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Team collaboration capabilities as drivers for innovation
performance: the case of Spanish technology-based startups

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Abstract

Technology-Based Startups (TBSs) are newly emerged entrepreneurial ventures typically launched by a team with the purpose of bringing innovative products or services to market and achieving the scalability of their business models. Today, it is widely recognized that TBSs play a very important role in the economy as a source of disruptive and radical innovations and creation of new jobs. However, most TBSs face significant challenges associated with conflicts among team members and with changes in the environment, which affect their innovation performance and survival. In fact, despite the potential novelty of their products and services, many TBSs fail and even disappear together with their innovations.

In this thesis, we propose the concept "Team Collaboration Capabilities" (TCCs) referred to the interaction among TBS team members as an essential organizational condition to allow the construction of new strategic dynamic capabilities. In particular, the thesis focuses on the relationships between TCCs, operational capabilities, and innovation performance.

We consider four elements as the main dimensions of TCCs: trust, communication, problem-solving and team efficacy. Firstly, team trust, which allows team members to be open to sharing their ideas, be confident and expressing their feelings and constructive feedback. Secondly, team communication that encourages open sharing of ideas about information that favors the commitment between members and benefits the projects and the organization. Thirdly, team problem-solving encouraging the establishment of protocols that give solutions to the disagreements that may arise on a daily basis. Fourthly, team efficacy in achieving teams' goals, solving difficult tasks through joint efforts, manage together unexpected problems, be competent and increase the self-efficacy to perform the tasks and the efficient management of resources.

The empirical study is based on a survey of TBSs based in Spain, aimed at the analysis of TCCs and their relationships with the operational capabilities and the TBS innovation performance. We draw on 45 valid responses of TBSs. Most of the companies in our sample were participants in accelerator programs such as STARTUPV, EIT Climate KIC Valencia Accelerator Program, Fundación Repsol Entrepreneurs Fund, Social NEST and Scientific Park of Madrid. The sample covers TBSs with activities focused on the development of products and services in a wide range of sectors, including environment, renewable energies, clean technologies, transport, consulting, industrial management services, art, leisure, and entertainment.

Given the particular conditions of our sample and the type of data collected through the survey, we use structural equation modeling (SEM). This method allows a component-based estimation for cause-effect modeling with latent variables. The model has been estimated using Smart PLS 3 software.

The findings suggest that the development of TCCs in TBSs contribute to building new operational capabilities that result in greater innovation performance. We also propose future lines of research for the role of TCCs in external collaborations. For instance, the assessment of public initiatives that take into account the critical phases of TBSs development, in regards the promotion of talent attraction and the furtherance of compensation schemes that retain it. Finally, it would be interesting to study the collaboration between the TBSs and other external agents in open innovation projects. We believe that these collaborations would favor their survival and competitiveness.

Resumen

Las Startups de Base Tecnológica (SBT) son nuevas empresas emprendedoras lanzadas típicamente por un equipo con el propósito de llevar productos o servicios innovadores al mercado y lograr la escalabilidad de sus modelos de negocios. Hoy en día, se reconoce ampliamente que las SBT desempeñan un papel muy importante en la economía como fuente de innovaciones disruptivas y radicales y en la creación de nuevos empleos. Sin embargo, la mayoría de las TBS se enfrentan a retos significativos asociados con conflictos que surgen entre los miembros del equipo y con cambios en el entorno, aspectos que afectan a su rendimiento de innovación y supervivencia. De hecho, a pesar de la potencial novedad de sus productos y servicios, muchas SBT fracasan e incluso desaparecen y con ellas también sus innovaciones.

En esta tesis proponemos el concepto de "Capacidades de Colaboración en Equipo" (CCE) referido a la interacción entre los miembros del equipo de una SBT como una condición organizativa esencial que permite la construcción de nuevas capacidades dinámicas estratégicas. En concreto, la tesis se centra en la relación entre CCE, capacidades operativas y resultados en innovación.

Consideramos cuatro elementos como las dimensiones principales de las CCE, que comprenden: la confianza, la comunicación, la resolución de problemas y la eficacia del equipo. En primer lugar, la confianza del equipo, que les permite estar abiertos a compartir sus ideas, tener confianza y expresar sus sentimientos y comentarios constructivos. En segundo lugar, la comunicación, que consiste en fomentar el intercambio abierto de ideas e información que beneficien a los proyectos y a la organización. En tercer lugar, la resolución de problemas, que fomenta el establecimiento de protocolos para dar solución a los desacuerdos que puedan surgir a diario. En cuarto lugar, la eficacia del equipo para lograr los objetivos, resolver tareas difíciles a través del esfuerzo conjunto, gestionar problemas inesperados, ser competente y aumentar la autoeficacia para realizar las tareas y la gestión eficiente de los recursos.

El estudio empírico se basa en una encuesta con el objetivo de identificar las CCE y sus relaciones con las capacidades operativas y los resultados en innovación de las SBT. Se obtuvieron 45 respuestas válidas de SBT, en su mayoría empresas que han participado en programas de aceleradoras como STARTUPV, EIT Climate KIC Valencia Accelerator Program y Fundación Repsol Entrepreneurs Fund, Social NEST y el Parque Científico de Madrid. La muestra incluye SBT con actividades centradas en el desarrollo de productos y servicios en una amplia gama de sectores, incluyendo medio ambiente, energías renovables, tecnologías limpias, transporte, consultoría, servicios de gestión industrial, arte, ocio y entretenimiento.

Dadas las condiciones particulares de nuestra muestra y el tipo de datos recopilados a través de la encuesta, utilizamos la técnica de modelos de ecuaciones estructurales (SEM). Este método permite una estimación basada en componentes para el modelado de causa-efecto con variables latentes. El modelo ha sido estimado utilizando el software Smart PLS 3.

Los hallazgos sugieren que el desarrollo de CCE en las SBT contribuye a la creación de nuevas capacidades operativas que resultan en mayores resultados en innovación. Asimismo, proponemos futuras líneas de investigación sobre el papel de las CCE en las colaboraciones externas. Por ejemplo, se podría estudiar la existencia de iniciativas públicas que tengan en cuenta las fases críticas del desarrollo de las SBT, como por ejemplo la promoción de la atracción de talento y el fomento de esquemas de compensación que lo retengan. Finalmente, se plantea estudiar la colaboración entre las SBT y otros agentes externos en proyectos de innovación abierta. Consideramos que estas colaboraciones favorecerían su supervivencia y competitividad.

Resum

Les Startups de Base Tecnològica (SBT) són noves empreses emprenedores llançades típicament per un equip amb el propòsit de portar productes o serveis innovadors al mercat i aconseguir l'escalabilitat dels seus models de negocis. Hui dia, es reconeix àmpliament que les *SBT exerceixen un paper molt important en l'economia com a font d'innovacions disruptives i radicals i en la creació de noves ocupacions. No obstant això, la majoria de les *TBS s'enfronten a reptes significatius associats amb conflictes que sorgeixen entre els membres de l'equip i amb canvis en l'entorn, aspectes que afecten el seu rendiment d'innovació i supervivència. De fet, malgrat la potencial novetat dels seus productes i serveis, moltes SBT fracassen i fins i tot desapareixen i amb elles també les seues innovacions.

En aquesta tesi proposem el concepte de "Capacitats de Col·laboració en Equip" (CCE) referit a la interacció entre els membres de l'equip d'una SBT com una condició organitzativa essencial que permet la construcció de noves capacitats dinàmiques estratègiques. En concret, la tesi se centra en la relació entre CCE, capacitats operatives i resultats en innovació.

Considerem quatre elements com les dimensions principals de les CCE, que comprenen: la confiança, la comunicació, la resolució de problemes i l'eficàcia de l'equip. En primer lloc, la confiança de l'equip, que els permet estar oberts a compartir les seues idees, tindre confiança i expressar els seus sentiments i comentaris constructius. En segon lloc, la comunicació, que consisteix a fomentar l'intercanvi obert d'idees i informació que beneficien als projectes i a l'organització. En tercer lloc, la resolució de problemes, que fomenta l'establiment de protocols per a donar solució als desacords que puguen sorgir diàriament. En quart lloc, l'eficàcia de l'equip per a aconseguir els objectius, resoldre tasques difícils a través de l'esforç conjunt, gestionar problemes inesperats, ser competent i augmentar la autoeficàcia per a fer les tasques i la gestió eficient dels recursos.

L'estudi empíric es basa en una enquesta amb l'objectiu d'identificar les CCE i les seues relacions amb les capacitats operatives i els resultats en innovació de les SBT. Es van obtenir 45 respostes vàlides de SBT, en la seua majoria empreses que han participat en programes d'acceleradores com STARTUPV, EIT Climate KIC València Accelerator Program i Fundació Repsol Entrepreneurs Fund, Social NEST i el Parc Científic de Madrid. La mostra inclou SBT amb activitats centrades en el desenvolupament de productes i serveis en una àmplia gamma de sectors, incloent medi ambient, energies renovables, tecnologies netes, transport, consultoria, serveis de gestió industrial, art, oci i entreteniment.

Donades les condicions particulars de la nostra mostra i el tipus de dades recopilades a través de l'enquesta, utilitzem la tècnica de models d'equacions estructurals (SEM). Aquest mètode permet una estimació basada en components per al modelatge de causa-efecte amb variables latents. El model ha sigut estimat utilitzant el programari Smart PLS 3.

Les troballes suggereixen que el desenvolupament de CCE en les SBT contribueix a la creació de noves capacitats operatives que resulten en majors resultats en innovació. Així mateix, proposem futures línies d'investigació sobre el paper de les CCE en les col·laboracions externes. Per exemple, es podria estudiar l'existència d'iniciatives públiques que tinguen en compte les fases crítiques del desenvolupament de les SBT, com per exemple la promoció de l'atracció de talent i el foment d'esquemes de compensació que el retinguen. Finalment, es planteja estudiar la col·laboració entre les SBT i altres agents externs en projectes d'innovació oberta. Considerem que aquestes col·laboracions afavoririen la seua supervivència i competitivitat.

Index

1. Outlining the Technology-Based Startups' organization as Study Subject.....	19
1.1 Introduction	19
1.2 The research aim	21
1.2.1 Research questions	21
1.2.2 Research objectives	21
1.3 Overview of the thesis.....	22
2. Technology-Based Startups (TBSs): origins, definition, context, and organization	27
2.1 Entrepreneurship as core of the Startups foundation.....	28
2.1.1 Entrepreneurship in team	32
2.1.2 Entrepreneurship trends in TBSs: green and sustainable	36
2.2 Defining Technology-Based Startups	37
2.2.1 Historical evolution of TBS concept.....	38
2.2.2 The TBS characteristics and classification.....	43
2.2.3 TBSs creation from invention to innovation	47
2.3 The Technology-Based Startup ecosystem	50
2.4 Brief discussion and TBSs definition.....	52
3. Dynamic Capabilities: Technology-Based Startups and their innovation context.....	55
3.1 Dynamic Capabilities definition.....	56
3.1.1 Skills.....	63
3.1.2 Routines.....	64
3.1.3 Capabilities.....	67
3.2 Strategy and competitive advantage.....	68
3.3 Collaboration capabilities.....	72
3.4 TBSs team collaboration capabilities	74
3.6. Brief discussion	79
4. Conceptualizing TBS Team Collaboration Capabilities (TCCs)	83
4.1 The technology-based startups organization as a team	84
4.2 TBS Team collaboration capabilities	87
4.2.1 Trust in teams	89
4.2.2 Communication and problem-solving in team	91
4.2.3 TBS Team efficacy.....	93
4.3 TBS Team operational capabilities	95
4.3.1 Technical capability	97

4.3.2 Marketing capability	98
4.3.3 Managerial capability	100
4.4 Innovation performance	101
4.5 The Model	104
4.6 Hypotheses	105
4.7 Brief discussion	110
5. Methodology and empirical design	115
5.1 Research methods.....	116
5.2 The survey as a research tool	118
5.2.1 Survey designed and administration.....	119
5.2.2 Variables and measurement	122
5.3 Survey designed	123
5.4 Data collection	127
5.5 Data analysis: Structural Equation Modeling (SEM) technique	129
5.5.1 The data analysis parameters validity and reliability	130
5.5.2 The model development stages with Structural Equation Modeling (SEM).....	131
5.5.3 Smart PLS software 3 as tool for model design and analysis.....	134
6. Analysis and results of the empirical study.....	139
6.1 The TBS in the Spanish context.....	139
6.2 Descriptive statistics of TBS participants	141
6.3 TBS TCCs model designed compliance.....	145
6.3.1 Model estimation.....	147
6.3.2 Data reliability	149
6.2.3 Evaluation and interpretation	151
6.4 Brief discussion.....	158
7. Summary and Conclusions.....	163
7.1 Statement of the problem of the TBS in Spain.....	163
7.2 Limitations and future lines of research	168
References	173
Glossary.....	203
Appendix 1 Deepen the discussion of TBSs on Chapter 2.....	205
2.3.1 The technology-based startups: business model and scaling up	205
2.3.2 The technology-based Startup's uncertain conditions.....	206

Appendix 2 Deepen the discussion of TBSs team formation on Chapter 4	208
4.1.1 TBS and team formation	208
4.2.2 Technology-Based Teams: characteristics and members.....	210
Annex 1. Survey sample version 160616.....	214
Annex 2a. Definitive Survey content, first phase phone contact: Spanish version	224
Annex 2a. Definitive Survey content, first phase phone contact: English version	228
Annex 3b. Definitive second part survey content: Online Spanish version	232
Annex 3b. Definitive second survey content: On line English version.....	238
Curriculum Vitae.....	244

Tables

Table 2.1 Some definitions contrasting the use of ‘new firms’	41
Table 3.1 Published reviews on the concept of dynamic capabilities based on team members’ interaction or collaboration.	74
Table 5.1 Team Collaboration Capabilities scales	124
Table 5.2 Operational capabilities: survey’s questions that represent variables and its respective scales	126
Table 5.3 Innovation Performance: survey’s questions that represent variables and its respective scales	126
Table 5.4 Contact sources of Technology-based Startups	127
Table 6.1 TBS participants target sector (self- source)	143
Table 6.2 TBS received training and investment sources	143
Table 6.3 Startup team members: study participant demographics (self-source).....	144
Table 6.4 Formative and reflective constructs nature according to Hair et al. (2012); Sarstedt et al. (2016)	146
Table 6.5 Indicators of reliability, previous factor analysis of each variable is reflective	150
Table 6.6 Measurement model’s results.....	152
Table 6.7 First Order inner model assessment indicators	154
Table 6.8 Second-order inner model assessment indicators.....	154
Table 6.9 Correlation matrix for principal constructs	154
Table 6.10 Discriminant validity matrix for principal constructs (Fornell-Larcker Criterion, 1981)	155

Figures

Figure 2.1 Wennekers and Thurik (1999: p.51) framework: linking entrepreneurship to economic growth	31
Figure 2.2 Opportunity recognition sequences in entrepreneurial venture	33
Figure 2.3 Entrepreneurial team and process of new venture creation	34
Figure 2.4 Relationship between the macro-environment and the micro-environment where the entrepreneurial team is formed.....	35
Figure 2.5 Sequential model of development and funding of an organization	49
Figure 2.6 Integrated model regarding the innovation ecosystem (Teece 2010,.....)	51
Figure 3.1 Causation in the Dynamic Capabilities approach	57
Figure 3.2 House of DCs that includes sample DC processes	63
Figure 3.3 Collaboration capability as a multi-and cross-level concept	73
Figure 4.1 TBS team collaboration capabilities construct	88
Figure 4.2 Trust in TBS teams' model sub-construct basis according to Khan <i>et al.</i> (2014)	91
Figure 4.3 The teams' cross-functional cooperation model subconstruct basis according to Pinto <i>et al.</i> (1990).....	93
Figure 4.4 Team efficacy subconstruct basis according.....	95
Figure 4.5 Operational capabilities (OCs).....	97
Figure 4.6 Technical capability subconstruct (Pavlou and El Sawy 2011).....	98
Figure 4.7 Marketing capability subconstruct (Pavlou and El Sawy 2011).....	100
Figure 4.8 TBS team's managerial capability subconstruct.....	101
Figure 4.9 Innovation performance construct	104
Figure 4.10 Research model: Team collaboration capabilities	105
Figure 4.11 TBS team's collaboration capabilities' hypothesis.....	112
Figure 5.1 Representation of the structural equation modeling stages according to Hair <i>et al.</i> (1999 pp.620-642) and Del Barrio <i>et al.</i> (2000 p.493)	132
Figure 5.2 Measurement model conceptualization and operationalization	134
Figure 5.3 Checking PLS Reliability and Validity (adapted table).....	135
Figure 6.1 Geographical distribution of TBS participants	141
Figure 6.2 Representation of the SEM stages according to Hair <i>et al.</i> (1999 pp.620-642) and Del Barrio <i>et al.</i> (2000 p.493).....	146
Figure 6.3 TBS team's collaboration capabilities is a reflective-formative construct	147
Figure 6.4 TBS team's operational capabilities construct (Pavlou and El Sawy 2011).....	148
Figure 6.5 Total effects of the causal model	153
Figure 6.6 PLS-SEM model assessment results.....	156
Figure 0.1 Dynamic Model of System for creating new technology-based organizations (Hart and Denison 1987)	208
Figure 0.2 Formation of effective teams (Vyakarnam <i>et al.</i> 1999, p.159).....	210

Graphs

Graph 6.1 TBS participants' type of technology.....	141
Graph 6.2 TBS participant's market orientation	142
Graph 6.3 Spanish TBSs' level of response anchors related to collaboration with others.	145



CHAPTER 1

Outlining the Technology-Based Startups' organization as Study Subject

1. Outlining the Technology-Based Startups' organization as Study Subject

1.1 Introduction

Startup dynamics are widely recognized as an engine for innovation and economic development and in recent years has become an interesting area of study around the world. In a few decades the environment where Technology-Based Startups (TBSs) emerge has changed dramatically. The rise of TBSs becomes evident in the proliferation of incubators, accelerators and company builders in the last decade (Aernoudt 2004; PriceWaterhouseCoopers 2013; BENISI 2016) as well as in policy-making such as, for example, the 'Startup and Scale-up Initiative' (EC, 2016) and the 'European Startup Monitor' (Ripsas and Hentschel 2015; Cano-Kollmann et al. 2016). Startups, particularly those that are technology-based, combine fast growth, heavy reliance on the innovation of product, processes, and financing, keen attention to new technological developments, and extensive use of innovative business models. TBSs are source of both radical and disruptive innovations and, as some literature has shown, are relevant for their high potential for creating jobs worldwide (Bravo-Biosca 2010; Haltiwanger et al. 2013; Decker et al. 2014a; Criscuolo et al. 2015). At the same time, many studies point out the high rates of failures and steady decline over time facing current hypercompetitive and turbulent markets (Mata and Portugal 1994; Haltiwanger et al. 2013; Decker et al. 2016; Alon et al. 2017).

Extensive research has been conducted on issues concerning the factors which influence the creation, growth and survival rates of TBSs at early stages, mostly focused on the background of the founders; the access to financial resources and infrastructure support, e.g., incubators, accelerators and networks or "industrial clusters" (for reviews see Autio et al. 1997; Storey and Tether 1998; Hyytinen et al., 2015).

However, to date little empirical evidence exists to explain the entrepreneurial team's formation and the critical factors that influence the TBSs' entry, survival, and growth (Clarysse and Moray 2004; Santarelli and Vivarelli 2007; Harper 2008; Ortín-Ángel and Vendrell-Herrero 2014; Visintin and Pittino 2014). Despite the existence of an ample body of literature dealing with tech-startups in previous decades (Bruno and Leidecker 1988; Storey and Tether 1998), there is still a "black box" around the origins and operation of TBS team founders, especially with respect to its role in building the required capabilities to adapt the organization to the turbulent conditions, known as Dynamic Capabilities (DCs). DCs are understood as a collection of rapidly buildup capabilities that allow the company to make subsequent changes and adaptations in response to the surrounding market circumstances (Leonard-Barton 1992; Teece et al. 1997; Teece, 2007, 2012). The kind of dynamic capability will depend on the firm's context, for high-technology (Deeds et al. 1999) or in low-technology (Evers 2011) environments.

This research focuses on whether and how the team collaborative interactions influence the creation of dynamic capabilities and improve their competitiveness and sustainability. With this, it should be noted that the study of startups, these days, can be compared with the study of stars, some are born supernovae, others are born and maintained, others quickly grow and disappear, while the vast majority do not manage to be born or dissolved in their journey leaving a great void in what it could have been an innovation that could have changed the world in some way.

1.2 The research aim

To date innovation studies and management literatures base on the TBS context above mentioned. To this concern, we address the complexity of intra-organizational factors that impact the development of new capabilities or harnessing the TBS current capabilities, defined as dynamic capabilities. In doing so, the study pursues the following aim:

To introduce team collaboration capabilities as a new approach to analyze the intra-organizational interactions that drive capability building focused on TBS innovation performance.

1.2.1 Research questions

With reference to the theoretical background and the TBS context above mentioned, this study addresses the following research questions:

1. *What are TBS organizational cornerstones?*
2. *What factors underpin TBS internal collaboration capabilities?*
3. *How can TBS maintain their organizational sustainability towards innovation performance?*

1.2.2 Research objectives

1. To deepen our understanding of the Technology-Based Startups' complexity from their essential origin to its organizational conformation from the perspective of Dynamic Capabilities.
2. To define the concept of TCCs' as a set of interrelated factors that support the TBSs' essential and strategic capabilities aimed to their innovation performance.
3. To empirically analyze the TCCs effects on operative capabilities with regard to the TBS innovation performance.

4. To propose recommendation to TBS team founding members to encourage the team's collaboration capabilities.

1.3 Overview of the thesis

The set-up of the chapters' structure has been designed for a monographic document of the research, it is defined as it follows:

Chapter 2 aims to respond the first theoretical question through briefly explain the TBSs complexity origin from its entrepreneurial basis. TBSs definition involves the a historical view of its genesis and evolution of the term, considering the transition of the invention to a product as the central item where the TBS is founded. Then the relevance of the TBSs' ecosystem, as their context, where we describe some relevant players that influence and molding the TBSs' organizations, business, network, and operations. Finally, we introduce a brief discussion and definition through the description-base integrated in the study.

Chapter 3 outlines the Dynamic Capabilities a framework related to the theoretical approach where the TBSs' innovation orientation grounds strategic operations for the firm survival in innovative environments. In the first part, we present basic terms that embody the DCF such as skills, routines and capabilities to set more clear understanding of the Dynamic Capabilities (DCs) concept. The DCs concept pursues to explain what are the firm's internal innovation processes that pursuing benefits and wealth, and at the same time, they build adaptive capabilities to overcoming turbulent market conditions. The DCs outline the origins of the operational capabilities and the new capabilities building or the evolution or leveraging of the existent capabilities follow by the firm's strategy and sustainability in the short time. This chapter allows us to settle the basis of the collaboration capabilities (CCs) as concept introduction inside the team as a prime source of competitive advantage to the TBSs' innovation performance.

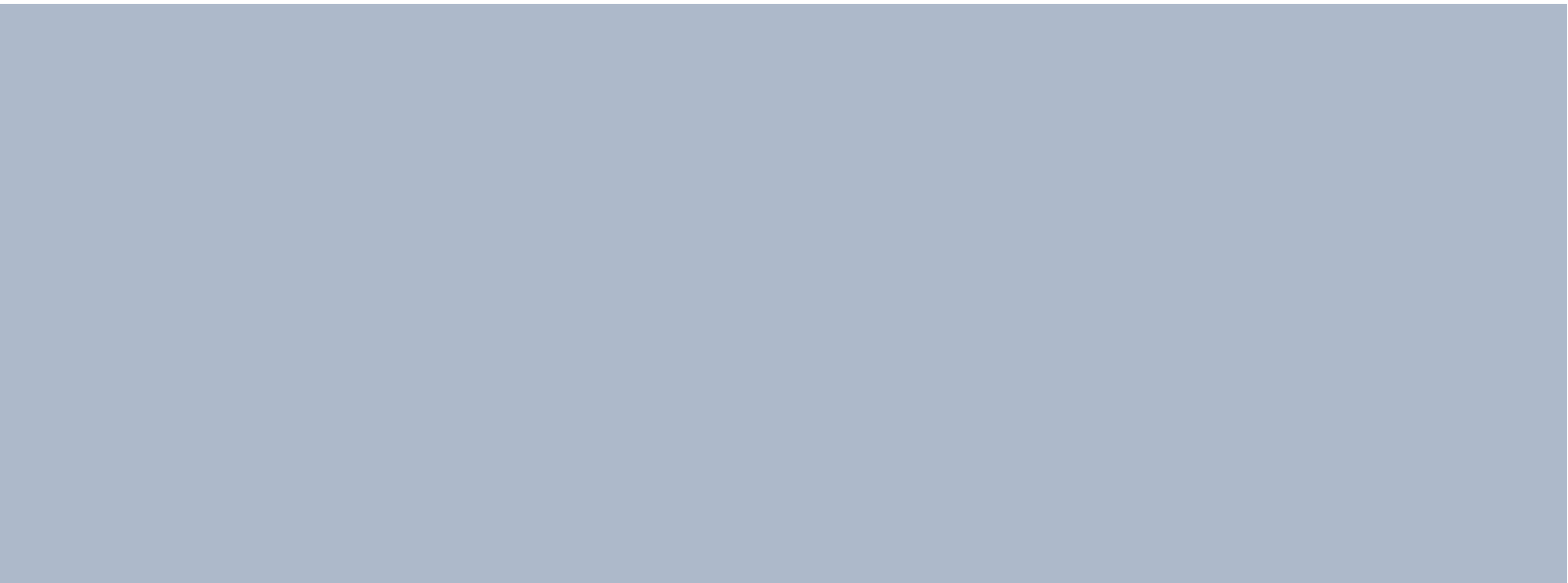
Chapter 4 centers on the conceptualization of the TBS team collaboration capabilities' (TCCs) model that combines the essential team's interaction terms as essential factors for inter-organizational collaboration purposes based on: trust, problem solving,

communication and team's efficacy. TCCs constitute some essential and strategical elements inside the TBS' teams and relevant factors that sustain their innovation performance. and its accompanied by the respective hypothesis description.

Chapter 5 focuses on the methodology and empirical study designed to undertake the TBS team collaboration capabilities concept. We bring together this research's processes such as the database sources, the survey design (as a valuable tool), the data collection, and the use of structural equation modeling as the analysis technique.

Then Chapter 6 shows results of the empirical study. This chapter has been divided in three parts, the first part is related descriptive statistics from the data collected of the TBS participants. Then, second related to the TBS TCCs model dimensionality and compliance from the responses of our primary sources. The third part centers to the results discussions.

Finally, the Chapter 7 integrates summary and conclusions. Where we define the problem statement, then the implications for TCCs theory and practice according the results, and finally we frame the research limitations and further research opportunities.



CHAPTER 2

Technology-Based Startups (TBSs): origins, definition, context, and organization

2. Technology-Based Startups (TBSs): origins, definition, context, and organization

This chapter aims to integrate different aspects that constitute the origin and evolution of the TBSs, and it has been divided into four parts. The first part aims to introduce and explain a general vision from established literature the complexity of TBSs, the first part contains (1) entrepreneurial foundation and trending topics, (2) a brief history of the TBSs, some definitions, classification and characteristics, (3) context external (ecosystem) and how it shapes their business model and defines their scaling up; and finally, (4) proposed a briefly a TBSs definition, discussion and conclusion of the chapter.

This first part explores different outlooks that compose the general picture of the TBSs. These particular organizations are grounded essentially by an entrepreneurial spirit, and their potential contribution to national and international economies as active pioneering agents of innovation and the technological change.

2.1 Entrepreneurship as core of the Startups foundation

The role of entrepreneurs as the explanatory variable for economic reality has been analyzed by different schools of thought (French, British, German, Austrian, American) over the long history of the development of economic theories (Landström, 2004). Early contributions of the French and British Schools in the eighteenth century discussed the notion of entrepreneurship within the classical economic theories. The first formal analysis of entrepreneurship was by Richard Cantillon, pioneer of the French school of thought, who in the “*Essai sur la nature du commence en Gèneral*”¹ in 1755 refers to an entrepreneur as one who bears risks by buying at certain prices and selling at uncertain prices (Brown *et. al.* 2013). Entrepreneurs, thus, were formally identified as 'economic agents' who transform demand into supply for profits. Cantillon's most significant contribution was to introduce the entrepreneur into a formal economic system, identified as a new factor of production independent of land, labor and capital. The idea of entrepreneurship, as conceived by Cantillon, was centered on the concept of adopting the risk and uncertainty due to the disequilibrium between the specified intrinsic production cost and the uncertain market price. After this, then forthcoming other contributions from the French and British schools focus on describing the function of entrepreneurs. Other relevant contribution came from von Thünen, from the German School, whom contribution considers the entrepreneur as the risk bearer and the innovator (Hébert and Link 2006).

In the late 19th century, the European discussion on entrepreneurship found an audience in the United States, which at that time was on the way to becoming a major industrial power. One salient economist in this context was Frank Knight (1885-1972). In his thesis *Risk, Uncertainty and Profit* (1916, revised 1921), he makes a distinction between risk and uncertainty, arguing that entrepreneurship is mainly characterized by uncertainty, i.e. a situation that is uncontrollable and that cannot be appraised in terms of probability. The profit that accrues to the entrepreneur is the reward for his/her risk-taking under conditions of uncertainty.

¹ Version in English available at <http://files.libertyfund.org/econtalk/cntNTdownload.html>

Regardless of the relevant contributions about entrepreneurship in Europe, it was Joseph Schumpeter, an Austrian-born in America, who was the first to explore the concept of the entrepreneur as innovator (Landström, 2004). He made the entrepreneur a central figure in economic theory, as part of the "energy" within the economic system that gave rise to imbalances in the market. His work "*Theorie der Wirtschaftlichen Entwicklung*" (1912, second edition 1926) or Theory of Economic Development (1934), which is the English translation of the second edition, it exposed Schumpeter's main contribution regarding the cyclical and irregular conception of economic growth. This work contains his theory of "entrepreneurial spirit" (entrepreneurship), derived from entrepreneurs, who create technical and financial innovations in a competitive environment in which they must assume continuous risks and benefits that are not always stable. In his book "*Capitalism, Socialism and Democracy*" Schumpeter (1942) uses the expression "*creative destruction*" in reference to the fundamental role that entrepreneurship would have in the economy. In his own words, "*the opening of new domestic or foreign markets, the organizational development of marketing channels and the creation of basic industries such as steelmaking, illustrate a process of mutation, which incessantly revolutionizes the economic structure from within, which is destroying the old structures and creating new elements for development. This process of creative destruction is an essential fact for the progress of capitalism*". (Schumpeter, 1942, p. 83). All these elements intervene in irregular economic growth. Schumpeter's theory also assigned a central role to the term of entrepreneurship regarding new technology development, or invention, as the basis of economic evolution (Schumpeter 1942; Roininen and Ylinenpää 2009; Binnui and Cowling 2016). Moreover, his most cited concept states:

"The function of entrepreneurs is to reform or revolutionize the pattern of production by exploiting an invention, or more generally, an untried technological possibility for producing a new commodity or producing an old one in a new way, by opening up a new source of supply of materials or a new outlet for products, by reorganizing an industry, [...] To undertake such new things is difficult and constitutes a distinct economic function, first because they lie outside of the routine tasks which everybody understands and secondly, because the environment resists in many ways that vary, according to social conditions, from simple refusal either to finance or buy a new thing, to physical attack on the man who tries to

produce it". (Schumpeter 1942, p.132; Auerswald and Branscomb 2007, p.2).

Other leading exponent of the Austrian tradition is Israel Kirzner, who developed new insights about entrepreneurship in his book '*Competition and Entrepreneurship*' (1973). According to Kirzner, it is fundamental for an entrepreneur to be alert in order to identify and deal with profit-making opportunities ("entrepreneurial alertness"), i.e. the entrepreneur tries to discover profit opportunities and helps to restore equilibrium in the market by taking advantage of these opportunities. The entrepreneurial function, in this respect, involves coordinating information by identifying the gap between supply and demand, as well as acting as a broker between supply and demand, making it possible to earn money from the difference. Thus, the entrepreneur looks for imbalances in the system, with the availability of knowledge being key. Additionally, Loasby (2011) alludes to Kirzner's entrepreneurship as continuous human activities searching for improvement by identifying and achieving new emerging potential profits from exchange (Loasby 2011, p.251). Kirzner wrote that:

[t]he pure entrepreneur ... proceeds by his alertness to discover and exploit situations in which he is able to sell for high prices that which he can buy for low prices. Pure entrepreneurial profit is the difference between the two sets of prices. It is not yielded by exchanging something the entrepreneur values less for something he values more highly. It comes from discovering sellers and buyers of something for which the latter will pay more than the former demand. The discovery of a profit opportunity means the discovery of something obtainable for nothing at all.

(Kirzner 1973, p.48)

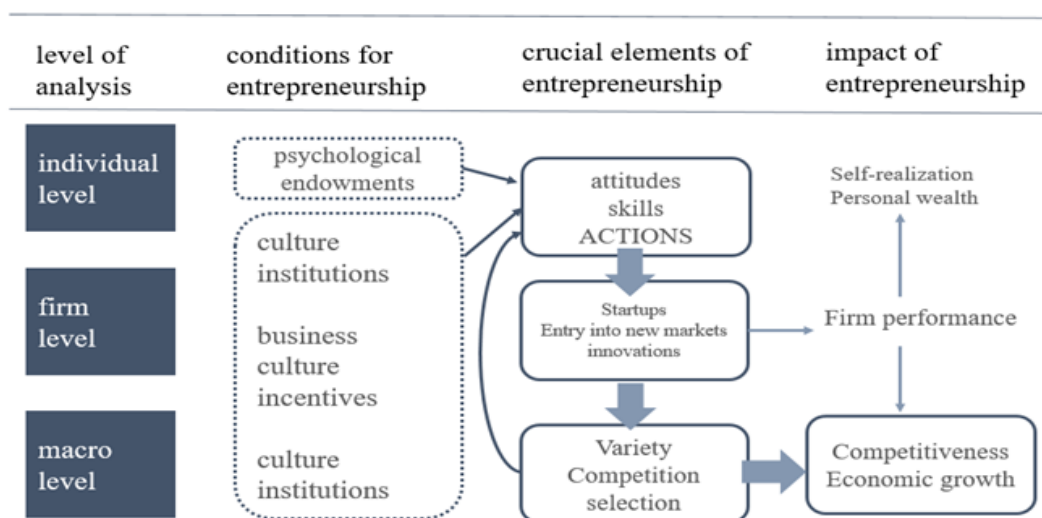
Entrepreneurs discover and exploit profit opportunities in a variety of ways, ranging from virtually instantaneous arbitrage to complex activities that may involve the creation of new ventures or product innovation (Kirzner, 1984). Pure entrepreneurial profits have the desirable property of coordinating market participants facing price discrepancies. Indeed, Kirzner's view of entrepreneurship as linking and integrating participants in different markets: '*Entrepreneurs must therefore participate in more than one market in order to earn pure profits*' (Kirzner 1973, p. 124). Rivalry among producers gradually

eliminates these profits and lead to more accurate prices. Overall, entrepreneurship is seen as the practice of initiating new business ventures, or to rejuvenate any mature organization in response to identified market imbalances.

Other works such as Wennekers and Thurik (1999) highlights that the ‘Austrian’ school concentrates the attention on the entrepreneur’s abilities to perceive benefits and opportunities, usually after some shocking external factors. They consider that entrepreneurs combine resources to satisfy present needs but not pursuing to solve problems or satisfy market inefficiencies or deficiencies. This means that they first seek to satisfy their immediate needs for themselves and not to improve or influence a shift in the general external conditions.

Notwithstanding, there is no dispute that entrepreneurs play a fundamental role of driving economic growth in every country (Foss *et al.* 2005; Binnui and Cowling 2016; Bjørnskov and Foss 2016), then this means, their actions are rooted in a collectivity and not in solo. Likewise, Foss *et al.* (2008) defined entrepreneurship as the result of the creative team’s efforts that integrate heterogeneous know-how combined with the company assets to produce collective output, being essentially greater than just individual outputs (see Figure 2.1).

Figure 2.1 Wennekers and Thurik (1999: p.51) framework: linking entrepreneurship to economic growth



Continuing with Wennekers and Thurik (1999), they argue that entrepreneurial actions are performed by individuals at firm level. Their definition of “*mimic smallness*” looks to highlight what is occurring from inside larger firms which also develop entrepreneurial process. They use organizational forms, such as business units, subsidiaries and joint ventures. Therefore, entrepreneurship occurs irrespective of the size of organizations. They define entrepreneurship as: “*the manifest ability and willingness of individuals, on their own, in teams, within and outside existing organizations, to - perceive and create new economic opportunities (new products, new production methods, new organizational schemes and new product-market combinations) and to – introduce their ideas in the market, in the face of uncertainty and other obstacles, by making decisions on location, form and the use of resources and institutions*” (Wennekers and Thurik 1999, pp.46-47).

The relationship between the entrepreneur (person) and the opportunities that are recognized, discovered and created constitutes the entrepreneurial process, which is defined as: “[...] *all the functions, activities, and actions associated with the perceiving of opportunities and the creation of organizations to pursue them*” (Bygrave and Hofer 1992, 14). Pointing to the entrepreneur as the active creator of constant value towards the market.

2.1.1 Entrepreneurship in team

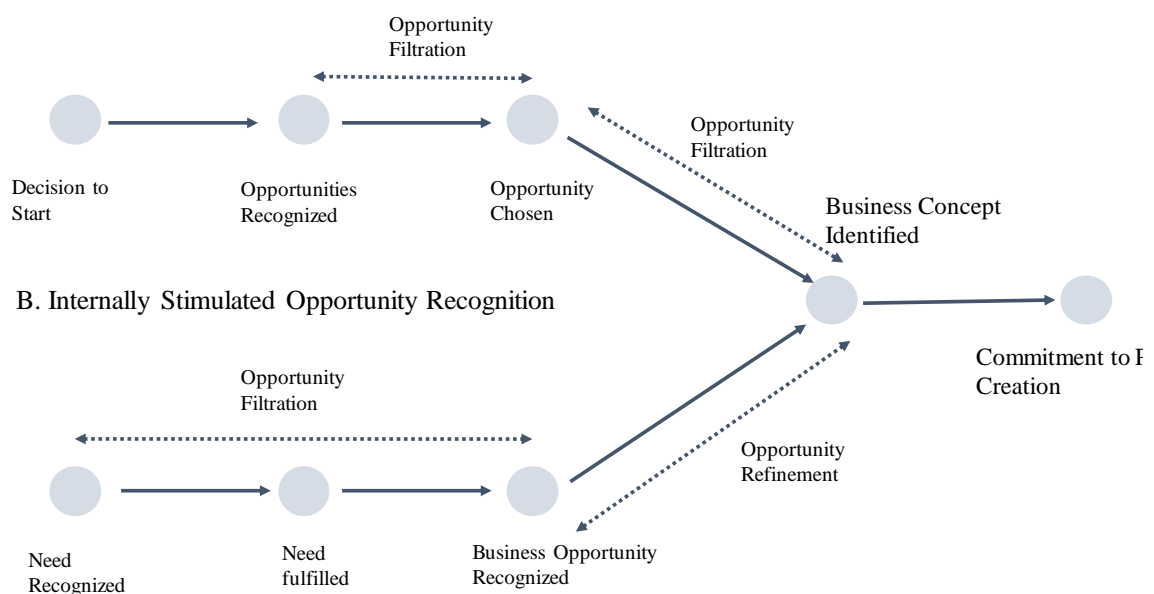
The literature about theory of entrepreneurship and firms’ foundation that addressing the entrepreneurial endeavors of teams is still scarce, while, still prevailing the entrepreneurial figure as an individual more than a team. Despite the reduced attention to see entrepreneurship as something that can be undertaken in collectivity, as ‘*collective entrepreneurship*’, (Auerswald and Branscomb 2007), the insertion of the joint effort as the entrepreneurial team than the individual endeavor starting to become a phenomenon that attract the attention of researchers and practitioners (Johannisson 2003). In addition to the relevance to motives and conditions which such teams are created. Some models and schemes linking individuals in teams in the early stages of venture creation have been developed by Muller-Boling (1993); Kamm and Nurick (1993) and Cooney (2005). For instance, Kamm and Nurick. (1993) worked out a model that deals specifically with venture formation by teams. It presupposes that the process of venture formation occurs

in stages with the idea coming first and then the implementation which includes team intra-relationships.

The TBS' foundation process is linked to the term 'collective entrepreneurship' denoting the conjunction of actions to joint different individual synergies based on trust and reputation where a group of entrepreneurial individuals works collaboratively (Auerswald and Branscomb 2007). On the other hand, Bhave (1994) remarks that according to Van de Ven (1986) and Hart and Denison (1987) a venture creation integrates a close relationship between internal critical elements with its founder members and its context (see Figure 2.2). The context represents a pull of diverse agents whose activities complement the new venture such as other technologies, training with consulting firms, educational software companies, etc. (Bhave 1994; Auerswald and Branscomb 2007; Hartono 2015; Paradkar *et al.* 2015).

