow, out of however many staff there are, I was the only one who got through to the final 40. And that might happen again. You might get more people apply and only one get through but the fact that we’re not even getting a lot of applications from staff, it made me feel quite sad / I think if staff knew that, that was available to them, you know, are we putting it in staff communications, that this is available to them, or is it viewed as a student opportunity (2)

Case	Weaknesses of the competition and the programme	Organizational Barriers
Vertical Farming	We chose the social approach and I think that it also had a great influence on the judges in delivering the prizes, because we were not completely in the category in which we entered... I think that if there were a category to solve an environmental problem, if it had been technological, environmental and social, I think it would have been different. The categories to participate were quite limited / What does not seem to me is that you are judge and part. Mentors participated as contestants and I think that shouldn't have been / I think the rules of the participants, many of those who won were ideas that have already been worked on in Ingenuity, that have already participated in past Ingenuity versions and this year they participated as mentors. That the truth, I say, I would not want to think badly, but it can lend itself to something unethical (1) / I remember that, that everything was fast, all the explanation was fast. They didn't let each person say it completely, that's what I think. When things are like this, well, you get to know many things but perhaps some of them are not fully understood and then you forget them...The Ingenuity process as such, for me I think it was very fast if you haven't had, if you haven't taken a course like that, which at that time was "Real Creativity" where they taught you the whole Ingenuity process / No, we being finalists could not use the physical spaces (Ingenuity lab) later...Yes, if they had given us a physical space to work, there would be encouragement to continue with the project / What if it made us feel a little disappointed to see those ten winners, not all, but I see some who say "well, they were part of the mentors and now they are the winners", because I did not know what that could be done. And there what we learned is that Ingenuity19 lost a bit of credibility / I think that after the first time we talked (first interview), I don't know if it was because of that, but what I did was that I entered the page and there was a questionnaire that said "If you are interested (in participating in the new version de ingenuity) put your information here and we will send you information when it starts "and I never received anything / they should also invite the Alumni to the new competitions (2)	From the side of support in the engineering side, the truth is that no. Because I approached an academic, I went to his office, I had doubts about my project in the technical part and I knew that he had worked with vertical farming and they were from my "Architecture and build environment" school. He was even my teacher in my master's degree and I said "well, I'm going to get closer to him." He was always in a hurry, he attended to me in five minutes and with answers of nothing concrete, broad, little credible (2)
Social Supermarket	We have mentors from the university who have experience and we can always ask for advise to them. However, they are involved in many projects. So we want to have that position of external advisor so that they are focused with us more than with many other projects (1)	

Case	Weaknesses of the competition and the programme	Organizational Barriers
Outsourcing Services App	there was a bit of a cold aspect of Ingenuity that was ... it was like the end goal was always to create a business, but they neglected the creative part of that business a lot. They just assumed that the idea that you brought in already came as a predefined idea and could essentially be considered as good but it could not necessarily be so. There was no pre-stage where the idea was discussed and someone said "are you sure this idea is good?" that they make you rethink the idea so as not to advance and not use the future resources that they have available in an idea that definitely does not offer any significant change, any major impact, because they rest on the fact that the person had an idea and that's it ... yes is the idea of ??the person is fine. But it is not necessarily so / We immediately jump to the technical, without a creative process because we start from the predefined idea / there were very few people from the city outside the university population. The other thing, I am sure that people are intimidated, because they are inside a university, and they know that there will be students who are in undergraduate and postgraduate and many people that I knew, who did not have the possibility of studying ... then maybe if It is done within a safer ecosystem, that offers them more confidence, they can perform better (1) / people go of their own free will because they do not know the activity. Then people are going to be amazed, dazzled or surprised at what can be delivered there. So ok you feel surprised but there will probably be a level of people with knowledge that will be super useful because it will be technical knowledge that they did not have. In my case, I did have that knowledge, I had had similar experiences like when these speakers arrive and they tell you their own experience, but it is known that no one learns the experience of others / These activities quickly seek to generate an effect. They seek to give you some knowledge and then evaluate that knowledge that was given to you through an evaluation as if it magically pretended that these contents are going to generate something, probably better than it would have been generated otherwise. They (mentors) tell you something like “you have to take up the knife, you have to turn on the stove, use trays and some things called saucepan and there is something that stirs and a clock and let’s see what works best for you.” But no one asks you what you have in your backpack because if you bring a “lobster” in your backpack, you are probably guaranteed success with the judges. If you bring a potato with rice, you will probably do the best you can, and that is what I mean by the background of each one that is not covered by these courses (2)	

Case	Weaknesses of the competition and the programme	Organizational Barriers
Mentor A		They don't even realise that there are ways of doing it. They don't even know that there is a potential way of engaging with other members of other bits of the university to then get somewhere / Does every part of this university act in the same way that the Haydn Green Institute does, no it doesn't. If you want entrepreneurial thinking to imbue the entire university it might need to / there is a perception from the majority of students who aren't in the business school or who aren't already linked to the Ingenuity Lab that it's not for them. There's some mental barrier there /I'm not saying it's a real barrier because it's perfectly possible for folk from across the university to get involved. I think there's a perception or a communication or some sort of barrier that stops the vast majority of students or members of staff at this university from engaging in something entrepreneurial / vast majority of students do not apply because they have an issue because it's got the word entrepreneur in it and they think you've got to be a business student or you've got to somehow be… "it's not me, it's not for me" / I don't think that would be an easy task for most of the students in engineering. I don't think that would be an easy task for most of the academics or postdocs or PhD students in engineering (1)
Mentor B	Another issue about being a mentor, you have maybe three or four different teams competing on the Ingenuity competition at the same time, so you don't have time to focus on an specefic project / I remember that this girl, she was doing the thing with water for developing countries. She was quite quiet during the competition, she would only listen like when something general was said but she wasn't really actively involved. I believe because probably she had already everything set in her mind and there were a lot of people like that in the tables, especially those who came alone without the team (1)	

Appendix 17: Interpersonal barriers – Illustrative Quotes

Case	Different priorities and additional responsibilities	Communication barriers and interactional difficulties	Disciplinary backgrounds of team members
Students Applications		The second negative aspect is everyone in the team have a clear response between... sometimes some clash between you know what one is saying someone might not agree with it so, you know, disturbing events and other things which might lead to some dispute for short term (1)	
Equine Repellent	In my case is because is not a team that works in the same office, So gain all the people can back responding and everything because they have other job mixing is a bit slower than I would like / Because they have other jobs, they are busy and stuff, and so getting them by email or sometimes is a bit slower (1)		I think that background differences more than anything (barriers to the collaborative process) (1)
Access to water			

Shells and Chitosan	In the times of our personal agenda, yes. Because we were all studying or some were working. So, I was just studying and then I could dedicate a lot of time to him after class and for me there was no problem / If there is not everyone's interest, then it is when they begin to leave the project, there is no good communication and conflicts begin (1) / At the beginning when the idea came up, when we started working in the laboratory, we were a team of 8 people. Later, when we were moving forward, because it takes a long time to test and commit to the project, in the end, when we set up the company and we had to set rules, there were only two of us, and from then on we have always been two (2)	Barriers, at the beginning the communication. It was like trying to communicate in different vocabularies /Also how to communicate at the beginning, like "look, this works this way", then when you tried to - "look, we have to get here, but in my area it is done this way" - "no, no, is that in mine is done like this ", then trying to connect them to make it something that fits into what we were doing that was also conflict or" challenging " / In not understanding each other. For example, when I spoke of denaturing a protein, no, that portein is denatured. The answer is like ... "WHAT? !!!" and how to translate this in terms of design. Then you already have to draw it. "Imagine that this is so, now we have to explain it with an image, so instead of being rolled up it will be unrolled (the image represents the protein) and in financial terms that no longer works. So that's a waste, waste of money. So, these kinds of translations ... I think they happen when you are doing something scientific, right? Because that process you have to translate into different languages for each type of person who is listening to it, so that it can be understood and make sense / Another thing was the personality because it happened that at the beginning one of the team members had a very "sour" personality, very sarcastic, then others on the team were very sensitive, so it is important to have someone to muffle those as jokes or blows at the beginning / Well, once we entered competitions, the problems were of communication, time, stress and personality ... they are the egos (new origin of conflicts) "Mine was the most important, mine was the one that impacted the most (my contribution) "or when we returned to expose the idea, someone tried to show off more than another, then those were the conflicts / Also go back to Mexico, literally reconnect because where we develop it is here (Mexico), and well I was for a whole year in the UK and you like it or not, when you are not constantly working in a relationship it wears out or can be lost, then it was like going back to make this relationship (2)	At the beginning it was a little bit like a shock between us because we have different backgrounds so when we were working together, for example, the people from the business was focussed on the money, on the business part of the idea, and in my case it was biotechnology, on the technology, on the quality (1)
3D Prosthesis			