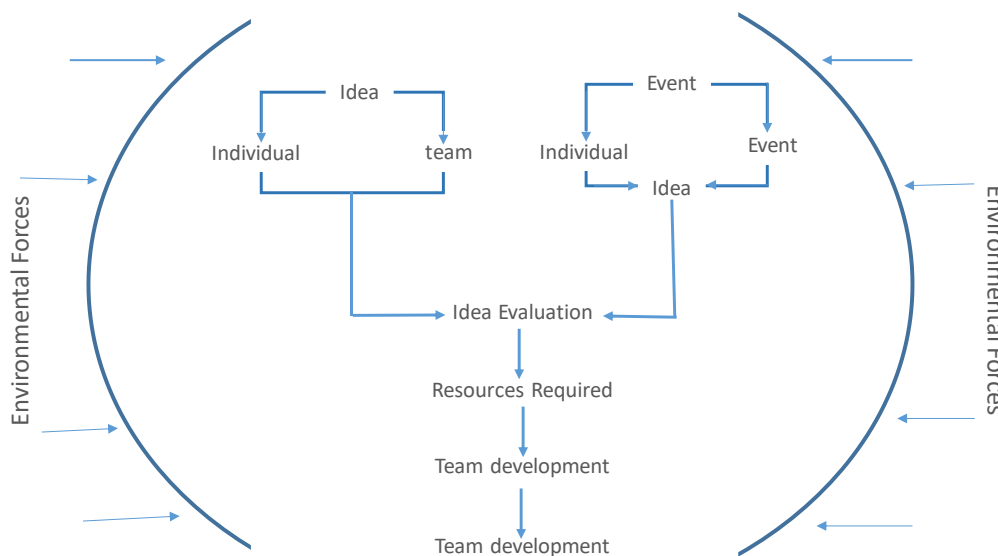
Figure 2.2 Opportunity recognition sequences in entrepreneurial venture
(Bhave 1994, p.229)

A. Externally Stimulated Opportunity Recognition



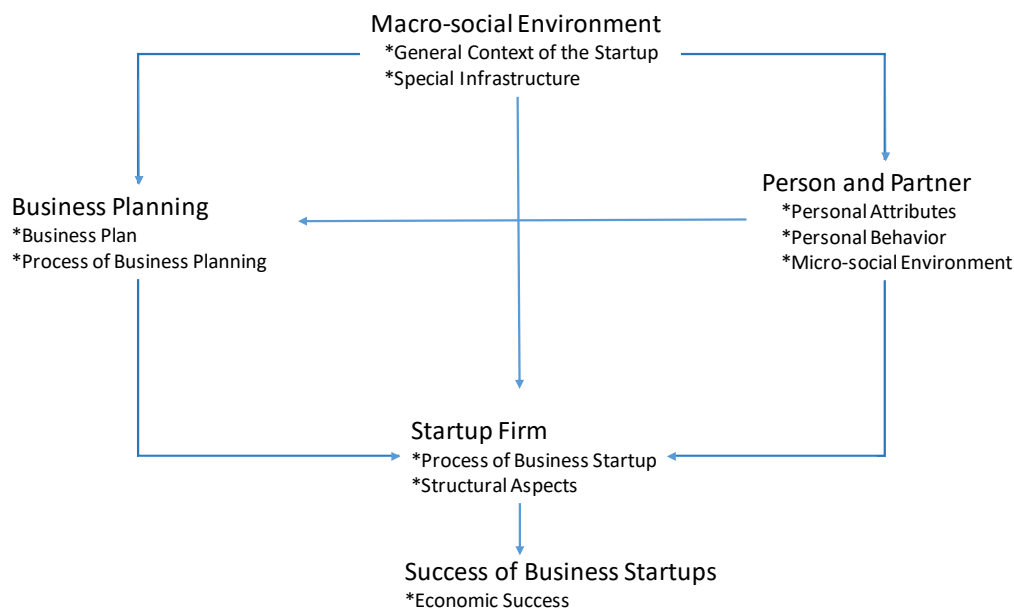
Cooney (2005) designed a model that describes the entrepreneurial team and new venture foundation process, see in Figure 2.2. This model offers perspectives on the conception, gestation and birth of ventures by business teams from an idea or event that drives their foundation. The implementation stage of the "idea" requires decisions about the provision of resources, the incentives to attract partners, and the formation and maintenance of a team. While, there is another parallel stage, that suggest a start from an event followed by an individual that proposes the idea inspired or pushed by external conditions. This model obeys the cause-effect process with awareness of the context and guided by the problem-solving process seeking resources, material and human, to undertake a new enterprise.

Figure 2.3 Entrepreneurial team and process of new venture creation
 (Source: Cooney, 2005, p. 232)



Additionally, Muller-Boling (1993) proposed a macro-scheme comprising the macro-social environment where the entrepreneurial team is composed and influenced by its context. This scheme introduces “a person” (entrepreneur) “with the partners” (other entrepreneurs), who participate in parallel with the business plan, and design the organization structure aspects and outline their operation processes at their micro-social level, then the team is formed (see Figure 2.3). Altogether pursue success, material but also “non-economic success”, which might relate to other personal achievements in each team’s member endeavors.

Figure 2.4 Relationship between the macro-environment and the micro-environment where the entrepreneurial team is formed



While Clarysse and Moray's (2004) contribution to the business team development process focuses on the integrated experiential learning process and how it interrelates with the life stages of entrepreneurship process creation. This aspect is fundamental to the building of new capacities by members of business teams to understand the nature and micro foundations of business performance towards long-term sustainability.

Shaping an innovation-driven team requires to integrate entrepreneurship with a broad vision that embeds systemic interaction between different internal and external actors, whose network social interactions that include cultural norms (even religious or moral beliefs) and an individual's knowledge and experience (van Kleef and Roome 2007). These multifactor systemic interaction is composed by rational and irrational behavioral activities and visions, among its members, and allows the organizational adaptation to its environment and survival (Porter 1996; Manu 1992). Such aspects involve many different types of entrepreneurship displayed in a variety of TBSs focusing to different market niches.

2.1.2 Entrepreneurship trends in TBSs: green and sustainable

Green entrepreneurship and innovation emerged over the last decades amid growing concerns about production cycles and the importance of maintaining an environmental equilibrium and safeguarding the limited resources for future generations (The World Bank 1987). The so-called 'grand challenges' involving climate change, power supply, the need to change systems of production and consumption, among others, have revolutionized entrepreneurial dynamics (Foster and Green 2000), being drivers of new entrepreneurial profiles.

The identification of the need towards a technological transition to sustainable development has permeated the attention of "green" entrepreneurs, through the creation of innovations that help this transition by revolutionizing old industrial structures and processes (Berkhout et al. 2004; Smith 2007). Its market orientation focuses on environmental and sustainable objectives such as changing production standards, consumption behavior, and even to new economic pathways.

Despite the expansion of the green tech sector, most literature on eco-innovation is focused on large mature firms, practically neglecting small and medium enterprises (SMEs) (Schiederig *et al.* 2012). Very few studies address the innovation process of new ventures and TBSs driven by environmental orientation (see Keskin, *et al.* 2013 for an exception).

The green view in TBS combines their core activities and innovation behavior with an integrated vision, which is rooted on the way they directly build their operations directly (Schiederig *et al.* 2011; Ketata *et al.* 2014). Green TBSs have different visions, value propositions, activities, and goals. Schick *et al.* (2002) identify three categories that describe the ecological orientation of a business, characterizing their respective organizational culture.

The green TBSs' entrepreneurial vision focus on environment care, most of the eco- and sustainable innovation involves an interconnectedness between reducing environmental impact, business and community engagement. These TBSs consider developing competitive and strategic mechanisms through engagement based on their

vision, mission and innovation to influence the market. Green TBSs seek to solve environmental and societal problems even though they are small organizations with relatively similar goals to their competitors (Porter and Mark 2011). Consequently, TBSs focus on sustainability depend greatly on the their operational capacity for problem-solving, business orientation, adding resources and performing adequate actions to ensure continuous innovation (Schaltegger 2002; Schaltegger and Wagner 2011).

The organizational orientation of the TBSs, whether towards green or towards sustainability, in both senses seeks to operate with objectives of influence towards the propaganda of a new system, which makes them more active in promoting and encouraging a change of paradigm in the way of doing business. Nevertheless, they pursue to maintain coherence in their business objectives for long-term subsistence. The degree of environmental orientation and social responsibility towards sustainable development that these TBS pursue in influencing market, but rather environmental and social norms, policies (Schaltegger 2002; Schaltegger and Wagner 2011). In this sense, their context, politically and socially aspects, as well as industrial, business and environmental, stimulate these ventures and their connections are a crucial condition for their creation and long-term sustainability.

2.2 Defining Technology-Based Startups

The term ‘startup’ can be understood as having either a very broad meaning or a narrow one. Oxford Dictionaries defines a start-up as “a newly established business” (Oxford Dictionaries, 2015). According to Cambridge dictionary, a startup is a “business that has just been started” (Cambridge Dictionaries, 2015). Given these broad definitions, almost any new firm can be labelled as a startup in the sense that it has just been started. Instead, the word is most commonly used when talking about a new venture that carries with it a promise of high revenues and a high potential of changing the competitive landscape with an innovative idea (Van de Ven et al. 1999). Although the word startup can refer to any economic and socio-cultural sector, normally it is closely related to the technological field, involving a company that usually makes intensive use of scientific and technological knowledge or is directly related with the world of the Internet and information and communications technologies (ICT). Although this often involves a new

technology or a new way of using existing technology, a startup does not necessarily relate to technology so these definitions are still somewhat vague. For instance, Y-combinator, a popular seed accelerator program in Silicon Valley, focuses more on the firms' growth potential rather the use of technology in their mission: "A startup is a business which has ambitions and plans to grow by a large factor (10x or more) over the next few (1-5) years" and adds that startups are companies that have not existed longer than 5 years (P. Miller and Bound 2011).

2.2.1 Historical evolution of TBS concept

Although the culture of startup entrepreneurship is now spreading around the globe, and taking on new forms, the term start-up was coined in the 1950's in Santa Clara Valley, now famously known as Silicon Valley (Bresnahan *et al.* 2001). During the Second World War, the development and production of military electronics were carried out mostly in esteemed east coast universities, but also in other places including some universities in Santa Clara Valley. However, in California there were no large technology firms in the vicinity of Santa Clara Valley, so this created pressure to facilitate interaction between the universities and small firms (Saxenian 1996; Azagra-Caro *et al.* 2017). On the east coast, and especially around MIT, there were plenty of big established tech companies. In another way, the absence of large technology firms was one factor that led the chance of west coast universities, especially Stanford, to create a more complex network that facilitate interactions with entrepreneurs and partnerships creation. As a result, a special culture of cooperation formed between entrepreneurs and universities (Saxenian 1996). The startup phenomena then emerged, where young organizations, despite their youth and lack of resources, were able to survive and move fast in the market thanks to support from angel investors or from being absorbed by already consolidated companies. The official story goes that in 1957 eight engineers left their jobs at Shockley Labs (in Santa Clara) and founded the first startup: Fairchild Semiconductor (Florida and Kenney 1988; Klepper 2009).

Different definitions have been put forward to describe the term new firms, young firms or nascent firms based on technology (Oakey *et al.* 1990; Oakey 2003; Roberts and Senturia 1996; Autio, Yli-Renko, and Sapienza 1997; Storey and Tether 1998). Common

denominators include that their activities are based on the exploitation of advanced technological know-how, the prior affiliation of founders with research establishments and the entrepreneurial character of the firm. Research studies in Europe, North America and the Pacific Rim have identified these firms' important contributions in new employment creation, export sales growth, product and process innovation and structural adjustment (Oakey et al. 1990; Audretsch and Acs 1991). However, usually the authors adjust the concept of to the sample in analysis, referring to new technology-based firms (NTBF) (Autio *et al.* 1997; Laranja and Fontes 1998; Fontes and Coombs 2001), small and medium technology-based firms (Mason and Harrison 1994; Dahlstrand 1999), small technology-based firms (Meyer and Roberts 1985; Klofsten 1994), small technology intensive firms (Keeble et al. 1998), or high technology SMEs (Ray Oakey 1991).

In the decade of 1960s TBSs are conceptualized as independently owned businesses established for not more than 25 years and based on the exploitation of an invention or technological innovation implying substantial technological risks. Later, Shearman and Burrell (1988) referenced the term as "new independent firms which are developing new industries" (also Storey and Tether 1998, 934). Butchart (1987) characterized NTBFs as small and medium-sized firms operating in high technology sectors. Such early definitions of NTBFs reflect the difficulty in its conceptualization. Indeed, performing a review of the studies on NTBFs spanning 16 countries in Europe, Storey and Tether. (1998) confirm that those studies were based on high-tech SMEs rather than 'NTBFs', and in technology-intensive sectors instead of new and emerging industries. The use of distinct definitions continues nowadays, with researchers adjusting the concept to the aim of their study or the sample under observation. Sometimes tech-startups are considered as a component of the SMEs universe, involving those with innovative behavior and technology-based (Rothwell and Wissema 1986). Laranja and Fontes (1998) and Fontes and Coombs (2001) studied this kind of firms in developing countries, defining NTBFs as "young independent firms involved in the development and/or diffusion of new technologies" (Fontes and Coombs 2001, p. 83). This understanding about the NTBF phenomenon in less advanced countries breaks the direct linkage between new technologies and new industries and proposes an important role for NTBFs as key actors in the diffusion of technological knowledge developed in more advanced economies.

Most definitions allude to ‘firms’ instead ‘startup’ due, in part, to the ambiguity surrounding the number of years that correspond to the early stage of development, firm establishment or sector activity. For instance, the already mentioned study by Storey and Tether (1998) found that in the services sector during 1980’s - with some variation of data among countries - the firms’ survival was between 10 and 20 years, with a modest contribution to employment growth of 3.3 employees after 3 years and, with difficulties to establish different analytical stages because the lack of structures. The use of ‘new’ in the term New Technology-Based Firms (NTBF) presents a challenge in that it can be unclear what constitutes “new” (usually 3, 5 or 6 years).

Among the authors who have contributed definitions of NTBFs, we can highlight Storey and Tether (1998), Delapierre *et al.* (1998) and March-Chorda (2004). They all agree that the definition of this type of new companies is not a simple task and it is far from being a homogeneous business sector. Overall these studies define NTBFs as SMEs that act in sectors of high technology, that is, the difference is based on the degree of intensity in R&D focusing its activities to broadly and industrial market sectors.

Storey and Tether (1998) mention the existence of ‘closed’ definitions, comprising the early definition provided in 1970th, when were considered of as independent business oriented towards the exploitation of an inventor technological innovation, assuming considerable risks. Shearman and Burrell (1988) also characterize them as independent businesses capable to originate new industries. Overall, the word ‘startup’ instead ‘new firms’ in the literature shows an emphasis on the shift towards the knowledge economy, where NTBF and tech-startups interchangeably name new companies based on the domain of intensive scientific and technical knowledge. They are knowledge "producer organizations" that develop goods and services supported and/or enabled by technology, sometimes originated as spin-offs in corporations or research institutions (Auerswald and Branscomb 2007; Ortín-Ángel and Vendrell-Herrero 2010).

More recently, March-Chorda (2004) maintain that innovative startups are “*a specific category of enterprises that pertain to high technology industries or, at least, exhibit an innovative behavior that distinguish them from most SMEs*” (p. 1). Another key aspect is the firm’s orientation towards internationalization. In the 1960s and 1970s the internationalization of a firm was usually seen as a gradual process during which a

firm increases its international involvement little by little over time and ultimately, a result of a series of incremental decisions.(Johanson and Vahlne 2009). However, in the last decades' scholars have increasingly reported new ventures that challenge this classical view, with nascent firms aiming at the international markets right from the beginning; the so-called 'born globals'. These firms are described as entrepreneurial and knowledge-intensive SMEs by nature, with an orientation to a fast scalability (Ferneley and Bell 2006; Bell and Loane 2010). Table 2.3 compares some definitions of NTBS in contrast to the popularized notion of 'startup', which implicitly involves technology.

Table 2.1 Some definitions contrasting the use of 'new firms' and 'startup' terms (Own elaboration)

<i>Descriptions of NTBS /new technology ventures</i>	<i>Descriptions of Startup (grey literature where technology is implicit)</i>
<p><i>"a firm that emphasizes research and development or that places major emphasis on exploiting new technical knowledge" (Cooper 1971, p.5)</i></p>	<p>"A startup is a temporary organization used to search for a repeatable and scalable business model" (Black and Dorf 2012, p.12)</p>
<p><i>New Technology-Based Organizations (NTBOs) are "ventures that emphasize the role of research and development in the introduction of new products or services or as those that place their major strategic emphasis on the exploitation of technology in products, processes, or services" (Hart and Denison 1987, p. 512).</i></p>	<p>"a start-up is a human institution designed to deliver a new product or service under conditions of extreme uncertainty" (Ries 2011, 8)</p>
<p><i>"new independent firms which are developing new industries" (Shearman and Burrell 1988).</i></p>	<p>'Startups are firms that utilize an innovation (either a technology or business models), that want to achieve significant growth in terms of sales and employees and that are not older than ten years' (German Startup Monitor 2015, cited by Weber, 2016, p. 25)</p>
<p><i>"young independent firms involved in the development and/or diffusion of new technologies" (Fontes and Coombs 2001, p. 83)</i></p>	
<p><i>Young Innovative Companies (YICs) are small, young and highly intensively engaged in innovation activities These firms seem to be more inclined to exploit a newly found concept, stimulating that way technological change, an important determinant of long-run productivity (Czarnitzki and Delanote 2013)</i></p>	

Roure and Keeley (1990), Birley and Westhead (1994) and Bhave (1994) named a startup as a "young company" that is beginning to develop and grow, even from the first stages of operation, and usually financed by an individual or small group of individuals. A startup is also seen as a dynamic organization that searches for an unknown business model in order to disrupt existing markets or create new ones, wherein the founders

attempt to capitalize on developing a product or service for which they believe there is a demand.

The TBS concept refers to small firms whose activities focus on the development and introduction of new technologies or technological advances. A TBS transforms new knowledge and ideas into marketable products and processes (Rammer 2006; Colombo and Piva 2008), thus becoming economic vehicles of innovation. Other determinants of the TBS's characteristics from their creation is their geographical location as a determinant of classification. For example, locations in large urban centers of big cities offer advantages with respect to access to qualified staff, better R&D infrastructures, and advanced transport links. The same happen to those who are close to Universities or industrial parks. Also, there are aspects added that can be the size of the prospecting market and the networks' links with allied suppliers and customers, they are considered as the relevant determinants of their innovation ecosystems shaping.

TBSs activities are intimately linked to external conditions as part of entrepreneurship and innovation cycling condition. Löfsten (2016) defines them also as NTBF as a small independent firm that seeks to address new markets with new or developing products through business planning and the use of external resources in uncertain conditions. However, their internal integration and adoption of external information demand to develop organizational conditions of adapting process

One of the most recent definitions was cited by Eric Ries (2011) in *The Lean Startup*, referring to a startup as “*a human institution designed to create new products and services under conditions of extreme uncertainty*” (Ries 2011, p.8). Another common definition has been provided by Blank (2006) in *Four Steps to the Epiphany*, stating that a startup is a temporary organization designed to search for a repeatable and scalable business model. “*At its heart, startup is a catalyst that transforms ideas into products. Customers interact with those products, they generate feedback and data. The products a startup builds are really experiments; the learning about how to build a sustainable business is the outcome of those experiments. For startups, that information is much more important than dollars, awards, or mentions in the press, because it can influence and*

reshape the next set of ideas." (Ries 2011, p.75). Despite this definition seems it is focused on digital startups, it pursues to integrate a broadly type of organizations.

Another term recently introduced is Young Innovative Companies (YIC), labeling the growth of firms characterized as small, young and intensively engaged in innovation activities (Schneider and Veugelers 2010; Czarnitzki and Delanote 2013). This literature affirms that YICs are more inclined to exploit a newly found concept than established firms that mostly introduce incremental innovations in efforts to safeguard existing profits rather than risk radical innovations. However, it still remains unclear how the growth pattern of this type of firms evolves and to what extent they can be differentiated from other types of firms.

Paradkar *et al.* (2015) include the term "tech-startup firms" and describe them as organizations managed by entrepreneurs who have scientific or technical background and have the abilities to assess markets, technologies and business models and attempt to create new products or to influence customer values with respect to existing products. There is where the concept of academic entrepreneurship is emerging. Also, these entrepreneurial firms exploit their own ideas, adapt and integrate the ideas of others, or change new or existing assets into meaningful and value-added configurations. Thus, entrepreneurial startup firms disturb the status quo of established firms; through breaking the rules with fresh views and redefine established the market with new products and service concepts. The TBSs' products and services change the ways of doing things by altering traditional patterns of behavior in industrial processes, consumption and business models (Teece *et al.* 1997; Gans *et al.* 2002; Paradkar *et al.* 2015).

2.2.2 The TBS characteristics and classification

What are the elements/characteristics that differentiate TBSs from other organizations? We identify interesting approaches that identifying TBS its particular characteristics and classification, mostly defined according to a "parental organization", where the invention has been produced. On the one hand, Parhankangas *et al.* (2003, p.464) define the corporate spinoff as a "*new business formation based on the business ideas developed within the parent firm [or research organization] being taken into a self-standing firm*". On the other hand, Auerswald *et al.* (2007) define a university-based

startup as a technology firm whose genesis lies outside the commercial world, inside a university or other academic scenario. Both conditions spin around the fact there should be an invention, radical or incremental, with potential characteristics to become a product. Delapierre *et al.* (1998) analyzed various empirical studies of NTBFs, in the French context, and proposed the following set of criteria to identify them:

1. New firms created by scientists and/or technicians
2. SMEs in high technology that operates in the frontier between research and industrial production
3. SMEs that transfer and/or introduce new products into new markets through the application of a new technology
4. Innovative micro-enterprises that develop technological innovations in processes and products
5. Micro-firms that adapt to new technologies acting as suppliers of large industry corporations
6. Innovative enterprises that launch new products not based on new technologies
7. Although not all criteria here make reference to characteristics such as size or age, most NTBFs are considered 'micro-firms' formed by small teams and in an early stage of development.

Traditionally, TBS' has been associated with science-based inventions leveraged to create new products, services and processes, and are considered a relevant economic motor of every country's economy (Schumpeter 1942; Garnsey 1998; Hart et al. 1987). Some of these particular organizations are highlighted as champions for placing their breakthroughs in the market. Around these kinds of organizations, academic scholars and researchers had formulated a different kind of typologies according to the context of their founding.

University spin-offs seem to be similar to academic entrepreneurship. Nevertheless, according to Ortín-Ángel *et al.* (2010) young university spin-offs have more formal education levels and are more attractive to venture capital investors than independent technological startups (Ortín-Ángel *et al.* 2010). These firms are based on university intellectual property, or they involve the parent organization as a shareholder. But in other cases, the relationship with the parent organization is weak or even non-existent. What makes these firms special is that, being created by academics, they inherit from their founders a profile that clearly differs from those of other NTBFs (Colombo and Piva 2008).

Hindle *et al.* (2004) suggest three main classes of new ventures created from public research agencies and classify them according to their parent organization:

“1. Direct research spin-offs (DRSO) are companies which have been created in order to commercialize intellectual property (IP) arising out of a research institution where IP is licensed, involving a patent or copyright, from the research institution to the new firm to form the founding IP of the firm and staff may be seconded or transferred full or part-time from the research institution to the new firm.

2. Technology transfer companies (TTC) are companies set up to exploit commercially the university’s tacit knowledge and know-how, usually but not solely in the area of the process rather than product innovation, where no formally protected (e.g. patents) IP and/or exclusive licensing is involved.

3. Startups or indirect spin-off companies (ISO) are companies set up by former or present university staff and/or former students drawing on their experience acquired during their time at the university, but which have no formal IP licensing or similar relationships to the university.

4. Spin-ins (to existing companies) can be defined as new ventures deriving from the licensing or other agreed exploitation of new knowledge generated by public research agencies, whether or not separately incorporated entities

are set up or they may operate as discrete ventures within the existing company' (Hindle and Yencken 2004, p.797-798).

In our view, based on the review of relevant literature as well as the criteria listed above, the core features that characterize TBSs are:

1. They are temporary independent organizations. This encompasses the entire validation and searches for an innovative business model by the founders (owners). Therefore, it is a temporary stage between the seed phase and the venture phase. A business model is constituted of a series of statements about the value be created and how it will be provided to customers/users.
2. TBS are very small companies composed of very few employees and they produce goods and/or services with high added value.
3. Their founders possess specialized human resources and a greater tendency towards collaboration (with universities, institutes or research centers, other companies, etc.).
4. They exhibit entrepreneurial and innovative behavior (high level of novelty), including a high tolerance for risk not only to develop new products and processes but also, their capacity to transfer scientific and technological knowledge. Their new products and services, in overall their novelties, act upon business ideas that other companies often do not identify.
5. They have a technological profile. As discussed before, the evolution of the TBS concept is grounded in the role of technology and strong R&D; the reason why they were originally referred to as NTBFs (Hart *et al.* 1987; Storey *et al.* 1998; Hindle *et al.* 2004; Colombo *et al.* 2016) or "Hi-Tech Startups"(HTS) (Chorev *et al.* 2006; Wu 2007; Colombo *et al.* 2010; Colombo *et al.* 2010; Colombo *et al.* 2011; Colombo *et al.* 2016).
6. They are orientated towards fast growth (business scalability and replication). This aspect is closely related to the age of the firm; a key attribute about which researchers have not reached a consensus. In this study we consider an age until 6 years.

2.2.3 TBSs creation from invention to innovation

Whichever upon its origin, a TBS may be categorized as a university-based spin-off (academic entrepreneurship) or corporate spin-off (corporate intra-entrepreneurship) or a research center, as well as from an independent source of foundation (technologic entrepreneurship). The TBS founding is linked to an invention, which can be incremental or radical, the first have a limited impact because of they represent minor improvements of existing technologies. Instead, the second type, a radical invention often are grounded on solid changes and represents a new technological paradigm (Schoenmakers and Duysters 2010; Auerswald and Branscomb 2007). The transition of an innovation to a product is considered as a complex process, because it requires an organizational restructure and vision. Auerswald and Branscomb. (2007) focus their attention on the innovation development and investment as a critical trigger of the TBS creation.

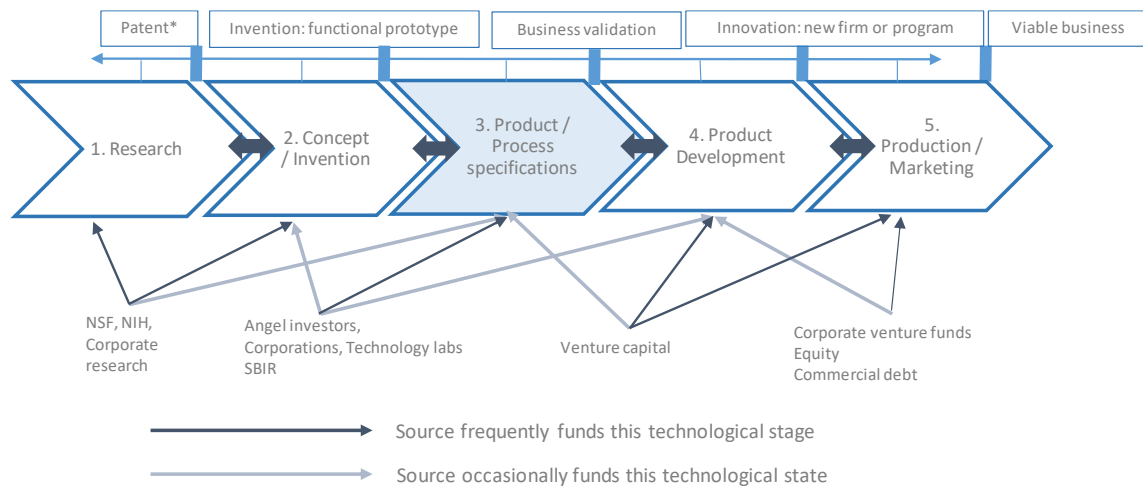
The innovation's transition stage contains the processes of shifting a “basic science invention” into a commercially viable “innovation” (stages 1, 2 and 3 see in figure 2.5). Innovation opportunities are linked to the market patterns of the demand. The market defines the innovation performance guidelines, particularly in global markets the time to market of an innovation process becomes more competitive. This competitiveness fact increases the risks of failing in the innovation progression to placing into the market (Chorev *et al.* 2006). As a consequence, the need to intensify the innovation development requires parallel investment in crucial phases with R&D activities as an effect input-process-out.

The TBSs' innovation launching process is a game of experimentation which is the essence of their innovative behavior on both sides. It requires an innovation with commercial potential, but also a market involved and motivated enough to adopt it. This is described by Black (2009; 2006) as follows: *'startups that survive the first few tough years do not follow the traditional product-centric launch model espoused by product managers or the venture capital community. Through trial and error, hiring and firing, successful startups all invent a parallel process to product development. In particular, the successful. Winners invent and live by a process of customer learning and discovery. I call this process "Customer Development," a sibling to "Product Development," and each and every startup that succeeds recapitulates it, knowingly or not'*.

In the case of university-based startups, the transition from invention to innovation can also be referred to as ‘*the invention’s transition*’; as the move from academia to the commercial realm. By contrast, a spin-off is an early stage of technology development (ESTD) project initiated in a large corporation as the original aim of the invention was for commercial purposes, but its path to the market is considered as an entrepreneurial venture (Auerswald *et al.* 2007). Despite the TBS different origins, the transition process from an invention to an innovation has the same need of investment to support the operations that will hold their innovation performance. The TBS operations are supported by the quality of the founding team as the starting base rather than just by a single individual (Eisenhardt *et al.* 1990; Feeser *et al.* 1990). Zucker *et al.* (1998) sustain that the size and qualitative composition of the founding team, sustain the adequate human intellectual capital, and these factors that influence both the investment attraction and decision-making.

Figure 2.5 shows a similar sequential model in their development. Stages 1 and 2 focus on the invention process while stages 4 and 5 represent the innovation process and commercial development. According to (Auerswald and Branscomb 2007, the “*invention to innovation transition is shaded in light blue. The boxes at top indicate milestones in the development of a science-based innovation. Then The arrows across the top of, and in between, the five stages represented in this sequential model are intended to suggest the many complex ways in which the stages interrelate. Multiple exit options are available to technology entrepreneurs at different stages in this branching sequence of events*” (p.32).

Figure 2.5 Sequential model of development and funding of an organization founded in a university or a corporation (Auerswald and Branscomb 2007, 32)



* A more complete model would address the fact that patents can occur throughout the process.

The TBS that have also an origin from independent initiatives, entrepreneurial initiatives without a corporative or university umbrella, their origin is founded by a team of independent entrepreneurs who pursue the same objective jointing their motivation, commitment and experience around an invention with the potential to be a new product or service. This process is similar to all types of TBSs, and it still becomes a critical factor to overcome the transition stage and depends on the team's members abilities and experience (Chorev and Anderson 2006). For instance, when the founder leaders of the team hold relevant networking of scientific and technical expertise where external support came from collaborations with different types of interactions in universities, public research organizations and technology firms (Hindle and Yencken 2004; Faems, Van Looy, and Debackere 2005; Miles, Miles, and Snow 2006; Boland et al. 2012; Lavalley et al. 2014). According to D'Este *et al.* (2012) the potential of academic entrepreneurship lies in the researchers who contribute their scientific and highly specialized skills and knowledge to founding university spin-offs. Moreover, once the potentiality of university-spin-off is identified given the integration and continuity in the diversity of technical skills and scientific expertise, but also because of the proximity of technical facilities. In particular, when the discoveries and technological breakthroughs motivate the R&D continuity with commercial exploitation of a university invention (D'Este et al. 2012).

2.3 The Technology-Based Startup ecosystem

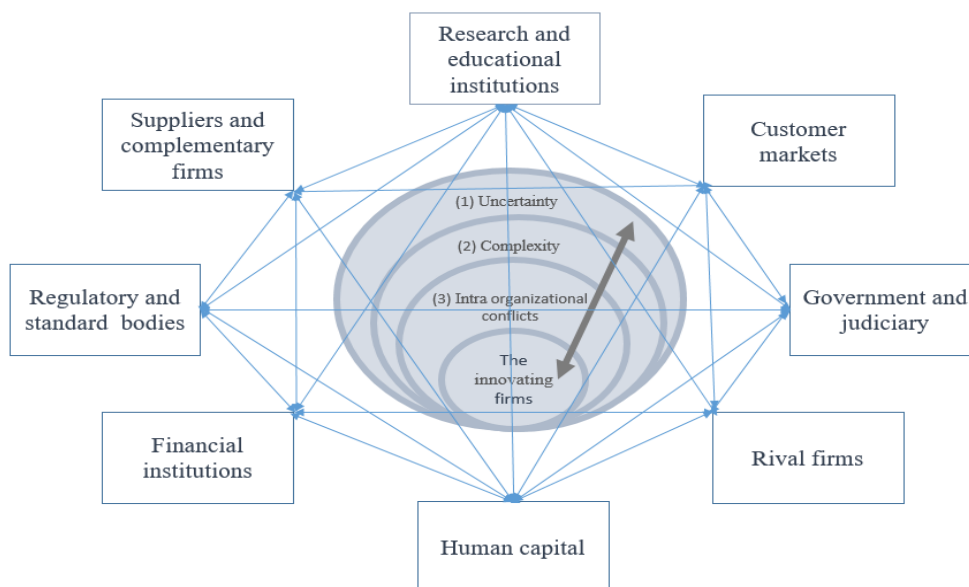
The TBSs' environment and networking is known as its ecosystem. The ecosystem hosts a diversity of actors that contribute to incentive the new business opportunities and activities. Therefore, some authors consider the TBS ecosystem as a conditional that influence the TBS origin and organization molding. The TBS count with intangible resources that allow them to actively participate in and focus their efforts to their innovation performance, even on international markets (Weerawardena et al. 2007). The TBSs' organization and operational structure aims to develop significant competitive advantages seeking a place in the worldwide markets (Weerawardena et al. 2007; Oviatt and McDougall 1994). This requires effectiveness among the TBS's team members where internal and external networking, cooperation and coordination are essential to collaborate successfully with different actors, such as support groups (accelerators, public agencies), subcontractors (suppliers and distributors), and customer communities (Thamhain 2004).

The ecosystem constitutes the environment in which the many players who interact with TBSs along the development stages coexist (Zahra and Nambisan 2011). The support of venture capital firms and other financial bodies plays a relevant role with funding mechanisms for the creation and emergence technology-based startups. Venture capital plays a particularly important role in the technological innovation processes.

The context in which the TBS develops can be favorable or unfavorable. It determines how the TBS operates depending upon the amount of support they receive. The context involves policies and regulations, incubation, and acceleration programmes, supporting platforms and funding intermediation, such as banks, foundation institutions, venture capital and other investors. All provide to TBS of market opportunities (clients, supplier, partnering), funding capital, training, and networking. The role of such institutions and government is relevant to the sustainability of the TBS. On the other hand, with regard the high competitiveness and the market's uncertainty risks in innovation environments, they are considered as invisible conditions but represented by suppliers and complementary firms, customers, and rival firms. Altogether work to incentive the strengthening the internal TBS structures.

Due to their environment, TBS should develop an effective organization prone to recognize, develop, guard, and organize resources that increase their competitive advantage (Teece 2010b). Figure 2.6 illustrates the different factors that impact how the team organization determines the best way to manage their resources in a bidirectional flow process, this means from both exploration and exploitation (Jensen *et al.* 2017).

Figure 2.6 Integrated model regarding the innovation ecosystem (Teece 2010, p.687) and levels of managerial challenges (Amit and Schoemaker 1993, 33)



There is an intimate connection between the TBS resource-based with its ecosystem that affects team management and decision making (Amit and Schoemaker 1993). The challenge that TBS managers face lies in identifying, developing, protecting, and deploying resources and capabilities to provide the firm with sustainable competitive advantages, activities closely linked with the team collaborative interactions².

² We deepen the discussion regarding TBSs business models, business scalability and uncertain conditions in Appendix 1, p.193

2.4 Brief discussion and TBSs definition

Entrepreneurship is an adventure in itself. Although the entrepreneur is considered an innovative individual (Schumpeter 1942; Hébert and Link 2006; Roininen and Ylinenpää 2009), what characterizes the current emergence of startups is “collective entrepreneurship” and the formation of entrepreneurial teams (Auerswald and Branscomb 2007; Vyakarnam et al., (1999); Kamm and Nurick 1993).

The conformation of the TBS occurs from different circumstances, it can start from the identification of an opportunity (Bhave 1994), otherwise begins from the stage of creation of an idea or concept (Cooney 2005; Miller and Bound 2011), where an individual or a group with entrepreneurial characteristics, can recognize an opportunity within a given context, through their networks of contacts and jointly decide if the concept should be further developed (Muller-Boling 1993).

Their business foundation involves creating and exploiting opportunities to launch new products, open new markets and use new resources, despite the fact that these activities face risks and uncertainties (Kamm and Nurick 1993; Rice and Kelley 2001; Andren, Magnusson, and Sjolander 2003).

From the foregoing, we propose a new definition of TBS as follows: “A technology-based startup is an organized team of two or more entrepreneurs with high qualifications, technical and/or scientific background, who share knowledge and responsibilities by through the configuration of a team, from which new ideas are generated and responsibility is shared in the taking of operational and strategic decisions to sustain the organization in the long term”. In the following chapter we present and discuss on a notion that explains how TBS may maintain and increase their competitiveness, i.e., the concept of dynamic capabilities”.



CHAPTER 3

Dynamic Capabilities: Technology-Based Startups and their Innovation Context

3. Dynamic Capabilities: Technology-Based Startups and their innovation context

Introduction

The use of the Dynamic Capabilities (DCs) as framework enables us to analyze the sources and methods of value creation and capture by enterprises who operating in innovation environments of fast technological change (Teece *et al.* 1997). Moreover, the DCs view explains how the organizational and operational evolution process occur inside an innovation-oriented firm. This framework denotes the unique and high-leveling organizational abilities of adaptation of the firms to face the turbulent conditions of innovation markets (Teece and Pisano 1994; Eisenhardt and Martin 2000; Zollo and Winter 2002; Winter 2003, p.992). DCs also becomes the origin of its competitive advantage of the firm (Cepeda and Vera 2007).

As we previously overview in the last chapter the technology-based startups' (TBSs) internal organization is founded by entrepreneurial activities integrated by a unique team, with scientific and technical knowledge basis. Inside TBS reside a compact, flexible and a dynamic organization influenced by their context (Cooney 2005; Forbes et al. 2006; Harper, 2008; Khan et al. 2014), usually associated with a strong know-how

(Colombo and Grilli 2005; Clarke Højbjerg *et al.* 2014; De Mol *et al.* 2015). The TBS is an innovation-orientated organization whose capabilities are located in the areas of resource allocation, technology, employees, operations, and markets (Siguaw *et al.* 2006). Authors such as Zolin *et al.* (2011) and Ruef (2002) among others, highlight that team's members have close ties and develop intense social interactions (Lechler 2001; Eisenhardt and Schoonhoven 1990). The TBS team's interaction conditions are crucial to build capabilities to their innovation performance. It also could help the TBS to overcome the most immediate threats to their survival. As some studies suggest TBS, like other business at very early stages, are fragile organizations because of their dynamic and risky environment so-called *liability of newness*, that makes them prone to fail (Bruno and Leidecker 1988; K. Eisenhardt and Schoonhoven 1990; Baron and Henry 2010).

We argue that the TBS team associated with DCs are crucial, at the same time, likely to be different than those in more mature and big companies, since TBSs have access to fewer resources and a strong innovation orientation. Guided by Eisenhardt and Martin (2000) who suggest that much of the strategy literature is 'vague' on the nature of DCs, and making it necessary to establish a clear distinction of associated terms that give sense to CDs, such as skills, routines and capabilities.

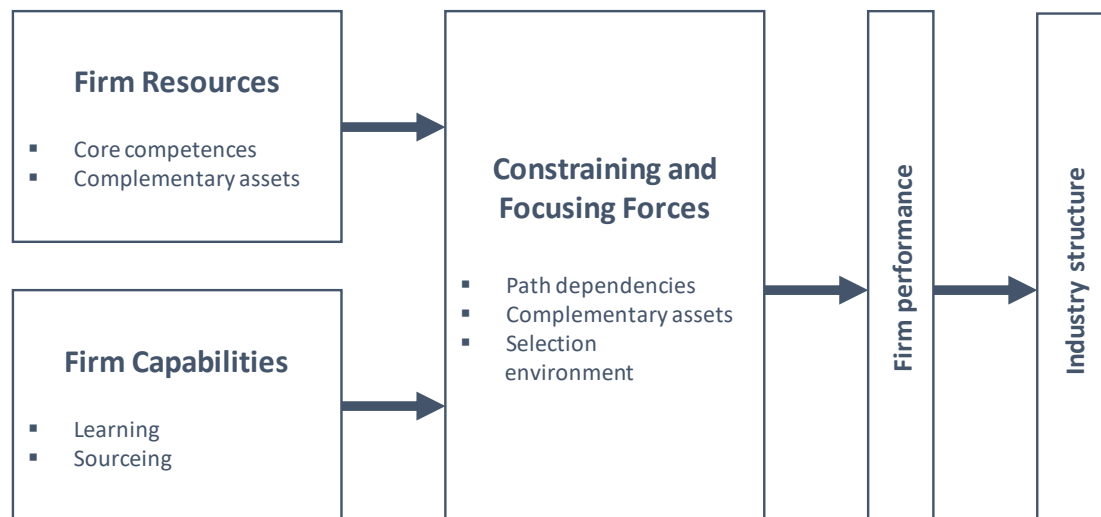
3.1 Dynamic Capabilities definition

Despite the lack of consensus, the notion of DCs prevails due to the importance of the link between a firm's strategic choices and the environmental conditions. Moreover, the DCs concept addresses the crucial question of how firms can effectively respond to the challenges of an ever-changing environment. Current economies present more challenges than ever to efficient and effective management because of what some scholars have termed *hypercompetitive environments* (Finkelstein and D Aveni 1994) or *high-velocity environments* (Bourgeois and Eisenhardt 1988). Both terms refer to the increasing frequency of major, discrete, environmental shifts in competitive, technological, social, and regulatory domains.

The working paper entitled "*Firms Capabilities Resources and the Concept of Strategy*" by Teece *et al.* (1990, p. 11) constitutes the seminal contribution that name

Dynamic Capacities: *"our vision of the company is something richer than the perspective based on resources (...) it is not only a set of resources that matter but the mechanism by which companies understand and accumulate new skills, as well as the forces that limit the speed and direction of the processes"*(Teece *et al.* 1990b). Then these ideas were published in 1994, as *"The dynamic capabilities of firms: An introduction"* this time by Teece and Pisano, which explains how the RBV is not able to clarify how some successful companies demonstrated timely responsiveness. This work is based on firms where product innovation is fast, flexible and possesses the capacity of optimized management coordinating and redistributes internal and external competencies efficiently. They pointed out that it is essential to consider the nature of changes produced by the external environment, provided by the industry sector (see Figure 3.1). Therefore, the role of strategic management is key to the *'adaptation, integration and reconfiguration of internal and external organizational operations'* as sources and methods of creating and capturing value (Teece *et al.* 1990b)

Figure 3.1 Causation in the Dynamic Capabilities approach
(Teece *et al.* 1990, 18:p.31-32)



Later, Teece *et al.* (1997 p. 516) collected their previous ideas and proposed a definition for dynamic capabilities as: *"...the firm's ability to integrate, build, and reconfigure internal and external competences to address and shape rapidly changing environments"*(Teece *et al.* 1997). DCs' make possible the understanding of the phenomenon that an organization rapidly adapt to turbulent market conditions by extending, modifying, and reconfiguring existing operational capabilities to better respond to environmental conditions (Teece and Pisano 1994; Pavlou and El Sawy 2011).

Like resources and competences, dynamic capabilities must be built inside the firm (Teece 2010b; Teece and Pisano 1994).

Zollo and Winter (2002), suggest that the definition of Teece *et al.* (1997) is redundant and define DCs “*a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness*” (p.340). Nevertheless, despite the diversity of visions, which obey specific activities, context and approach of the firms’ organization it is possible to classify DCs definitions in two groups. On one hand, there are those authors who define them prescriptively; that is, assuming that dynamic capacities are always good and are a source of sustainable competitive advantage. On the other hand, there are those who do not contemplate competitive advantage within their definitions. The table 3.1 collects and groups the most relevant definitions proposed for dynamic capabilities:

Table 3.1 Definitions of dynamic capabilities with and without competitive advantage.