Case	Different priorities and additional responsibilities	Communication barriers and interactional difficulties	Disciplinary backgrounds of team members
Accommodation Booking			
Housing for Refugees	She went to this conference and it was like a solicitors firm and it made her go, I quite fancy being a solicitor now. She came back and got on a course at Nottingham Uni, I think it is, so she's doing the LLB postgrad. That's why she left. She left in September to start that degree (team member left the team) (1)		
Platform for designers			
Entrepreneurship female toolkit	"" was like I can't really be involved because I'm too busy with my new business. I definitely text messaged her again and said are you sure you don't want to come on because you have been involved, and she was like no, that's fine, you guys go ahead..."" was like okay, if you think we can go for it, I'll be involved, but it was very much "" and I who went through it and put together/ Then "" and I were like we'll have to do it and actually we won't invite "" to present with us, because if she's not helped with the pitch and the slides it would feel a bit weird. "" and I did it. We still kept in touch with "" but she wasn't really massively involved (1)	I think there were a lot of emails going around at one point and misunderstandings as well, so people not quite reading things properly and going hold on a minute, why have we changed our mind on this. We'd agreed this and how come Isobel and "" have agreed something else, and it was like no, we haven't really but okay / I guess there was a little bit of a personality conflict with "", and "", and me and it wasn't easy. It kind of felt like "" and "" and "" and I was trying to help them in the middle but I think in the end "" was just kind of like… she had to do her own thing / It was an interesting dynamic. It's all fine now. I guess entrepreneurial women can be quite strong minded and they stand up for themselves because they've had to in business. They're probably not the easiest people to manage, they're probably unmanageable but I try my best (1)	

Case	Different priorities and additional responsibilities	Communication barriers and interactional difficulties	Disciplinary backgrounds of team members
Support for Anxiety			
Vertical Farming	we think about it (create a company), but then what happened was that, let's say, she had personal problems related to financial and emotional stability, she had many personal problems right after. Just after she finished Ingenuiy, that we didn't win and that we talked "we didn't win, what are we going to do with this?". When we met again to talk and talk about this, she began to tell me that she had many problems at that time, that she had to get out of where she was living as soon as possible and things like that. So what ... apart from that she had to get a job because she had no money and had no other support and we agreed that since I have an immigration status, I have a student scholarship and we cannot be in the UK as long as we want. So, considering its instability at that time and considering my immigration situation, we decided that this year, in September, we were going to talk about it again / Honestly, we haven't even talked about it, I haven't done those activities because, well, I don't know, other things come out, I had to come here to Mexico, I was in limbo for a while thinking "I continue with this or not." Because apart, I talked about this idea to some families here in Mexico, some families with the ability to finance it, they told me yes, but in the end, I didn't (2)	I think the biggest problem we had was exactly the language (1) / We lost contact with Jessica and we have hardly spoken almost anything (2)	I think our differences had a lot to do with our background. She commented on an idea (business perspective) to include and I analysed it from a technical point of view and I said “this idea cannot be done” or “this idea is going to be very complicated”. So, the conflict began (1)

Case	Different priorities and additional responsibilities	Communication barriers and interactional difficulties	Disciplinary backgrounds of team members
Social Supermarket	Another is that eople stop being able to do (both) things, the studies and the project...If you are in the project, you have to be fully involved...If you are not able to have a balance between studies and the project, some people feel like they cannot do both, and they end up. If you invest a lot of time in the project, you can see that your academic performance will worsen. So some people end their participation in the project not in a good way because, in the end, they see that they have spent too much time involved and have stopped for concentrating on their studies / One, the most normal, is that people graduate (reasons to left the project) (1) / I think in the end last summer was quite difficult for us because many of the team members graduated, so there were four or five people left covering what ten or more were doing before, so I think that was the reason why which we couldn't use the contacts as much as we should have, because we were very busy with day-to-day things, with the orders arriving, with the store being open, so I think last summer was quite difficult and we don't use them that much / I'm going to stop doing this in January, because the exams ... because I'm starting the third year and I want to focus on the end-of-year exams / There are many limitations because we are students and because everyone is a volunteer (2)		Sometimes you don't realize that each one comes from a different area but other times you do notice it (laughs). For example, with the girl who studies Law, she is always very busy because what she does is quite intense and it's like ... sometimes you see that the mentalities are different, for example, the girl who studies mathematics because talking to her it will always be more based on concrete facts and then if we talk about any specific topic she will give you that background of the facts. While other people are more strategic. For example, when I was doing HR, I am much more of working with people while she has a lot of Excel files and that is what she does (1)

Case	Different priorities and additional responsibilities	Communication barriers and interactional difficulties	Disciplinary backgrounds of team members
Outsourcing Services App		in terms of technical capacity, charismatic capacity and language, we had no problem for that. But it was going to be more difficult than being in Chile. Clearly in the cultural context in which we were, it was going to be a bit ... because first, they were going to hear us, the accent was already coming in the first bias / I think we would have hesitated to do something thinking about those kinds of barriers that were probably in us and not in them but for us, they are going to be real. We were probably going to try the same, we didn't lose anything, but they were there (barriers), they were latent. At least for me they are and will always be / we were never so open with our idea…I think our idea was light and easy to implement, it was just an idea, it was like I told someone about the previous idea of uber, that is, anyone could have done it first, because basically it is a reasoning. We were afraid (of plagiarism), yes, of losing basically as a position of having been the first to do that, because it doesn't take into account that here in England it hadn't been done, but we don't know why it hadn't been done (2)	
Mentor A		For those groups, is it easy? No. They have to find ways of constructively challenging each other / They have to find ways of then ultimately coming to a decision and implementing it. I'm not saying this is an easy path but the outcomes for the business and for those involved I think are better / If we can't communicate those basic business concepts to anyone who's credible enough to come along, so not a three year old child, but even then some of it is communicating effectively, working with others, then we've done our job wrong as educators, as supporters, as mentors (1)	

Case	Different priorities and additional responsibilities	Communication barriers and interactional difficulties	Disciplinary backgrounds of team members
Mentor B		Some of them are really secretive about what they're working on, like they think somebody's going to steal their idea in the competition, because not many people is quite open to talk about their ideas / I would say the first one is if either they come in a group or they come alone. People coming in a group they're more willing to interact and talk about and are more open to participate in the activities, because in the end these two days in the competition are activity-based / Then again if you want to do the Ingenuity process and they don't to provide their original idea to put through the process you need to come up with some example. Those people in teams are more open to do that / Those people who come alone some of them just go with the motion, it's weird to have found someone who's actually engaged a hundred percent with all the activities (1)	