	AUTHORS	DYNAMIC CAPABILITIES DEFINITION
Those who consider DCs as source of competitive advantage	Griffith and Harvey (2001, p.597)	<i>"a dynamic global capacity is the creation of difficulties to imitate the combination of resources, including the effective coordination of inter-organizational relationships on a global basis that gives the company a competitive advantage."</i>
	Lee <i>et al.</i> (2001, p.734)	<i>"dynamic capabilities conceived as a source of competitive advantage in Schumpeterian regimes of rapid changes."</i>
	Wang and Ahmed (2007, P.35)	<i>"dynamic capabilities as the orientation of a company's behavior to integrate, reconfigure, renew and recreate its resources and capabilities continuously and, above all, to improve and rebuild its core capacities in response to changes in Environment to achieve and maintain a competitive advantage."</i>
Those who do not consider any competitive advantage	Eisenhardt and Martin (2000, p.1107)	<i>"Dynamic capabilities are the business processes that integrate, reconfigure, obtain and separate resources to adjust to or even generate market changes. Organizational and strategic routines through which companies achieve new configurations of resources in function of the evolution of markets".</i>
	Zahara <i>et al.</i> (2006, p.1107)	<i>"the ability to reconfigure the resources and routines of the company in the expected and adequate form for decision making."</i>

The difference between the two groups of definitions is that we can consider redundant or repetitive. In particular, there are some authors that support the idea that if a company builds DCs, it will have good results due to the DCs performance (Priem and Butler, 2001; Cepeda and Vera, 2007). Furthermore, Teece et al. (1999) in the “*Dynamic Capabilities and Strategic Management*” describe “*the competitive advantage of firms is seen as resting on distinctive processes (ways of coordinating and combining), shaped by the firm's (specific) asset positions (such as the firm's portfolio of difficult-to-trade knowledge assets and complementary assets), and the evolution path(s) it has adopted or inherited*”. The advanced results of these complex combination is the organization reconfiguration and ‘*evolution path(s)*’ translated into their competitive advantages (Teece *et al.* 1999). Moreover, Teece argues that pursuing sustainable competitive advantage requires more than just protecting intellectual property from imitators but also building the firm’s capabilities, which are difficult to reproduce, and contribute to sustaining superior enterprise performance (Teece 1996; Chesbrough *et al.* 2006; Teece 2007a; Dixon *et al.* 2014; Schneckenberg *et al.* 2015). .Nevertheless, according to Teece, there do exist dependence conditions; DCs alone do not ensure the firm’s success, because they must operate in accordance with a ‘good strategic vision’ (Teece 2012; Rumelt 2011; Teece 2010c; Augier and Teece 2009; Teece *et al.* 1999). DCs support the top management of the firm, helping to assess, corroborate or reject opportunities and realign assets as the market conditions demand.

Likewise, Eisenhardt *et al.* (2000) define DCs as a source of disruptive change. They point out that the direct association between competitive advantage and dynamic capabilities is reiterative in the same way as the perspective of resources and capacities. At the same time, they reject the vision of dynamic capacities as ‘*best practices*’ with many potential meanings, but the same effect on performance. They argue that dynamic capabilities will contribute to competitive advantage depending on the same factors identified in the RBV (Eisenhardt and Martin 2000). Also indicate that RBV analytical approach tools linked to dynamic capabilities that confer a sustainable competitive advantage (Dierickx and Cool 1989; Amit and Schoemaker 1993).

In contrast, there are others who find DCs have an indirect connection with the firm’s competitive advantages (Helfat and Lieberman 2002). In particular, Zott (2003) argues that DCs are indirectly linked because they facilitate changes that are being made

to the firm better responds to its environment. The modification of the company's resources from their environment as a whole, as well as the routines and competencies that affect its performance. There are those who espouse a more conservative perspective, such as Helfat *et al.* (2007, p. 1), defining dynamic capacities as "*the ability of an organization to create purpose and extend, or modify its resource base*". Esterby-Smith *et al.* (2009) argue that this definition is precise enough to be subtle, and in turn sufficiently broad to enable scholars to learn more about the nature and origin of dynamic capabilities through research. Moreover, it does not conflict with the definitions given by Teece *et al.* (1997) that DCs allow the company to respond to changes in the environment.

The term DCs explains an organizational phenomenon that is easily identified in mature organizations because they are more easily identified. However, in small organizations, it is highly relevant to understand how their organizational and strategic basis behavior are settled in innovation environments. To date, the most commonly referenced definition of dynamic capabilities is "*the firm's ability to integrate, build, and reconfigure internal and external competences to address and shape rapidly changing environments*" (Teece and Pisano 1994; Teece *et al.* 1997; Teece 2010b; Cantwell 2016). The purpose of building DCs is to address turbulent market conditions; adapting the organization through extending, modifying and reconfiguring existing operational capabilities to respond to the demands of their environment (Teece and Pisano 1994; Pavlou and El Sawy 2011). In essence, dynamic capabilities describe the resources and competences that must be built and developed inside an innovation organization (Teece 2010b; Teece and Pisano 1994). The theoretical analysis of the origin, formation and linkage of dynamic capabilities to strategic organizational behavior has been considered by numerous academics and scholars. The main objective of this thesis is to explain and analyze DC specifically in organizations related to new technologies and innovation, using diverse contexts and approaches as a foundation.

There are three significant and differing views pursue to explain the genesis of DCs; the resource-based view (Wernerfelt 1984; Barney 1991; Barney and Hansen 1994; Barney 1999; Helfat and Peteraf 2003), the second is knowledge-based view (Nonaka 1991; Nonaka *et al.* 2000; Von Krogh *et al.* 2001; Grant *et al.* 2000; Conner and Prahalad 1996; López Iturriaga and Martín Cruz 2008; Nonaka *et al.* 2014). In recent years, the third approach is from microfoundations approach it pursue to understand the origins of

routines and capabilities, adding skills available in the organization. These views seek to explain DCs and how they link and even influence the strategies as internal tactics planned to move resources, integrating them into the TBS organization's processes (Felin *et al.* 2012; Loasby 2006; Teece 2007a; Argote and Ren 2012; Felin *et al.* 2015).

Table 3.2 Activities that create and capture value (organized by clusters of dynamic capabilities) (Teece 2010, p. 694).

	<i>Sensing</i>	<i>Seizing</i>	<i>Transforming</i>
<i>Creating Value</i>	Spotting opportunities.	Investing discipline.	Achieving organizational and operational recombination(s)
	Identifying opportunities for research and development.	Commitment to research and development.	
	Conceptualizing new customers need and new models.	Building competencies. Achieving new combinations.	
<i>Capturing Value</i>	Positioning for first mover and other advantages.	Intellectual property qualification and enforcement; Implementing business models.	Managing threats. Honing the business model.
	Determining desirable entry timing	Leveling complementary assets. Investment or co-investment in "production" facilities.	Developing new complementarities.

The table 3.2 shows the roles of routines and non-routine actions that must be carried out by top entrepreneurial managers. Entrepreneurial functions in management are motivated by creating and capturing value. Their aim is to combine assets together or transform them inside the organization to better create or capture value (Teece 2012). Non-routine refers to idiosyncratic decision-making, leadership, coordination and execution activities which are performed through social interaction. *"Even though managers are often called upon to strategize and to implement change, the manner in which this occurs can hardly be considered entirely routine"* (Eisenhardt and Martin 2000; Teece 2007b, 2010a, 2012, p.6).

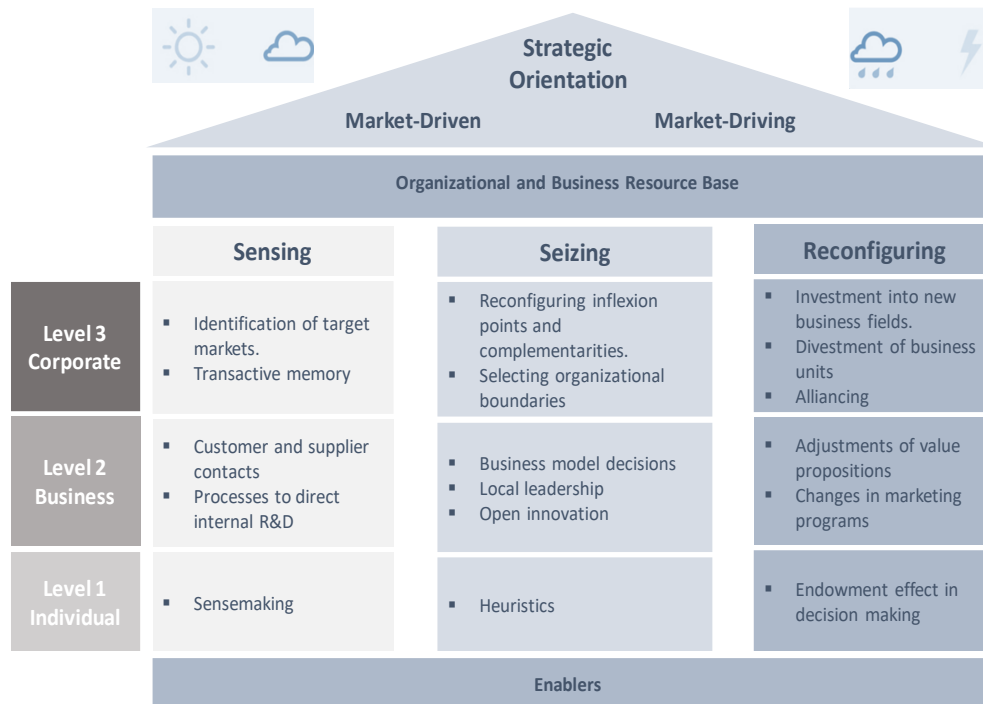
Adding to the above-mentioned microfoundations of DCs, Dixon *et al.* (2014) highlight the role of the 'underpinning routines generated and evolved' which are composed of "distinct skills, processes, procedures, organizational structures, decision rules and disciplines" (Dixon *et al.* 2014). DCs act as instrument to adapt the firm's behavior to the changing market conditions that have an impact on its operational capabilities. These activities involve exploration, or 'knowledge acquisition', which leads to path creation processes, experimentation and risk taking including the search for new

ideas and new perspectives. They also involve exploitation, or ‘*knowledge internalization*’, of operational changes according the new circumstances faced when operating within highly competitive environments. ‘*Disseminate knowledge*’, related to organizational communication, includes activities such as networking, job rotation, working groups, the use of change agents, data management systems and information and communications technology. Internalization and knowledge dissemination processes include project team activities such as, learning-by-doing and trials-and-error (*Dixon et al.* 2014).

In the recent review conducted by Wilden *et al.* (2016), DCs are explain from a strategic management framework that aims to identify the drivers of the firm’s endurance and growth over the long run. Wilden *et al.* (2016) develop a model of microfoundations of DCs focused on the strategic orientation at three different levels of analysis: individual, business unit, and organizational. They state that the microfoundational approach requires a multidimensional scheme of DCs analysis enabling the DCs and the strategic alignment of the firm. However, they claim that despite the academic interest about what DCs are and how they are related to the firm performance, they still remain unclear.

The house of DCs is an analogy for the organizational structure of the firm where the roof is the organizational strategy, supported by operational capabilities, which sit on top of the DC enablers as a foundation (see figure 3.2). The use of this analogy pursues to describe the internal level of interaction between different processes linked to existing operational capabilities to understanding the performance implications of DCs.

Figure 3.2 House of DCs that includes sample DC processes (Wilden *et al.* 2016, p.1031).



The pillars, sensing, seizing and reconfiguring, symbolize the categories of operational capabilities that hold together the organization under turbulent market conditions. Enablers represent the foundations of the team or business-unit, determining the organizational behavior at different levels. The organizational structures can be mechanistic (rigid) or organic (flexible). “*Mechanistic structures*” comprise centralized-decision making, formal rules and procedures, detailed reporting and control of flow of the information. Then the “organic structures” denote decentralized decision-making, communication, informal rules and susceptible to undergoing accordant the change (Wilden *et al.* 2016, p.1037).

3.1.1 Skills

The term skill in human capital encompasses an individual’s stock of knowledge and abilities obtained through education, training and previous job experience (Attewell 1999). Nonaka *et al.* (2000) define two types of knowledge: explicit knowledge and tacit knowledge. Explicit knowledge is expressed in formal and systematic language and share in codified form, such as, data, scientific terms (formulae) and specifications described in

manuals and guidelines. On the other hand, tacit knowledge intrinsic knowledge conditions from the individual and his context it consists of mental models, beliefs, and perspectives, also referred to as ‘know-how’. The essence of the ‘skills’ usually involves tacit knowledge; the knowledge that can be acquired only through personal experience.

Moreover, Nonaka *et al.* (2000, p.7) consider skills as knowledge, tacit knowledge as “*justified true belief*”, considering ‘*trustfulness*’ an essential attribute of knowledge. Therefore, knowledge has an active and subjective nature represented in “commitment” and “beliefs”, being intimately enrooted in the individuals’ value system (Nonaka *et al.* 2000; Nonaka 1991). It is partly of technical skills produced by complex and diverse sources (Nonaka *et al.* 2000; Cavusgil *et al.* 2003; Duguid 2005; Quist and Tukker 2013).

Skills have a multidimensional presence among individuals’ interaction in the creation of the team-organization. Trust and knowledge both codified and tacit are essential in communication and team interactions, determining the way they develop and share skills and routines. The result of the accumulation of these ‘skills’ inputs through exchanging and sharing activities transform processes and build operational capabilities within the emergent organization (Teece 2011; 2012).

3.1.2 Routines

In organizational environment routines are defined as ‘actions’ carried out by actors; put simply, routines are what actors do. Loasby also offers a more philosophical approach involving an emotional impulse to develop different kinds of connections. He acknowledges routines as pathways of “*evolutions of knowledge*”. In this respect, routines are the baseline of the shifting conditions inside an organization. Routines begin from the sum of individual knowledge, skills, behavior, and rules hold and developed among organization members, and which are supported by interaction and networks of these individuals. Routines concept seek to resolve problems and validity of the information, these factors are not tangible.(Loasby 2002, p.1236).

The definition of routine is broad and varying. Miller et al. (2012). focus on the study of the origin of organizational routines, characterizing them “*as repetitive,*

recognizable patterns of interdependent actions carried out by multiple actors” (Pentland and Feldman 2007; Pentland *et al.* 2012, p.1485). Winter (2003) made another interesting contribution, defining routine as “*a behavior that is learned, highly patterned, repetitious, or quasi-repetitious, founded in part in tacit knowledge*” and with specific aims (Winter 2003, p.991). Alternatively, Zollo and Winter (2002) define routines as stable patterns of behavior that shape the organization with coordinated actions that incentive it by diverse internal and external inputs. For example, in marketing data related to customers require a defined procedure for internal communication regarding a certain product and decision-making to upgrade a production process. They define two types of operating routines, those which are necessary for the normal enterprising operation and superior routines, which are established as source of advantage. The superior routines have different effects on the generation and appropriation of profit depending on the conditions of the environment (Zollo and Winter 2002, p.341).

Conversely, for Felin *et al.* (2012) routines are explicitly a collective action rather than individual action. They emphasize the implicit collective interaction and include two critical aspects: ‘*ostensive*’, that involves the acceptance and adoption of a routine through time and space, and ‘*performative*’, which refers to their changeability and that they are the result of collective outcomes. A performative aspect in an organization involves knowledge and resources in action in a specific place and time (Felin *et al.* 2012, p.10-12). Teece (2012) considers that: “*A routine is a repeated action sequence, which may have its roots in algorithms and heuristics about how the enterprise is to get things done*” (Teece 2012, p.1396). The organizational routines transcend in the employees’ minds. Teece (2012) identified that the development of particular routines is related to an organizational adaptation and transformation, which is the basis for the creation of capabilities.

Pentland *et al.* (2012) focus their attention on identifying the micro-foundations of routines in order to study the role of individual actors. They pursue to explain the routines origins through the individual motivations and incentives, and how the development of these activities arise inside routines that have an impact at macro-level. A routine can be ‘recognizable’ if there is a sequence of established steps for its performance, also a routine is ‘repetitive’ as an identifiable pattern forms and changes

over the time (Pentland et al. 2012, p.1486). The dynamic nature of routines incorporates the condition of ‘time’ meaning that they evolve and are not static.

Routines are usually performed and executed with technologies and artifacts. These artifacts or technological components, such as computer devices, and specialized software, are tools that compile sophisticated information such as procedures or manuals, defined as ‘*sociomaterial ensemble*’ (Pentland et al. 2012). This condition of organizational routines assume that individual preferences and actions are accompanied by artifacts as key factors that keep routines heading in the right direction (Pentland *et al.* 2012, p.1487-1488). Routines are present in those activities involving new product development, supply chain management, business intelligence, finance, marketing and sales.

Felin *et al.* (2012) identify three types of routines, from more rigid to more flexible depending on the organizational context. The first type is ‘Zero-order’ routines (Winter 2003; Zollo and Winter 2002) these are usually related to operational functions of the firm. Then are the ‘first order’ routines and the ‘higher-order capabilities’. The higher routines are tailored routines introduced for a specific strategic function known as “dynamic capabilities” (Zollo and Winter 2002; Winter 2003; Helfat and Peteraf 2003) These can be translated to very specialized activity such as risk management and tacit knowledge transfer practices. Routines can be rigid routines that must be performed in a specific and efficient manner in order to minimize risks, to maximize coordinated tasks and deliver immediate solutions, such as standardized activities or specific procedures in hospitals, chemical plants, nuclear stations, etc. (Felin *et al.* 2012). Flexible routines are simple operative and cognitive oriented, they reflect top management teams’ criteria and characteristics that adding the unique individual values, beliefs and expectations to the organization (Pentland et al. 2012; Pentland and Feldman 2007; Feldman and Pentland 2003). Following the new routines creation, Miller et al. (2012) introduce the term ‘*transactive memory*’ that describes the dynamic of creation and integration of new organizational routines. The formation of new routines, from facing challenges in lack of resources considering the context conditions and market demands. The introduction of the term ‘*transactive memory*’ (know-who) which forms over the time as individuals seek to solve problems through the help of others. They enable access to expertise on an as-needed basis, enhancing problem-solving and facilitating the adaptation to uncertain

conditions (Miller *et al.* 2012; Argote and Ren 2012; Heavey and Simsek 2015). . In this respect, the relevance of inclusion of individuals with high skills and abilities, that represent talented components is crucial for the organization, because this might affect a routine or capability indirectly whose impact integrates to a collective phenomenon.

3.1.3 Capabilities

Loasby (2002) refers to the *capability origin* or *genetics* of an organization, as a unique set of routines and processes that interact with other firm's assets in response to a specific phenomenon. Referring to how is conformed a capability, he denotes: [those] "*actions create connections, that provide new rules and routines, and releasing cognitive capacity for new applications*" (Loasby 2002, p.1233). Moreover, organizational processes are the central activities of enterprising intentions produced at a TBS. According to Amit and Schoemaker (1993) capabilities refer to the firm's capacity to deploy resources combining organizational processes in order to obtain an expected outcome. Moreover, they state that capabilities are information-based and can be tangible or intangible; developed over time through complex interactions within the firm. Resources, tangible and intangible, include available stocks, assets and mechanisms (technologies, or artifacts) that the firm owns and controls, and in whose management of the human capital plays an essential role (Amit and Schoemaker 1993; Soetanto and Jack 2013; Paradkar *et al.* 2015).

The 'content' of a capability is related to a collection of business processes that are strategically produced by the firm's members; who translate their experience, knowledge, skills, and competences into effective tasks (Bingham *et al.* 2007). Moreover, those processes combine individual perceptions and willingness about the process of creation and discovery of new ideas. Also, these processes merge the innovation and entrepreneurship activities linking to opportunities searching. Hence, the organizational-learning basis of such processes produce and add experience to the firm, i.e., builds the own firms' designing and prototyping capacities and capabilities (Bingham *et al.* 2007; Andren *et al.* 2003; Amit and Schoemaker 1993).

On other hand, according to Helfat and Peteraf (2003, p. 999), “*The concept of a capability as a set of routines implies that in order for the performance of an activity to constitute a capability, the capability must have reached some threshold level of practiced or routine activity.*” In order to say that an organization has a capability “[...] *means only that it has reached some minimum level of functionality that permits repeated, reliable performance of an activity*” (Helfat and Peteraf, 2003, p.999). Then, Teece (2010) considers that a capability is composed of different organizational resources. He defines a ‘*competence*’ as a particular type of organizational resource; reinforced by organizational processes and routines. Competences can be quantified and represented by clusters of organizational routines and problem-solving skills. As an organization grows and matures, its capabilities become ingrained in competences and resource and become shaped by the organization’s values (Teece 2010b, p.690). Teece (2012) states that capabilities are developed through collective learning – a product of joining diverse skills, talent, creativity among the group works of employees – and with the use and interactions of technologies and facilities (Teece 2012).

Capabilities are related to an organization, and they can be quantified and measured, formal or informal, and they are imprinted by the employees and the management decision-making process (Teece 2010, p. 690). Also, are considered as organizational mechanisms in small organizations composed by routines, involved capacities of systematically articulate and codify knowledge derived from past experiences (Zollo and Winter, 2002). Both routines and capacities are the principal building blocks of capabilities.

3.2 Strategy and competitive advantage

Due to the TBSs' market challenges are increasingly complex particularly to those who pursue being global, the understanding competitive environments are important, but it is even more important to understand what are the TBSs internal processes. The TBSs internal functions comprehension allow the innovation development, considering the organization as a crucial element that works in two sides, one side is to strengthen and protect their internal processes towards the development of innovation; and on the other side, to avoid failure in the loss of the innovation progression. The primary aim of the Dynamic Capabilities is “to explain the sources of enterprise-level competitive advantage

over time, and provide guidance to managers for avoiding the zero profit condition” (Teece 2007a, p.1320). The Dynamic Capabilities (DCs) take its bases from the resources-based view (RBV), and it involves turning the organization and operations into the innovation (Barney 1991; Helfat and Peteraf 2003). The RBV highlights the resources-based of the firm which had a static role in the organization and develop common capabilities. The DCs explain how do the rapid evolution and transformation of those common capabilities happen to a high performance.

As a background of the term Nelson and Winter (1982), in their work “An Evolutionary Theory of Strategic Change”, considered the role of routines and the way they contribute to shape and restrict how companies grow and cope with changing environments. The RBV implies they are rigid and non-transferable resources considered as possessions that belong entirely to the firm. There are two different types of resources that constitute the assets of the firm in the DCs: tangible and intangible. The tangible resources are physical materials that constitute the stock inventory of an organization, such as the office facilities, machinery, vehicles, computers and software. Intangible resources relate to intellectual capital such as logos, but also less visible resources like routines and capabilities develop by the firm’s activities and interaction (Paradkar et al. 2015). Consequently, these activities and interaction corresponding to routines and capabilities that can be distinguished for its use as static and dynamic resources. Static resources are those that can be considered as active stock. In contrast, dynamic resources can reside in capabilities, as well as in the organization's ability to learn and create knowledge, generating additional opportunities over time (Nieves and Haller 2014).

Then the DCs grounds from the resource-based of the firm to explain the organizational abilities that some organizations build through the time. There are two streams that want to explain the organizational benefits to deploy strategically the firm’s resource-based. The first was to determine what resources and capacities produce sustainable competitive advantages and the second focus to identify and assess them (Barney 1991; Amit and Schoemaker 1993). The DCs is a complex term, there is some disagreement over concept of DCs among experts. An example is the exchange between Arend and Bromiley (2009) and Helfat and Peteraf (2009) on the future of DCs published in Strategic Organization in 2009: whereas the first authors suggested that the DCs construct should be abandoned due to its weak theoretical foundations and

inconsistencies, the second researchers called for further developmental efforts given the infancy of the field and its growing relevance.

Considering DCs from the perspective of strategy management, Wang and Ahmed (2007) point them out as sequential conditions an organization's strong adaptive capabilities bring that bring outstanding competitive advantages to the firm. This involves the comparison of the DCs at different points of time and will be different for each company in an industry because of how they uniquely build DCs. The key to every firm's survival and success lies in its ability to create a range of different capabilities that allow it to be successful in competition with other companies (Dierickx and Cool 1989). The better equipped the company, the greater the chances it will have to develop more complex strategic advantages (Amit and Schoemaker 1993). Also, the strategy of the company determines which capacities need to be further developed and strengthened. If a company wants to achieve differentiation, its dynamic capabilities should be oriented towards leveraging its assets to develop greater capacity to innovate. But to achieve cost leadership, the firm will focus on developing completely different capacities. Therefore, the strategy of the firm will direct the use of dynamic capabilities to improve specific organizational capabilities (Wang and Ahmed 2007).

Based on this, we can posit that DCs lead to a superior long-term performance. However, this is an indirect both sided cause-effect relationship, one side mediated by the strategic directives of company, and the development of operational capacities on the other (Teece and Pisano 1994; Zollo and Winter 2002; Zahra *et al.* 2006; Shuen 1999; Lawson and Samson 2001b; Green *et al.* 2008). In this respect there are four assumptions. Firstly, that DCs are present in both high-tech and low-tech organizations (Evers 2011). Secondly, the processes of dynamic capacity building is based on experience and learning (Cohen and Levinthal 1990; Zollo and Singh 2004). Thirdly, DCs are related to the environment that they develop within; influenced by the managerial behavior, trajectory of the company (the founders' background), human capital, leadership, and trust, this is supported by the team's members and efficacy (Teece 2012; Verona and Ravasi 2003; Dixon *et al.* 2014). And finally, the context of DC implies market sector which represent a high level of dynamism, competitiveness, and uncertainty, with fast cycling and recycling processes. So, we submit that DCs influence the development of capacities and

resource bases, which in turn may lead to sustainable competitive advantages (Teece *et al.* 1997; Teece 2012).

The relationship between the resource-based and the competitive advantages can be moderated by environmental characteristics such as complexity, uncertainty, as well as characteristics and conditions of the country itself. These results will affect the performance of the company (Teece *et al.* 1997; Wu 2006; Green *et al.* 2008; Cruz-González *et al.* 2015). Nevertheless, it is important to distinguish the differences between strategy processes in big and medium firms and TBS. Bhidé (1999) in his book “The Origin and Evolution of New Businesses”, argues that opportunistic organizational adaptation and the knowledge management (ideas, deep experience, and credentials), which usually lack at very early stages, but both are linked to the environment systemic conditions (Bhidé 1999). Similarly, Hitt *et al.* (2002) state that administrative management in established firms focuses on loss prevention and coordination, while entrepreneurial management in the case of nascent firms focuses on value creation, opportunity recognition, and the discovery of future businesses. Thus, operational functions are very different in big firms than in TBSs. In TBS, particularly in the high-tech area, entrepreneurs cope with significant levels of ambiguity and uncertainty (Hill and Levenhagen 1995). The essential features of the environment are often very limited, making it necessary to refrain from exhausting analysis instead focus on strategic experimentation (Nicholls-Nixon *et al.* 2000), in which the firm carry out its ideas on the environment in order to get feedback for further development.

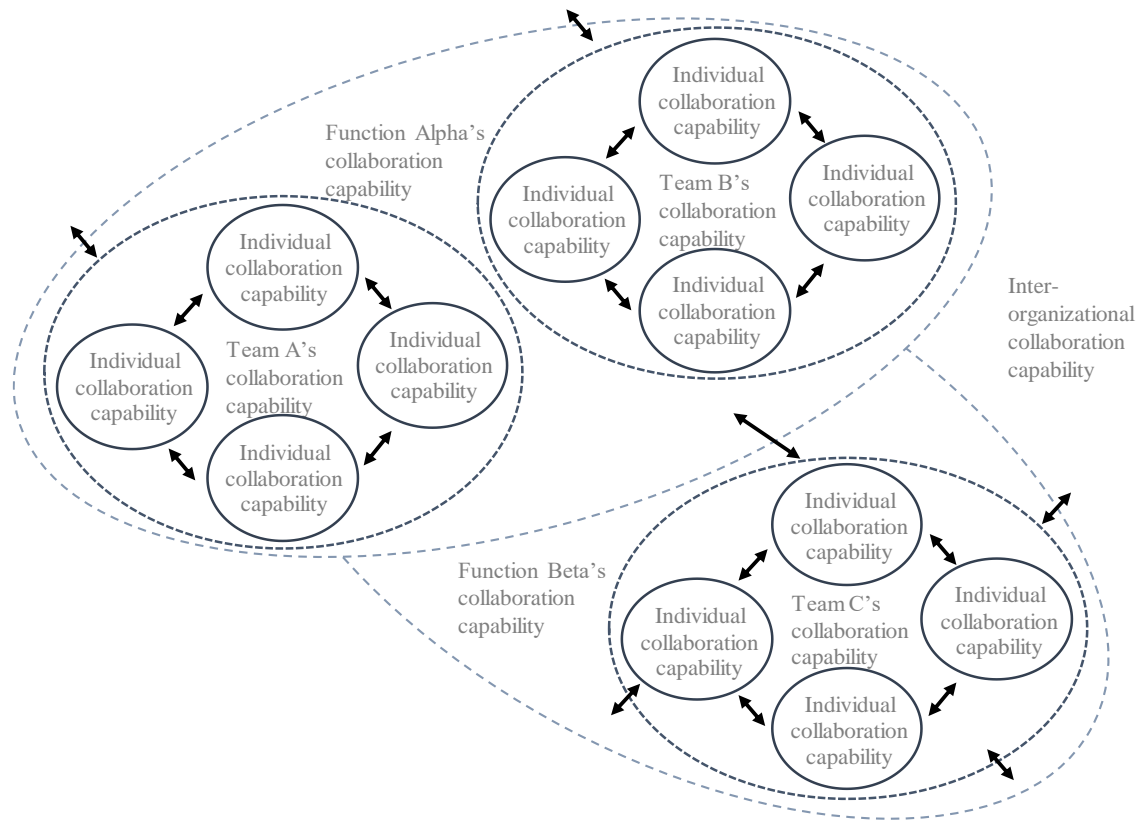
To date, research on capability creation during the early stages of a firm is scarce or practically non-existent. One exception from Kazanjian and Rao (1999), found that the formalization of budgeting decision processes had positive effects on the build-up of engineering capabilities within firms, while an increasing size of the management team had a negative effect on these capabilities. Another from Boccardelli and Magnusson (2006) suggests that earlier proposed DC frameworks need to take into account the entrepreneurs as a source of DCs, introducing the concept of resource flexibility.

3.3 Collaboration capabilities

The collaboration capabilities (CCs) support and strengthen organizational capabilities throughout the innovation processes till its performance. CCs can be only understood under the DCs approach due to their interdependence with the company's internal resources. Collaboration in an organization focused on innovation involves the integration, coordination, and continuity of output-input activities between two or more actors (Grant and Baden-Fuller 1995; Blomqvist and Levy 2006). Instead, capabilities within a TBS are conceived as a high-level routine or a set of routines developed by the organization in question (Winter 2003). Innovation is the result of collective and coordinated efforts produced by *integrating* and *cross-leveling grouping interactions* (Teece 2007; Blomqvist and Seppänen 2003; Blomqvist and Levy 2006).

With regard the CCs relationship with DCs, Blomqvist et al. (2006) referring the DCs view does not implicitly refer collaboration in their leveling up processes; however, the term itself infers that alliances, inter- and intra-organizational collaborations demand a strong integration of other synergies that includes '*collaboration*' (Blomqvist and Levy 2006). The TBS teams, as a social collectivity require a collection and integration of diverse actions and functions among the organization's members (see figure 3.3). Those functions can be particularly exchangeable and specific, where each individual covers the distributed tasks for operational purposes. For instance, in R&D, new product development routines and quality control routines are shared and distributed among the available team members (Eisenhardt and Martin 2000).

Figure 3.3 Collaboration capability as a multi-and cross-level concept
(Blomqvist and Levy 2006, p.36)



Collaboration and dynamic capabilities are not implicitly integrated concepts; however, the term itself implies that dynamic capabilities at inter- and intra-organizational level demand the tight integration of other synergies that involve ‘collaboration’ (Blomqvist and Levy 2006). In the TBS’ organization foundation is essentially a team. The team’s members are vehicles of external and internal knowledge, produced and acquired through sharing in a continuous interaction, and subsequently, they influencing the TBS operational capabilities (Verona and Ravasi 2003; Soosay, Sloan, and Chapman 2005). The team ‘management performance’ is an ‘input-process-output’ condition, characterized by a combination of autonomy, flexibility, mutual support, discipline, and trust among the team members (Parens 1998; Prieto *et al.* 2009). This requires a high level of intra-organizational team integration, defined as “*collaborative capabilities, which consist of information processing, communication, knowledge transfers and control, the management of intra- and inter-unit coordination, trustworthiness or the ability to engender trust, and negotiation skills*” (Tyler 2001; Blomqvist and Levy 2006, p.34).

3.4 TBSs team collaboration capabilities

Most of the TBSs focus on international markets, hence collaborate in order to build new capabilities quickly it is vital for their survival. However, the building capabilities conditions cannot go in the same because are related to the TBS's bias. According to Zahra et al. (2006), it is from the TBS' origins, history and goals were to reside the capabilities to transform and create DCs for innovation performance. As Penrose (1952), and Zahra *et al.* (2006) also spot the importance of the team's members' expertise and skills as the key source of innovation, particularly they contribute in transform resources, considered as 'notably managerial resources' to foster new capabilities building. Then; DCs depend on additional team's 'substantive capabilities', based on collective knowledge-based, activities, and decision-making, linked to the strategy (Eisenhardt and Martin 2000; Zahra *et al.* 2006). The team's substantive capabilities are their collective ability to produce and support operative capabilities focus on, e.g. new product development or distribution capabilities (Winter 2003).

We conducted a literature search to gain insight on various dimensions by examining reviews of dynamic capabilities to identify collaboration and interaction as essential factors of new capability building in TBS teams. Table 3.2 summarizes the most relevant literature exploring the concept of DCs.

Table 3.1 Published reviews on the concept of dynamic capabilities based on team members' interaction or collaboration.

<i>Year</i>	<i>Author/s</i>	<i>Title</i>	<i>Journal name</i>	<i>Intra-team interactions/collaboration influences dynamic capabilities</i>
2000	Deeds, DeCarolis, and Coombs	Dynamic capabilities and new product development in high technology ventures: An empirical analysis of new biotechnology firms	Journal of Business Venturing, 15 (3), 211-229	<p><i>"...what a high-tech venture needs is leadership that understands and has experience in the new product development process, but is independent and distinct from the scientific team. This kind of leadership maintains the scientific team focused on research and development, and out of the boards." (p. 212)</i></p> <p><i>"According to dynamic capabilities theory, firms compile knowledge, expertise, and skills through organizational learning. Learning</i></p>

				<p><i>capabilities enables firms to perform their activities in improved ways. Organizational learning happens when their members interact with each other and develop common codes of communication and coordination of activities. Furthermore, organizational learning is a dynamic activity, not only as an internal activity but also as a result of the assimilation and use of knowledge generated outside the firm.”(pp.213-214)</i></p>
2006	Zahra, Sapienza, and Davidsson	Entrepreneurship and dynamic capabilities: A review, model and research agenda.	Journal of Management Studies, 43(4), 917-955.	<p>“...dynamic capabilities are affected by and transform substantive capabilities and the firm’s knowledge base. Together, the substantive capabilities and the firm’s knowledge base directly and interactively affect the organization’s performance. Finally, performance results affect future entrepreneurial choices.” (p.8)</p> <p>“...substantive capabilities are embedded in what the firm does and how it does it.” (p.9)</p>
2007	Wang and Pervaiz	Dynamic Capabilities: A Review and Research Agenda.	International Journal of Management Reviews 9 (1): 31–51.	<p>“...the firm’s resources and capabilities in relation to environmental changes and that allow for the identification of firm-specific or industry-specific processes that are critical to the firm’s evolution.” (p.10)</p> <p>Hence, capabilities are often firm-specific and are developed over time through complex interactions among the firm’s resources.” (p.11)</p>
2009	Bowman and Ambrosini	What are dynamic capabilities and are they a useful construct in strategic management?	International Journal of Management Reviews, 11, 29—49.	<p>“...the top management team and its beliefs about organizational evolution may play an important role in developing dynamic capabilities.” (p.2)</p> <p>“The ‘dynamism’ relates to how the resource base changes in a new context conditions through the use of dynamic capabilities. The dynamism consists in the interaction of the dynamic capability and resource base, allowing their modification respectively.” (p.8)</p>
2009	Easterby-Smith,	Dynamic capabilities: Current	British Journal of Management, 20(s1), S1-S8.	<p>“The operational mechanisms that influence new process development are rooted in knowledge</p>

	Lyles, and Peteraf	debates and future directions.		<p><i>articulation and knowledge codification, and these reflect managerial decisions. Knowledge articulation can include managerial decisions to have functionally diverse teams, which may include co-location strategies to improve learning and problem-solving performance.” (p.S5)</i></p> <p><i>“...dynamic capabilities can take a variety of forms and involve different functions, such as marketing, product development or process development, but the overriding common characteristics are that they are higher level capabilities which provide opportunities for knowledge gathering and sharing, continual updating of the operational processes, interaction with the environment, and decision-making evaluations.” (p.S7)</i></p>
2009	Arend and Bromiley	Assessing the dynamic capabilities view: spare change, everyone?.	Strategic Organization 7(1) 75-90.	<p><i>“Scholars who examine organizational change generally agree that a variety of firm behaviors interact with the firm’s condition and environment to influence the likelihood of performance-enhancing change.” (p.82)</i></p> <p><i>“The dynamic capabilities concept thus suggests greater tangibility and coherence in desirable features than the reality of complex, interacting firm behaviors. Firms may have the ability to do things they do not frequently do.” (p.83)</i></p>
2010	Barreto I.	Dynamic capabilities: A review of past research and an agenda for the future.	Journal of Management, 36(1), 256—280.	<p><i>The dynamic capabilities approach was built around “...several main elements that highlight its major theoretical underpinnings (nature, role, context, creation and development, outcome, and heterogeneity).”</i></p> <p><i>“...specified the desired end (i.e., the role) of this special capability as being to integrate (or coordinate), build, and reconfigure internal and external capabilities. Herein, [Teece et al. (1997: 516)] they assumed an evolutionary economics perspective (Nelson & Winter, 1982) by enunciating the role of routines, path dependencies, and organizational learning.”(p.4)</i></p>
2010	Di Stefano, Peteraf, and Verona	Dynamic Capabilities Deconstructed. A	Industrial and Corporate	<i>Not mentioned</i>

		bibliographic investigation into the origins, development, and future directions of the research domain.	Change, 19(4), 1187-1204.	
2012	Giudici and Reinmoeller	Dynamic capabilities in the dock: A case of reification?	Strategic Organization, 10(4), 436-449.	<i>Not mentioned</i>
2013	Vogel and Güttel	The dynamic capability view in strategic management: A bibliometric review.	International Journal of Management Reviews, 15(4), 426-446.	<i>“Streamlining research in this field would lead to a better understanding of the micro-foundations of dynamic capabilities. It would also help elucidate the field’s central theoretical concept, and thus consolidate the field’s identity, by drawing on (a) the interaction between top-management cognition, (b) strategic decision-making and (c) routines and practices for reconfiguring the firm’s resource base.” (pp.441).</i>
2013	Peteraf, Di Stefano, and Verona	The elephant in the room of dynamic capabilities: Bringing two diverging conversations together.	Strategic Management Journal, 34(12), 1389-1410.	<i>Not mentioned</i>
2013	Wilden, Devinney, and Dowling	The Architecture of Dynamic Capability Research: A Scientometric Investigation.	Academy of Management Proceedings (Vol. 2013, No. 1, p. 11807	<i>Not mentioned</i>
2014	Eriksson T.	Processes, antecedents, and outcomes of dynamic capabilities.	Scandinavian Journal of Management, 30(1), 65-82.	<i>“Most of the studies conceptualizing Dynamic Capabilities as specific processes focus on product or technology development and transfer, although some emphasize inter-organizational collaboration and capability acquisition, organizational restructuring or business-model adaptation” (p.69). “Firms use various knowledge-integration strategies, many of which rely on organizational interaction and collaboration routines.” (p.70) “In analytical terms it is connected to absorptive capacity in that organizations with such capacity are better able to make use of the knowledge at their disposal. The sharing of tacit knowledge, in particular, is essential in the interaction between individuals. Therefore, overcoming</i>

			<i>communication barriers is vital for knowledge utilization.” (p.70)</i>
2016	Wilden, Devinney, and Dowling	The Architecture of Dynamic Capability Research Identifying the Building Blocks of a Configurational Approach.	Academy of Management Annals, 10(1), 997-1076.
			<i>Dynamic Capabilities are essentially a multilevel phenomenon spanning individuals, groups [teams], business units, organizations, and alliances, and that much of the definitional confusion arises from a failure to account for the interactions across levels and between contexts.”(p.1027)</i>

Hence, collaboration under the dynamic capabilities framework emerges from the interaction and build-up of experience, skills and technical knowledge processes (Deeds et al. 2000), and depending on the firm’s activity, it means based on “what the firm does and what it does it with” (Zahra et al. 2006); it involves changes in their environment that encourage the organization to evolve (Wang and Ahmed 2007); and entails a coordinated and active organizational condition of interaction with its context (Easterby-Smith et al. 2009). Hence, the organizational shift, dynamic capability, fostered through the interaction of the firm’s internal operational conditions with its context; in sum, through the tangibility of resources and consistency of continual efforts according to the circumstances (Arend and Bromiley 2009). Dynamic capabilities integrate internal and external collaboration activities in different dimensions of the firm, related to its operations, goals, context, processes of creation, development and outcome, by including the stakeholders in its ecosystem (Barreto 2010). Finally, dynamic capabilities provide the framework for the understanding of a multilevel phenomenon that (1) arises from the interplay between top-management cognition, strategic decision-making and the incentive of flexible routines and coordinated practices (Vogel & Güttel, 2013); (2) emphasizes intra-organizational (internal) and inter-organizational (external) collaboration through routines that allow the exchange of knowledge (Eriksson, 2014); and (3) is influenced by the context of the technology-based startup (Wilden et al., 2016).

Technology-based startup teams, as a social group, require the collection and integration of diverse activities and functions to consolidate the organization of the technology-based startup. These activities and functions can be exchangeable and specific, where each team member undertakes tasks that are distributed for operational purposes. For instance, in R&D, new product development routines and quality control

routines are shared and distributed among the available team members (Eisenhardt & Martin, 2000).

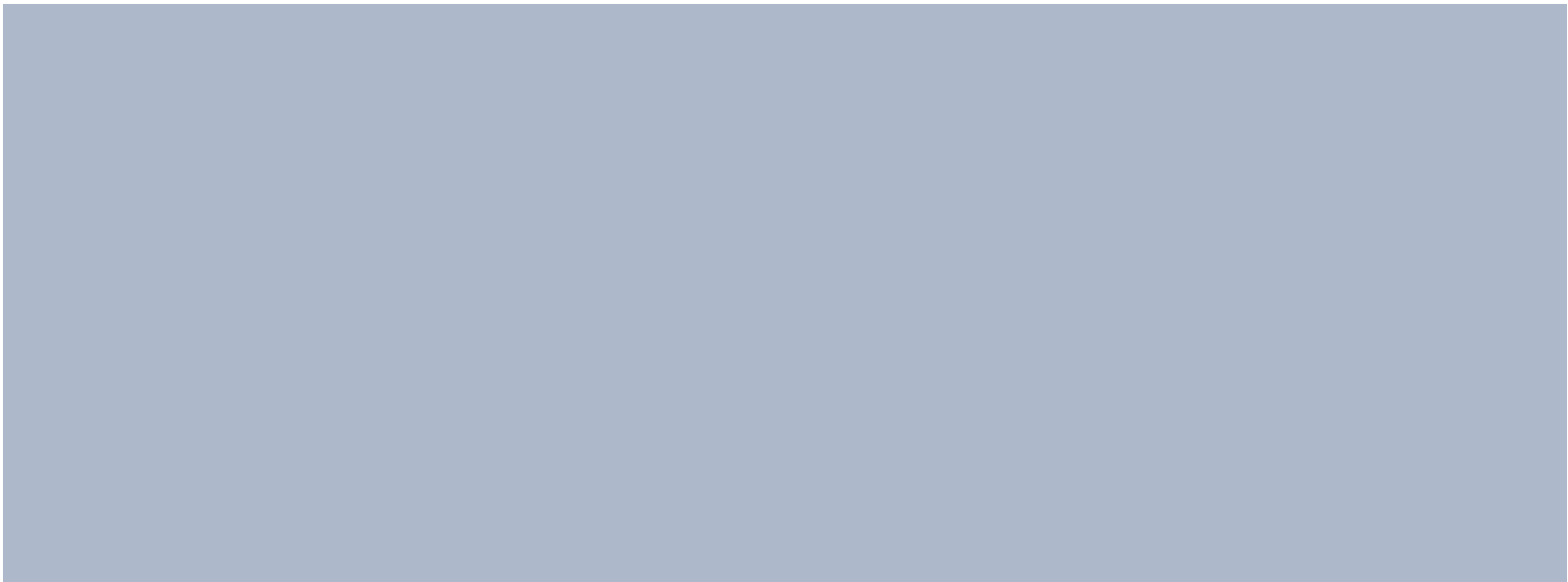
3.6. Brief discussion

The main objective of this chapter was to explore through the DCs as framework, linking collaboration capabilities (CCs) with the role of TBSs teams' intra-collaboration. DCs have often been understood as a collection of rapidly buildup capabilities that allow the company to make subsequent changes and adaptations in response to the surrounding market circumstances (Leonard-Barton 1992; Teece et al. 1997). Many empirical studies conceptualize the use of specific DCs related to procurement (Zollo and Singh 2004), new product development (Deeds et al. 1999; Marsh and Stock 2003; Pavlou and El Sawy 2011), alliances (Zheng et al. 2010; Zollo and Singh 2004), R&D and commercialization (Lin et al. 2011), the joint development of new products (Helfat 1997; Green et al. 2008), knowledge management (Alegre *et al.* 2011), and entrepreneurial and innovation orientation (Zahra et al. 2006).

While *routines* are predetermined, repetitive, specific, and standardized activities, such as those performed in production processes; *interactions* are more related to connectivity and coordinated contact (networking) between two or more members. Regardless which are their activities and interactions can be studied with two levels of intensity and frequency (Yli-Renko *et al.* 2001). Finally, *sentiments* are emotions, motivations and attitudes which derive to generate and adopted knowledge and skills that cannot be measured but can have an impact upon both activities and interactions (Loasby 2002, 2006). These can be modified through the time by the individual and the team as consequence of collective outcomes.

Meanwhile, a capability is the TBSs' processes and functions combined by the organizational resources in order to obtain an expected outcome. Then Dynamic Capabilities building in TBSs teams enable through willing and positive behavior and the series of constant interactions that take place in team collaboration capabilities. They should produce good organizational outcomes as long as they work together and combine their individual skills. The TBS team's activities, together with their coordinated

interaction, are entrepreneurial components of their organization, which constitute drivers oriented to mobilizing the available resources, spotting new opportunities and assessing potential markets. In the following Chapter 4 we define the concept of Team Collaboration capabilities (TCCs) and describe its implications for TBSs.



CHAPTER 4

Conceptualizing TBS Team Collaboration Capabilities (TCCs)

4. Conceptualizing TBS Team Collaboration Capabilities (TCCs)

Introduction

This chapter is dedicated to explain the theoretical concepts proposed in this empirical studio, collaboration capabilities (CCs) usually addressed the activities of individuals, groups, teams or the entire organization (the TBS) with regard to other organizations and the establishment of a collaboration relationship. In this study our focus is on intra-organizational collaboration interactions, i.e., in the collaborations established between the members of the TBS team.

In studies of both organizational and innovation teams, the entrepreneurial element activities involve a collection of knowledge and synergies. These factors and elements constitute the resource-base of the organization's operation and are essential resources for the TBS (Eisenhardt 2013; Klotz *et al.* 2014). Since innovation involves a set of factors to produce a novelty, among them there are the willingness, expertise, and coordinated interaction that lead collaboration. This chapter pursues depth and extended theoretical explanation of the *team collaboration capabilities* (TCCs) as a factor that support the TBS innovation performance. According to (van Wijk, Jansen, and Lyles 2008 Collaboration

constitutes an essential and strategic condition inside TBS teams, that sustain and create their competitive advantage.

Considering, that capabilities comprise a set of specific and recognizable routines (behavioral actions) and processes such as product development, strategic decision-making, and external integration through collaborations (Eisenhardt and Martin 2000). Also, the origin of new capabilities depends on the organization ability to develop an efficient organizational and operative structure it is simultaneously linked to external conditions (Helfat and Lieberman 2002). Then, a capability is supported by the TBS organization which essentially is integrated by the team's members (with their skills, expertise, abilities), technologies and other facilities interaction constitute the resource-based. Altogether, sustain the operational capabilities and tactical internal activities that led by their strategies towards innovation performance.(Amit and Schoemaker 1993; Loasby 2002; M. Zollo and Winter 2002; Winter 2003; Teece 2010b; Felin et al. 2012). Therefore, TCCs allow the TBS to identify and develop new, special capabilities for adapting operations rapidly, DCs, to turbulent market conditions. DCs suppose an improvement of internal key structures that can be similar among different firms, and are recognized as *'best practices'* in innovation environments. For instance, DCs in high-velocity environments are simple, experiential and interactive processes, whereas in only moderately dynamic markets, they are analytic routines that depend on existing knowledge (Nonaka et al. 2000; Eisenhardt and Martin 2000).

4.1 The technology-based startups organization as a team

The TBS team considers the organization and its innovation as a whole. The concept of team and entrepreneurial team could emerge within, across or outside a firm or institution, such as an university, research institution or industry (Harper 2008). According to Hoegl *et al.* (2001) a team is: “... *a social system of three or more people, which is embedded in an organization (context), whose members perceive themselves as such and are perceived as members by others (identity), and who collaborate on a common task work*” (Hoegl and Gemuenden 2001, 436; Lechler 2001). The concept of team reflects grouping people in a specific context with interesting attributes such as complexity, adaptive capacity and dynamism (Harris and Harris 1996; Ilgen et al. 2005). Its context is related to the entities to which they belong, these can be management teams of business units and top management

teams of startups (Eisenhardt 2013; Kraiczy *et al.* 2015; Bjornali *et al.* 2016). In new companies all team members have to define their individual roles, including different tasks and relations where aspects like trust are crucial. The entrepreneurs themselves have to legitimize their roles within the ‘*microrealm*’ of the social system by conforming to existing images and stereotypes, and by defining their own rights and duties. The TBS management teams are particularly influenced by an active interaction and integration, with other resources of the firm, and defined responsibilities according to their scientific and technical backgrounds (Eisenhardt and Schoonhoven 1990; Eisenhardt 2013; Klotz *et al.* 2014; Bjornali *et al.* 2016). The TBS teams are shaped according to their innovation needs and are nourished by their ecosystem, through interacting with external actors -specially intermediaries- that facilitate resources to support the innovation, such as government agencies, incubators, accelerators and investors (Carayannis and Von Zedtwitz 2005; Kohler 2016; Battistella *et al.* 2017). Various authors also highlight the positive relationship between their operational autonomy and their organizational and strategic performance (Harris and Harris 1996; Kim and Srivastava 1998; Srivastava *et al.* 2006).

Teams are conceived as an organizational units and also as an “entrepreneurial resource” inside a corporation or large firm (Penrose 1952; Srivastava *et al.* 2006). Over time, team members and their environment involves strategy design and execution activities to address uncertainty and complexity, even for the strategy performance. When TBS teams interact with their context, they configure particular synergies among their members and these create new inputs and processes (Ilgen *et al.* 2005). Entrepreneurial teams usually come from interactions between individuals coming from high-technology industries (Vyakarnam *et al.* 1999).

The entrepreneurial team is also referred to other terms such as ‘top management teams’, ‘new ventures teams’, ‘founding teams’, ‘startup teams’ and ‘technology-based teams’. Cooney (2005) defines an entrepreneurial team as ‘*two or more individuals who have a significant financial interest and participate actively in the development of the enterprise*’ (p.229). Thus, ‘the financial interest’ represents the exchange of professional activities and expertise as expected recognition from the business benefits. The founders are individuals that take part in an entrepreneurial venture and constitute human capital and valuable resources of the TBS. Harper (2008) highlights the role of ‘a common goal’ defining an entrepreneurial team as “*a group of entrepreneurs with a common goal that can*

only be achieved by appropriated combinations of individual entrepreneurial actions” (p.614). It is worthwhile to note that the entrepreneurial team could emerge within, across or outside another firm or institution, such as a university, research institution or industry as result the individual networking (Harper 2008).

A more broad definition proposed by Schjoedt and Kraus (2009) maintains that “*An entrepreneurial team consists of two or more persons who have an interest, both financial and otherwise, in and commitment to a venture’s future and success; whose work is interdependent in the pursuit of common goals and venture success; who are accountable to the entrepreneurial team and for the venture; who are considered to be at the executive level with executive responsibility in the early phases of the venture, including founding and pre- start up; and who are seen as a social entity by themselves and by others.*” (p.515). This definition emphasizes the pursuit of common responsibilities in objectives and the management of the team, and infers a level of equity among the members to the teamwork performance.

As mentioned, TBSs are more commonly performed by teams or groups than by single individuals. Klotz *et al.* (2014) describes the ‘new venture team’ as ‘*the group of individuals that is chiefly responsible for the strategic decision making and ongoing operations of a new venture*’ (p.227). Ideally all the team members ‘actively’ participate and contribute to the development of the organization and operations implementation. Specifically, team members define the guidelines of the business plan and strategy, organize the vision and mission of the TBS, attract investment and recruit talent, among other activities (Berry 1998; Chesbrough 2010; Rohrbeck *et al.* 2013; Klotz *et al.* 2014).

Technology-based teams (TBTs) require concentrated, complex and diverse collective efforts. These efforts consist of two or more individuals who hold and share responsibility for the firm and actively exerts an influence on strategic decisions (Harper 2008; Zahra, Sapienza, and Davidsson 2006; Eisenhardt and Schoonhoven 1990; Khan *et al.* 2014). Innovative teams have been conceptualized as an organizational ‘mechanism’ for combining diverse expertise and skills from individuals who agreed to perform specific tasks in coordination with others, under complex and uncertain conditions in order to achieve their goals (Hoegl and Gemuenden 2001). The efficiency of the team is crucial in

activities related to the delivering of sophisticated services, developing new products, and determining the strategic direction of the organization (Cohen and Bailey 1997).³

4.2 TBS Team collaboration capabilities

The team collaboration capabilities (TCCs) in the core of TBS organization comprise a high and complex concentration of interaction factors produced by and between each team's members. Therefore, TCCs is the group of interactive factors developed, at multidimensional levels; this means that they are performed among the team's members from individual and team level. Altogether supports the TBS team as the organizational and operational duties (Jassawalla and Sashittal 1998).

Added to the above exposed, there are other concepts that refer to several interdependent functions related to collaboration in teams and its functions and benefits. For instance, collaboration in teams contributes to the overall goals of the organization. Inside the TBS organization the integration and production of collective knowledge activities are linked to the team members' interactions (Lechler 2001) On the other hand, Pinto et al. (1990) build a definition to explain '*cross-functional cooperation*' which is "*the quality of task and interpersonal relations when different functional areas work together to accomplish organizational tasks*" (p.203). Consequently, the term of 'team collaboration' refers in this particular to the team's members' joint efforts, where diverse knowledge, expertise, and abilities interaction, with a different mindset, agree to work collectively. Altogether, linked to technologic interaction and organizational routines fit in the 'team collaboration capabilities' that enabling the operational functions of the TBS to accomplish the innovation performance as a common goal.

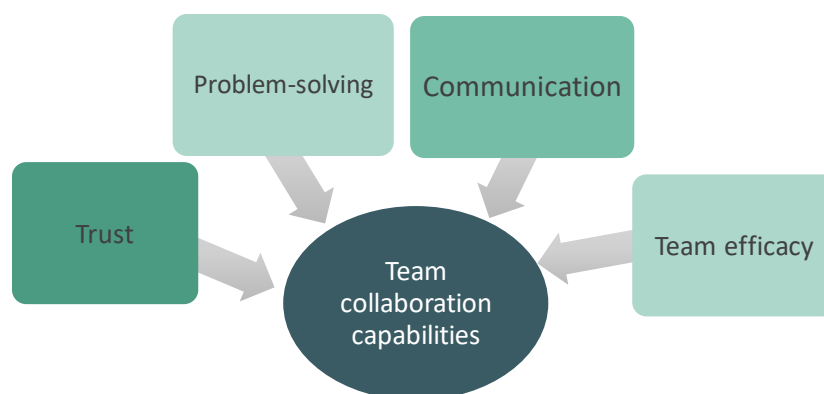
According to Lechler (2001), the social interaction among innovation team members defines the level of collaboration within team's members. Lechler (2001) identifies six levels of interaction among the members in a technology-based team for innovation terms is measured through six components: (1) *communication*, this consider sharing and receiving (exchange) of information; (2) *cohesion*, relates the level of integration and level they want to remain together in team or group; (3) *work norms*, these are defined as social-

³ We deepen the discussion about TBS team formation and team's members' characteristics in Appendix 2, p. 196.

framed conditions and expectations regarding the behavior of other members at task level; (4) *mutual support*, the collaboration in the team depends on the cooperation of each team member. (5) *Coordination*, it comprises on a collective, harmonized and synchronized group of activities, subtasks, tasks and routines, defined in time period, with a specific budget and defined deliverables. Finally, the (6) *conflict resolution*, the handle problem solving in dynamic environments becomes highly relevant in team's interaction because their effects on the team performance (Lechler 2001). In addition, Nissen Aarøe et al. (2014) denote teams' collaboration and teamwork share a similar meaning, both involves strong linkages and interdependency between the team members. Particularly, TBS operation processes need heterogeneous team with a high level of integration, where trust plays an important factor to share knowledge.

Teams interaction is underlined by an intra-organizational collaboration that follows informal aspects among the team's members, especially the role of informal communication and direct interaction. 'Collaboration' in team has been referred as team integration (Swink 1999), and communication and problem solving in cross-functional cooperation (Pinto *et al.* 1993). Then, Holton (2001) implies it is necessary to have solid foundations of trust and collaboration in teams. Also, Järvenpää and Leidner (1998) consider trust and communication to be team success factors among the members' interaction. On the other side, according to Costa (2003) as well Khan *et al.* (2014) consider team trust, diversity impacts the team performance. Finally, Jansen *et al.* (2015) Jansen et al. find team cohesion and team efficacy support the team members to overcome challenges together. Under these elements, we build the '*Team Collaboration Capabilities*' (TCCs) model in figure 4.1.

Figure 4.1 TBS team collaboration capabilities construct



To capture of the complexity of TBS teams our model includes four dimensions of team interaction factors, such as trust, communication, problem-solving and team efficacy.

4.2.1 Trust in teams

The concept of trust within teams relates to both individuals and the team. It comprises the behavioral intention of 'good will' and openness, and is bidirectional between individual and individual, individual and group, and individual and organization. Trust must be mutual within teams and addresses one's perception of his/her partner. For instance, "*if one believes that a partner is trustworthy without being willing to rely on that partner, trust is limited*" (Morgan and Hunt 1994, p.23). Trust within teams is a condition for team collective efficacy (Ilgen et al. 2005). On the one hand, team members need to feel confident in the teamwork and feel that the team can perform competently enough to accomplish their objectives. On the other hand, the team members should also feel safe, meaning that they believe that the team will not harm their individual interests. For Ilgen et al. (2005), faith in the competence of the team is conveyed by the constructs of potency, collective efficacy, group efficacy, and team confidence.

The definition of trust in organizational behavior is conceived as a "*social construct*" (Fulmer and Gelfand 2012) existent in every individual's interaction, relationships, embedded in activities with other actors, teams, groups and organizations of their business ecosystem. Trust role is essential in the way to build reliable interpersonal relationships, business, trade and exchange to sustain individual and organizational effectiveness (McAllister 1995). Also, trust at individual level hold attributions and motives that emphasize trust higher is more positive at workplace where behaviors and attitudes make easy open communication and information sharing (Costa 2003; McAllister 1995).

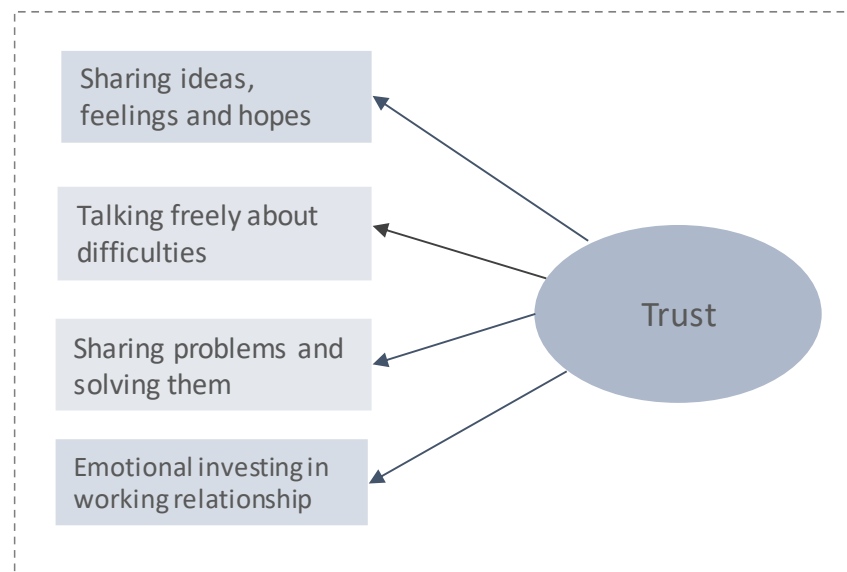
To frame trust in team Marschak affirms in his book "Elements for a Theory of Teams" that the decision making is a group task (Marschak 1955). Later he points that is the manager's task, as the principal actor of decision-making, and his decisions are founded by the consistent group interests, tastes, and beliefs. His work describes the problem of

organizations, where there is a unipersonal decision-making process under uncertainty and how there will appear alternative choices for the ‘decision-maker’, (the manager). The ‘trust’ condition is essential, trust becomes the base into a collective condition of confidence that give place to “wishful thinking” and “persecution mania”, both give motivation for action. Finally, the decision-maker obeys the rules of logic (Jacob *et al.* 1972).

Reflected on their Holton (2001) considered trust in teams is linked to the collaborative learning-integration processes, where individuals feel free of constraint and open in sharing insights, concerns, ideas, and opinions. Trust comprises to keep a reciprocal faith among the participants of a team, and in organizational and entrepreneurial environments it is often related to “competence, credibility, confidence, faith, hope, loyalty, goodwill, and reliance” (Blomqvist 2002; Prieto *et al.* 2009). Team members that actively participate to share, exchange, combine, transform and build the basis of a flexible organization (Prieto *et al.* 2009). However, according to Morgan *et al.* (1994) when trust is attached to a team opportunistic behavior, the individual short-term interest is resigned by the group long-term interest (Morgan and Hunt 1994; Prieto *et al.* 2009).

Trust is a crucial component in business and entrepreneurship teams that aims innovation; however, this lies in the joint effort and in the will of each individual and altogether represents a real impact in the team performance, as a whole, (McAllister 1995). Khan *et al.* (2014) identify ‘affective trust’ in entrepreneurial teams as trust linked to care, concern and emotional bonds. The presence of “affective *trust*” among diverse members affects team performance because it influences proactivity, commitment, and involvement level. The team member relationships (see Figure 4.2) are shaped by each individual’s perceptions, based on feelings and beliefs that motivate his or her participation in the group (Pennings and Woiceshyn 1987; Khan *et al.* Schwarz 2014).

Figure 4.2 Trust in TBS teams' model sub-construct basis according to Khan *et al.* (2014)



4.2.2 Communication and problem-solving in team

The team's members' activities lead different processes and multifunctional interactions, internal and external, that support the TBS operations. Pinto *et al.* (1990) defined that communication and problem solving are relevant factors that support '*cross-functional cooperation*' in the team. The cross-functional cooperation refers to the continuous exchange of activities among R&D, manufacturing and marketing as inter-faces functions that lead to more effective new product development (NPD)(Song *et al.* 1997; Pinto and Pinto 1990). The cross-functional teams bring together different experienced individuals whose expertise contribute to relevant improvement in the NPD (Eisenhardt and Martin 2000; Ehrhardt *et al.* 2014). This is because communication is a significant factor that facilitates a participatory behavior among the team's members leaded by spontaneity, freedom of expression, sharing ideas and, knowledge creation that produce creative solutions for internal and external problems (H. Lee and Choi 2003; Clarke Højbjerg, Nissen Aarøe, and Rostgaard Evald 2014). Pinto *et al.* (1990) considered that the cross-functions in a team demand a multiple information and sometimes routines exchange among individuals in a group, it produce *cooperation* or *collaboration* that aims the NPD.

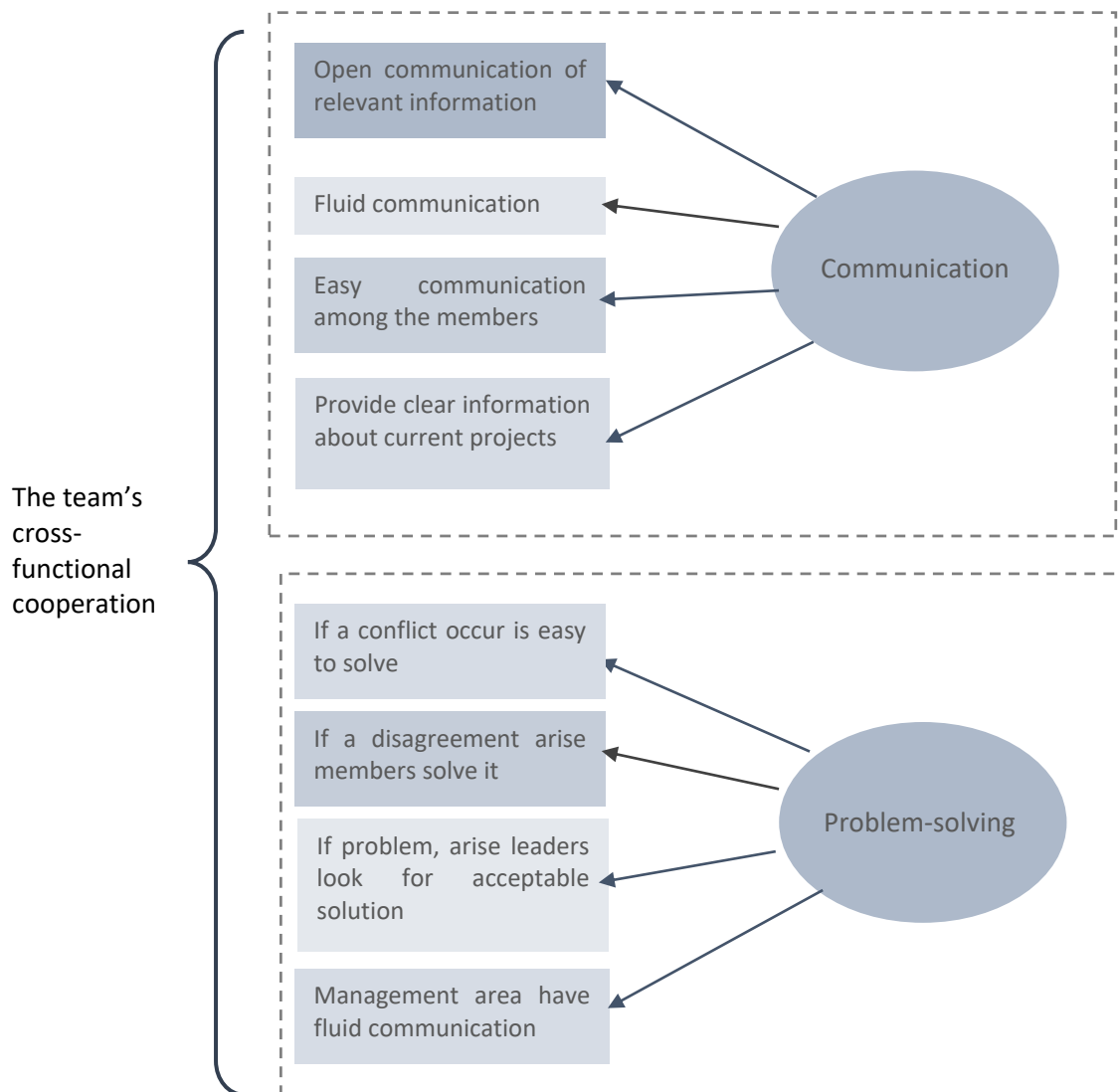
Team communication and problem-solving support the collective work in projects and stimulate the trust among its members. Pinto *et al.* (1990) identify three types of communication such as, (1) internal and external, this means a bi-directional condition inside and outside the team; (2) formal and informal; it obeys a multilevel exchange among

the individuals and between organizations, that work in collectivity; and (3) written and oral communication, it refers to the type of communication, like the use technological systems or face-to-face. These means that communication is an organizational factor that shape and influence in the organization interaction (Becker-Beck 2005; Pentland et al. 2012). Moreover, high levels of communication and the capacity to solve problems in the team increase trust and willingness to face other issues in collectivity. Therefore, communication and problem solving through direct and informal contact also contribute to building cohesiveness in a team (Pinto and Pinto 1990).

On the other hand, Lechler (2001) studied communication and problem-solving, as a relevant conflict solution, both as components of social interactions within the entrepreneurial team. In the meantime, the communication bridges the social interaction with the information exchange. While, problem-solving is related how the team's interaction overcome rising conflicts, particularly in situations under pressure and dynamic contexts. Problem-solving is required for special conditions where intense interactions regarding knowledge generation, knowledge integration and knowledge reconfigurations for new product development (NPD)(Prieto *et al.* 2009; Pavlou and El Sawy 2011). The problem-solving actions includes problem recognition, knowledge application to solve problems, and further ideas generation for another NPD. Both factors' quality depends on the frequency, formalization, structure and openness of the information exchange.

Team communication and problem-solving require a willingness and disposition to solve conflicts and problems. Figure 4.3 illustrates how both communication and problem solving contribute to the team's cross-functional cooperation.

Figure 4.3 The teams' cross-functional cooperation model subconstruct basis according to Pinto *et al.* (1990)



4.2.3 TBS Team efficacy

The collective efficacy refers to the team members believing that they have the abilities and group capacity to overcome obstacles and achieve their goal(s) (Cohen and Bailey 1997). Team efficacy in the context of entrepreneurial efforts refers to how the group executes and coordinates their collective efforts to address challenges (Edmondson 1999; Arnold *et al.* 2001; Jansen *et al.* 2015)

On the one hand, self-efficacy has been conceived as a predictor condition of entrepreneurial intentions. Drnovšek *et al.* (2010) focus their analysis on “*entrepreneurial self-efficacy*”, which is rooted in the individual’s beliefs and motivations that support the

initiative to found a business or start a business expansion processes (Krueger 1993; Drnovšek *et al.* 2010; Tyszka *et al.* 2011; Hattab 2014). Entrepreneurial self-efficacy is founded in three dimensions at business founding process. The multidimensional condition of their study comprises the individual self-efficacy from (1) personal perception and beliefs about an individual perception of their abilities to establish a team for business intentions, (2) focusing on specific tasks to accomplish their entrepreneurial goals and (3) the capacity to control positive or negative perceptions. Moreover, Tan *et al.* (2013), maintain that the entrepreneurial intentions and self-efficacy are important resources that reinforce the business consolidation.

Self-efficacy at an individual level, and among the individuals, that taking part in a group, allows a mutual belief and confidence to complete the business goals. Moreover, when it is present and shared in collectivity is a valuable condition and entrepreneurial resource that trigger positive relationships and reduce negative perceptions. Particularly, it has to be reinforced by the team management and leadership. The team efficacy strengthens the problem-solving, decision making, and reinforces the commitment to the team members (Tan *et al.* 2013; Tyszka *et al.* 2011).

Another perspective on team efficacy sees it as ‘*a group’s collective belief that it can successfully perform a specific task*’ (Jansen *et al.* 2015, p.2). It also means the collective perception that together as an integrated group can achieve their goals together. When the team holds enough cohesion and motivation both facilitate the knowledge exchange through communication and solve difficulties. Therefore, both are essential team factors where the team can deal together with unexpected problems and increase their commitment (Hoegl and Gemuenden 2001; Jansen *et al.* 2015; Bjornali *et al.* 2016). Furthermore, Jansen *et al.* reaffirms that efficacy, from a socio-psychological perspective, stimulates perseverance, stamina and competence among team members. Also there is a general perception to distribute and integrate the available resources to perform their tasks. The figure 4.4 shows the team efficacy construct as the explanatory variable with its respective items

Figure 4.4 Team efficacy subconstruct basis according to Jansen *et al.* 2015



4.3 TBS Team operational capabilities

The operational capabilities (OCs) are a set of resources of the firm (skills, processes, and routines) planned to effectively develop the functional activities of the firm. The OCs development are a consequence of well-established learning processes in the firm organization (Zollo and Winter 2002; Zahra ,*et al* 2006). In a nutshell, they are essential functions of the operations of the TBS, they constitute the foundation of entrepreneurial activities and execute its strategy. As well, they are conceived as the activities or routines that pursuing create value, through its identity and profit (Zollo and Winter 2002; Zahra *et al.* 2006; Bustinza *et al.* 2010; Wu *et al.* 2010). OCs are also known as ‘*ordinary capabilities*’ or ‘*zero order capabilities*’ defined as moldable capabilities that enable operative adaptability (Winter 2003). In other words, the OCs represent the functional engine at the core of the TBS.

The OCs involves entrepreneurial operative and specific activities that constitute the TBS’ functions. The technical capability (TC) is associated with the TBS’ abilities and processes, that apply scientific and practical knowledge, center on the development and improvement of the TBS’s product or service. Moreover, TC is also related with information processing, being likely learning, adopting and applying data and knowledge abilities (Zahay and Handfield 2004). Then, marketing capability is an integrative capability focus

on product placement, promotion, distribution and pricing strategies (Kahn and Mentzer 1998). And the managerial capability constraints the TBS' organizational behavior and resources coordination, considering it also is an integrative capability. The managerial capability emphasizes also technology-push strategies linking on the other two previous capabilities -technical and marketing capabilities to bridging their innovation to the market (Paradkar *et al.* 2015).

When we relate OCs as functional activities, the question who perform them is popping up. The “organizational capabilities meet the conditions, articulated by the resource-based view of the firm, for being a source of sustainable competitive advantage” (Collis 1994, p.143). In a TBS is the team who execute the OCs activities to support its innovation. Hence, the team's available resources should be effectively coordinated with their operational capabilities (OCs) that pursuing the innovation performance (Gotteland *et al.* 2016). The team enables the OCs to perform specific activities and allows its functionality as an innovative and business entity.

Many scholars have made efforts to articulate the distinction between operational and dynamic capabilities (DCs). Li *et al.* (2008) consider there is a ‘*thin and blurry*’ line separating OCs and DCs because both bearing exploration-exploitation activities toward its innovation performance (Teece and Pisano 1994; Eisenhardt and Martin 2000; Zollo and Winter 2002; Winter 2003, p.992). Therefore, both constitute in less or more grade an internal source of the TBS' competitive advantage (Teece and Pisano 1994; Pavlou 2002; Schneckenberg *et al.* 2015).

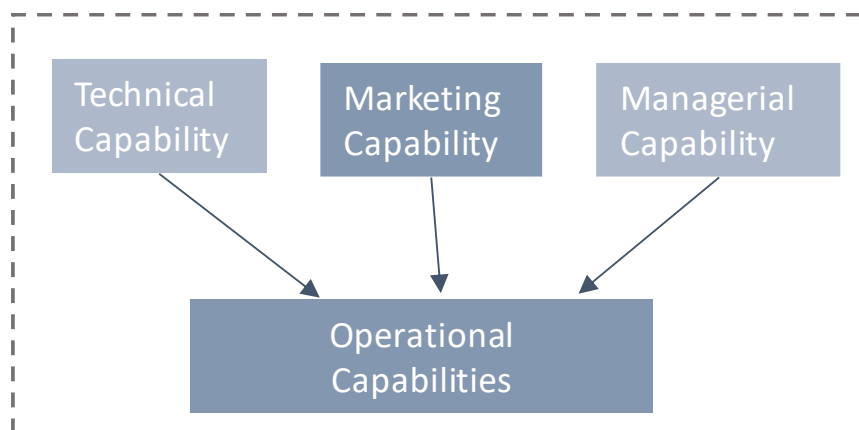
TBS team OCs are built, like other capabilities, over time and particularly in turbulent market conditions. The urgency implicit in the development of new product, means that OCs are often created under pressure of time.(Gotteland *et al.* 2016). Despite the upgrading OCs have over the time they still embrace the essential core of entrepreneurial activities. When the OCs evolve rapidly (DCs) continue shaping the innovation activities and functions into the future.

Because the unstable markets and aggressive competition the TBS have to increase specialize and effective action in its OCs, in specific areas or capabilities such as *marketing, technical development, and management*. The OCs specific capabilities focus on bridging

the innovation to the market. Each capability integrates the OCs is complementary to each other, when they focus on new product development through learning processes, such as technical activities such as gathering information, adaptation, application and adoption (Pavlou and El Sawy 2011). Also, OCs engage the existing resources according to their business demand (Zollo and Winter 2002; Winter 2003; Cepeda and Vera 2007; Knight and Cavusgil 2010; Pavlou and El Sawy 2011). The OCs are known as ordinary capabilities, the uncertain market conditions incentive new capabilities building or leveraging the improvement of current capabilities, identified as dynamic capabilities (DCs). The DCs building denotes capabilities of the organizational shifting or adaptability according to the market demands (D.J. Teece and Pisano 1994; K. M. Eisenhardt and Martin 2000; M. Zollo and Winter 2002; Winter 2003, p.992).

To integrate OCs as the TCCs moderating factor to the TBS innovation performance, we consider the model proposed by Pavlou and El Sawy (2011). The OCs construct gathers the three essential and complementary capabilities: marketing, technical and managerial capabilities respectively. These three capabilities constitute the OCs formative second-order model represented in the figure 4.5.

Figure 4.5 Operational capabilities (OCs) according to (Pavlou and El Sawy 2011)



4.3.1 Technical capability

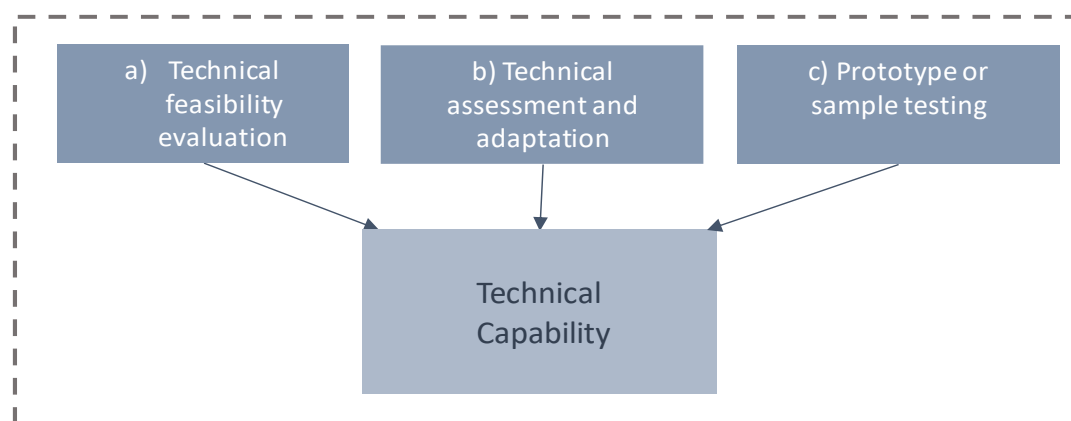
Particularly in innovation environments, technological advances and progress are founded on technical and scientific tacit knowledge (Zahay and Handfield 2004). The TBSs focus on innovation through the development of sophisticated products and services. This

demands the integration of a wide variety of expertise and implications regarding intellectual property (Adner and Levinthal 2001; Rodan 2002; Kaiser and Müller 2015). The TBS has to develop a specialized capability to enable technical design and manufacture processes to meet the expectations of potential customers. *Technical capability (TC)* represents the overall ability to develop new products and services that assimilate new technologies, in accordance with the firm's vision.

Technical capability (TC) encompasses the ability to administrate information and deploy valuable data through different communication process and instruments (software or hardware). Also, it provides information and implements and produces new knowledge translated into intellectual property. Indeed, is through the team members' experience, abilities, and interaction with technology that integrate this capability in the organization (Zahay and Handfield 2004).

Figure 4.6 shows the TC subconstruct, as subsidiary construct, that complements the OCs construct. The technical capability construct is represented by technical routines that support important stages of the NPD: a) technical feasibility evaluation, b) technical specifications' assessment and adaptation, and c) prototype or sample testing (Pavlou and El Sawy 2011).

Figure 4.6 Technical capability subconstruct (Pavlou and El Sawy 2011)



4.3.2 Marketing capability

The challenge in dynamic markets lies on accomplishing the innovation performance with an effective organizational orientation to the market. In the context of TBSs, marketing capability has been referred to by different scholars as 'market knowledge'

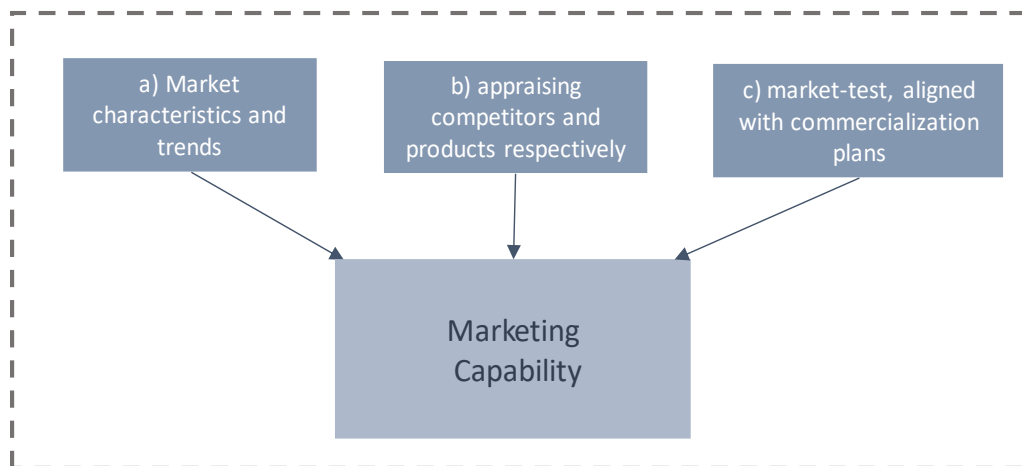
or ‘customer capability’ (Zahra and Nambisan 2011). The marketing capability supports the sizing of opportunities, the learning and adapting capabilities to the TBS innovation performance. Particularly the TBS market’s competition demands a high resourcefulness, effectiveness and rapid growth in global innovation ecosystems.

The *marketing* concept is attributed to Peter Drucker (1954) who highlighted customer satisfaction as the ultimate business goal. The term of innovation-driven involves the TBS activities aims. Also the TBS market orientation links the NPD adjustment to the client needs and supported by these three OCs capabilities: marketing, technical and management. The market orientation is positively associated with superior performance, and requires excellent skills in understanding and satisfying customer needs (Day 1994). It is based on the following structures:

- *“A set of beliefs that puts the customer’s interest first (Deshpande, Farley, and Webster 1993),*
- *The ability of the organization to generate, disseminate, and use superior information about customers and competitors (Kohli and Jaworski 1990), and*
- *The coordinated application of interfunctional resources to the creation of superior customer value (Narver and Slater 1990; Shapiro 1988; Day 1994, p.37)*

Day (1994) maintains Drucker’s premise that a customer capability helps to understand the potential customers. However, marketing capability integrates a broadly view of the market than just customer it pursues strategic conditions in their normal operations. Marketing capability ensures that the TBS attends to market dynamics, maintains the market connection, and fosters new partnerships not only with customers, but also with suppliers and competitors, through its activities of advertising, pricing, selling and distributing. The Figure 4.7 represents the marketing capability subconstruct integrated the following routines: a) market’s characteristics and trends; b) appraising competitors and products respectively; and c) market-test accomplishment based on experimentation aligned with commercialization plans (Day 1994; Pavlou and El Sawy 2011).

Figure 4.7 Marketing capability subconstruct (Pavlou and El Sawy 2011)



4.3.3 Managerial capability

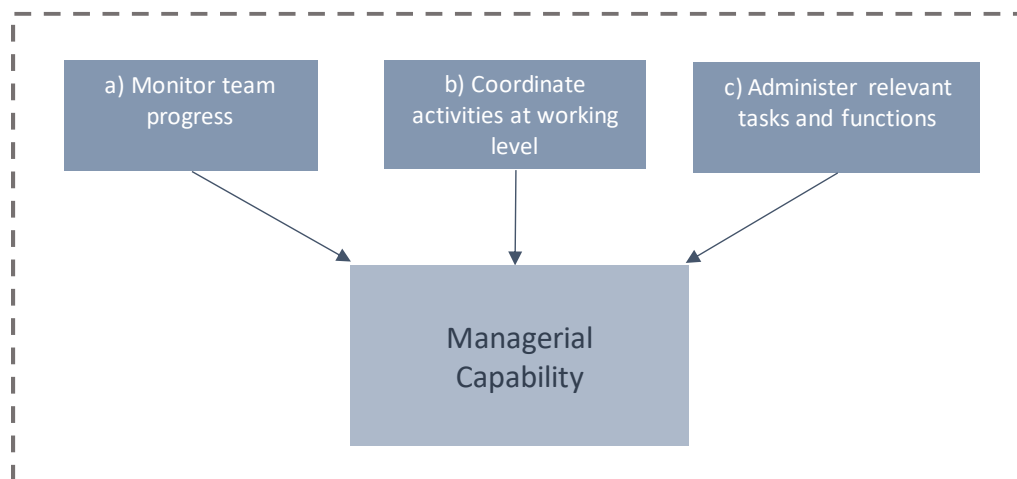
The firm's overall performance is supported by developing new technological products, identifying market opportunities, and performing managerial processes effectively (Teece *et al.* 1997; Cepeda and Vera 2007; Kauppila 2015). *Managerial capability* enables the coordination and reconfiguration of the cognitive capabilities – technical and marketing- through constant monitoring and strategic decision making (Helfat and Peteraf 2015). Managerial capabilities in a TBS are implemented through leadership and it runs from individual cognition or group cognition (according the type of leadership). Managerial capabilities contribute to develop different routines and processes that lead to higher new capabilities development (Felin *et al.* 2012). Moreover, managerial capabilities, includes internal processes that facilitate the identification, diffusion and implementation of new knowledge. Managerial capability involves the functional ability to coordinate, administer and activate technical and marketing capabilities at the operational level for NPD.