Appendix 18: Intrapersonal barriers – Illustrative Quotes

Case	Personal traits and individual issues	Competition as a time-consuming activity / Time Management	Individual interest and new projects
Students Applications	being a start-up how do you how do you manage to motivate a particular resource and keep them,you know, working and make them make their own vision to your vision aligned to what the company vision is that's the biggest challenge (1)	Time management is one. Time management, how to motivate your employees to give their time to you and keep it consistent over a period of time (2)	For example, team size is small, someone leaves the company. For example, if someone gets a better opportunity...definitely the difference between working for a corporate and for entrepreneurship is that if entrepreneurship if being successful will give better returns in the future. Working for corporate, on the other hand, makes you stable from day one, right?... that's negative aspects (1)
Equine Repellent	it's not great to be working alone on the project, just because there's so much things to do, but also because if the person is not... I only work with finances and to have also other projects and to keep them focused you always need to be there. "Come on, have you done this? Have you done that?" for my company is not as easy, but also just for brainstorming and stuff like that. It's much easier to be working in a team. (2)		

Case	Personal traits and individual issues	Competition as a time-consuming activity / Time Management	Individual interest and new projects
Access to water	When you go to a competition like this and some would you like just hits you with...with like a lot of criticism you take it personally because you think it's about you. It was never about you if you did it right / that's a personal thing so it's how do you take criticism, there's some people who tell you "kill your idea"... why did they say that? and what do we need to evaluate about this idea? / just because you have the background in whatever you're doing, and I've seen this a lot in entrepreneurs who... in people who are working part-time jobs... not part-time jobs, fulltime jobs and they're running a business on the side; the issue is never that their business is not viable, the issue is always the risk, the jump, and until it becomes necessary, they never feel like they want to take that risk because this is a secure salary that you are guaranteed every single month and then you're jumping into a business where you may not be guaranteed a secure salary for the next, I don't know how many months and it may not come in at the same level (2)	the fact that you only have 24 hours in a day and when you're running a business, you're thinking, oh, you want to go, go, go, go, but that is not feasible. It's not logical, it is not practical. So, one of the barriers I've run into is time I don't nearly have enough time to go round. I can be working 14 hours for six days, sometimes I used to work for seven days because it's on my mind every day, it's on my mind on Monday, Tuesday, Wednesday, Thursday. There was a time I used to work for, yes, 14 hours and I had a part-time job... no, and I had a full-time job as well. So, time is one but then you realise you are a limited resource so the other barrier is me. So, while I might be my own progress, I might be able to accelerate a lot of things, I am also the person who'll be the downfall as well (2)	
Shells and Chitosan	(As barrier) fear, fear to fail… yes, there was too much… / many of the partipants that I met were like ... "Oh, the truth is that I never did anything during the workshops, so I'm not going to compete" (1)		I think priorities, for example when you start an idea you need to give the time and also money. You really need to be committed with that. In my case I think most of my team wanted to do like… or experience other things, for example, work for a big company or they were more pressed about the money. I think that's… they were the main reasons to drop the team / there are always some people who are more interested than others. So, that also affects. In our case there was only one person who was not interested (the development of the project). So it is a barrier because you have to be pushing it, motivating them (1)

Case	Personal traits and individual issues	Competition as a time-consuming activity / Time Management	Individual interest and new projects
3D Prosthesis	I think it's easier to receive feedback on the business plan and harder to receive feedback on the product. Just because I think I'm more, almost like attached to the product, because it's something that I've worked on a lot myself. Whereas, the business plan is the bit I've had a lot of help with and the bit that wasn't my initial idea and initial thinking. Feedback on the business plan or how I pitch or how I present things, I think I'm very happy to have and be given, but negative feedback on the product I think is the hardest one to take (2)		
Accommodation Booking	so that's something I need to work on, getting other people involved and learning to, you know, let go of certain things / I did the Ingenuity competition and they all said that the main problem or weakness, or threat, is that you need more people involved, it can't just be me. I don't see it as a weakness though (1)	it is quite a lot of work and it is around exam time. It didn't hinder me, it was fine for me, but I can understand that could cause a bit more stress and it is a big process, so it is a commitment and yes, if you're a bit stressed about your exams then that's probably a negative (1)	
Housing for Refugees	The idea of standing up and making a presentation was like, that's terrible...we actually really, really did a dreadful job of that presentation. I think we actually covered about a third of the content that I'd written. It was bad (1)	Yes, I didn't get much rest that weekend and I was kind of like… for a student you expect that, don't you, but as a charity you don't, that's never going to happen. It felt pretty rough at the time / I'm good at enforcing boundaries with myself so I won't contact them out of work hours and… so I basically went, okay, I've got to write this presentation and go and deliver it on the Tuesday morning. I didn't get anybody else involved in it, I took it on myself, which meant working through the whole Bank Holiday weekend basically to get it sorted / I didn't go to the development meetings, to be fair, just because of time / One of the barriers is the summits being all day, two days running, so that for me was hard. I've still got the five days of the week I'm running the charity so effectively… then because the timing of having to apply for things, and I came back after writing my dissertation right at the end of January and I was completely exhausted / Going to work for five days takes a lot of energy from me so to do five days of the	