The decision making and strategy involves the TBS resources integration. Blomqvist and Seppänen (2003) define the DCs of the firm are integrative capability involves both external and internal. *“The internal integrative capability, involves the ability to diffuse, transfer, combine, and renew information and knowledge also at individual-, team-, and department-level, is at least as critical than external integrative capability for the firm to be able to constantly develop its capabilities and knowledge repositories”* (p.5). Managerial capability is an integrative capability, this means that it fosters collaboration and

exploration, encouraging learning processes at the operational level (Jarratt 2008). The TBS management team needs to engage in monitoring activities to transform information and knowledge into new products and to identify new market opportunities (Marsh and Stock 2003; Pavlou and El Sawy 2011).

The managerial capability subconstruct comprises actions that are linked with other functional areas inside the TBS and particularly marketing and technical activities supporting NPD (See Figure 4.8). Managerial capability links with those activities by, a) monitor team progress, b) coordinate activities at working level, and c) administer relevant tasks and functions.

Figure 4.8 TBS team's managerial capability subconstruct



4.4 Innovation performance

Innovation performance is commonly described through relationships between the innovative capacity, innovativeness and innovation stimulus as well as the efficiency and efficacy in the successful introduction of innovation in form of new products and services, organizational models or processes (Prajogo and Ahmed 2016; Neyens et al. 2010). Innovation performance embraces complementary synergies between operational capabilities and innovation processes which add value to the firm (Lawson and Samson 2001; Laursen and Foss 2003; Zizlavsky 2016).

To date empirical research on the innovation performance in TBSs from the perspective of dynamic capabilities is limited and shows controversial results, be either

positive or negative (Bruno and Leidecker, 1988; Hyytinen et al., 2015). Findings from a study conducted by Rosenbusch et al. (2011) indicate that new firms have unique capabilities to create and appropriate value through innovation, being those capabilities related to the way by which they operate and manage innovation processes. Since TBSs as smaller and highly entrepreneurial organizations can be expected to be more flexible and agile than established firms in operating when they pioneer innovations (Rosenbusch et al., 2011). Overall, young firms may benefit from the opportunities created by innovativeness due to their missing hierarchies, less rigid routines, nimbleness and quick decision-making (Kamm et al., 2003; Prieto et al., 2009). Such characteristics of TBSs increase the skills, abilities, and the quality of composition required of its core team management.

Various authors highlight the innovative behavior of TBS with respect to activities that demand that the organization learn, create, integrate, maintain, and combine knowledge in their operations. Hence, TBSs are considered as “*social communities that specialize in the internal transfer of knowledge*” being collaboration a key dimension in adding value to the organization (Kogut and Zander 1993; Felin et al. 2012). There is a consensus in the literature in recognizing that TBSs are equipped to develop, assimilate, and apply specialized knowledge to manage complex operations (Pinto and Pinto 1990; Jassawalla and Sashittal 1998). Then it is at the TBS’ team level where their organization and operations are orchestrated (Mumford *et al.* 2002; Teece 2012; Kapuruge *et al.* 2014) and may influence their innovation performance (Teece et al., 1990; Teece, 2012; Fernández-Mesa et al., 2012; Al-Aali and Teece 2014).

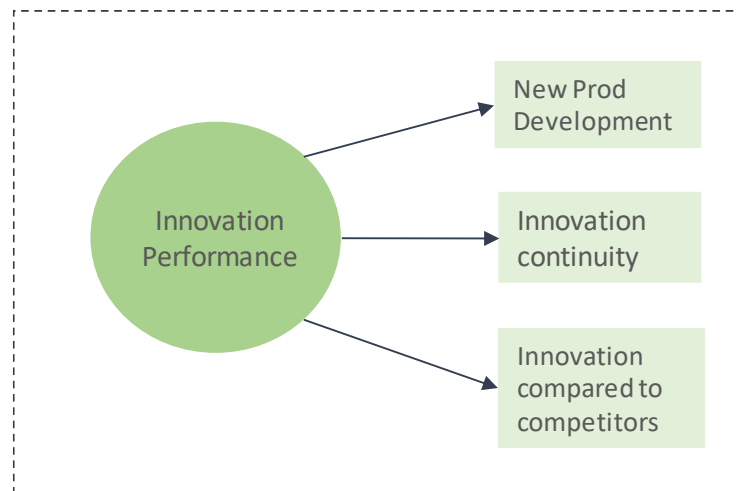
It is worth stressing that innovation orientation in a TBS is considered as synonymous with “innovativeness” (Kraiczky et al. 2015, p.4). Manu (1992) defines innovation orientation as a complex internal construct related to “innovative output (new products and processes), innovative effort (R&D) and timing of market entry” (p.334). His definition conceived ‘innovation’ as a necessary element to keep TBS on track of its market, it adds the ‘orientation’ concept as the direction or locus that comprises the internal innovation activities, programs and strategies. In this concern, innovation performance results of following strategies and collective synergies embedded by team social interactions, which include cultural norms (even religious, moral beliefs, ethics) and individuals’ knowledge and experience. These conditions are constituted by visions, behaviors, and activities that allow the adaptation of the organization to its surrounding

environment and survival (Porter 1996; Manu 1992). Additionally, Manu (1992) remarks that technology-based firms' innovation performance is influenced by market conditions strongly linked to their strategy. Thus, TBSs' innovation performance is aligned to 'strategy-making' behavior related to settle the organizational adaptation by developing their dynamic capabilities according the external market conditions.

Drawing on a review of innovation literature over the last 35 years, Siguaw et al. (2006) explain the organization's innovation orientation in terms on the deliberate managerial actions, processes, procedures, and practices that are done in the firm to develop specific innovation-facilitating competencies. In particular, these authors highlight the relationship between innovation orientation and dynamic capabilities, concluding that innovation orientation fosters the development of organizational competencies and operational capabilities and makes it possible for a firm to recognize and respond to shifts in market dynamism. Specifically, they explain how the organizational knowledge structure and the firm's ability to use its knowledge resources facilitate the development of organizational competencies and capabilities that in turn lead to their innovation activities in different areas. Those areas are three principally marketing, product development processes, and administration. Therefore, TBSs are conceived as 'innovation- orientated' organization, where the organizational orientation to innovation is described as "*the ability of the organization to adopt or implement new ideas, processes, or products successfully*" (Han et al. 1998, p.21).

Innovation performance activities relate to placing the innovation into the market, Dyer and Song (1997), Song et al. (2006) and also used by Ferreras-Méndez et al. (2015), identified three activities that lead the innovation performance: (1) new product development (that also refers to development of services and processes), 2) innovation continuity, and 3) how innovative they are perceived to be with respect to their market competition (Figure 4.9). All these aspects are in close connection with the way by which dynamic capabilities are built, i.e., the "ability to sense and then size opportunities quickly and proficiently" (Teece, 2000, p.36).

Figure 4.9 Innovation performance construct
(Dyer and Song 1997; Song et al. 2006)

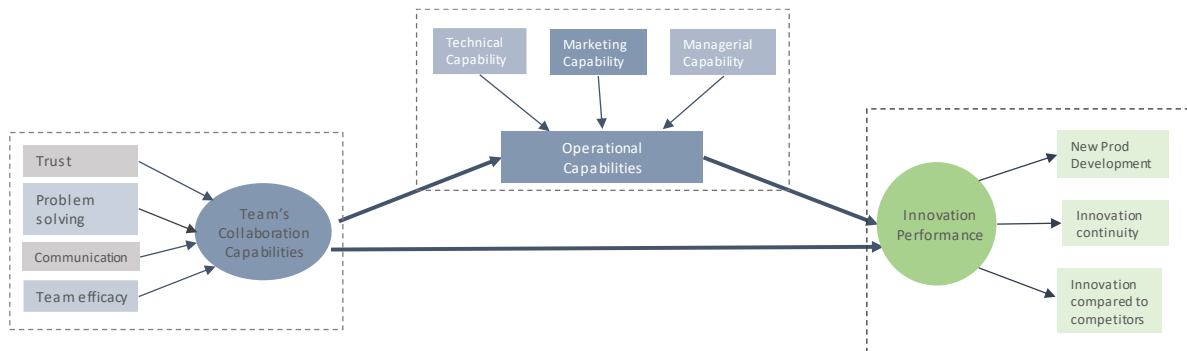


4.5 The Model

TBS teams' dynamics and interactions combine the team members' interaction with internal and external resources. Altogether contribute to building intra-collaborative capabilities that support external collaborations that lead the real technological change. To minimize risk and uncertainty, the product development and launch process requires diverse efforts and a variety of specialized knowledge (D'Este *et al.* 2014). Innovation environments demand the encouragement of external collaboration activities, defined by Dodgson (1994, p.285) as the "*definition of collaboration is used which include any activity where two or more partners contribute differential resources and know-how to agreed complementary aims. [...] distinguish between vertical collaboration which occurs throughout the chain of production for particular products, from the provision of raw materials, through the manufacture and assembly of parts, components and systems, to their distribution and servicing, and horizontal collaboration which occurs between partners at the same level in the production process*" (p.1). Therefore, TBS team collaboration capabilities integrate important factors that demand the team's synergies that shaping the TBS operations adaptation through the creation of new capabilities, and in the case of leveraging existing capabilities.

Figure 4.10 presents the theoretical TCCs' model proposed in this research. The dynamics of TCCs require technical and social competences produced, exchanged and reinforced by the same TBSs team members (Langfred 2004).

Figure 4.10 Research model: Team collaboration capabilities



Our study aims to identify the TBS team's interaction factors, the '*team collaboration capabilities*' (TCCs) supporting the development of new capabilities inside the team to face the dynamic conditions of innovation environments. Due to the innovation environment represents change and constant movement demands a high-level organization of fast adaptation to support external collaborations. The TCCs' model shows their path as enabler factors in the team that impulse the TBS innovation performance. Collaboration is an innovation basis, conceived as a multi-dimensional praxis from individual to a group that forms an essential foundation for better operational capabilities (Ulbrich *et al.* 2009).

TCCs inside the TBSs teams are the engine that facilitates the operational flexibility required to quickly adapt and implement new activities and processes (Thamhain 2004). TCCs represent the input-process-output conditions that Prieto *et al.* (2009) described as essential factors that grounds the origin of DCs.

4.6 Hypotheses

The concept of TBS team collaboration capabilities (TCCs) is based on the theory of entrepreneurial teams and the Dynamic Capabilities (DCs) as framework. Hence, the following argument pursues to confirm to what extent the TCCs' dynamics aiming the TBS innovation performance. The TCCs help to create inside the team particular organizational conditions that allow collective interaction for NPD and bridging it to the market. Each

TCCs interaction factor influence and shape the TBS organization and operations continuity as well.

The first factor, related to *trust* is linked to the collaborative learning-integration processes in a team (Holton 2001), where individuals feel free of limitations and open their will to sharing insights, concerns, ideas and opinions (Zolin *et al.* 2011). Trust is influenced by the size, knowledge diversity and expertise of team members. Moreover, elements such as common history or previous experience of working together add conditionals of trust in the team's interaction (Khan *et al.* 2014). The second and third factors are *communication* and *problem-solving*, both constitute essential social integrators that support managerial capabilities and facilitate the team's knowledge and information exchange (Pinto and Pinto 1990). Also, reinforce the cross-functional activities with high levels of knowledge exchange, commitment, collective confidence and better productivity. Both factors support important functions including strategic decision making and learning and developing organizational skills. These team's active interaction conditions face highly conflictual conditions and force to still continue team unit (LePine 2003; Andren *et al.* 2003). Therefore, communication and problem-solving both have an important impact on team performance (Eisenhardt 2013). Finally, the fourth factor is *team efficacy* (Gully *et al.* 2002), it involves the group's ability to accomplish their goals with outstanding results reflected on their team (Lapiedra and Chiva 2006) and also directly affects in the TBS' innovation performance.

When a TBS entrepreneurial team exhibits high-levels of these four factors, the team will be active and flexible, thus enabling the organization to adapt and evolve quickly. This fosters an environment in which they can effectively build new capabilities which, in turn, contribute to innovation performance. This reasoning, based on research into teams and innovation, (see figure 4.13) we conclude that TCCs influence the innovation performance of TBSs. With that, our first hypothesis is:

H1. TCCs have a positive effect on TBS innovation performance

Operational capabilities (OCs) “are firm-specific sets of skills, processes, and routines, developed within the operations management system, that are regularly used in solving its problems through configuring its operational resources” (Wu *et al.* 2010, p.

726). OCs are integrated by three essential capabilities: technical capability, marketing capability, and managerial capability (Winter 2003; Cepeda and Vera 2007; S. J. Wu, Melnyk, and Flynn 2010; Pavlou and El Sawy 2011). The three capabilities constitute the entrepreneurial foundation of the TBS innovation performance. The OCs are the functional consequence of the TCCs. In other words, TCCs represent the engine and OCs are gears that move the TBS efforts to their innovation performance. For example, testing a technology prototype require to identify a particular niche of users that can be able to use the technology. Then, technical and marketing areas work together to improve the technology and the “potential customer” experience, therefore each OCs’ capabilities are closely related to NPD.

On the other hand, the role of managerial capabilities involves the decision making-process that sums communication and problem-solving. Communication and problem-solving play an important role in decision making when, for example, members need to ask for and receive valuable information, or when they collectively need to reducing friction. The managerial area leads with high communication supports the information and data classification such as allocating, monitoring and organizing, and to share insights reducing conflicts conditions through different areas or functions such as marketing, technical and managerial capabilities. Added to that, managerial capabilities lead the team’s efficacy synergies, focuses on teams goals-orientation, reflects positive external relationships with their clients (Morgan and Hunt 1994).

It is throughout the NPD as one of the different stages of innovation performance where TCCs’ employ trust, communication, problem-solving and team efficacy. The TCCs support the OCs as the essential entrepreneurial functions of the TBS. TCCs facilitate as well knowledge exchange and willing to share and contribute to the TBS sustainability in the long run (Cabrera *et al.* 2006; Clarke Højbjerg *et al.* 2014). TCCs are enablers of OCs, both constitute the TBS’ sources of value creation (Wernerfelt 1984; Barney 1991; Foss 1998).

Moreover, the TCCs support the OCs in day-to-day activities, thus backup the survival of the firm during demanding market conditions. They are relevant in everyday and strategic operations, such as marketing, design and product development, and production.

Therefore, the TCC drive the use of the OCs, which essentially encompass the daily tasks and functions of the TBS. The OCs are structural activities linked to NPD and can be related to marketing, technical and managerial tasks. They collectively represent the efficient managerial use of the existing resources of the TBS (Zollo and Winter 2002; Winter 2003; Cepeda and Vera 2007; Knight and Cavusgil 2010; Pavlou and El Sawy 2011). OCs are responsible for the entire NPD process (see figure 4.11). Based on this discussion the hypothesis suggested is:

H2. TCCs positively affect TBS's operational capabilities

Recalling what we previously mentioned, innovation performance integrates the input and output processes of technical development and the market introduction of an innovation. Base on this innovation performance definition, we affirm that technical, marketing and managerial capabilities altogether respectively conforms the TBS OCs. Moreover, OCs constitute the TBS gears focus on R&D, manufacturing, selling and monitoring functions and activities that supports its innovation performance. The OCs are essential drivers that evolve and modify their functions according the dynamic changes of the TBS market conditions (O'Connor *et al.* 2008; Teece 2012; Paradkar *et al.* 2015). Therefore, each OCs covers and support very specific actions that sustain the TBS' innovation towards its performance. In this concern, technical capability influences the TBS' innovation performance through applying scientific and practical knowledge focus on R&D, prototyping and improvement of the product or service. Then, marketing capability impacts the firm's '*innovation compared to competitors*' (i.e. innovation continuity and spotting market opportunities). Finally, management capability aims to achieve innovation continuity through the effective coordination of the TBS's resource-based. This coordination is part of managerial capabilities. However, are these three capabilities areas that makeup the TBS OCs.

The OCs are the TBS' everyday functional activities and they are potentially breeding new capabilities building that represent competitive advantage for the firm. In TBS teams, there is a closed connection between OCs and innovation performance (see figure 4.13), linking specialized and specific routines towards the achievement of innovation (Shin *et al.* 2012).

Therefore, we hypothesize that:

H3. Operational capabilities positively affect TBS innovation performance

To this point we have proposed that the dynamics of TCCs in a TBS positively affect its innovation performance; however, we can also consider that OCs contribute to this relationship in a positive way. To successfully overcome the competitive market conditions, the TBS has to develop TCCs that support the new building and evolution of effective technical, marketing and managerial capabilities; collectively understood as OCs. Therefore, TCCs are critical to supporting OCs, both also bearing intensive interactions and activities of the TBS team with their environment (La Rocca and Snehota 2014). TCCs and OCs constitute the most important TBS value source, holding and creating value inside the team. Both contribute to shaping and re-structuring the innovation processes, which has a direct impact on the TBS innovation performance.

The dynamics of the TBS's TCC are intimately linked to OCs, and through them, to the firm's innovation orientation and performance. In other words, TCCs affect the OCs, but it is through the OCs that the TBS will actually achieve the innovation performance. TCCs represent - skills, experience, synergies, networks, routines, and processes - conceived as multidimensional interaction factors produced by the TBS team. Although TCCs are dynamic factors, they can also affect OCs, due to the compact nature of the organization, the need to maximize available resources and the close dependence between both capabilities as the TBS' resource-based.

Through the coordinated interplay of TCCs and OCs, it is possible to reach high levels of innovation performance related to activities focusing on 1) new product development (NPD), 2) innovation continuity and 3) market competition's perception.

The OCs are defined processes with the potential to evolve in each of technical, marketing, and management areas. A TBS's innovation orientation incentivizes the formation of organizational routines, processes, structures, and conditions that help to develop competencies required to reach their innovation goals. It encourages '*technical innovations*' related to R&D, '*innovation improvements grounded on 'market testing*', and internal redesign of resources administration linked to '*administrative innovations*' related

to organizational processes and functions (Han, Namwoon, and Srivastava 1998; Siguaw, Simpson, and Enz 2006). The potential for evolution of these capabilities will depend on bidirectional conditions, this means that externally it will be upon the level of the TBS innovation stability in the market. Also, internally the team's interaction factors, held by the TCCs whose role is to support the rapid development of new and high specialized capabilities aiming the innovation performance.

All of this leads us to the fourth hypothesis, see figure 4.11 illustrates the complete model which establishes the relationship of TCCs with the organizational and operational process that result in innovation performance:

H4. Operational capabilities mediate the relationship between TCCs and innovation performance

4.7 Brief discussion

According the management literature most TBSs' organizations are created and supported by experienced, highly-skilled, capable, and diverse team members (Vyakarnam et al. 1999; Fischer and Boynton 2005; Colombo and Grilli 2010). The TBS' human capital is formed by founders, investors and employees who join their knowledge, experiences and relationships (Nahapiet and Ghoshal 1998; Bendickson *et al.* 2017). The diversity of knowledge and skills that the TBS members hold constitutes a potential resource-based for the organization and its abilities to adapt and to 'reshape' the team's operations and becoming as unique capabilities, that are their competitive advantage in the long run (Kaiser and Müller 2015).

The team's activities are related to a coordinated work in a group; being the essence of the TBS team is linked to the quality of interaction generated by its 'collaborative work' (Hoegl and Gemuenden 2001). The 'collaborative work' or teamwork in a team leads the success of innovative projects. Hence, the teamwork is conceptualized as 'human behavior' in a group or collectivity, that it is established by an organized, continual and coordinated 'activities, interactions and sentiments' among the team members (Hoegl and Gemuenden 2001, p.436). Hence, the teamwork is shaped by the natural grouping of ideas and personal

beliefs in common among team members. The TBS team contains a significant amount of social capital and knowledge. According to Loasby (2011), teams, from their beginnings, are basically composed of social capital and interactions with organizational complementarities, as their personal and organizational networking.

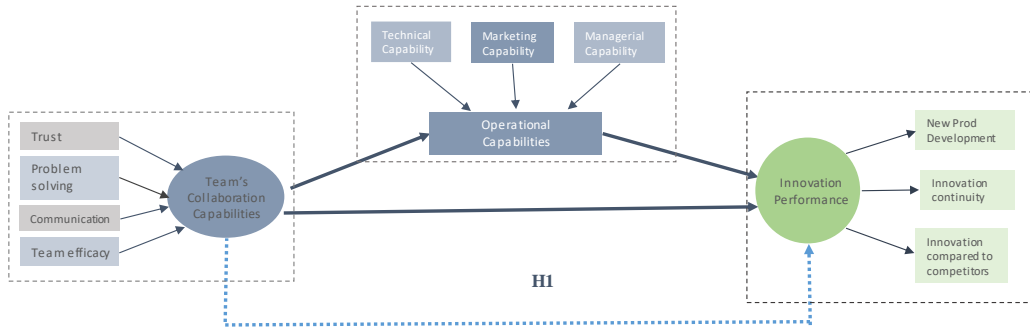
Moreover, TBS team implies knowledge heterogeneity and an organizational structure in their daily basis activities; this involves to articulate combinations of human capital with formal and informal connections for specific purposes, these constitute a differentiated firm structure (Loasby 2011). The TBSs' organization and operations are melted by each individual experience, knowledge, and skills that shape the 'team expertise'. The way in which individuals consistently work together defines, in part, the organization and its operational capabilities (Teece 2011).

The interaction among the members of the technology-based startup is crucial for its entrepreneurial activities and to build strategic capabilities. The team's activities support the perspective of harnessing the creativity and knowledge of each team member within the context of the startup. In this context, routines are predetermined, repetitive, specific, and standardized activities, such as those performed in production processes; interactions are more related to connectivity and coordinated contact (networking) with two or more members, taking into account their levels of intensity and frequency. Finally, sentiments are emotions, motivations, and attitudes that derive in the generation and adoption of knowledge and skills that cannot be measured but can have an impact upon both activities and interactions (Loasby, 2006).

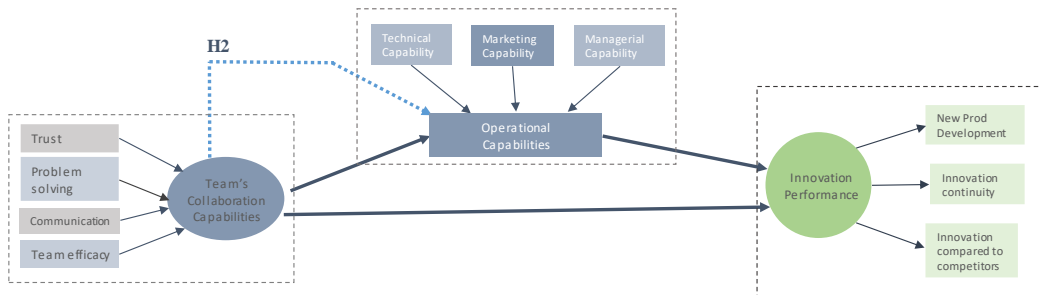
The TBS 'organizational and operational conditions are extremely active but because innovation is "*a force of instability*" a TBS team requires a long term vision and commitment (Lawson *et al.* 2001). Despite of the fact, that the team interaction is a process that evolves through the time, particularly in these type of organizations, the rapid understanding of the team collaborative dynamics process are decisive for the organizational evolution, the firms outcomes and innovation performance (Beckman and Burton 2008).

Figure 4.11 TBS team's collaboration capabilities' hypothesis

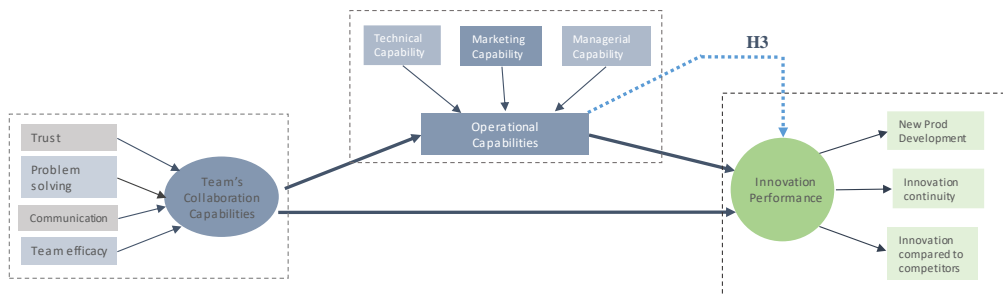
H1. TCCs have a positive effect on TBS innovation performance



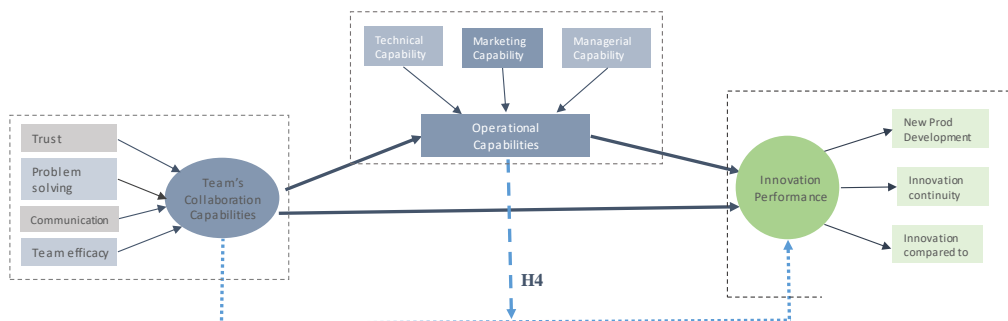
H2. The TBS' TCCs positively affect operational capabilities



H3. The TBS' operational capabilities positively affect their innovation performance



H4. Operational capabilities mediate the relationship between TCCs and innovation performance





CHAPTER 5

Methodology and empirical design

5. Methodology and empirical design

Introduction

Our empirical design involves a sample of TBS firms established in Spain with activities focused on new technology development and its application in products and services for industry, government, and the general public. The characteristics of these TBS, according to Pavitt (1984) describe the organizations with dynamic behavior with intense activity to innovation as (1) providers; (2) intense production and (3) science-based. The TBSs participants in this studio are business established thanks to the fact that they received financial incentives, awards or seed investment, they are operative. The TBSs selected for this study meet the following characteristics:

1. Their product, technology or service, plays an important role in the direction of their technological and management priorities. (Koberg, Sarason, and Rosse 1996). Because of novelty of its product or service, they are aware of unpredictable of the high tech market, complex and dynamic sector and are focused on the development and application of new technologies in either new products or new services.

2. Given the nature of their product or service, they applied scientific and technical knowledge, so they have a research background. At least, one or more founders previously worked or enrolled in specialized studies (Master or Ph.D.), worked at the university or in a big company or in a research institute. (D'Este et al. 2012; D'Este *et al.* 2014).
3. Their market aim is to provide sophisticated and specialized products or services in at least one of the following sectors: smart cities, transport, sustainability, environment, renewable energy, and clean-tech (Horwitch and Mulloth 2010; Shapira et al. 2014).
4. They concentrate their efforts on identifying and seizing new business opportunities, remaining competitive, and influencing the international and global markets (Johnson 2004).
5. The empirical data was drawn from a survey carried out to 100 TBS and we received 53 responses from them just 45 were considered for the study. Almost all were former participants in accelerator programs. They contain high skilled workforce involved in developing and improving their technology or services and boosting its business (Khera 2012; Teece 2011).

5.1 Research methods

Our research is grounded in social science basis, it focuses on the understanding of the individual behavior and team interaction that conforms the TBS organization that fosters its innovation performance. And how such as particular organizations, in order to achieve innovation, must develop skills of collaboration to survive. Collaboration in organizations is associated as phenomenon in organizational behavior linked to social praxis (Ulbrich et al. 2009). It is also closely related to knowledge creation and social exchange as a basis for collaboration (Nonaka 1991; Grant and Baden-Fuller 1995; Grant *et al.* 2000; Nonaka *et al.* 2000; Blomqvist and Levy 2006; Inayat and Salim 2014).

Unraveling the complexity of TBS teams requires shaping the answers of a situation-specific constructed by these social actors (Schwandt 1994). Then to develop

scientific knowledge and give an answer to our research questions, we need to contrast the empirical data obtained with existing theories basis. In this concern, the Structural Equation Modeling (SEM) as our data analysis method supports us to use an integrated set of mathematical models, computer algorithms, and statistical pathways. This method allows us to define constructs from theoretical concepts comparing them with our empirical data (Camisón and Forés 2010). Concisely, the SEM support the contrasts of the theory from reality with the aim to identify patterns that anticipate solutions that in this case is focused on the TBS' team interaction factors.

The constructivist, or interpretivist, view is based on the individual's understanding of reality (Schwandt 1994). That means that the same reality experienced by different actors will have different interpretations based on each actor background and experiences. The study of innovation environments involves an extensive conceptual and theoretical comprehension of the firm (Macher and Mowery 2009). The understanding of TBS team as an organization aiming the innovation performance, as our object of study, this goal demands to any organization an excellent capacity for managing internal and external resources, and interaction defined in the TBS kind of technology (Teece 2010c). However, in some cases they are enough to support their innovation performance due to each members' contribution of their unique technical and scientific background (D'Este et al. 2012). Because the specificity of the study and the relevance of data collection, we designed a survey that integrates qualitative and quantitative questions. The survey essentially aims to identify specific team's interactions that constitute Team Collaboration Capabilities (TCCs) and thus support the building of new capabilities for innovation performance.

TCCs is a new concept that applied just to TBS organizations. For the purposes of this study, we see the nature of the TBS as an organization that is mainly based around an independent management team. For this reason, we applied entrepreneurship and team theory approaches. The TBS establishes its foundation through different group of routines and coordinated interactions that are focused on processes for the development of new technology.

If innovation is a goal for TBS teams, then collaboration should be their appropriate pathway. However, Because the multidimensional nature of collaboration makes it a complex to interpret at simple sight. Then in order to reach the innovation performance as goal in a TBS it is necessary to build the appropriate internal organizational conditions. TCCs are characterized in part by two components; single actors who lead the organization, and the group who leads the operational dynamics.

This research was designed in three stages: First stage, *understanding the TBS organization and its context*, we considered this stage as the grounding element to identify the problem and to define the survey as a tool. This is supported by three previous steps (i) literature review, (ii) informal interview with TBS contacts, entrepreneurs and academics to identify the gap and formulate our research questions. Then, the second stage is defined by the survey design and administration, which hold other three steps: pre-test, redesign and administration. Finally, the third stage relates the data collection, analysis and results through the Structural Equation Modeling (SEM) technique

5.2 The survey as a research tool

The study and understanding of the organizational behavior that affects innovation pose a challenge due to the reliability and validity of scales employed in the survey. The term validation implies the assessment of an individual's activities in relationship with his/her environment and depends on other conditions. Moreover, it requires the establishment of measurement criteria for their activities or decision-making performance (Schoenfeldt 1984). Hinkin (1998) in his paper, credits Nunnally (1976) with this "*there are three major aspects of construct validation: (a) specifying the domain of the construct, (b) empirically determining the extent to which items measure that domain, and (c) examining the extent to which the measure produces results that are predictable from theoretical hypotheses*" Hinkin (1998) (p.4). The development of measurements used in the survey contributes to building credibility for the validity of the construct.

Because the complexity of measuring TBS teams we defined in the first stage, we undertook three steps to understand the TBS internal and external context (Fawcett et al. 2011):

1. An extensive review of literature related to the TBS concept and taxonomy, entrepreneurship, entrepreneurial teams, theory of the firm, dynamic capabilities, and collaboration for innovation. This review contributed valuable insights useful for designing meaningful data collection instruments.
2. More than a dozen preliminary, informal managerial interviews were conducted to ensure the managerial relevance of the topic.
3. Initial contact with TBS managers, contacts of the TBS and entrepreneurial sector, and academics to obtain feedback on the research content.

These efforts provided the context to effectively analyze and interpret the study findings. The consistent selection of the participants was important. The preliminary interviews and advisory academic discussions suggested the participants be limited to founders or key managers with broad accountability for and influence over the TBS performance data. The survey was administered to TBS founding members, CEOs, or strategic managers.

5.2.1 Survey designed and administration

The second stage, was defined to design and administer the survey. The survey was designed to collect information about specific items that represent theoretical concepts or latent variables related to collaboration capabilities in a TBS. We employed a multidimensional assessment of the TBS team's interaction and organizational aspects that compose the TBS collaboration capabilities (CCs). Empirical studies related to organizational behavior were used to identify specific indicators suitable for assessing entrepreneurial teams.

The survey design and survey administration was the second stage of this research. The survey was performed in three phases: (1) pre-test survey or exploratory study, (2) re-design and (3) definitive survey launch. In the pre-exploratory pilot study,

we previously designed a preliminary survey, where we introduce an extensive number of items that included different sections:

1. Control variables were related demographic information about the surveyed general data: name, charge, e-mail contact.
2. TBS's number of employees; founder team's members, such as generals of nationality, studies, professional experience, years of experience and if it was in their current sector, activities that are developed inside the TBS.
3. Motivation to carry on the "Startup", what was their value proposition, what was its target market.
4. The TBS background related to participation in an incubator or accelerator programs, what kind of benefits got from the program, and principal financial sources.
5. The level of the organization operations such as: innovation perception, product operational capabilities, dynamic capabilities, innovation performance and external collaborations performance (See annex 1).

This exploratory study was performed to validate the survey content. The pilot-survey was developed during a three-month research visit, from May to July 2016, at the Copernicus Institute of Sustainable Development at Utrecht University. The two principal aims of this pilot-survey were: (1) to develop a preliminary survey, taking into consideration the comments and opinions of senior researchers of Innovation Studies at Copernicus Institute, and (2) to perform a pilot test with local Dutch TBS firms.

During this pre-test application to few local TBS, whose profile was focused on new technologies and whose invariable aiming sustainability and Climate Change in Rotterdam Port Accelerator program 2016. The approach to this TBS was informal and face-to-face with the aim to pre-test the survey:

- (a) to test the levels of comprehension and clarity,
- (b) to request opinions and comments about the survey, and
- (c) to measure the response time.

This preliminary survey is added in Annex 1. On the other hand, I sent by e-mail the same survey in Spanish language to three Spanish entrepreneurs. The survey was pre-tested in both languages: English and Spanish. The feedback came from four international entrepreneurs and TBS founders based in Rotterdam, Netherlands. It was also sent to three external advisory academic boards who provided us with relevant feedback to improve the “extended” and “ambitious” survey. The pre-testing of the survey resulted in a decision to reduce the number of items to be included in the definitive survey.

The second phase the survey definition was relative less complex because it involved the consideration of the external comments and suggestions. In recognition of these feedback, and because it was not relevant for the study, we did not ask sensitive specific questions regarding sales and funding amounts.

The third phase, related to the definitive survey. Based on the feedback, more than half of the questions and items were eliminated from the survey. Other questions were restructured and adjusted to more accurately address the research question and to focus more on the TBS team’s core interaction and their capabilities development.

The feedback helped us to estimate the survey response time in 35 minutes. The survey duration was ambitious and long, we decided to split it into parts the survey. The first part could be a phone call, 15 minutes, that allow us to do a detailed picture of the startup, regarding the first 4 sections used as control variables: (i) demographic data: age, position, gender, studies, academic discipline, previous experience, nationality; (ii) accelerator programs participation; (iii) benefits of the programs, such as mentoring, training, funding and networking; (iv) principal financial support. The second part was including the fifth section regarding the organization internal operations such as: innovation perception, product operational capabilities, dynamic capabilities. We included Spanish and English versions in consideration of the international nature of several of the teams. Annex 2 contains the two sections of definitive survey.

5.2.2 Variables and measurement

The TCCs model construction, as we previously mentioned, was supported by empiric data from the survey respondents. The questions are supported by rating scales as responses generally they are focused on psychometrics and sociometrics. through indicators as “causes” and “effects” of element not directly observables (Curado *et al.* 2014). The psychometric and sociometric technics measure diverse aspects and components produced as result of social relationships, attitudes, behavior and decision-making.

The TBS’ team requires flexible and dynamic foundations to build its competitive advantage. Collaboration capabilities are a multi-dimensional praxis from individual to a group that conforms an essential foundation for better organizational capability (Ulbrich *et al.* 2009). In particular, Blomqvist *et al.* (2006), and Ulbrich *et al.* (2009) identify trust, communication and commitment at intra-organizational level, denoted them as essential factors that facilitate collaboration capabilities for innovation purposes. On the other hand, Prieto *et. al* (2009) highlight what aspects such as self-governance (independence in decision-making), performance management, organizational support and trust, describing them as the input-process-output conditions that build the DCs related to new product development.

The TCCs construct integrates the team's trust, communication, problem-solving and team efficacy as a source of the team essential synergies that support operational capabilities and the new capabilities building toward their innovation performance. Following the Blomqvist and Levy (2006) and Alfred *et al.* (2011), who propose that internal organizational failures in innovation can be overcome if the founding members of the TBS know how to employ their collaborative capabilities (CCs). The CCs founded in the core of an organization allow it to confront the internal and external issues that threaten to destabilize it.

It was important to carefully decide how best to measure the study variables. We determined that the multi-item 1-7 point Likert scales would be most useful as, according to the literature, this scale offers the most accurate rating measurement., even for different

items, for instance from “1= strongly disagree” to “7=Strongly agree”. In social science, quantitative variables are interval or ratio scale, these last present absolute zero. Adding also, latent variables are considered also as concepts that cannot be directly observed but affect the construct (Curado *et al.* 2014).

5.3 Survey designed

The phenomenon examined in this study is the team collaboration capabilities (TCCs) that improves aims the TBS innovation performance. The TCCs model construction, as we previously mentioned, was supported by empiric data from the survey respondents. For this purpose, we follow conceptually essential factors that facilitate collaboration capabilities in a TBS team such as relationships regarding collaboration at intra-organizational or intra-team level, according to Blomqvist and Levy (2006) and Ulbrich *et al.* (2009) where trust (Fawcett *et al.* 2011; Blomqvist and Levy 2006), communication and solving-problem aspects (Pinto and Pinto 1990) and team efficacy as goal-oriented crew’s efforts (Jansen *et al.* 2015), all represent essential factors that facilitate collaboration capabilities in a TBS team. These factors which also interacts with other conceptual dimensions of the organization, such as operational capabilities, in order to pursue increased the innovation performance of the company, which also in concepts that have to be introduced and assessed.

The TCCs is a specific construct that requires integrating different components also known as indicators (Curado *et al.* 2014). The values assigned to these indicators are in represent values assigned on an ordinal scale. Indicators build up a variable and can be defined as an item, or an observed measure, also as observed variable exchangeable (Bollen and Lennox 1991). Scales are used to measure differences among respondents through their attitudes and opinions. Numeric values are These opinions are assigned to these opinions numeric value, allowing the researcher to quantify the grade of acceptance of the question certain attitudes and/or opinions surveyed. Likert scales dress a collection of applying to ordinal items variables that are an interval in nature and can be analyzed using parametric techniques in order to obtain a more specific and accurate level of analysis. Once adequate indicators are defined according to each theoretical concept.

Scales are used to measure differences among respondents through their attitudes and opinions. These opinions are assigned a numeric value, allowing the researcher to quantify the grade of acceptance of certain attitudes and/or opinions surveyed. As it has been mentioned, Likert scales dress a collection of items that are interval in nature and can be analyzed using parametric techniques in order to obtain a more specific and accurate level of analysis (see also in Tables 6.2, 6.3 and 6.4). Once adequate indicators are defined according each theoretical concept. We used 7-level Likert scales, where 1 represented the lowest or most negative value, and 7 represented the highest or most positive value. The scales ranged from “strongly disagree” to “strongly agree”, with the items focusing on the degree to which the participants perform the stated routines.

We used 7 point-level Likert scales focusing on the degree to which the participants perform certain activities, where 1 represented the lowest or most negative value, and 7 represented the highest or most positive value. The scales ranged from 1 = “strongly disagree” and 7 = “strongly agree”, with the items focusing on the degree to which the participants perform the stated routines (see also in Tables 5.1, 5.2 and 5.3).

Table 5.1 Team Collaboration Capabilities scales

<i>Variable</i>	<i>Questions/Items</i>	<i>Reference</i>	<i>Likert reference</i>
<i>Trust</i>	In our leadership team, we can freely share our ideas, feelings, and hopes.	Khan et al. (2014)	1 = completely disagree, 7= completely agree
	I can talk freely to my partners in the leadership team about difficulties I am having at work and know that they will want to listen.		
	If I shared my problems with my team members, I know they would respond constructively and respectfully.		
	I would have to say that we have made considerable emotional investments in our working relationship.		
<i>Personal Common History</i>	With at least one of my founding partner, I have already worked together before founding the company.	Khan et al. (2014)	
	With at least one of my founding partner I had a friendly relationship before founding the company		

<i>Team communication</i>	<i>Open communication of relevant information occurs among the start-up members.</i>	<i>Pinto and Pinto (1990)</i>	<i>1 = completely disagree, 7= completely agree</i>
	The members of this start-up often manage to have a fluid communication with each other.		
	In general, it's easy to contact other members of this start-up.		
	The members of this start-up often manage to have a fluid communication with each other.		
<i>Problem-solving</i>	If conflicts occur among start-up members, they are easy resolved.	<i>Pinto and Pinto (1990)</i>	
	If disagreements arise, the members of this start-up are actually able to solve them.		
	When problems arise, the leaders of this start-up looking for solutions that are acceptable to each member.		
	The members of this start-up always provide clear information on what they are working on projects.		
<i>Team efficacy</i>	Achieving this start-up's goals is well within our reach.	<i>Jansen et al. (2015)</i>	<i>1 = completely disagree, 7= completely agree</i>
	Our start-up is able to solve difficult tasks if we invest the necessary effort.		
	Our start-up is able to manage effectively unexpected problems.		
	Our start-up as a whole is totally competent to perform the tasks.		
	Our start-up is able to allocate and integrate available resources to perform the tasks well.		

Table 5.2 Operational capabilities: survey's questions that represent variables and its respective scales

<i>Variable</i>	<i>Questions/Items</i>	<i>Reference</i>	<i>Likert reference</i>
<i>Technical Capabilities in new product Development (NPD)</i>	In this start-up, we evaluate the technical feasibility of developing new products with continuously changing features.	Adapted question from Pavlou and El Sawy (2011)	1 = strongly disagree; 7 = strongly agree.
	In this start-up recurrently we perform tests to determine basic performance against shifting technical specifications.		
	In this start-up frequently executing prototypes or sample product testing or pilot of new products / service applications.		
<i>Customer Capabilities in NPD</i>	We have defined our market characteristics and trends.		
	We identify regularly appraising competitors and their products—both existing and potential.		
	Executing several test-marketing programs in line with commercialization plans.		
<i>Managing Capabilities in NPD</i>	We monitor the progress on product development and improvement.		
	Management is actively involved in activities at the working level.		
	Management effectively administers relevant tasks and functions.		

Table 5.3 Innovation Performance: survey's questions that represent variables and its respective scales

<i>Variable</i>	<i>Questions/Items</i>	<i>Reference</i>	<i>Likert reference</i>
<i>Innovation performance</i>	Our program of development of new products / services it is focus on meeting our objectives globally.	Dyer & Song, (1997); Song et al.,(2006), Ferreras-Mendez, Fernadez-Mesa and Alegre (2015)	1 = strongly disagree; 7 = strongly agree
	Our program of development of new products / services looks to continue the improvement of our current product/services as well.		
	Compared with our direct competitors, our development program of new products / services is more efficient and search to obtain superior results.		

5.4 Data collection

The technology-based startups (TBS) participants in this research represent active agents in the collective dynamic of innovation process of knowledge creation and transfer (Cavusgil *et al.* 2003; van Wijk *et al.* 2008; Teece 2010; Azagra-Caro *et al.* 2017). In order to identify characteristics of innovative firms it is necessary to understand the innovation processes and identify which are the innovation inputs. According to Binnui and Cowling (2016) the innovation inputs of a TBS consist of entrepreneurial demographics, firm characteristics, skills and competencies, R&D, financing and market internationalization.

We developed a list of 100 TBS, gathered data from several sources to ensure the profile, operability, and operations of each TBS participant. The sources of information about TBS were diverse (see table 5.4). We contacted accelerators, corporate foundations, scientific parks, and other Spanish universities. By attending formal and informal TBS meetups and gatherings, we were also able to contact TBS entrepreneurs in person. For instance, we attended an “Accelerator elevator speech” event, where TBSs promote their businesses to attract new venture capital. In addition, some entrepreneurs provided us with LinkedIn references to identify and contact other entrepreneurs of their acquaintance.

Table 5.4 Contact sources of Technology-based Startups

<i>Sources</i>	<i>%</i>
<i>Accelerator programs</i>	69%
<i>Universities</i>	11%
<i>Startups events</i>	7%
<i>Corporate foundations</i>	4%
<i>Industrial Parks</i>	2%

Survey distribution began in October 2016 and finished in February 2017. The 69% of the participants in our study took part in sector accelerator programs, from this percentage almost all the participants were participants in at least two incubator and/or accelerator programs. The most specialized TBS were focused on clean-tech or climate change accelerator programs. Meanwhile, other participants produced technology and

sophisticated services tailored according to their customers needs. All the TBS participants developed or use unique, innovative and radical technologies and services.

Starting the study with scientific basis, we explained to our participants that the data would be treated with absolute confidentiality. Both interview and survey consider general and opinion aspects about their startup founding team, organization and business environment. The response process was relatively agile. Once they accepted they could accede to the survey online. Their participation was absolutely voluntary and we will maintain their identity confidential. Due to the location of these companies was in different Spanish regions we considered to define a protocol of contact:

- (1) First contact face-to-face, phone call or email to invite them to participate to the study.
- (2) Then, once they agree to participate, the study consisted of a brief telephone call or Skype interview of 10-15 minutes. We define a semi-survey to collect the contact number, email, position, studies, market, training and finance sources. This help us as a filter to identified the TBS bias, such as funder teams, kind of technology and founding.
- (3) Finally, they responded the electronic survey in 10-12 minutes.

Previous to take the survey, the participant has a brief informal conversation regarding the founders' members, their training, kind of market and founding process. All coincide that taking part in events, such as startup summit.⁴, and contests they gained more exposure for their products and business models, with the objective of accessing venture capital or capital of risk rounds. In this respect Venture Capital provide to the TBS with greater financial and management resources, in exchange for assigning rights over their business, to sustain their presence in the market.

From the complete sample of 100 Spanish TBS firms, 53 completed the online survey, that represents a 53% of response rate. However, only 45 of those were deemed relevant because were considered accurate for the study. The response rate is due in part

⁴ A summit meeting (or just summit) is a meeting of influencers and representatives such as heads of state, governments, CEOs, of prestigious corporations and firms with considerable media exposure, tight security, and a prearranged agenda.

to individual efforts to explain the study and to follow-up with participants to have them complete the survey. Our insistence and explanation of the relevance of the theoretical study, motivated the entrepreneurs to participate in the study. From the 48% non-respondents we identified four issues that could explain why they did not participate: (1) their website data and contact information were insufficient, making us impossible to speak with them in person; (2) their contact information was not precise, it was impossible to make contact with at least one of the TBS team member; (3) the team was in the process of restructuring or dissolving; (4) the TBS was actually established in another EU country even though they had participated in a Spanish accelerator program because they had one or more Spanish team members; or (5) they did not find the time to complete the survey or they simply were not interested enough to participate.

5.5 Data analysis: Structural Equation Modeling (SEM) technique

The potential use of structural equation modeling (SEM) is suitable for strategic management studies when the research objective focuses on prediction and explaining the variance of key target constructs by different observed variables, known as explanatory constructs (Hair *et al.* 2013; Becker *et al.* 2012; Ringle and Sarstedt 2016; Henseler *et al.* 2016). Particularly, partial least square (PLS) algorithm was developed by (Wold *et al.* 1989), it is “*a sequence of regressions in items of weight vectors. The weight vectors obtained at convergence satisfy fixed point equations*” (Ringle *et al.* 2015). The PLS is considered to our study because the particularity amount of our sample, according to Sarstedt *et al.* (2012), “*PLS-SEM is appealing when the sample size is relatively small and/or the available data is non-normal*”(p.321). SEM is a “*technique used to reduce the number of observed variables into a smaller number of latent variables by examining the covariation among observed variables*”(Schreiber *et al.* 2006, 323). We choose SEM to develop and analyze quantitatively the scales, through a combination of exploratory factor analysis (Schreiber *et al.* 2006; Gaskin 2017).

Since the theoretical concept, also known as latent variable, represents an unobserved concept that can only be approximated by observable or manifested through indicators (Alegre-Vidal 2003). Latent variables’ application can be also assessed as latent variable modeling (LVM) and are also integrated in the construct and the model

architecture. The SEM procedures can assess if the proposed model is consistent with the data. But SEM by itself cannot conduct just to a precise indicator selection (Bollen and Lennox 1991).

SEM is a quasi-standard analysis process that permits to assess completed theories and concepts by causal relationships and identify the correlation, both are common condition in a statistical context. The causation supposed that something occur as result of happens of another event, it refers to a cause an effect conditions. Then the correlation is a statistical measure, that describes the size and the direction of a relationship between two or more variables Bollen *et al.* (1991) identify five conventional guidelines to be considered for the measurement of a construct. They are:

- (a) the construct indicators should be internally consistent for valid measure;
- (b) there are optimal levels of correlations of indicators between items;
- (c) the validity of measure depends on the adequacy with which is taken the sample of a specific domain. The indicators must tap all facets of unidimensional concepts and it makes sense for causal indicators within and between constructs.
- (d) within-construct correlations must be greater than between construct correlations; and
- (e) a linear composite of indicators can replace latent variables.

5.5.1 The data analysis parameters validity and reliability

We studied the content and construct validity. The first refers to the agreement among a panel of topic experts, who evaluate the items. Regarding the construct validity process, we studied the *convergence* and *discriminant validity*. *Convergence* refers the items are correlated or harmonize the construct. Otherwise, they could be discriminant, where the construct is not correlated among others items in the same construct (Curado *et al.* 2014).

According to Curado *et al.* (2014) “[t]he dimensions of the scale and its heterogeneity can lead to problems with reliability and validity; recommendations suggest a minimum of three items by dimension, ideally, five to twenty items. Regarding

the number of classes by item (odd or even), some authors valorize instruments with more classes (five or more) over those with three or four classes. Therefore, some authors considered that items with greater number of classes, strengthens the possibility that participants will respond, and improves the quality of the sum of items. Such qualities will be reflected on sensibility and reliability of items” (p.151). The reliability of the scales involves the construct measurement were carefully selected to be consistent. In that respect, the Cronbach’s alpha estimates reliability and it is also known as internal consistency assessment of items. However, it is necessary an homogeneity of variances of inter-item covariance, the internal consistency items require a previous standardized covariance (Curado *et al.* 2014, p.150). The reliability equations and the validity of the measurement scales use the Confirmatory Factor Analysis. This is considered a particular analysis of the structural models.

The Coefficient Alpha (Cronbach, 1952) and test-retest reliability of the items that compose each variable are indexes of consistency. The term of consistency in items of each variable refers to uniformity and stability in their loads. The general agreement is that values with 0.70 or higher are considered reliable and offer equilibrium (Noar 2003). We used SPSS software to assess each variable' internal item’s consistency.

5.5.2 The model development stages with Structural Equation Modeling (SEM)

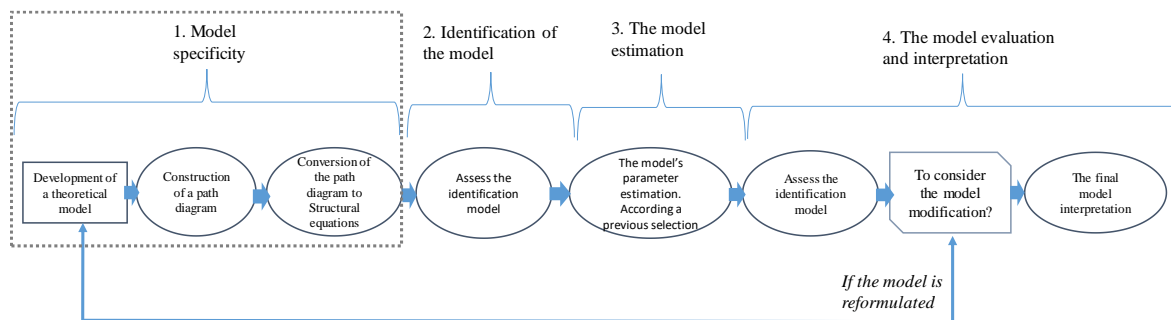
The technology-based startups (TBS) team’s collaboration capabilities (TCCs) model design, definition and assessment obey the process conversion specificity of the path diagram to structural equations. The model compliance has been performed under the Structure Equation Modeling (SEM) technique related to the team’s collaboration capabilities model. All is based on the data produced in our empirical study. We used information from 45 TBS surveys’ responses.

The model design and development took place in four stages that included (1) specification, (2) identification, (3) estimation and (4) evaluation and interpretation of the model. For the addition of any particular dimensions it is necessary to follow the sequenced stages (see Figure 5.1).

The (1) regarding the model specification in figure 5.1, relates to how the researcher defines the causal model founded on the theory. It is necessary to identify and establish the dependence relationship between different, but relevant, variables that might explain the study phenomenon. Additionally, it should imply a concise and parsimonious models as more acceptable way of understanding and identification of the phenomenon.

With respect the model conformation, there are two types of variables included in the SEM regarding measurement and structural. These two variables are associated: *exogenous*, which are similar to independent variables and *endogenous*, which are similar to dependent variables or outcome variables. In SEM, exogenous variables embody those constructs that do not influence other constructs in the study and are also not influenced by other factors or elements in the quantitative model. The endogenous constructs can be affected by exogenous and other endogenous variables in the model (J B Schreiber et al. 2006). Once the variables are theoretically justified it is possible to identify the correlation between different variables.

Figure 5.1 Representation of the structural equation modeling stages according to Hair et al. (1999 pp.620-642) and Del Barrio et al. (2000 p.493)



The (2) identification of the model consists of assessing the collected data (from the survey). It should be including variances and covariances greater than or equal to zero.

The (3) model estimation consists of defining the coefficient that represents the variables correlations. This is an iterative process that ends with the residual matrix, which is the covariance matrix of the model and cannot be minimized.

The final stage is (4) the model evaluation and interpretation during which it is determined if the obtained data fits the proposed model. If it does not fit, there should be an adjustment to the proposed model. This adjustment could be in three levels: the (i) global model assessment, the (ii) model measurement assessment and the (iii) parsimonious structural fit model assessment. The global model adjustment is focused on absolute measures of adjustment, and these are related to the global data matrix. The model measurement assessment is an incremental measurement of adjustment (this is stipulated when the model is null). And finally, the parsimonious structural fit is determined by the appropriateness of the model with a number of estimated coefficient required to reach the adjustment level.

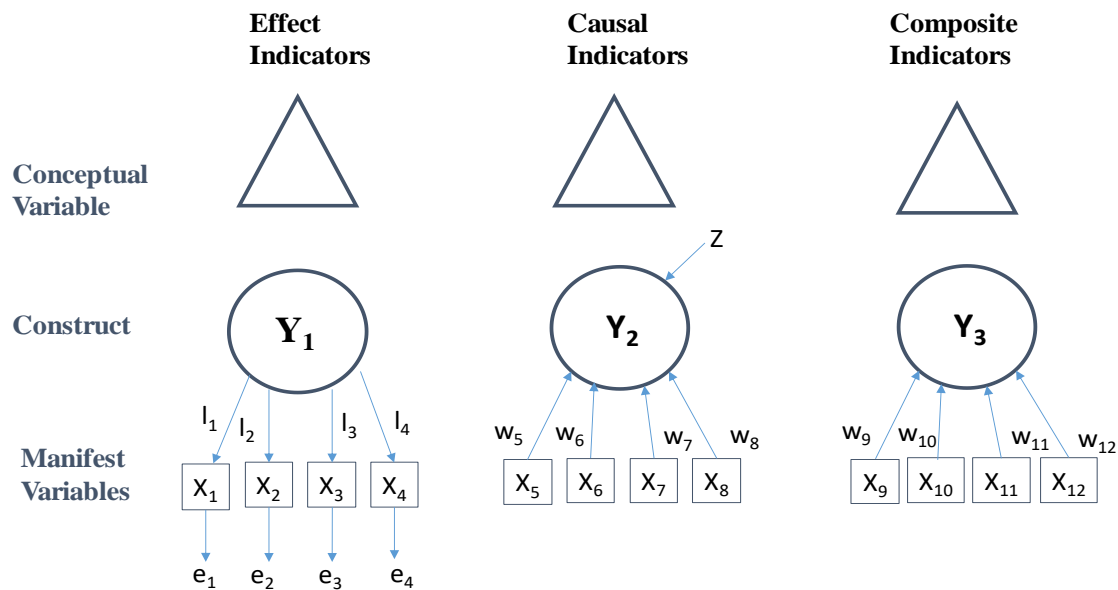
As previously mentioned, a theoretical model reflects a set of structural relationships, and this conceptual basis represented on variables. Simultaneously, the constructs symbolize the collection of variables at different levels of the theoretical concept basis. The construct definition relies on the measurement of observable amounts reflected on the variables or indicators (based on the defined scales, e.g. Likert scales). It is known that the relationship between two determined variables, one is an observed and the other, an unobserved. It is modeled by the following equation:

$$x = l \cdot Y + e,$$

It express “ x ” is the observed variable, “ Y ” is the latent variable and the loading “ l ” is a regression coefficient the strength of relationship between “ x ” and “ Y ” (Sarstedt et al. 2016). There are two approaches to produce constructs: reflective and formative. If indicators are highly correlated and exchangeable, they are reflective. Figure 5.2 shows a latent variable “ Y ” represents reflective indicators associated with a particular construct which should be highly correlated to each other, and any change is reflected simultaneously. It works as sufficient the construct has a sufficient reliability, however, they are considered fallible (Bollen and Lennox 1991).

On the other hand, the indicators of a construct or latent variable are not interchangeable among themselves they are formative (Wong 2013). When indicators are formative the arrows have to be reversed. Then a construct with formative indicators are intricately dependent to their measures. In formative measurement models are not required correlated indicators because they are prone to be highly correlated and keep satisfactory levels in reliability and validity.

Figure 5.2 Measurement model conceptualization and operationalization (Sarstedt et al. 2016)



5.5.3 Smart PLS software 3 as tool for model design and analysis

We selected Smart PLS 3 (Ringle *et al.* 2015) to perform statistical analysis of Partial Least Squares (PLS) path modeling (Wong 2013; Ferreras-Méndez *et al.* 2015). We selected the recent Smart PLS version 3 to perform the TCCs approach and the respective model estimation. PLS computes composed variables in the model contained in a figure. There are three aspects to consider in this regard: (a) PLS only allows for formative measurement models with causal indicators, in this regard to estimate formative measurement models running a reflective measure unless they can be simultaneously available; (b) PLS is based on model logic composition, the method only estimates common factor-based reflective measurement models; (c) PLS use two modes to estimates the indicator weight. Mode A for reflectively specified constructs and Mode B for formatively specified constructs (Sarstedt *et al.* 2016).

The PLS factor analysis assessment has been made by observing the variables that compound the theoretical model. The table 5.5 shows the SmartPLS' measurement references considered in this study.

Figure 5.3 Checking PLS Reliability and Validity (adapted table)
(Wong 2013, p.21)

What to check?	What to look for in SmartPLS?	Is it OK?
Reliability		
<i>Indicator Reliability</i>	“Outer loadings” numbers	Square each of the outer loadings to find the indicator reliability value - 0.70 or higher is preferred. If it is an exploratory research, 0.40 or higher is acceptable (Hulland, 1999)
<i>Internal Consistency Reliability</i>	“Reliability” numbers	Composite reliability should be 0.70 or higher. If it is an exploratory research, 0.60 or higher is acceptable (Bagozzi and Yi, 1988)
Validity		
<i>Convergent validity</i>	“AVE” numbers	It should be 0.50 or higher (Bagozzi and Yi, 1988)
<i>Discriminant validity</i>	“AVE” numbers and latent Variable Correlations	Fornell and Larcker (1981) suggest that the “square root” of AVE of each latent variable should be greater than correlations among the latent variables.



CHAPTER 6

Analysis and results of the empirical study

6. Analysis and results of the empirical study

6.1 The TBS in the Spanish context

The growth of TBS in Spain from 2000 onwards has an intense productivity and international impact, mostly associated to the generation of TBS by small teams operating in high technology service sectors (Fariñas et al. 2007; Barajas et al. 2011). On the other hand, a study conducted by Pérez and Sánchez (2003) shows the increased contribution of ‘hi-tech’ entrepreneurship from university spin-offs catalyze knowledge transfer in innovation networks. In 2002 the Center for Technology and Industry Development (CDTI) and other government agencies launched lines of credit called NEOTEC to facilitate the development of NTBFs. The difficulties for the creation and development of TBS in other countries are similar in Spain, the principal barrier being the access to funding (Storey et al. 1998). Other obstacles are the lack of business and/or commercial experience among the founders, the level of sophistication of the innovation, when it represents a wide knowledge gap for its use. In 2015 several founders of Spanish TBS made a manifesto called "Manifiesto of Spanish startup companies" (2015).⁵ aiming to articulate the need to adapt the local market; in the same year the Spanish Association of Startups was created, following the European Manifesto (2013) focusing on the improvement of the entrepreneurial European landscape.

⁵ http://www.asociacionstartups.es/wp-content/themes/aes/pdf/asociacion-espanola-startup-emprender-_manifiesto-reasonwhy.es_.pdf

Some reports show the types and founding support of the TBSs in Spain. Nonetheless, there is a lack of statistical information to enable the identification of the distinctive features of this collective and how to distinguish TBSs versus SMEs (Fariñas and Martín-Marcos 2007). One Report from the Spanish startups association analyzed a sample of Spanish innovation ecosystem and entrepreneurial activity micro and small-medium-sized technology-based companies and showed that the greatest concentration of this type of firm is in Catalonia, Madrid and Andalusia, with much lower concentrations in other Autonomous Communities. 60% of these companies are located in a distinctly urban area: cities with populations over fifty thousand.

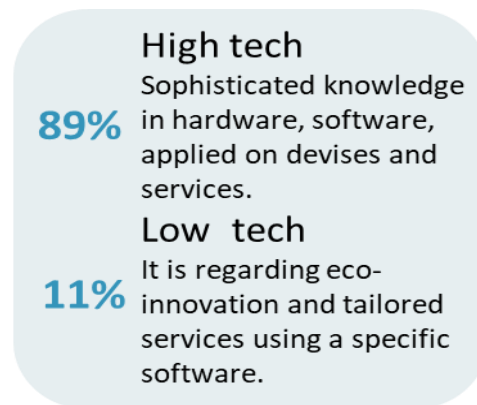
On the other hand, according to the Medium/Tech.eu as European technology news say that Valencia, despite being the third largest city in Spain that offers an integrated support system for early-stage startups, hosting a complete entrepreneurial package with an interesting network of business angels, incubators, and co-working office spaces. Regardless of Valencian entrepreneurial ecosystem hosting attractive conditions for TBS, it is considered insufficient to retain and support the TBSs with long-term vision. Even counting with its universities, business schools, and research institutes, because it is “*spotted technical talent, cheap and easy to afford*” (Müller 20016), which becomes a serious brain drain that affects the capacity to support the scaling up its TBS. Also because of more than half of the TBS successful cases were founded from 2001 to 2009.

Iñigo and Gorricho (2011) point out the key role played by the entrepreneurial team in the process of creation and consolidation of Spanish TBS base on four case studies. Particularly, they recognized the team’s members’ relevance as the TBS promoters, whose technical expertise and tight interaction bear to develop internal pioneering ideas, new technology and team support. Other important aspects include the strategies of collaboration, particularly with large companies, universities and research centers, as complement agents of new product development. Finally, found that the teams’ founders developed collaboration strategies with other entities, even before formally constituting the company. This thesis is the first on studying TBS from the perspective of dynamic capabilities (DCs).

6.2 Descriptive statistics of TBS participants

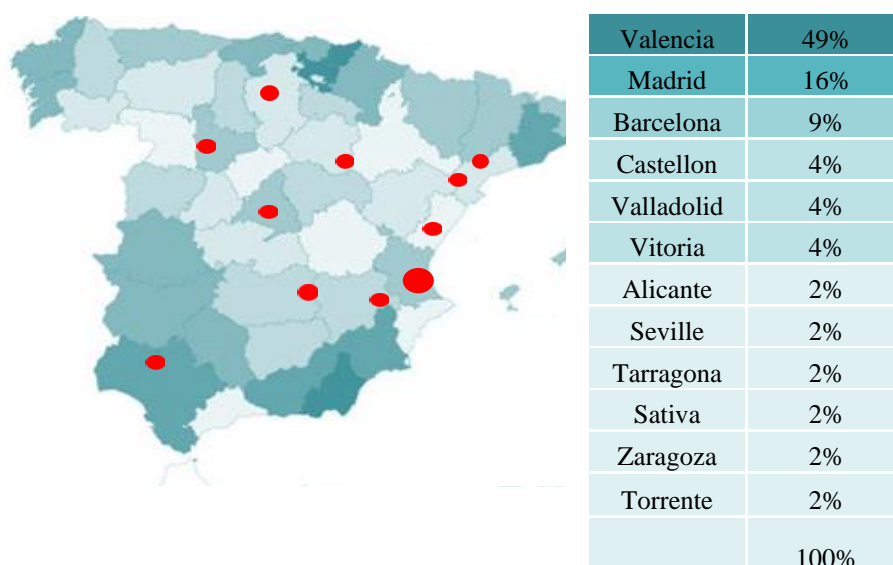
The study focuses on a sample of Spanish TBS in which its innovative product or service is based on new systems, industrial processes and interfaces, hardware and software. These characteristics function as our control variables. Because of the complexity and especificity of some TBS innovation's particularities, we just differentiate two kinds of technologies: high tech and low tech. The 89% is high tech and they are specialized in developing and apply sophisticated knowledge in software, products and services; and 11% were low tech: they offer products or services that reduce environmental impacts or improve industrial processes, like outsourcing processes or specific tailored services using a specific software.

Graph 6.1 TBS participants' type of technology



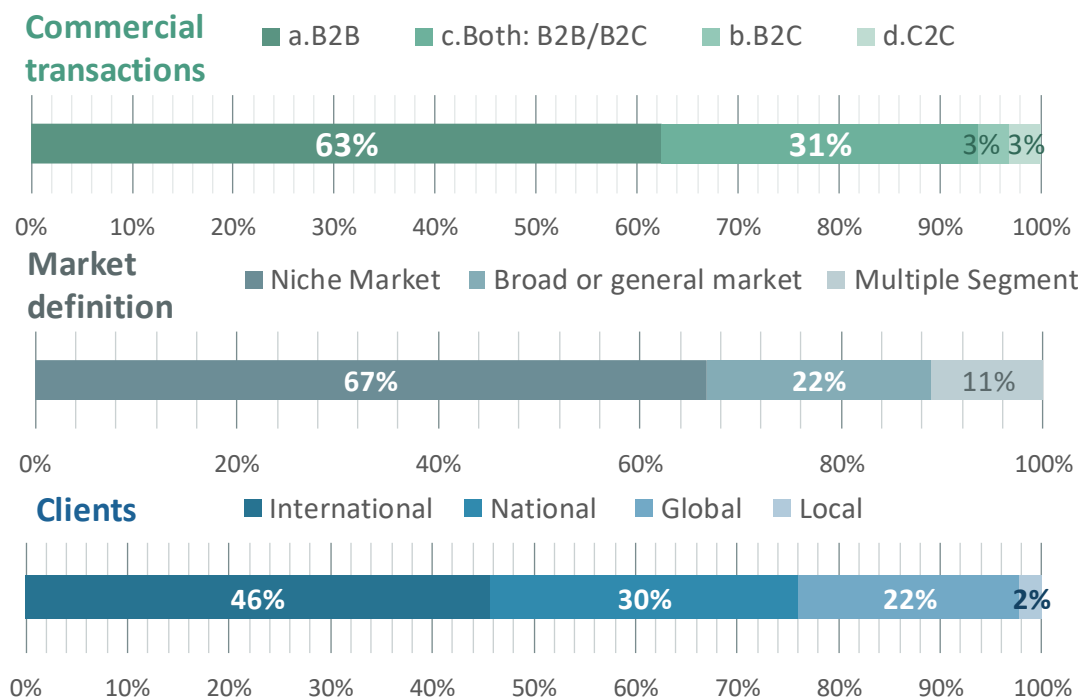
The figure 6.1 shows the geographical distribution of the TBS respondents, who are from 12 Spanish cities. Valencia region host most of the TBS respondents, we tried to integrate a diversity of answers of different Spanish provinces.

Figure 6.1 Geographical distribution of TBS participants



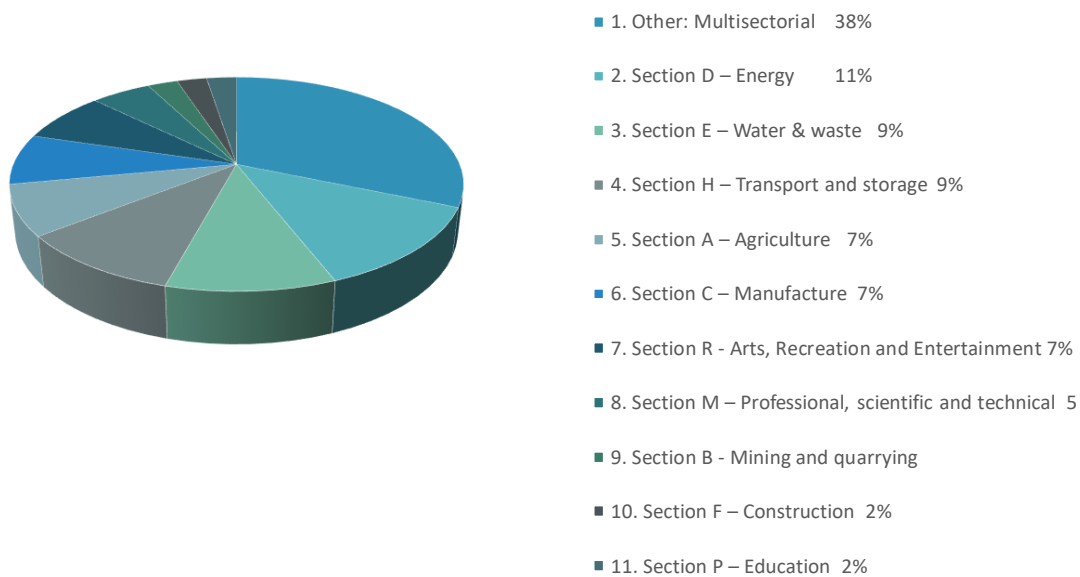
The TBS participant's market goals focus on launching their product or service. In this respect, the 46% of the respondents said they operate in the international markets, the 22% highlights pursuing a global market, and the other 30% affirm they operate the national and just the 2% confirm they work at the local market. With respect to their market segment or niche market ambitions, the 67% of the participants aiming niche markets, while others the 22% want to reach more general markets, and the 11% were to multiple market segments as their target.

Graph 6.2 TBS participant's market orientation



According to Romero and Martínez-Román (2012), entrepreneurial motivations are differentiated between internal and external motivations. An internal entrepreneurial motivation poses the idea that entrepreneurs undertake their activities to set up a TBS by mere pleasure than for vocational reasons or for professional development. Conversely, external entrepreneurial motivation implies that the entrepreneurs' activity is led by the desire of pursuing economic benefits. In table 6.1 we introduce a general description of the target sector of TBSs participants in this study.

Table 6.1 TBS participants target sector (self- source)



The participants in this study develop products and services that employ new, or emergent, technologies for the entertaining and the industrial sector. The 80% took part in an accelerator program and they belong to green sector, whose principal motives pursuing to solve problems related to sustainability, clean-tech, renewable energy, energy efficiency and low carbon transport.

Table 6.2 briefs specific TBSs' data regarding to training and financial support from external sources. All have ranked the (1st) personal investment from the team's members as the principal financial source to support thie endeavour; then (2nd) support from family and friends and (3rd) angel investors. In this respect, just three participants mentioned had received or is in a process to be supported by Venture Capital (VC), because their innovation radicalness these TBS require risk investment from VC (Nanda and Rhodes-Kropf 2013).

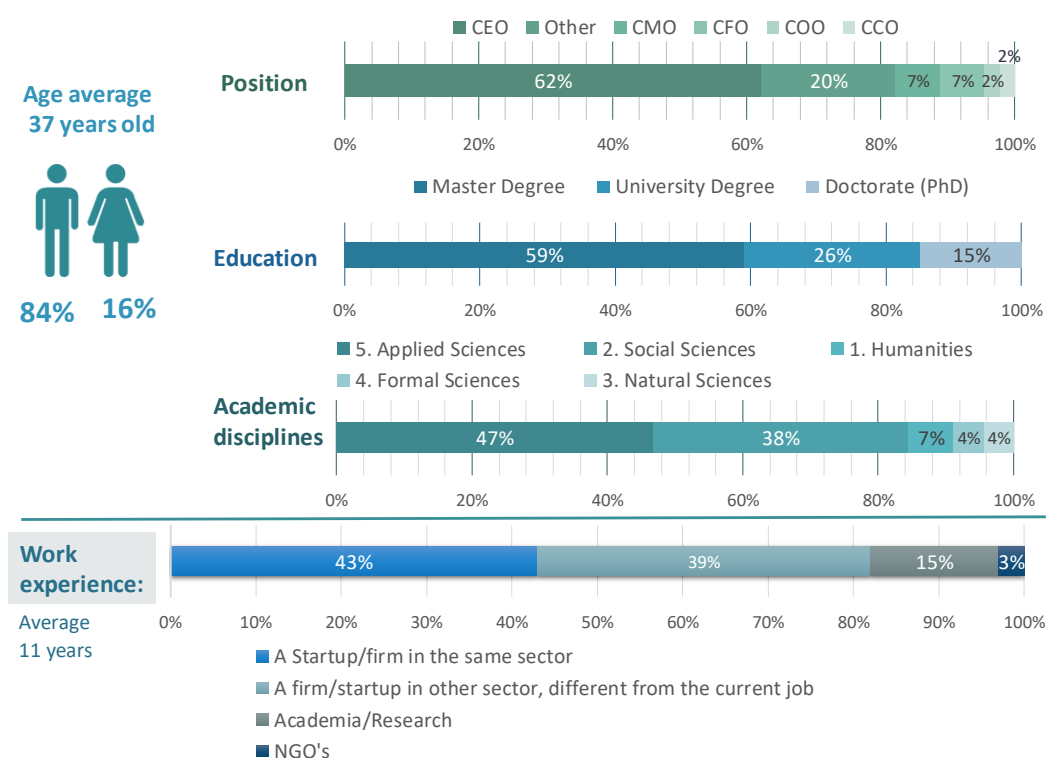
Table 6.2 TBS received training and investment sources

<i>Accelerator programs participation</i>	Yes 36 startups	80%	No 9 startups
<i>Ranked Principal benefits from these programs</i>	1. Mentoring	2. Training	3. Funding and Networking
<i>Principal financial suport</i>	Personal investment	Support from family and friends	Angel Investors Or Venture Capital

The participants in our study are established organizations, existing for between 1-6 years there are some exceptions with 10 years and keep working with a compact team. Most of the firms had already overcome the two most difficult stages; (1) *the new venture idea*, also known as the *bootstrapping stage* (Harrison and Mason 2004), and then subsequently received at least one round of (2) *seed investment*. Two firms were participants in the same program over two years. In the first year they received an early-stage investment and in the second year, they were pursuing a second round seeding investment to support and extend their operations.

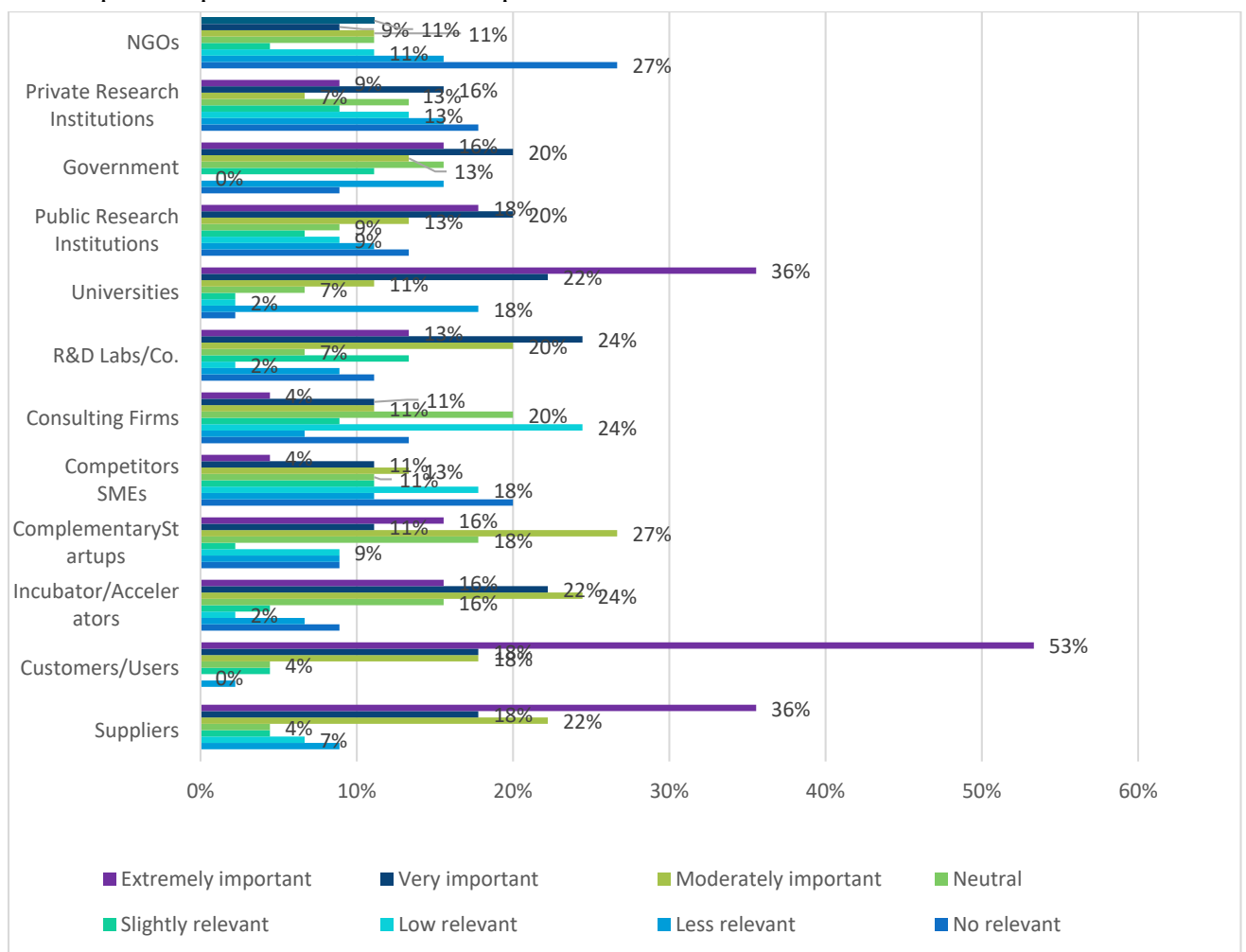
All the respondents have relevant positions and high level of responsibilities in the TBS's activities, as co-founders, or other cases, have key positions such as administration, business development or TBS promoters (see table 6.3). Also, they get involved in different activities that including operative activities, decision-making, and have access to relevant information for strategic purposes. On the other hand, our study shows interesting findings regarding gender involvement, meanwhile according to Storey and Tether (1998 p.938) in the 90's the founders' characteristics were a primary or exclusive male (95%-100%); this study shows that there is an increase the female involvement with the 16%, in the business development and decision making. This is a high percentage comparing with other studies.

Table 6.3 Startup team members: study participant demographics (self-source)



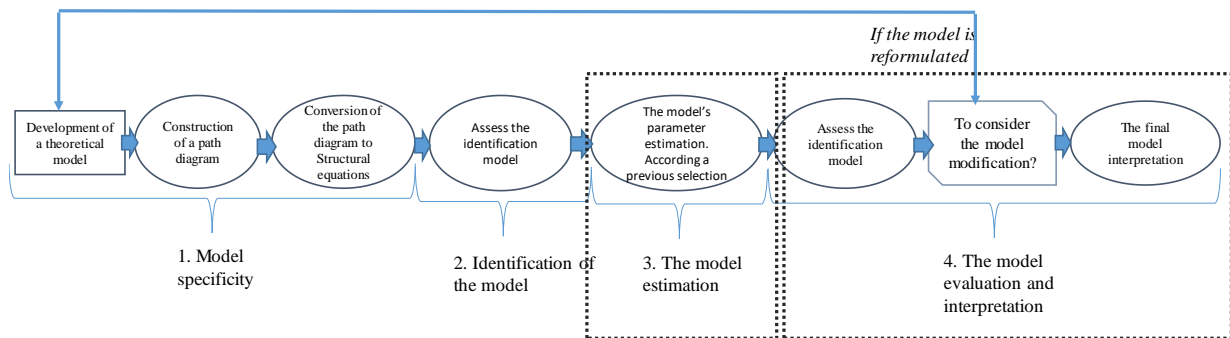
The TBSs' external collaboration anchors was considered as a control question in order to confirm their level of engaging collaboration for innovation purposes. The graph 6.2 shows the level of 0-7 Likert scales, responses were adapted from 0= *we do not collaborate with them*; 1= *less important*; 7= *extremely important*. On the one hand, the responses show a high rate to collaborating with classified *customers and users* (53.33%), the *Universities* and *suppliers* with the (35.56%) each respectively. Then the moderately importance is stressed between *complementary startups* and *incubators and accelerators*. Conversely, the less relevancy to collaborate with is place in *private research institutions*. Finally, the responses show that are low relevant to collaborate with consulting firms and non-relevant a collaboration with *NGOs* (26.67%) and *competitors SME's* (20%). Overall, the collaboration interests of the respondents pursue to collaborate intensively with institutions, customers, and suppliers that represent hotspots of knowledge creation, that support their technology to a continual improvement. However, they show less interest to collaborate in those whose activities might be closely related to their aims such as NGOs and competitors.

Graph 6.3 Spanish TBSs' level of response anchors related to collaboration with others.



We continue with model development, according to structural equation modeling (SEM). We develop *stage 3. the model estimation*, relative to the model's parameter estimation and stage 4. *the model evaluation and interpretation*.

Figure 6.2 Representation of the SEM stages according to Hair *et al.* (1999 pp.620-642) and Del Barrio *et al.* (2000 p.493)



After we introduced the database in the Smart PLS software to define the respective correlations, we identified the team collaboration capabilities (TCCs) as the PLS latent construct. The PLS latent construct can be estimated formative or reflective, by scoring each set of items to kit the indicators that define each construct of the model. The difference between these two types of models is defined in table 6.4 respectively.

Table 6.4 Formative and reflective constructs nature according to Hair *et al.* (2012); Sarstedt *et al.* (2016)

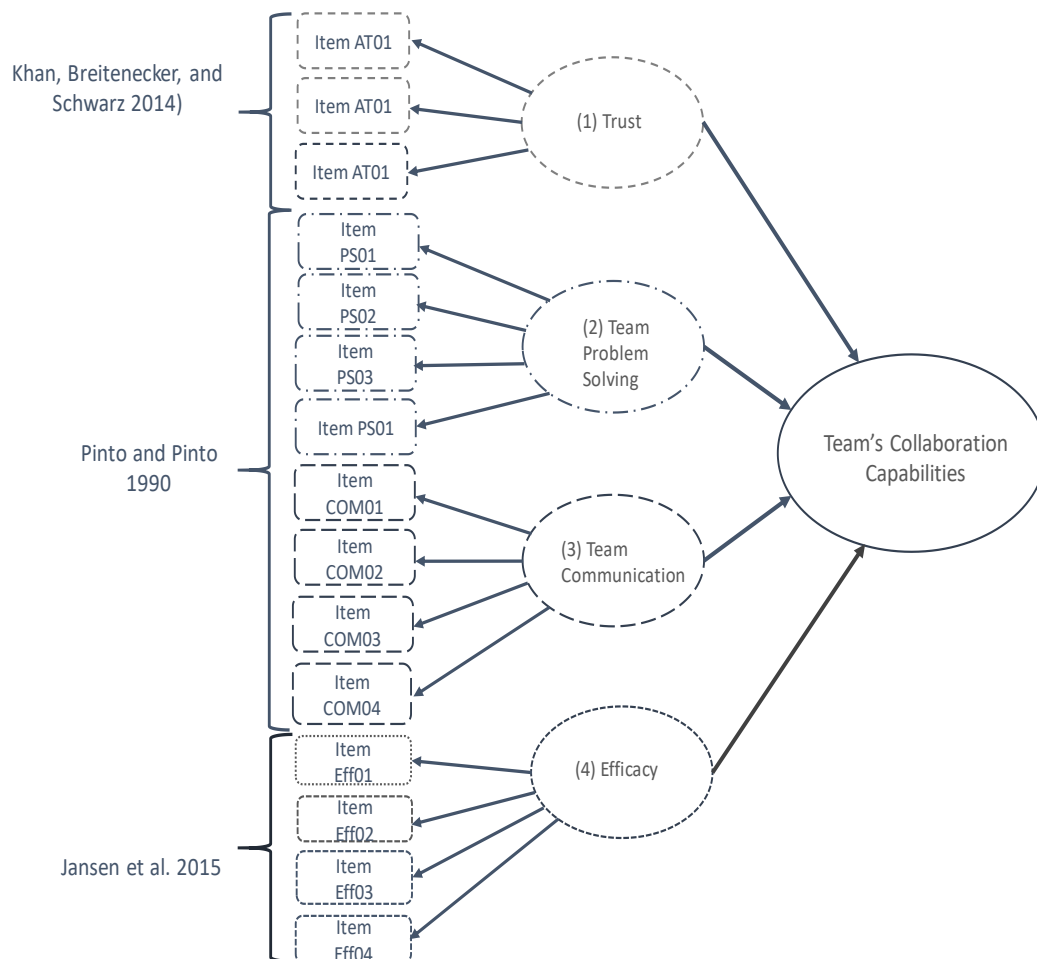
Formative constructs	Reflective constructs
<i>(i) direction of causality, it is from the measure to construct</i>	(i) pursue causality from the construct to measure
<i>(ii) when it does not expect a correlation in the measures</i>	(ii) its measures are expected to be correlated
<i>(iii) indicators should capture the entire content domain of the construct.</i>	(iii) the indicators do not interchange
<i>(iv) they are measure by weights</i>	(iv) they are measure by loadings

According to Roni *et al.* (2015) “*a construct is reflective when its indicators are results of changes in the construct.*”(p.250) This means causality flows from the construct to the indicators because the indicators are the consequences of an adequate or effective collective effort. On the other hand, “*a causality flow from indicators to the construct indicates it is formative*” (p. 250), when the indicators show a cause, it could be a motivation or well satisfaction.