Case	Personal traits and individual issues	Competition as a time-consuming activity / Time Management	Individual interest and new projects
		week and then two days at the weekend were… I always find if I'm on something that's like a training seminar, the level of your brain engaging with that makes me much more tired than if I was at work (1)	
Platform for designers			
Entrepreneurship female toolkit		"", it was awkward, because I have to kind of complain a little bit about the timing of Ingenuity '19, it was all around school holidays, weekends. ""'s a mum, I'm a mum and it was very difficult in terms of it didn't quite fit. It didn't actually work out with ""'s diary that she could really attend much / It was the boot camp, the develop, then it was the pitching. We made it to the top 40 teams. That was a week I was away in Menorca with my family and they told us the Friday, so I didn't get it until we arrived in Menorca, and then it had to be… we were pitching on the Monday we got back or something. That holiday I had to work on the presentation with "" but Debbie was on holiday as well and Debbie drew the line. She runs her own business, she was like this is my Easter holiday with my daughter, I can't really get involved / Then we got through to the second lot of pitches which again wasn't an awful lot of time but we juggled it and did it (1)	
Support for Anxiety	So Ingenuity felt like that, to some extent. I went into the big dome as it were, as it was. They've got an inflatable structure rather than having it in one of the lecture theatres, they'd got this big inflatable structure which was quite funny because I thought we would just be going into a building and then I go out and there's like, and there's all these young people and I think, for me as an older person, it was quite difficult to kind of get my head around that, that there was all these students; I felt a bit like an imposter / actually being on my own sometimes can be quite lonely. And it... the pressure can be quite difficult / So in a way, yes,	there was a lot of students and I felt somewhat out of place, particularly when you were invited to things, to attend things, and they'd be during the day and I'd have to say no because I was working, or I'd have to get special permission (1)	

Case	Personal traits and individual issues	Competition as a time-consuming activity / Time Management	Individual interest and new projects
	being on my own gives me a lot of control, it gives me a lot of say in what happens, but sometimes I do think it would be lovely to have others, and maybe I will get that from partnership working, I don't know, but we'll see. We'll see what happens (1) / The loneliness is a tough one, particularly when your workplace becomes your home, or your home place becomes your workplace. There's no boundary. It feels like everything's all in one and it does feel very much like you go to bed, you wake up, you go to bed and you're in the same place, you're working in the same place, you're not seeing people, you're not doing things, and I mean, I actually genuinely look forward now to going.../ I think at first I panicked. I think, you know, you don't... I mean, I've worked since I was 16, so you're looking at, oh gosh, oh no, that's awful, you're looking at 21 years of having a job. So, the idea of making that step, going fully self-employed to work on Mind Map, my other projects and the training that I deliver, after working for 21 years, was terrifying / you don't want to sound too negative but saying, "yes, yes I do". I do sometimes. I do still get that sometimes and I constantly get told off by people that I work with because I go, "oh yeah, no, I...", and they sort of say, " you're here because you worked hard to be here". But yes, imposter syndrome is there, it still exists and it's very difficult to deal with it. But, I hope that as time goes on, I'm better at dealing with it than I was when we last spoke. (2)		
Vertical Farming	At this moment, I did not feel competent, at that moment, because I imagined myself alone in a world where ... well in a completely different culture. The British are, they have a lot about fair play, but even so, well, I don't know ... trying to get the contacts, because it seemed to me "well, where do I start", or I saw it too complex to do it myself . So I said "well, I'm going to look for a job, actually looking for a job, still, and once I have something stable or a somewhat broader knowledge then start it"(2)		After January I evaluated following with this project and I said "well if I'm going to dedicate to this, because I can't dedicate just one year and then nothing more", because I have to give it a few years for this to work or else the project will die. I cannot leave it in the middle and finally I decided to want to look for a job first and then in the future when I have greater stability or I don't know, I have, well, I think a little more experience in an international sphere, well I say, If Jessica can't, then I'll do it / In the end I sat down and said "well, I'm going to apply" and I shortened