6.3.1 Model estimation

TBS team collaboration capabilities with the incorporation of its respective dimensions constitute the TCCs latent construct. The TCCs' construct conformation represents the dynamic interaction factors or relational conditions among the TBS team's members. TCCs emphasize the TBS entrepreneurial activities that aim the product or service development. Figure 6.3 shows our model design adapted to these elements composed reflective.

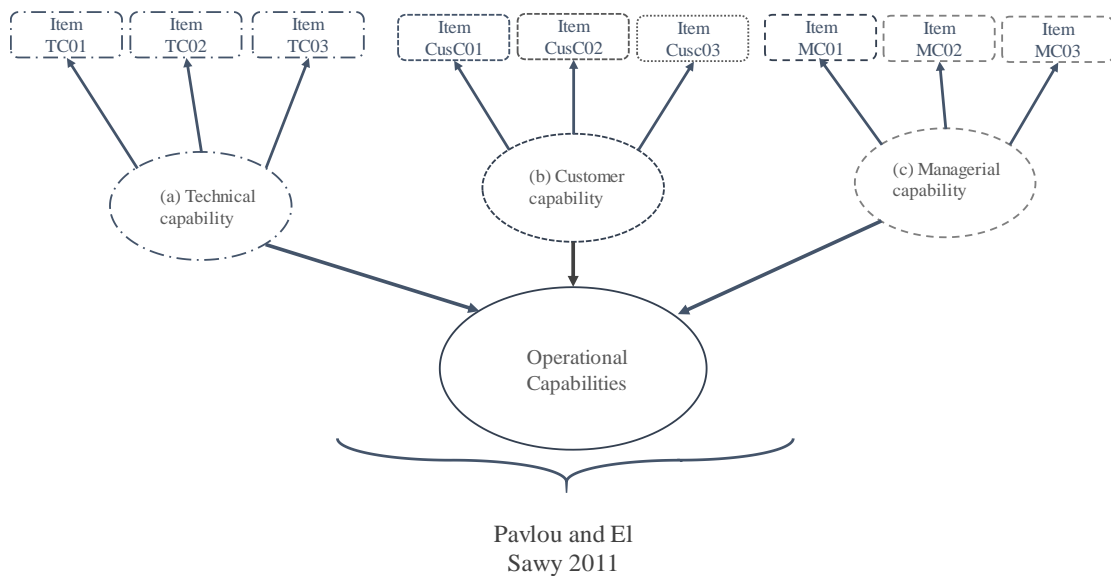
Figure 6.3 TBS team's collaboration capabilities is a reflective-formative construct



On the other hand, the operational capabilities' (OCs) construct integrates the TBS's functional activities such as: technical, marketing and management. OCs provides unity, integration and direction to the TBS team resources toward their entrepreneurial roles. The OCs constitute explicit activities (processes, routines and practices), where explicit and tacit knowledge are involved, altogether produce wanted outcomes.

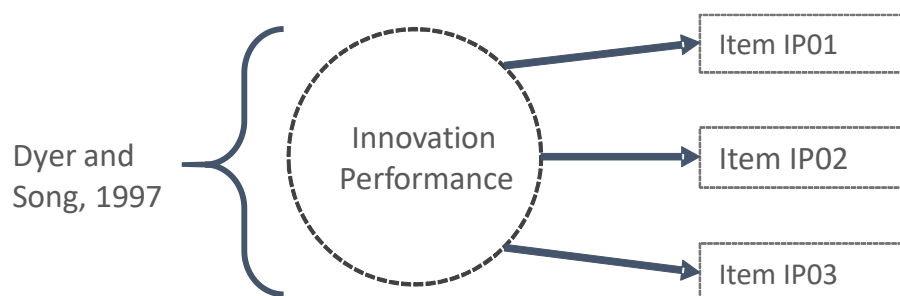
Particularly in our model we center the attention on OCs focus on new product development (NPD) due to the TBS essential activities (see Figure 6.4).

Figure 6.4 TBS team's operational capabilities construct (Pavlou and El Sawy 2011)



Subsequently, innovation performance (IP) represented in figure 6.5 illustrates the construct shaped by efficacy and effectiveness, plus comparing appreciation regarding theirs competitors (Dyer and Song 1997; Ferreras-Méndez et al. 2015). Innovation performance involves new opportunities creation starting from collaborative synergies at the TBS' team level.

Figure 6.5 TBS team's innovation performance construct



The integration of TCCs and their innovation performance relationship is dictated by the primary goal of the TBS, where specifically, the OCs (R&D, marketing, and

management) processes hold innovation functions that drive and complement the product and service development.

6.3.2 Data reliability

We utilized the data registered from the designed survey, which integrates the respective items that correspond to specific variables, all this using SmartPLS 3 software. We proceed to analyze the respective TCCs model compliance and the other correlation dimensions, such as, operation capabilities (OCs) and innovation performance (IP). All these according to the data collected, we defined a reflective construct related to external validity. The first-order construct using PLS scores which reference less than 1.7 indicate low levels of multicollinearity. In this respect, the PLS scores for the three constructs, or first-order constructs which support our model serve as formative and reflective indicators (according to the literature respectively). To check the reflective construct, then we test out the properties (items) of each variable to ensure its factorial structure. With this respect we will ensure the latent variable is correct. The reliability determine the quality of the used scale could be free of deviations, these could be produced by causal mistakes. If it does not fit, there should be an adjustment to the proposed model.

Each of the TCCs' dimensions, are factors that constitute a collection of characteristics from theoretical view and perceptions of team perceptions from individual perception, from the empirical data; which are conceptual dimensions of analysis that are not directly observables. Hence, the development of the TCCs' and each respective conceptual variable that represents an interaction factor, such as trust, communication, problem-solving and team efficacy. They respectively contribute to build the TCCs construct to analyze and explain the team interaction. Consequently, we do the same with other variables identified, such as operational capabilities (with its respective items) and innovation performance that represent factors other factors of interaction and the aiming of the TBS team. Because the TCCs construct has been configured by theoretical literature. The TCCs, in particular, is made up of reflective variables that constitute the construct. The smart PLS 3 factor analysis of the settled model (Gaskin 2017), provides the data verification of the specified structure of the data and the dimensions setting the variables. We use the scales 1-7 Likert scale. The factor analysis in Smart PLS 3 allows us to assess the reliability of the scales, with the path coefficients analysis and confirmed

through the coefficient alpha, also known as Cronbach's alpha (Cronbach 1963). Despite some authors support that a higher alpha does not warranty that all scales of the items are sufficient (Sarstedt *et al.* 2016), but it gives us insights of its consistency or if they are compatible through the appropriate reliability and validity (Brown 2002; Ercan *et al.* 2007).

Table 6.5 Indicators of reliability, previous factor analysis of each variable is reflective

Reflective Construct	Outer loadings	Cronbach's Alpha	Rho A	Composite Reliability	Average Variance Extracted (AVE)
Trust 01	0.729	0.751	0.800	0.854	0.663
Trust 02	0.869				
Trust 04	0.838				
Team Effi2	0.793	0.866	0.868	0.909	0.714
Team Effi3	0.845				
Team Effi4	0.863				
Team Effi5	0.876				
Team Comm1	0.708	0.847	0.883	0.895	0.682
Team Comm2	0.842				
Team Comm3	0.827				
Team Comm4	0.913				
Team ProbSolv1	0.833	0.874	0.881	0.913	0.725
Team ProbSolv2	0.846				
Team ProbSolv3	0.903				
Team ProbSolv4	0.822				
TechCaps01	0.755	0.761	0.770	0.863	0.679
TechCaps02	0.888				
TechCaps03	0.823				
MktCaps01	0.826	0.747	0.748	0.856	0.664
MktCaps02	0.821				
MktCaps03	0.797				
MgrCaps01	0.659	0.741	0.765	0.856	0.669
MgrCaps02	0.906				
MgrCaps03	0.866				
InnoProgPerfm01	0.848	0.738	0.747	0.854	0.663
InnoContiImprov02	0.887				
InnPerfCompet03	0.694				

The data integration for analysis follows these reference indicators according the Smart PLS (Joe F. Hair et al. 2012; Wong 2013; Gaskin 2017) factors to be assed:

1. Model dimensionality analysis The estimation and adjustment of the theoretical model (reflective) which has being defined with the SEM loadings Carmines and Zeller (1979) recommend factor loadings equal to or above 0.707, which means that the shared variance between the construct and its indicators is greater than the variance of the error.
2. Cronbach's alpha. Reliability of each indicator ≥ 0.5 (Cronbach 1963)
3. Composed Reliability ≥ 0.6
4. Convergent validity (AVE). Magnitude of factorial loadings ≥ 0.4 and Coefficient t ≥ 1.96 (statistically significant).
5. As a previous confirmatory analysis for the t-values for n=1000 subsamples
6. The AVE value should be at least 0.5, it means that the construct is able to explain more than half of the variance of its indicators on average (Fornell and Larcker 1981).

Once we performed the factor analysis, we confirm each dimensions' indicators' estimation are robust enough and adequate the respective adjustments in the model. No outstanding that the sample size was relatively small we which could be in three levels: the (i) global model assessment, the (ii) model measurement assessment (first-order construct) and the (iii) parsimonious structural fit model assessment (second-order construct)(Wetzels *et al.* 2009; Becker *et al.* 2012).

6.2.3 Evaluation and interpretation

The TCCs is a specific construct that requires to integrate different components also known as indicators (Curado *et al.* 2014). The indicators represent values assigned on the ordinal scale. Indicators build up a variable and can be defined as an item, or an observed measure, also as observed variable exchangeable (Bollen and Lennox 1991).

The results of the control variables in our model did not represent any significance, which was the case of the ones we applied for example: The Startups participants in accelerators, as previous professional experience, or number of employees, even type of technology or financing received were not representative within the model. According to Hair *et al.* 2013 only when the effect of the control variables is significant, the researcher should use this finding with special attention when reaching conclusions or initiating additional analyses regularly when this element is significant increases the complexity of the model. Therefore it may also require an increase in the sample size required to estimate the PLS model (Hair *et al.* 2013; Roni *et al.* 2015).

We assess the variables relationship under PLS's four criteria assessment processes such as: factor loading, composite reliability, average variance extracted (AVE) and discriminant validity (Kock and Lynn 2012). Each criteria allows to evaluate different

parameters according their particular indicators. For instance, factor loadings should be equal or above 0.707 this funds the construct and indicators is greater than the variance of the error. Table 6.6 displays the inner model assessment indicators of TCCs, with the other constructs interaction with operation capabilities (OCs) and innovation performance.

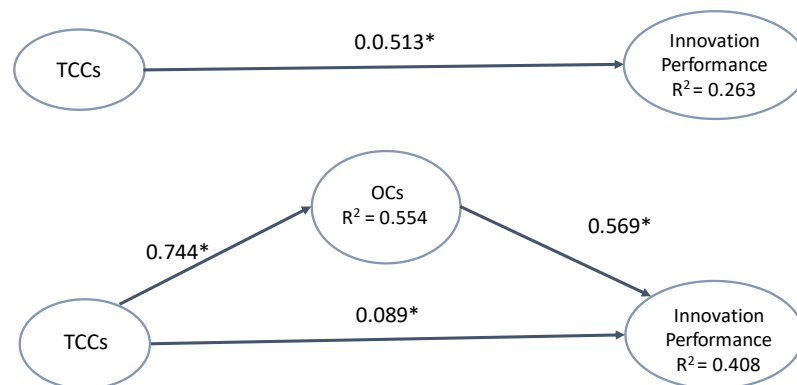
Table 6.6 Measurement model's results

	<i>Outer Loadings</i>	<i>P-values</i>	<i>Cronbach's Alpha</i>	<i>rho_A</i>	<i>CR</i>	<i>AVE</i>
<i>Team Colloaboration Capabilities (TCCs)</i>			0,738	1,000		
<i>Communication</i>				0,915	0,889	0,670
<i>Q11_1TeamComm1</i>	0,651	0,007	0,847			
<i>Q11_1TeamComm2</i>	0,877	0,000				
<i>Q11_1TeamComm3</i>	0,797	0,000				
<i>Q11_8TeamComm4</i>	0,913	0,000				
<i>Trust</i>			0,751	0,910	0,848	0,653
<i>Q10_3 Trust1</i>	0,690	0,027				
<i>Q10_3 Trust2</i>	0,904	0,002				
<i>Q10_3 Trust3</i>	0,815	0,003				
<i>Problem-solving</i>			0,874	0,897	0,913	0,725
<i>Q11_2TeamProbSolvin1</i>	0,837	0,000				
<i>Q11_2TeamProbSolvin2</i>	0,833	0,000				
<i>Q11_2TeamProbSolvin3</i>	0,913	0,000				
<i>Q11_2TeamProbSolvin4</i>	0,820	0,000				
<i>Team Efficacy</i>			0,866	0,882	0,908	0,713
<i>Q10_8TeamEffic2</i>	0,771	0,000				
<i>Q10_8TeamEffic23</i>	0,831	0,000				
<i>Team efficacy04</i>	0,882	0,000				
<i>Team efficacy05</i>	0,888	0,000				
<i>Operational capabilities (OCs)</i>				1		
<i>Marketing Capabilities</i>			0,747	0,767	0,853	0,660
<i>Q12_4MktCaps1</i>	0,822	0,031				
<i>Q12_5MktCaps2</i>	0,778	0,070				
<i>Q12_6MktCaps3</i>	0,836	0,020				
<i>Managerial Capabilities</i>			0,741	0,787	0,856	0,669
<i>Q12_7MgrCaps1</i>	0,639	0,000				
<i>Q12_7MgrCaps2</i>	0,917	0,000				
<i>Q12_7MgrCaps3</i>	0,870	0,001				
<i>Technical Capabilities</i>			0,761	0,781	0,863	0,678
<i>Q12_1TechCaps1</i>	0,755	0,000				
<i>Q12_1TechCaps2</i>	0,888	0,000				
<i>Q12_1TechCaps3</i>	0,823	0,000				
<i>Innovation Performance</i>			0,738	0,752	0,853	0,663
<i>Q7_1InnoProgPerfrm</i>	0,856	0,000				
<i>Q7_2InnoContiImprov</i>	0,888	0,000				
<i>Q7_3InnoPerfCompet</i>	0,684	0,001				

Note: Cronbach's alpha. Reliability of each indicator ≥ 0.5 ; (CR) composed reliability ≥ 0.6 (Cronbach 1963). Convergent validity (AVE). Magnitude of factorial loadings ≥ 0.4 and Coefficient $t \geq 1.96$ (statistically significant). P value ≤ 0.05 , for path analysis the t-values we made $n=500$ subsamples. The (rho) is a measurement of correlation between two variables random continue. It could be -1 and 1, value 0 means no correlation and no independence.

The path analysis is used to describe the directed dependencies among the model variables, this means to know the cause and effect relationships between independent or causal variables and the independent or influenced variable. According to Chin (1998) the essential criterial to evaluate the structural model has to be from the coefficient of determination (R^2) of the endogenous latent variables. The regression analysis is interpreted as the proportion of the variance in the dependent variable that is predictable from the independent variable. The R^2 confirms how strong is the relationships between the constructs of the model. Following Chin's (1998) recommendations related the use of bootstrap to estimate standard errors and t-statistics based on 500 bootstrap samples of our model. The coefficient of each endogenous constructs are shown in figure 6.5

Figure 6.5 Total effects of the causal model



Note: $p \leq 0.1$ * $p \leq 0.05$ ** $p \leq 0.01$ *** $p \leq 0.001$

The model shows a more robust analysis (second-order) construct to give more consistency. On the other hand, because there According to Falk and Miller (1992) the R^2 measurement must be higher than 0.1, which ensures that at least the 10% of the construct viability from the model. However, lower R^2 estimation provides very little information, so the hypothesis concerning this latent variable cannot be sustained of the latent construct. In this figure we represent the total effects and the direct effect between

the TCCs and innovation performance. Added to that, another assessment confirmation of the structural model involves the model's predominant measure of predictive relevance is the Stone-Geisser Q^2 statistic (Geisser 1975), that is obtained by blindfolding procedures. If this value for certain endogenous latent variables should be greater than zero, which provides predictive relevance to the model. The tables 6.6 and 6.7 show respectively the model's first and second-order indicators.

Table 6.7 First Order inner model assessment indicators

	<i>R</i> <i>Square</i>	<i>R</i> <i>Square</i> <i>Adjusted</i>	<i>Sample</i> <i>Mean (M)</i>	<i>T</i> <i>statistics</i>	Q^2 (=1- <i>SSE/SSO</i>)
1. <i>Innovation performance</i>	0,526	0,503	0,646	4,137	0,234
2. <i>OCs</i>	0,926	0,918	0,905	24,932	0,159
3. <i>TCCS</i>	0,889	0,878	0,085	10,326	n/a

Table 6.8 Second-order inner model assessment indicators

	<i>R</i> <i>Square</i>	<i>R</i> <i>Square</i> <i>Adjusted</i>	<i>Sample</i> <i>Mean (M)</i>	<i>T</i> <i>statistics</i>	Q^2 (=1- <i>SSE/SSO</i>)	<i>Discriminant validity</i>		
						1.	2.	3.
1. <i>Innovation performance</i>	0.408	0.379	0.369	2.347	0.494	1.000		
2. <i>OCs</i>	0.554	0.543	0.541	3.324	0.314	0.636	1.000	
3. <i>TCCS</i>	n/a	n/a	n/a		n/a	0.513	0.744	1.000

The higher-order or second-order construct contributes to a more robust analysis of the other variables and their respective items, so then it is considered as a more robust unitary latent variable in the factor model. On the other hand, the entire model integrates reflective constructs, the tables 6.7 and 6.8 show the correlation matrix before to integrate the basis that supports the model second-order. They are respectively the correlation matrix and the Fornell-Larcker Criterion assessment matrix. The Fornell-Larcker Criterion assess the discriminant validity of each construct: "Each construct's AVE should be higher than its squared correlation with any other construct" (Fornell and Larcker 1981; Hair et al. 2012).

Table 6.9 Correlation matrix for principal constructs

	1	2	3	4	5	6	7	8	9	10
1. <i>Innovation Performance</i>	1,000									
2. <i>Managerial Caps</i>	0,492	1,000								
3. <i>Marketing Caps</i>	0,160	0,280	1,000							
4. <i>OCs</i>	0,717	0,803	0,261	1,000						
5. <i>Communication</i>	0,329	0,695	0,054	0,615	1,000					
6. <i>Team Efficacy</i>	0,534	0,522	0,084	0,647	0,683	1,000				
7. <i>ProbSolving</i>	0,422	0,693	0,110	0,642	0,892	0,719	1,000			
8. <i>Trust</i>	0,254	0,322	0,028	0,379	0,534	0,582	0,568	1,000		
9. <i>TCCs</i>	0,647	0,739	0,168	0,812	0,737	0,901	0,821	0,489	1,000	
10. <i>Tech Caps</i>	0,537	0,594	0,399	0,877	0,466	.,510	0,466	0,311	0,628	1,000

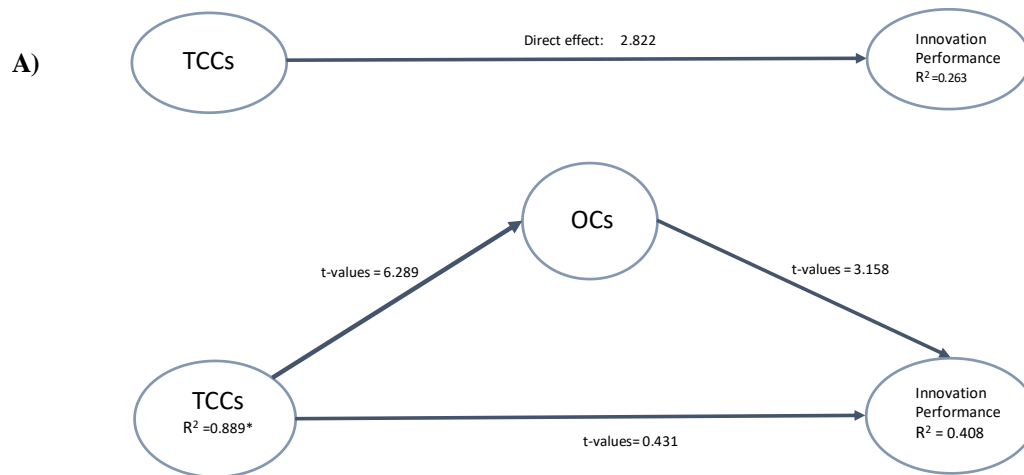
Note. Correlations above 0.15 are significant ($p < .05$); above .20 ($p < .01$).

Table 6.10 Discriminant validity matrix for principal constructs (Fornell-Larcker Criterion, 1981)

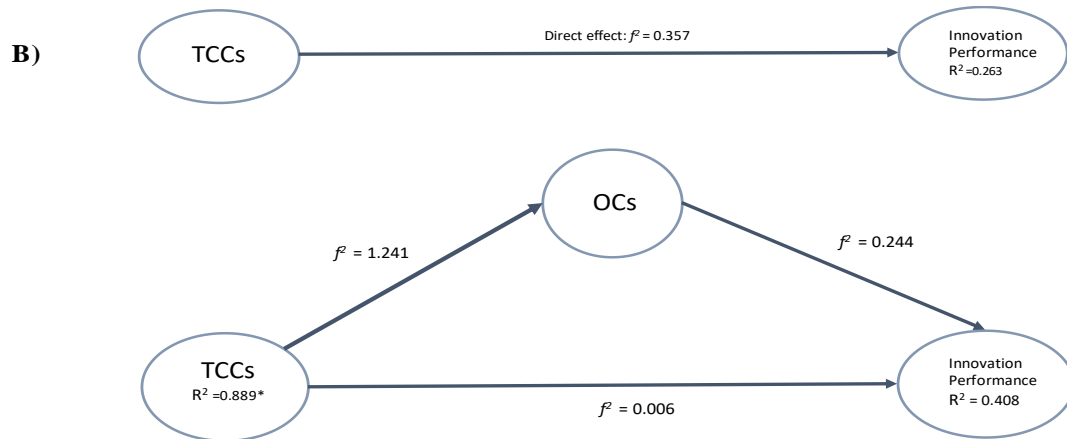
	1	2	3	4	5	6	7	8	9	10
1. <i>Marketing Caps</i>	0.813									
2. <i>I. Performance</i>	0.160	0.814								
3. <i>Managerial Caps</i>	0.281	0.492	0.818							
4. <i>OCs</i>	0.261	0.716	0.804							
5. <i>Trust</i>	0.028	0.254	0.322	0.379	0.808					
6. <i>Communications</i>	0.037	0.362	0.694	0.639	0.545	0.869				
7. <i>Team Efficacy</i>	0.084	0.534	0.522	0.646	0.583	0.709	0.844			
8. <i>ProbSolving</i>	0.109	0.422	0.693	0.642	0.568	0.893	0.719	0.851		
9. <i>TCCs</i>	0.164	0.643	0.745	0.814	0.489	0.901	0.901	0.823		
10. <i>Tech Caps</i>	0.399	0.537	0.594	0.877	0.311	.,510	0.466	0.466	0.631	0.824

The following figure (6.6) shows the model's second-order construct's path analysis results from testing various PLS-SEM results. These are result of bootstrapping performance, which is a nonparametric procedure that test the statistical significance of each result. In this respect, the R^2 , cross-validating redundancy and as a higher-order factor and the respective latent variable interaction are show here below.

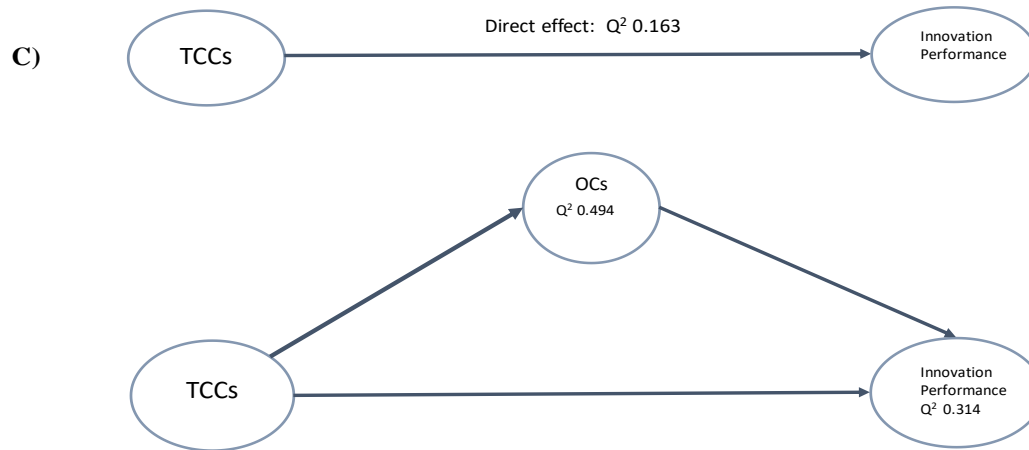
Figure 6.6 PLS-SEM model assessment results



Note The statistical interference (t-statistics) relies on bootstrapping. The bootstrapping choose randomly the model data with respect to the statistic being measured. This means that this operation is repeated a large number of times (e.g. 10000) and a distributions of a random result is the statistic produced: $t \leq 1.96$.



Note: effect size f^2 0.02, 0.15, 0.35 for weak, moderate, strong, effects respectively.



Note: Cross Validated Redundancy, $Q^2 (=1-SSE/SSO)$. Q^2 higher than 0 shows relevancy in the construct, if is 0 or negative means the model is not relevant. The Q^2 is a means for assessing the inner model's predictive relevance (Hair et al. 2014).

The TCCs model validation has been consolidated with a higher-order level (Roni *et al.* 2015). Figure 6.6 displays the model's results, direct and indirect to confirm our 4 hypothesis. The H1 *TCCs have a positive effect on TBS innovation performance*, due to the direct assessment effect between TCCs and innovation performance. In this concern, we propose that the TCCs as the intra-team interaction capabilities influence on the TBS' innovation performance (Blomqvist and Levy 2006). The TCCs involves, among the team members, collective dynamics that supports the TBS's organization evolution. It incentive a continual exchange of information, that entails common goals, shared values, mutual commitments, and collaborative behavior.

Related to H2. *The TBS' TCCs positively affect operational capabilities*, we consider the TCC's role is relevant in the OCs provide the coordinated team synergies. From inside the TBS, we propose that every OCs' focus on cross-functional activities supported by TCCs. OCs requires trust, communication, and problem-solving skills as a strong base for the exchange of information among the team members.

Following the H3 *The TBS' operational capabilities positively affect their innovation performance* stressing their efforts focus their innovation performance activities. The TBSs face unique and constant competitive conditions, so the role of the OCs of backing up the product or service is crucial, they represent a configured and distributed force that enabling direct actions to market (O'Connor et al. 2008; Teece 2012; Paradkar et al. 2015) The OCs specialization can occur by building new specialized capabilities or leveraging, re-shaping the current capabilities with strategical vision

(dynamic capabilities). Therefore, the TBSs' OCs hold a closed relationship with innovation performance.

Finally, with regard the model mediation proposed by H4 *Operational capabilities mediate the relationship between TCCs and innovation performance*. This mediation effect was analyzed the direct interaction between TCCs and innovation performance. We test the proposed theoretical model following the Preacher and Hayes' (2004; 2014) steps regarding mediation analysis. Hence, we confirm the model with the mediator variable has a much larger R^2 than the model without the mediator variable (OCs). Meanwhile the direct effect between TCCs to Innovation performance has $R^2= 0.263$, the interaction between TCCs to OCs has $R^2=0.554$ and OCs and Innovation performance ($R^2=0.408$), both are higher than the direct effect. Then, the direct positive and significant relationship of the model without the mediating variable becomes insignificant in the model in which you introduce the mediating variable. Also, the relationship between the independent variable and the mediated variable is significant in the model in which you introduce the mediating variable. And as a final point, the relationship between the mediator and the dependent variable is significant in the model in which the mediator variable is presented. We conclude that the entire model integration with TCCs and OCs relationship as a complementing an essential basis for the TBS organization and operations. TCCs and OCs, both seem to be driven a positive and significant effect on the innovation performance.

6.4 Brief discussion

Pursuing to expose the implications for TCCs theory and practice. This study has two key findings. First, it identifies and articulates a set of the TBS' team collaboration capabilities (TCCs) (Figure 6.6), and it proposes a measurable model to represent their relationship with operation capabilities. Second, it empirically supports a structural model in which TCCs have an indirect positive effect on performance by reconfiguring operational capabilities in the development of products (as well as services). These two key findings have implications for (i) conceptualizing, operationalizing, and measuring the TBS team's organization, and (ii) understanding the effects of TCCs with OCs as the essential origins to reconfigure new capabilities for innovation performance purposes.

TCCs represents essential interaction factors that relate individual abilities to collective synergies that sustain OCs and contribute to building new capabilities (Teece 2007, Pavlou and El Sawy 2011). Moreover, this study offers a parsimonious model with a limited set of specific, concrete, and measurable the team collaboration capabilities in TBSs. We underline that each TCCs' component constitutes multidimensional conditions (individual to collective) as essential team's abilities that facilitate the TBS's organizational functions. These team interactions require developing unique intra-organizational conditions, that include a set of practices designed to foster organizational adaptation and sustainability over the long-term.

The TBS teams' members require developing adequate organizational mechanisms and conditions that mitigate adverse market conditions that could jeopardize their organization and innovation processes. Therefore, the understanding of the TBS team's internal interaction may favor external collaborations for innovation. The TCCs, as the team's interaction factors, develop and shape the TBS value to transforming organizational value into competitive advantages.



CHAPTER 7

General discussion and conclusions

7. Summary and Conclusions

7.1 Statement of the problem of the TBS in Spain

The TBS is an active agent in the collective dynamic of knowledge creation and transfer (Cavusgil *et al.* 2003; van Wijk *et al.* 2008; Teece 2010; Azagra-Caro *et al.* 2017). We highlight from the literature the relevancy of the TBS as a drive for innovation that leads technological breakthroughs. These dynamic organizations usually come from the entrepreneurial activities developed by a team operating with technical and scientific basis. Although TBSs have a measurable impact in many national economies, in Spain their success ratio is low. According to the OECD, to improve the competitiveness of Spanish TBS, more support is needed through the entrepreneurial processes to grow their innovation capacity and meet their needs for internationalization (OECD 2016). TBS organizations have been seen as a “black box”, alluding to the lack of understanding of their organizational performance within the market instability and the factors that determine their success or their failure. Therefore, this research aims to extend our understanding of the interaction among the TBS team members as source of value creation and engine for developing unique competitive advantages.

Innovation does not take place in a vacuum, it requires a collective effort, information transformed into knowledge, R&D and management activities, investments, and there must be a concrete objective to address. The real role of innovation is to solve problems and there is no way this can happen without a specific purpose. The real objective of the TBS is to *generate value through collaboration -both internal and with other actors,*

being such cooperation vital for their sustainability. Hence, TCCs are embedded in the organization's innovation management and the overall organizational behavior, determining the different ways by which the TBS builds DCs. The TBS TCCs are an essential engine for sustaining and supporting the operational capabilities that enhances the innovation performance.

With reference to the theoretical background, this study addressed to the following research questions:

(1) What are TBS organizational cornerstones?

At the heart of the TBS organization is the team of directors or founders, determining the team management structure (Eisenhardt 2013; Klotz *et al.* 2014; Kraiczy *et al.* 2015) and their strategic efforts enable the TBS business to develop, innovate and bring products and services to local and global markets (Tanev *et al.* 2015; Borseman *et al.* 2016). That said, the highly-skilled team members (also known as knowledge bearers) who manage day-to-day operations but who are not founders of the firm, play an equally important role as drivers of innovation. Both levels – management and operations – are decisive in contributing to the success of the TBS. Supporting this idea, De Winne and Sels (2010) state that the simple presence of highly-skilled human resources is not sufficient to explain the TBS innovation outcomes.

The TBS's activities are most often driven by the technology-oriented management team whose work requires collaboration with their technology and non-technology networks (Rammer 2006). As many authors have argued, the internal organization and operations behaviors are linked to the conditions of their external context. It has been proposed that it is the TBS's ability to adapt their internal operations to the external environment that might determine their success or failure (Newey and Zahra 2009). It is the team's management that enables the TBS to develop unique practices, carry out technological projects, and make the decisions that leverage their operational capabilities to achieve innovation performance.

Our second research question was:

(2) What factors underpin TBS internal collaboration capabilities?

This dissertation presents team collaboration capabilities (TCCs) as the term that describes the factors that affect the team's intra-organizational interaction. TCCs, as they impact management team dynamics, can be a source of competitive advantage for the TBS, involving factors that influence collaboration inside organizations, such as trust, communication, problem-solving, and team efficacy.

According to literature, collaboration capabilities are conceived as an organizational “meta-capability that enables leverage of both internal and external knowledge bases in uncertain and complex environments” (Blomqvist and Levy 2006, p.33). We recognize that innovation is a result of diverse actors combining resources, including tangible (investment, material) and intangible (time, knowledge, actions). Therefore, TCCs constitute a collection of integrated action-resources that are the engine of the TBS’s innovation performance through the enhancement of operational capabilities (OCs)

The TBS’s OCs are continuously defining their daily activities and functions. And comprise marketing, technical, and managerial activities and the more or less efficient managerial use of the existing resources of the firm (Zollo and Winter 2002; Winter 2003; Cepeda and Vera 2007; Knight and Cavusgil 2010; Pavlou and El Sawy 2011). The development of OCs is a consequence of well-established learning processes in the TBS organization. In a nutshell, they are the essential functions or operations of the firm, and constitute the foundation of the firm’s strategy, its primary source of profit, and its identity (Zollo and Winter 2002; Zahra et al. 2006; Bustinza et al. 2010; S. Wu et al. 2010).

Finally, the third research question led us to integrate the TCCs in our causal model as a critical dimension that enables and incentivizes the competitive advantage towards the TBS’ innovation performance.

(3) *How can TBS maintain their organizational sustainability towards innovation performance?*

The TBSs' TCCs and OCs drive the creation and development of dynamic capabilities, and therefore, the generation of competitive advantages. Therefore, we emphasize the importance of implementing TCCs among the TBS's founding members to better enable them to face internal and external pressures that might threaten to destabilize the organization. TCCs can hence be seen as the engine that drives new knowledge creation, develops competitive advantages, and leads strategic actions geared towards strengthening the organization's operations and innovation performance. For instance, the organization's adaptativeness is relevant to attracting investments and venture capital (Hellmann and Puri 2002; Rin *et al.* 2013). Therefore, the TBS's principal objectives are centered on creating value from the very beginning to enable their continuity and survival (Teece 1996; Zahra *et al.* 2006; Teece 2012; Lubik *et al.* 2013). However, the need to interact with and adapt to the external environment is not limited to administrative and financial management. It equally relates to other complementary resources lead by *managerial capability* and supported by *customer capability*, both of which create bridges to external sources of knowledge through the marketing relationship (Morgan and Hunt 1994; Kahn and Mentzer 1998). In addition, the marketing relationship does not just contribute to obtaining insights from external knowledge, it also works in combination with the *technical capability* to impact the TBS's performance (Pavlou and El Sawy 2011; Tzokas *et al.* 2015). Even, when the TBS is still a small organization, but with potential to grow, it needs to blend learning and exchange complementary knowledge with external sources such as, other individuals, organizations and institutions (Stuart 2000; Colombo *et al.* 2006; Kohler 2016). These kinds of interactions produce value and are reflected in management strategies through the TBS's outsourcing operations and business models (Morris *et al.* 2005; Miles *et al.* 2006; MacCormack *et al.* 2007; Lüdeke-Freund 2010).

This dissertation presents the TCCs as intra-team interaction factors that are capabilities fundamental to the survival of the TBS. However, TCCs must be joined with OCs to enable the TBS to adapt to the demands of the external environment, and collaboration requires internal structural enablers from the core of the team (Allred *et al.* 2011). These results are not only significant for the TBS team founder members.

The following are simple guidelines, that we believe, will ensure and strengthen the TBS team's operations:

1. To facilitate collaboration between team members, starting from building trust through working towards collective benefits, e.g., by providing positive emotional supports through rewarding individual merits. Recognition of the work of each team member, such as recognition of individual effort and contribution, can support the ongoing process of knowledge creation.

2. Define communication mechanisms that reinforce individual professional security. When team members have clear, direct and respectful communication mechanisms, they can create internal and external partnerships with greater security. Direct communication between team members produces internal allies in TBS operations that create and attract more value.

3. Establish problem-solving procedures through formal and informal mechanisms will reduce future risks. The principal aim of the team is to solve issues, and this should start from the core of the team organization, then the definition of protocols to solve disagreements that emerge on a daily basis is essential. This will help to avoid organizational discord and to reduce risks in their operations, for their present and future clients and investors.

4. Aligning team objectives and expectations around innovation should ideally be through orchestrating the skills of each team member. This can be done by harmonizing these skills by assigning tasks that can be performed according to the experience of the members who benefit from the results of the group as a whole. The collective efforts of the team should be clearly understood by each individual; everyone should strive to achieve something together. The promotion of collective profit can drive the identification of new business opportunities; this can potentially come from any team member.

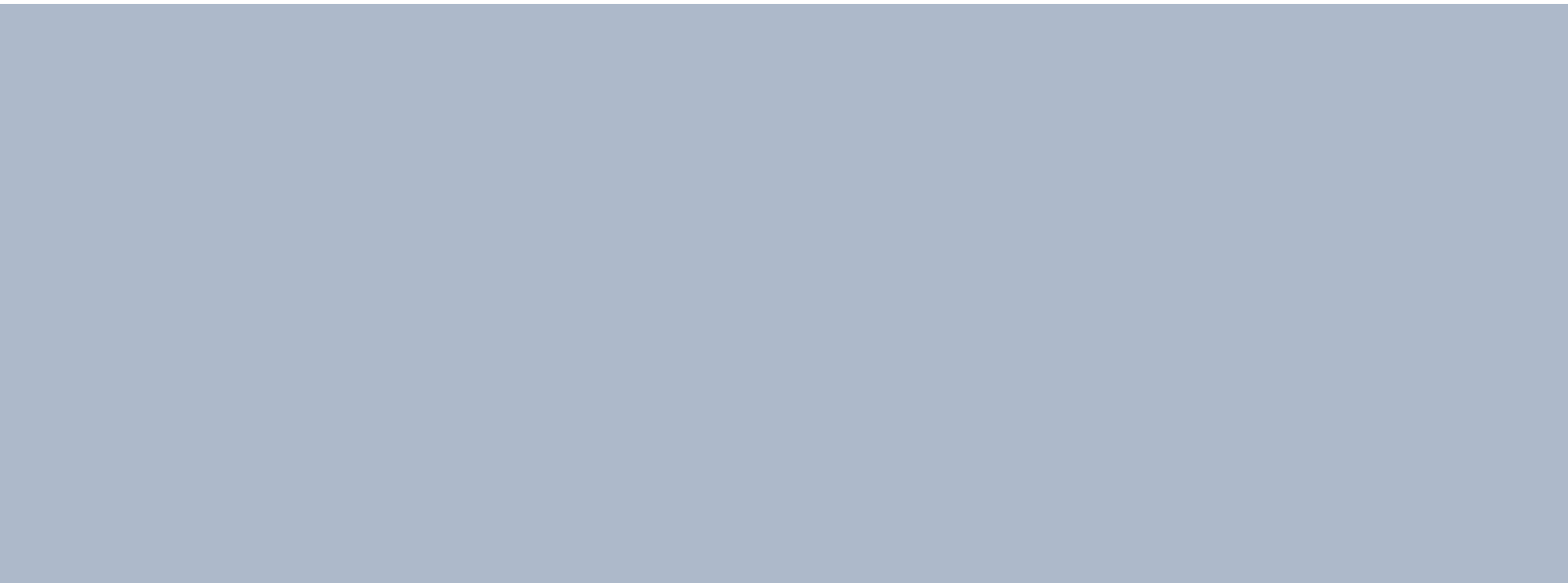
Our proposal to governments and public agencies is founded on a better understanding of the challenges of the entrepreneurial and innovation processes. They should promote genuine support in finance, investment, and collaboration for innovation processes, particularly in potential TBSs teams, and to protect employment best practices. Innovation is essential, but it is a complex phenomenon that can occur among different actors as the TBS. Hence, solid innovation policies can ensure the TBS's sustainability by helping to connect sophisticated knowledge sources, create high skilled employment that attracts talented people, and creating the adequate synergies that allow them to achieve innovation performance. The TBS's environment should encourage collaboration and knowledge exchange as a fundamental resource that supports and triggers innovation with other organizations. In this way, TBS's can make a significant contribution to the present economic growth of the country.

Last but not least, this study claims to increase both awareness and understanding of the important role of TCCs as critical factors in the TBS's business success. Incubators, accelerators, and policymakers can use this research to build an appropriate framework to encourage TBS teams for external collaborations for collective innovation projects through training and investment. This is necessary for attracting and retaining talented and highly-skilled individuals in these particular enterprises in Spain.

7.2 Limitations and future lines of research

This study has some inherent limitations that may also suggest future research lines. First, the data were gathered at one point in time. A longitudinal study may provide further insight into the dynamics of the TBS team. Second, the target population is narrowly defined to include a fairly homogeneous set of firms, TBS, which may limit the generalization of research results to other kind of companies. While the theory introduced here may hold in other empirical contexts, future studies could evaluate the generalizability of our findings by performing this study in other organizations run by teams.