Case	Personal traits and individual issues	Competition as a time-consuming activity / Time Management	Individual interest and new projects
			my options and said "first I work and then I think about this project" (2)
Social Supermarket			In the end we were unable to take advantage of the contacts they gave us because we were so busy in Food Print operations. Many people had graduated, had started to work and a lot of things happened and in the end we could not use them / the most common is that people graduate (reasons to left the project). Another is that if people stop being able to do both things, the studies and the project (1)
Outsourcing Services App			for me it was the experience and it was good because I am quite busy in the PhD / In my case, Ingenuity for me was the experience, it was nice, debut and farewell, thank you very much and it's just fine because no, it wasn't the reaon why I am in the UK / I think that the issue of, look ... there is the issue of my scholarship, that I have to comply with a scholarship, that you have an ethical duty that they are paying you to be in a thing, so distracting from that for me was ethically, not reprehensible, but it was on the cutting edge, despite the fact that one has freedom, in the sense that I do not have to show anything but still there is always the permanent risk of not meeting the academic objectives of the PhD program...it is not like the fear of failure but there is the possibility of failing in the PhD because of that in the event that one had dedicated the time to it. If afterwards one had said "and if those six months had been devoted only three to the doctorate, the result would probably have been different". So in the end she's running two races. You are in a marathon but you also want to run 400 meters / I did (to create a company), I would, but not at this point in the PhD / I would be willing every day to start a new venture. for that I have no problem. In fact, studying design is like an entrepreneurial project. So for me it's not a problem. The problem is neglecting the doctorate with what that entails / I didn't have more communication with participants (after Ingenuity) it was because of my PhD studies. In an ideal world I would have had more contact because people wanted to have interaction with others (2)

Case	Personal traits and individual issues	Competition as a time-consuming activity / Time Management	Individual interest and new projects
Mentor A	I'm not saying they're not capable of it. That's why I'm saying it's a mental barrier than an actual real barrier. I just think there is this mind-set in the vast majority of folk that it's not for them and they don't even realise that it is possible / vast majority of students do not apply because they have an issue because it's got the word entrepreneur in it and they think you've got to be a business student or you've got to somehow be… "it's not me, it's not for me". I don't know what the answer is / I'm speaking in January to a company of psychologists to talk about resilience and mental health because I think there are a number of stresses that aspiring and real entrepreneurs face that we perhaps aren't doing quite enough to address (1)		
Mentor B	I'm quite sure that some people walk in because it's mandatory. They listen to the talks, they bounce some of the ideas with the mentors and with the other people round the table but still they go back and they probably work on the same stuff / they are afraid of criticism and they don't want to have bad feedback from the mentors or bad feedback from the other competitors (1)	I would say the negative side is that it takes time to do. It's not a quick process like maybe you could fast-track it and with examples that we do during the sessions you can finish a run through the Ingenuity process maybe in 50 minutes, but then we're working with hypothetical examples. If you want to do it with a problem in a company it might take you more than that and in the real world it's difficult to have this process done, like to convince a company to do them themselves (1)	