Another attractive future research initiative would be to compare the TCCs proposed as measurement scale for innovation performance. Given the TCCs implication, it could be interesting to link the measurement scale for external collaboration for innovation with some objective instrument such as a patent or new product development, also the promotion of talent attraction, its interaction and the furtherance of compensation schemes that retain talent in the TBS. Finally, we suggest that future investigations could also apply the proposed TCCs scale to organizations of different sizes working in teams. We believe that encouraging different collaborations schemes would favor the TBSs' survival and competitiveness.



References

References

- Acs, Zoltan J. & Audretsch, D. B. 1991, *Innovation and Technological Change: An international comparison*. Ann Arbor: University of Michigan Press.
- Aernoudt, R. (2004). Incubators: tool for entrepreneurship? *Small Business Economics*, 23(2), 127-135.
- Adner, Ron, and Daniel Levinthal. 2001. "Demand Heterogeneity and Technology Evolution: Implications for Product and Process Innovation." *Management Science* 47 (5): 611–28. <http://www.jstor.org/stable/pdfplus/822644.pdf?acceptTC=true>.
- Aernoudt, Rudy. 2004. "Incubators: Tool for Entrepreneurship?" *Small Business Economics* 23: 127–35. doi:10.1023/B:SBEJ.0000027665.54173.23.
- Al-Aali, Abdulrahman, and David J. Teece. 2014. "International Entrepreneurship and the Theory of the (Long-Lived) International Firm: A Capabilities Perspective." *Entrepreneurship: Theory and Practice* 38 (1): 95–116. doi:10.1111/etap.12077.
- Alegre-Vidal, Joaquín. 2003. "La Adopción de Prácticas de Gestión Del Conocimiento y Su Efecto Sobre La Generación de Competencias Distintivas y El Desempeño Innovador: Un Estudio Empírico En El Sector de Biotecnología." Universitat Jaume I, Facultat de Ciències Jurídiques y Econòmiques. <http://www.javeriana.edu.co/biblos/tesis/derecho/dere6/DEFINITIVA/TESIS05.pdf>.
- Alkemade, Floortje, and Roald a.a. Suurs. 2012. "Patterns of Expectations for Emerging Sustainable Technologies." *Technological Forecasting and Social Change* 79 (3). Elsevier Inc.: 448–56. doi:10.1016/j.techfore.2011.08.014.
- Allred, Chad R, Stanley E Fawcett, Cynthia Wallin, and Gregory M Magnan. 2011. "A Dynamic Collaboration Capability as a Source of Competitive Advantage." *Decision Sciences* 42 (1): 129–61. doi:10.1111/j.1540-5915.2010.00304.x.
- Alon, Titan, David Berger, Benjamin Pugsley, and Robert Dent. 2017. "Older and Slower: The Startup Deficit's Lasting Effects on Aggregate Productivity Growth." *Journal of Monetary Economics* 93.
- Amit, Raphael;, and Paul J. H. Schoemaker. 1993. "Strategic Assets and Organizational Rent." *Strategic Management Journal* 14 (August 1992): 33–46. <http://links.jstor.org/sici?sici=0143-2095%28199301%2914%3A1%3C33%3ASAAOR%3E2.0.CO%3B2-8%0D>.
- Anderson, Edward G., and Geoffrey G. Parker. 2013. "Integration and Cospecialization of Emerging Complementary Technologies by Startups." *Production and Operations Management* 22 (6): 1356–73. doi:10.1111/j.1937-5956.2012.01415.x.
- Andren, Linda, Mats Magnusson, and Soren Sjolander. 2003. "Opportunistic Adaptation in Start-up Companies." *International Journal of Entrepreneurship and Innovation Management* 3 (5,6): 546–62. http://search.proquest.com/docview/194784934?accountid=10297%5Cnhttp://sfx.cranfield.ac.uk/cranfield?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:journal&genre=article&sid=ProQ:ProQ%3Aabigllobal&atitle=Opportunistic+adaptation+in+start-up+companies&t.

- Arend, Richard J., and Philip Bromiley. 2009. "Assessing the Dynamic Capabilities View: Spare Change, Everyone?" *Strategic Organization* 7 (1): 75–90. doi:10.1177/1476127008100132.
- Argote, Linda, and Yuqing Ren. 2012. "Transactive Memory Systems: A Microfoundation of Dynamic Capabilities." *Journal of Management Studies* 49 (8): 1375–82. doi:10.1111/j.1467-6486.2012.01077.x.
- Arnold, Kara A., Julian Barling, and Kevin E. Kelloway. 2001. "Transformational Leadership or the Iron Cage: Which Predicts Trust, Commitment and Team Efficacy?" *Leadership & Organization Development Journal* 22 (7): 315–20. doi:10.1108/EUM0000000006162.
- Attewell, Paul. 1999. "What Is Skill?" *Journal Work and Occupations* 17 (4): 422–48. doi:0803973233.
- Audretsch, David B., and Zoltan J. Acs. 1991. "Innovation and Size at the Firm Level." *Southern Economic Journal* 57 (3): 739–44. doi:10.2307/1059787.
- Auerswald, Phillep E., and Lewis M. Branscomb. 2007. "Collective Entrepreneurship Between Invention and Innovation." In *Start-Ups and Spin-Offs*, 61–91. doi:10.1017/cbo9780511610134.004.
- Augier, Mie, and David J Teece. 2009. "Dynamic Capabilities and the Role of Managers in Business Strategy and Economic Performance." *Organization Science* 20 (2): 410–21. doi:10.1287/orsc.1090.0424.
- Autio, Erkkö, Helena Yli-Renko, and Harry J. Sapienza. 1997. "Leveraging Resources under Threat of Opportunism: Predicting Networking in International Growth." *ESRC Centre for Business Research*.
- Azagra-Caro, Joaquín M., David Barberá-Tomás, Mónica Edwards-Schachter, and Elena M. Tur. 2017. "Dynamic Interactions between University-Industry Knowledge Transfer Channels: A Case Study of the Most Highly Cited Academic Patent." *Research Policy* 46 (2): 463–74. doi:10.1016/j.respol.2016.11.011.
- Balmford, Andrew;, Jennifer; Birch, Richard; Bradbury, Claire; Brown, and Stuart; Burchart. 2011. "Measuring and Monitoring Ecosystems Services at Site Scale."
- Barajas, Iñigo, Ascensión M^a Ubierna, and Andrés Gorricho. 2011. "Creación de Empresas de Base Tecnológica: Análisis de Casos." *Economía Industrial* 382 (1977): 129–40.
- Barney, J. 1991. "Firm Resources and Sustained Competitive Advantage." *Journal of Management* 17 (1): 99–120. doi:10.1177/014920639101700108.
- Barney, Jay B;, and Mark H Hansen. 1994. "Trustworthiness As a Source of Competitive Advantage." *Strategic Management Journal* 15: 175–90. doi:10.5755/j01.em.18.1.3669.
- Barney, Jay B. 1999. "How a Firm 's Capabilities Affect Boundary Decisions." *Mit Sloan Management Review*, no. April, 15th.
- Baron, Robert A., and Rebecca A. Hernry. 2010. "How Entrepreneurs Acquire the Capacity to Excel: Insights from Research on Expert Performance." *Strategic Entrepreneurship Journal*, no. 4: 49–65. doi:10.1002/sej.82.
- Barreto, Ilídio. 2010. "Dynamic Capabilities: A Review of Past Research and an Agenda for the Future." *Journal of Management* 36 (1): 256–80. doi:10.1177/0149206309350776.
- Battistella, Cinzia, Alberto F. De Toni, and Elena Pessot. 2017. "Open Accelerators for Start-Ups Success: A Case Study." *European Journal of Innovation Management* 20 (1): 80–111. doi:10.1108/EJIM-10-2015-0113.
- Becker-Beck, U. 2005. "Principles of Regulating Interaction in Teams Practicing Face-To-Face

- Communication Versus Teams Practicing Computer-Mediated Communication.” *Small Group Research* 36 (4): 499–536. doi:10.1177/1046496405277182.
- Becker, Jan-Michael, Kristina Klein, and Martin Wetzels. 2012. “Hierarchical Latent Variable Models in PLS-SEM: Guidelines for Using Reflective-Formative Type Models.” *Long Range Planning* 45 (5–6). Elsevier Ltd: 359–94. doi:10.1016/j.lrp.2012.10.001.
- Beckman, Christine M. 2006. “The Influence of Founding Team Company Affiliations on Firm Behavior.” *Academy of Management Journal* 49 (4): 741–58. doi:10.5465/AMJ.2006.22083030.
- Beckman, Christine M, and M Diane Burton. 2008. “Founding the Future : Path Dependence in the Evolution of Top Management Teams from Founding to IPO.” *Organization Science* 19 (1): 3–24. doi:10.1287/orsc.1070.0311.
- Bell, Jim, and Sharon Loane. 2010. “‘New-Wave’ Global Firms: Web 2.0 and SME Internationalisation.” *Journal of Marketing Management* 26 (3–4): 213–29. doi:10.1080/02672571003594648.
- Bendickson, Josh, Eric Ligouri, and Chelsea Midgett. 2017. “High Performance Work Systems: A Necessity for Startups.” *Journal of Small Business Strategy* 27 (2): 1–12.
- BENISI. 2016. “The BENISI Scaling Guide: Accelerating the Scaling of Social Innovations.” <http://guide.benisi.eu/wp-content/uploads/2016/04/Benisi-Scaling-journey-LR.pdf>.
- Berkhout, Frans, Adrian Smith, and Andy Stirling. 2004. “Socio-Technological Regimes and Transition Contexts.” ... *Innovation and the Transition to ...* 44 (106). http://books.google.com/books?hl=en&lr=&id=IEb7LWocQXsC&oi=fnd&pg=PA48&dq=Socio-technological+regimes+and+transition+contexts&ots=tJXGKk7mEL&sig=pOLzY1W0WguGAKnqZremqWpRL_Y.
- Berry, Maureen. 1998. “Strategic Planning in Small High Tech Companies.” *Long Range Planning* 31 (3): 455–66. doi:10.1016/S0024-6301(98)80012-5.
- Bhave, Mahesh P. 1994. “A Process Model of Entrepreneurial Venture Creation.” *Journal of Business Venturing* 9 (3): 223–42.
- Bhidé, Amar. 1999. “The Origin and Evolution of New Businesses.” *The Oxford University Press*.
- Bingham, Christopher B., Kathleen M.; Eisenhardt, and Nathan R. Furr. 2007. “What Makes a Process a Capability? Heuristics, Strategy and Effective Capture of Opportunities.” *Strategic Entrepreneurship Journal* 1 (1): 27–47. doi:10.1002/sej.
- Binnui, Anurak;, and Marc Cowling. 2016. “A Conceptual Framework for Measuring Entrepreneurship and Innovation of Young Hi-Technology Firms.” *GSTF Journal on Business Review* 4 (3): 32–47. doi:10.5176/2010-4804.
- Birley, Sue, and P. Westhead. 1994. “A Taxonomy of Business Start-up Reasons and Their Impact on Firm Growth and Size.” *Journal of Business Venturing* 9 (1): 7–31.
- Bjornali, Ekaterina S., Mirjam Knockaert, and Truls Erikson. 2016. “The Impact of Top Management Team Characteristics and Board Service Involvement on Team Effectiveness in High-Tech Start-Ups.” *Long Range Planning* 49 (4). Elsevier Ltd: 447–63. doi:10.1016/j.lrp.2015.12.014.
- Bjørnskov, Christian, and Nicolai J Foss. 2016. “Institutions, Entrepreneurship, and Economic Growth: What Do We Know and What Do We Still Need to Know?” *Academy of Management Perspectives* 30 (3): 292–315. doi:10.5465/amp.2015.0135.
- Black, Steve. 2009. “Preparing for Chaos – the Life of a Startup.” RSS.

- <https://steveblank.com/tag/early-stage-startup/page/4/?iframe=true&preview=true%2Ffeed%2F>.
- . 2010. “Make No Little Plans – Defining the Scalable Startup.” *January*. <https://steveblank.com/2010/01/04/make-no-little-plans—defining-the-scalable-startup/>.
- Black, Steve, and Bob Dorf. 2012. *The Startup Owner’s Manual: The Step-By-Step Guide for Building a Great Company*. K&S Ranch.
- Blank, Steve. 2006. *The Four Steps to the Epiphany. Successful Strategies for Products That Win*. Cafepress. Com. Second Edi. doi:22.
- Blatt, Ruth. 2015. “Tough Love : How Communal Schemas and Contracting Practices Build Relational Capital in Entrepreneurial Teams” 34 (3): 533–51.
- Blomqvist, Kirsimarja. 2002. *Partnering in the Dynamic Environment: The Role of Trust in Asymmetric Technology Partnership Formation*. Acta Universitatis Lappeenrantaensis. <http://urn.fi/URN:ISBN:978-952-214-598-7%5Cnhttp://www.doria.fi/handle/10024/38551>.
- Blomqvist, Kirsimarja, and Juha Levy. 2006. “Collaboration Capability—a Focal Concept in Knowledge Creation and Collaborative Innovation in Networks.” *International Journal of Management Concepts ...* 2 (1): 31–48. doi:10.1504/IJMCP.2006.009645.
- Blomqvist, Kirsimarja, and Risto Seppänen. 2003. “Bringing Together the Emerging Theories on Trust and Dynamic Capabilities – Collaboration and Trust as Focal Concepts.” *Business* 33: 1–25. <http://www.impgroup.org/uploads/papers/4296.pdf>.
- Boccardelli, Paolo, and Mats G Magnusson. 2006. “Dynamic Capabilities in Early-Phase Entrepreneurship.” *Knowledge and Process Management* 13 (3): 162–74. doi:10.1002/kpm.
- Boland, William P., Peter W.B. Phillips, Camille D. Ryan, and Sara McPhee-Knowles. 2012. “Collaboration and the Generation of New Knowledge in Networked Innovation Systems: A Bibliometric Analysis.” *Procedia - Social and Behavioral Sciences* 52: 15–24. doi:10.1016/j.sbspro.2012.09.437.
- Bollen, Kenneth, and Richard Lennox. 1991. “Conventional Wisdom on Measurement: A Structural Equation Perspective.” *Psychological Bulletin* 110 (2): 305–14. doi:10.1037/0033-2909.110.2.305.
- Borseman, Marcus, Stoyan Tanev, Michael Weiss, and Erik Stavnsager Rasmussen. 2016. “Lost in the Canvases: Managing Uncertainty in Lean Global Startups.” *ISPIM Innovation Forum. The International Society for Professional Innovation Management*. <http://www.forskningsdatabasen.dk/en/catalog/2298687214>.
- Bourgeois, L. J., and Kathleen M. Eisenhardt. 1988. “Strategic Decision Processes in High Velocity Environments: Four Cases in the Microcomputer Industry.” *Management Science* 34 (7): 816–35. doi:10.1287/mnsc.34.7.816.
- Bowman, Cliff, and Veronique Ambrosini. 2009. “What Are Dynamic Capabilities and Are They a Useful Construct in Strategic Management?” *International Journal of Management Reviews* 11 (1): 29–49. <http://onlinelibrary.wiley.com/doi/10.1111/j.1468-2370.2008.00251.x/full>.
- Bravo-Biosca, Albert. 2010. “Growth Dynamics, Exploring Business Growth and Contraction in Europe and the US.” *Nesta*, no. November: 1–25. https://www.nesta.org.uk/sites/default/files/growth_dynamics.pdf.
- Bresnahan, Timothy, Alfonso Gambardella, and Annalee Saxenian. 2001. “‘Old Economy’ Inputs for ‘New Economy’ Outcomes: Cluster Formation in the New Silicon Valleys.” *Industrial*

and *Corporate Change* 10 (4): 835–60. doi:10.1093/icc/10.4.835.

- Breuer, H, and F Lüdeke-Freund. 2014. “Normative Innovation for Sustainable Business Models in Value Networks.” Available at SSRN, no. June. http://ispim.org/files/2014_dublin_proceedings/552521905_Paper.pdf.
- Brown, Christopher, and Mark Thornton. 2013. “How Entrepreneurship Theory Created Economics.” *The Quarterly Journal of Austrian Economics* 16 (4): 401–20.
- Brown, James Dean. 2002. “The Cronbach Alpha Reliability Estimate.” *JALT Testing & Evaluation SIG Newsletter*.
- Bruno, Albert V., and Joel K. Leidecker. 1988. “Causes of New Venture Failure: 1960 vs. 1980’s.” *Business Horizons* 31 (6): 51–56.
- Bustanza, O. F., L. M. Molina, and D. Arias-Aranda. 2010. “Organizational Learning and Performance: Relationship between the Dynamic and the Operational Capabilities of the Firm.” *African Journal of Business Management* 4 (18): 4067–78.
- Butchart, Ron. 1987. “A New UK Definition of High Technology Industries.” *Economic Trends* 400 (February): 82–88.
- Bygrave, William D., and Charles W. Hofer. 1992. “Theorizing about Entrepreneurship.” *Entrepreneurship Theory and Practice* 16 (2): 13–22. doi:10.1177/104225879201600203.
- Camisón, César, and Beatriz Forés. 2010. “Knowledge Absorptive Capacity: New Insights for Its Conceptualization and Measurement.” *Journal of Business Research* 63 (7). Elsevier Inc.: 707–15. doi:10.1016/j.jbusres.2009.04.022.
- Cano-Kollmann, Marcelo, John Cantwell, Thomas J. Hannigan, Ram Mudambi, and Jaeyong Song. 2016. “Knowledge Connectivity: An Agenda for Innovation Research in International Business.” *Journal of International Business Studies* 47 (3): 255–62. doi:10.1057/jibs.2016.8.
- Cantwell, John. 2016. *The Eclectic Paradigm: A Framework for Synthesizing and Comparing Theories of International Business from Different Disciplines or Perspectives. The Eclectic Paradigm: A Framework for Synthesizing and Comparing Theories of International Business from Different Disciplines or Perspectives*. doi:10.1007/978-1-137-54471-1.
- Carayannis, Elias G., Evangelos Grigoroudis, Stavros Sindakis, and Christian Walter. 2014. “Business Model Innovation as Antecedent of Sustainable Enterprise Excellence and Resilience.” *Journal of the Knowledge Economy* 5 (3): 440–63. doi:10.1007/s13132-014-0206-7.
- Carayannis, Elias G., and Maximilian Von Zedtwitz. 2005. “Architecting GloCal (Global-Local), Real-Virtual Incubator Networks (G-RVINS) as Catalysts and Accelerators of Entrepreneurship in Transitioning and Developing Economies: Lessons Learned and Best Practices from Current Development and Business Incubation .” *Technovation* 25 (2): 95–110. doi:10.1016/S0166-4972(03)00072-5.
- Carmines, Edward G., and Richard A. Zeller. 1979. *Reliability and Validity Assessment (Vol. 17)*. Sage publications.
- Cepeda, Gabriel, and Dusya Vera. 2007. “Dynamic Capabilities and Operational Capabilities: A Knowledge Management Perspective.” *Journal of Business Research* 60 (5): 426–37. doi:10.1016/j.jbusres.2007.01.013.
- Chesbrough, Henry. 2010. “Business Model Innovation: Opportunities and Barriers.” *Long Range Planning* 43 (2–3). Elsevier Ltd: 354–63. doi:10.1016/j.lrp.2009.07.010.
- Chesbrough, Henry, Julian Birkinshaw, and Morris Teubal. 2006. “Introduction to the Research

Policy 20th Anniversary Special Issue of the Publication of 'Profiting from Innovation' by David J. Teece." *Research Policy* 35 (8 SPEC. ISS.): 1091–99. doi:10.1016/j.respol.2006.09.001.

- Chin, Wynne W. 1998. "The Partial Least Squares Approach to Structural Equation Modeling." In *Modern Methods for Business Research*, 295–336.
- Chorev, Schaul, and Alistair R. Anderson. 2006. "Success in Israeli High-Tech Start-Ups; Critical Factors and Process." *Technovation* 26 (2): 162–74. doi:10.1016/j.technovation.2005.06.014.
- Clarke Højbjerg, Ann, Helle Nissen Aarøe, and Majbritt Rostgaard Evald. 2014. "Knowledge Sharing in Heterogeneous Teams through Collaboration and Cooperation: Exemplified through Public-Private-Innovation Partnerships." *Industrial Marketing Management* 43 (3). Elsevier Inc.: 473–82. doi:10.1016/j.indmarman.2013.12.015.
- Clarysse, Bart, and Nathalie Moray. 2004. "A Process Study of Entrepreneurial Team Formation: The Case of a Research-Based Spin-Off." *Journal of Business Venturing* 19 (1): 55–79. doi:10.1016/S0883-9026(02)00113-1.
- Cohen, Susan G., and Diane Bailey. 1997. "What Makes Teams Work: Group Effectiveness Research from the Shop Floor to the Executive Suite." *Journal of Management* 23 (3): 239–90. doi:10.1177/014920639702300303.
- Cohen, Wesley, and Daniel Levinthal. 1990. "Absorptive Capacity: A New Perspective on Learning and Innovation." *Administrative Science Quarterly* 35 (1): 128–52. doi:10.2307/2393553.
- Collis, David J. 1994. "Research Note: How Valuable Capabilities Are Organizational Capabilities." *Strategic Management Journal* 15 (Special Issue): 143–52.
- Colombelli, Alessandra. 2016. "The Impact of Local Knowledge Bases on the Creation of Innovative Start-Ups in Italy." *Small Business Economics* 47 (2). Springer US: 383–96. doi:10.1007/s11187-016-9722-0.
- Colombo, M.G., and L. Grilli. 2010. "On Growth Drivers of High-Tech Start-Ups: Exploring the Role of Founders' Human Capital and Venture Capital." *Journal of Business Venturing* 25 (6). doi:10.1016/j.jbusvent.2009.01.005.
- Colombo, M.G., L. Grilli, and S. Murtinu. 2011. "R&D Subsidies and the Performance of High-Tech Start-Ups." *Economics Letters* 112 (1). doi:10.1016/j.econlet.2011.03.007.
- Colombo, M.G., T. Luukkonen, P. Mustar, and M. Wright. 2010. "Venture Capital and High-Tech Start-Ups." *Venture Capital* 12 (4). doi:10.1080/13691066.2010.486153.
- Colombo, M.G., E. Piva, A. Quas, and C. Rossi-Lamastra. 2016. "How High-Tech Entrepreneurial Ventures Cope with the Global Crisis: Changes in Product Innovation and Internationalization Strategies." *Industry and Innovation* 23 (7). doi:10.1080/13662716.2016.1196438.
- Colombo, Massimo G., and Luca Grilli. 2005. "Founders' Human Capital and the Growth of New Technology-Based Firms: A Competence-Based View." *Research Policy* 34 (6): 795–816. doi:10.1016/j.respol.2005.03.010.
- Colombo, Massimo G., Luca Grilli, and Evila Piva. 2006. "In Search of Complementary Assets: The Determinants of Alliance Formation of High-Tech Start-Ups." *Research Policy* 35 (8 SPEC. ISS.): 1166–99. doi:10.1016/j.respol.2006.09.002.
- Colombo, Massimo G., and Evila Piva. 2008. "Strengths and Weaknesses of Academic Startups: A Conceptual Model." *IEEE Transactions on Engineering Management* 55 (1): 37–49.

doi:10.1109/TEM.2007.912807.

- Colombo, Massimo Gaetano, Diego D'Adda, and Lorenzo H. Pirelli. 2016. "The Participation of New Technology-Based Firms in EU-Funded R&D Partnerships: The Role of Venture Capital." *Research Policy* 45 (2): 361–75. doi:10.1016/j.respol.2015.10.011.
- Conner, Kathleen R., and C. K. Prahalad. 1996. "A Resource-Based Theory of the Firm: Knowledge Versus Opportunism." *Organization Science* 7 (5): 477–501. doi:10.1287/orsc.7.5.477.
- Cooney, Thomas. M. 2005. "What Is an Entrepreneurial Team?" *International Small Business Journal* 23 (3): 226–35. doi:10.1177/0266242605052131.
- Cooper, Arnold C. 1971. "The Founding of Technologically-Based Firms." *Center for Venture Management, Milwaukee, Wis.*, 68.
- Costa, Ana Cristina. 2003. "Work Team Trust and Effectiveness." *Personnel Review* 32 (5): 605–22. doi:10.1108/00483480310488360.
- Costa, Ana Cristina, and Neil Anderson. 2011. "Measuring Trust in Teams: Development and Validation of a Multifaceted Measure of Formative and Reflective Indicators of Team Trust." *European Journal of Work and Organizational Psychology* 20 (February 2015): 119–54. doi:10.1080/13594320903272083.
- Crawford, G. Christopher, and Patrick M. Kreiser. 2015. "Corporate Entrepreneurship Strategy: Extending the Integrative Framework through the Lens of Complexity Science." *Small Business Economics* 45 (2). Springer US: 403–23. doi:10.1007/s11187-015-9637-1.
- Criscuolo, F., C. Calvino, and C. Menon. 2015. "Cross-Country Evidence on Start-up Dynamics." *C OECD Science, Technology and Industry Working Papers*. 06. doi:10.1787/5jrxtkb9mxtb-en.
- Cronbach, Lee. 1963. "Improving Understanding and Thinking." *Cronbach, Lee J.* doi:http://dx.doi.org/10.1037/14353-011.
- Cruz-González, J., P. López-Sáez, J.E. Navas-López, and M. Delgado-Verde. 2015. "Open Search Strategies and Firm Performance: The Different Moderating Role of Technological Environmental Dynamism." *Technovation* 35. doi:10.1016/j.technovation.2014.09.001.
- Curado, Maria Alice Santos, Júlia Teles, and João Marôco. 2014. "Análise de Variáveis Não Diretamente Observáveis: Influência Na Tomada de Decisão Durante o Processo de Investigação." *Revista Da Escola de Enfermagem Da U S P* 48 (1). Revista da Escola de Enfermagem da USP: 149–56. doi:10.1590/S0080-623420140000100019.
- Czarnitzki, Dirk, and Julie Delanote. 2013. "Young Innovative Companies: The New High-Growth Firms?" *Industrial and Corporate Change* 22 (5): 1315–40. doi:10.1093/icc/dts039.
- D'Este, Pablo, Nabil Amara, and Julia Olmos-Peñuela. 2014. "Fostering Novelty While Reducing Failure: Balancing the Twin Challenges of Product Innovation." *Technological Forecasting and Social Change* 113. Elsevier Inc.: 280–92. doi:10.1016/j.techfore.2015.08.011.
- D'Este, Pablo, Surya Mahdi, Andy Neely, and Francesco Rentocchini. 2012. "Inventors and Entrepreneurs in Academia: What Types of Skills and Experience Matter?" *Technovation* 32 (5). Elsevier: 293–303. doi:10.1016/j.technovation.2011.12.005.
- D'Este, Pablo, Francesco Rentocchini, and Jaider Vega-Jurado. 2014. "The Role of Human Capital in Lowering the Barriers to Engaging in Innovation: Evidence from the Spanish Innovation Survey." *Industry & Innovation* 21 (February 2015): 1–19. doi:10.1080/13662716.2014.879252.
- Dahlstrand, Åsa Lindholm. 1999. "Technology-Based SMEs in the Gothenburg Region: Their

- Origin and Interaction with Universities and Large Firms.” *Regional Studies* 33 (4): 379–89. doi:10.1080/713693558.
- Day, George S. 1994. “The Capabilities of Market-Driven Organizations.” *Journal of Marketing* 58 (4): 37–52. doi:10.2307/1251915.
- Dechezleprêtre, Antoine, Matthieu Glachant, Ivan Hašič, Nick Johnstone, and Yann Ménière. 2011. “Invention and Transfer of Climate Change-Mitigation Technologies: A Global Analysis.” *Review of Environmental Economics and Policy* 5 (1): 109–30. doi:10.1093/reep/req023.
- Decker, Ryan A.; John; Haltiwanger, Ron; Jarmin, and Javier Miranda. 2016. “Declining Business Dynamism: What We Know and the Way Forward.” *American Economic Review* 106 (5): 203-07.
- Decker, Ryan, John Haltiwanger, Ron; Jarmin, and Javier Miranda. 2014. “The Secular Decline in Business Dynamism in the U. S.” *Manuscript*, <http://faculty.chicagobooth.edu/workshops/AppliedEcon/pdf/Haltiwangerseculardecline.pdf>.
- Deeds, D L, D DeCarolis, and J Coombs. 2000. “Dynamic Capabilities and New Product Development in High Technology Ventures: An Empirical Analysis of New Biotechnology Firms.” *Journal of Business Venturing* 15 (3): 211–29. doi:10.1016/S0883-9026(98)00013-5.
- Deeds, David L, Dona Decarolis, and Joseph Coombs. 1999. “Dynamic Capabilities and New Product Development in High Technology Ventures : An Empirical Analysis of New Biotechnology Firms.” *Journal of Business Venturing* 15 (216): 211–29. doi:10.1016/S0883-9026(98)00013-5.
- Delapierre, Michel, Bernadette Madeuf, and Arlène Savoy. 1998. “NTBFs—the French Case.” *Research Policy* 26 (9): 989–1003. doi:10.1016/S0048-7333(97)00055-3.
- Derue, D Scott;, and Brent D. Rosso. 2009. “Towards a Theory of Rapid Creativity in Teams.” *Research on Managing Groups and Teams* 0856 (734): 1–50. doi:10.1108/S1534-0856(2009)0000012011.
- Deshpande, Rohit, John U. Farley, and Frederick Jr. Webster. 1993. “Corporate Culture, Customer Orientation, and Innovativeness in Japanese Firms: A Quadrad Analysis.” *Journal of Marketing* 57 (January): 23–37.
- Dierickx, I., and K. Cool. 1989. “Asset Stock Accumulation and the Sustainability of Competitive Advantage: Reply.” *Management Science* 35 (12): 1514–1514. doi:10.1287/mnsc.35.12.1514.
- Dixon, Sarah;, Klaus; Meyer, and Marc Day. 2014. “Building Dynamic Capabilities of Adaptation and Innovation: A Study of Micro-Foundations in a Transition Economy.” *Long Range Planning* 47 (4): 186–205. doi:10.1016/j.lrp.2013.08.011.
- Dodgson, M, and Roy Rothwell. 1994. “Technological Collaboration and Innovation.” *The Handbook of Industrial Innovation*, 285–92. doi:10.1093/oxfordhb/9780199694945.013.003.
- Drnovšek, Mateja, Joakim Wincent, and Melissa S. Cardon. 2010. “Entrepreneurial Self-efficacy and Business Start-up: Developing a Multi-dimensional Definition.” *International Journal of Entrepreneurial Behavior & Research* 16 (4): 329–48. doi:10.1108/13552551011054516.
- Duguid, Paul. 2005. “‘The Art of Knowing’: Social and Tacit Dimensions of Knowledge and the Limits of the Community of Practice.” *The Information Society* 21: 109–18. doi:10.1080/01972240590925311.

- Dyer, Barbara, and X Michael Song. 1997. "The Impact of Strategy on Conflict: A Cross-National Comparative Study of U.S. and Japanese Firms." *Journal of International Business Studies* 28 (3): 467–93. doi:10.1057/palgrave.jibs.8490108.
- Dyer, Jeffrey H., and Harbir Singh. 1998. "The Relational View: Cooperative Strategy and Sources of Interorganizational Competitive Advantage." *Academy of Management Review* 23 (4): 660–79.
- Easterby-Smith, Mark, Marjorie A. Lyles, and Margaret A. Peteraf. 2009. "Dynamic Capabilities: Current Debates and Future Directions." *British Journal of Management* 20 (SUPP. 1). doi:10.1111/j.1467-8551.2008.00609.x.
- Eccles, Jacquelynne S, and Allan Wigfield. 2002. "Motivational Beliefs, Values, and Goals." *Annual Review of Psychology* 53 (January): 109–32. doi:10.1146/annurev.psych.53.100901.135153.
- Edmondson, Amy. 1999. "Psychological Safety and Learning Behavior in Work Teams." *Administrative Science Quarterly* 44 (2): 350. doi:10.2307/2666999.
- Edwards-Schachter, Mónica, Elena Castro-Martínez, Mabel Sánchez-Barrioluengo, Guillermo Anlló, and Ignacio Fernández-De-Lucio. 2013. "Motives for International Cooperation on R&D and Innovation: Empirical Evidence from Argentinean and Spanish Firms." *International Journal of Technology Management* 62 (2): 128–51. doi:10.1504/IJTM.2013.055162.
- Ehrhardt, Kyle, Janice S. Miller, Sarah J. Freeman, and Peter W. Hom. 2014. "Examining Project Commitment in Cross-Functional Teams: Antecedents and Relationship with Team Performance." *Journal of Business and Psychology* 29 (3): 443–61. doi:10.1007/s10869-013-9325-6.
- Eisenhardt, Kathleen M. 2013. "Top Management Teams and the Performance of Entrepreneurial Firms." *Small Business Economics* 40 (4): 805–16. doi:10.1007/s11187-013-9473-0.
- Eisenhardt, Kathleen M, and Jeffrey A Martin. 2000. "Dynamic Capabilities: What Are They?" *Strategic Management Journal* 21 (10/11): 1105–21.
- Eisenhardt, Km, and Cb Schoonhoven. 1990. "Organizational Growth: Linking Founding Team, Strategy, Environment, and Growth among US Semiconductor Ventures, 1978-1988." *Administrative Science Quarterly* 35 (3): 504–29. doi:10.2307/2393315.
- Ercan, Ilker, Berna Yazici, Deniz Sigirli, Bulent Ediz, and Ismet Kan. 2007. "Examining Cronbach Alpha, Theta, Omega Reliability Coefficients According to Sample Size." *Journal of Modern Applied Statistical Methods* 6 (1): 291–303. doi:10.22237/jmasm/1177993560.
- Eriksson, Taina. 2014. "Processes, Antecedents and Outcomes of Dynamic Capabilities." *Scandinavian Journal of Management* 30 (1). Elsevier Ltd: 65–82. doi:10.1016/j.scaman.2013.05.001.
- European Commission. 2016. "Europe's next Leaders: The Start-up and Scale-up Initiative."
- Evers, Natasha. 2011. "International New Ventures in 'Low Tech' Sectors: A Dynamic Capabilities Perspective." *Journal of Small Business and Enterprise Development* 18 (3): 502–28. doi:10.1108/14626001111155682.
- Faems, Dries, Bart Van Looy, and Koenraad Debackere. 2005. "Interorganizational Collaboration and Innovation: Toward a Portfolio Approach." *Journal of Product Innovation Management* 22 (3): 238–50. doi:10.1111/j.0737-6782.2005.00120.x.
- Falk, R. F., and N. B. Miller. 1992. *A Primer for Soft Modeling*. Akron, OH, US: University of Akron Press.

- Fariñas, José C., and Ana Martín-Marcos. 2007. "Exporting and Economic Performance: Firm-Level Evidence of Spanish Manufacturing." *World Economy* 30 (4): 618–46. doi:10.1111/j.1467-9701.2007.01007.x.
- Fawcett, Stanley E., Cynthia Wallin, Chad Allred, Amydee M. Fawcett, and Gregory M. Magnan. 2011. "Information Technology as an Enabler of Supply Chain Collaboration: A Dynamic-Capabilities Perspectives." *Journal of Supply Chain Management* 47 (1): 22. doi:10.1111/j.1745-493X.2010.03213.x.
- Feeser, Henry R., and Gary E. Willard. 1990. "Founding Strategy and Performance: A Comparison of High and Low Growth High Tech Firms." *Strategic Management Journal* 11 (2): 87–98. doi:10.1002/smj.4250110202.
- Feldman, Martha S., and Brian T. Pentland. 2003. "Reconceiving Organizational Routines as a Source of Flexibility and Change." *Administrative Science Quarterly*, no. 48: 94–118. doi:10.2307/3556620.
- Felin, Teppo, Nicolai J.; Foss, Koen H.; Heimeriks, and Tammy L. Madsen. 2012. "Microfoundations of Routines and Capabilities: Individuals, Processes, and Structure." *Journal of Management Studies* 49 (8): 1351–74. doi:10.1111/j.1467-6486.2012.01052.x.
- Felin, Teppo, Nicolai J.; Foss, and Robert E. Ployhart. 2015. "The Microfoundations Movement in Strategy and Organization Theory." *The Academy of Management Annals* 9 (1): 575–632. doi:10.1080/19416520.2015.1007651.
- Fernández-Mesa, Anabel, Joaquín Alegre-Vidal, and Ricardo Chiva-Gómez. 2012. "Orientación Emprendedora, Capacidad de Aprendizaje Organizativo y Desempeño Innovador." *Journal of Technology Management and Innovation* 7 (2): 157–70. doi:10.4067/S0718-27242012000200013.
- Ferneley, Elaine, and Frances Bell. 2006. "Using Bricolage to Integrate Business and Information Technology Innovation in SMEs." *Technovation* 26 (2): 232–41. doi:10.1016/j.technovation.2005.03.005.
- Ferreras-Méndez, José Luis, Sue Newell, Anabel Fernández-Mesa, and Joaquín Alegre. 2015. "Depth and Breadth of External Knowledge Search and Performance: The Mediating Role of Absorptive Capacity." *Industrial Marketing Management* 47. Elsevier Inc.: 86–97. doi:10.1016/j.indmarman.2015.02.038.
- Finkelstein, Sydney, and Richard A. D Aveni. 1994. "CEO Duality as a Double-Edged Sword: How Boards of Directors Balance Entrenchment Avoidance and Unity of Command." *Academy of Management Journal* 37 (5): 1079–1108. doi:10.2307/256667.
- Fischer, Bill, and Andy Boynton. 2005. "Virtuoso Teams." *Harvard Business Review, Organizational Culture*, no. July-August. <https://hbr.org/2005/07/virtuoso-teams>.
- Florida, Richard L., and Martin Kenney. 1988. "Venture Capital, High Technology and Regional Development*." *Regional Studies* 22 (1): 33–48. doi:10.1080/00343408812331344750.
- Fontes, Margarida, and Rod Coombs. 2001. "Contribution of New Technology-Based Firms to the Strengthening of Technological Capabilities in Intermediate Economies." *Research Policy* 30 (1): 79–97. doi:10.1016/S0048-7333(99)00095-5.
- Fornell, Claes, and David Larcker. 1981. "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error." *Journal of Marketing Research* 18 (1): 39–50. http://www.jstor.org/stable/3151312?seq=1#page_scan_tab_contents.
- Foss, Nicolai J., Nicolai J. Foss, Peter G. Klein, and Peter G. Klein. 2005. "Entrepreneurship and the Economic Theory of the Firm: Any Gains from Trade?" *Handbook of Entrepreneurship Research: Disciplinary Perspectives*.

<http://www.springerlink.com/index/m708567ux46w2156.pdf>.

- Foster, Chris, and Ken Green. 2000. "Greening the Innovation Process." *Business Strategy and the Environment* 9 (5): 287–303. doi:10.1002/1099-0836(200009/10)9:5<287::AID-BSE256>3.0.CO;2-7.
- Fulmer, C. a., and M. J. Gelfand. 2012. *At What Level (and in Whom) We Trust: Trust Across Multiple Organizational Levels*. *Journal of Management*. Vol. 38. doi:10.1177/0149206312439327.
- Gans, Joshua S, David H Hsu, and Scott Stern. 2002. "When Does Start-Up Innovation Spur the Gale of Creative Destruction?" *RAND Journal of Economics* 33 (4): 571–86. doi:10.2307/3087475.
- Garnsey, Elizabeth. 1998. "A Theory of the Early Growth of the Firm." *Industrial and Corporate Change* 7 (3): 523–56. doi:10.1093/icc/7.3.523.
- Gaskin, James. 2017. "SmartPLS 3 Factor Analysis." *Youtube*. https://www.youtube.com/watch?v=J_etGiwbOoM.
- Geisser, Seymour. 1975. "A New Approach to the Fundamental Problem of Applied Statistics." *Sankhyā: The Indian Journal of Statistics, Series B (1960-2002)* 37 (4): 385–97.
- Giudici, Alessandro, and Patrick Reinmoeller. 2012. "Dynamic Capabilities in the Dock: A Case of Reification?" *Strategic Organization* 10 (4): 436–49. doi:10.1177/1476127012457977.
- Glachant, Matthieu, Antoine Dechezleprêtre, and Ivan Hascic. 2008. "Invention and Transfer of Climate Change Mitigation Technologies on a Global Scale: A Study Drawing on Patent Data." *CERNA, Paris*.
- Gotteland, David, Hubert Gatignon, and Christophe Haon. 2016. "7. New Product Teams." In *Marketing Innovation Last: Valume 2*, 2:1–45.
- Grant, Robert M.; Baden-Fuller, Charles. 2000. "Knowledge and Economic Organization: An Application to the Analysis of Interfirm Collaboration." In *Knowledge Creation. A Spurce of Value*, edited by Toshihiro Von Krogh, Georg; Nonaka, Ikujiro; Nishiguchi, First Edit, 113–50. New York: St. Martin's Press, Inc.,.
- Grant, R. M.;, and C. Baden-Fuller. 1995. "A Knowledge-Based Theory of Inter-Firm Collaboration." *Academy of Management Proceedings* 1995 (1): 17–21. doi:10.5465/AMBPP.1995.17536229.
- Green, S. D., G. D. Larsen, and C.C. Kao. 2008. "Competitive Strategy Revisited: Contested Concepts and Dynamic Capabilities," no. August 2015. doi:10.1080/01446190701656174.
- Griffith, David A., and Michael G. Harvey. 2001. "A Resource Perspective of Global Dynamic Capabilities." *Journal of International Business Studies* 32 (3): 597–606.
- Gully, Stanley M., Kara A. Incalcaterra, Aparna Joshi, and J. Matthew Beaubien. 2002. "A Meta-Analysis of Team-Efficacy, Potency, and Performance: Interdependence and Level of Analysis as Moderators of Observed Relationships." *Journal of Applied Psychology* 87 (5): 819–32. doi:10.1037//0021-9010.87.5.819.
- Hair, Joe F., Marko Sarstedt, Christian M. Ringle, and Jeannette A. Mena. 2012. "An Assessment of the Use of Partial Least Squares Structural Equation Modeling in Marketing Research." *Journal of the Academy of Marketing Science* 40 (3): 414–33. doi:10.1007/s11747-011-0261-6.
- Hair, Joseph F., Christian M. Ringle, and Marko Sarstedt. 2013. "Partial Least Squares Structural Equation Modeling: Rigorous Applications, Better Results and Higher Acceptance." *Long Range Planning* 46 (1–2): 1–12. doi:10.1016/j.lrp.2013.01.001.

- Haltiwanger, John C., Ron Jarmin, and Javier Miranda. 2013. "Who Creates Jobs? Small versus Large versus Young." *The Review of Economics and Statistics* 95 (2): 1–46. doi:10.1017/CBO9781107415324.004.
- Han, Jin K, Kim Namwoon, and Rajendra K Srivastava. 1998. "Market Orientation and Organizational Performance: Is Innovation a Missing Link?" *Journal of Marketing* 62 (4): 30–45. doi:10.2307/1252285.
- Harper, David a. 2008. "Towards a Theory of Entrepreneurial Teams." *Journal of Business Venturing* 23 (6): 613–26. doi:10.1016/j.jbusvent.2008.01.002.
- Harris, Philip R, and Kevin G Harris. 1996. "Managing Effectively through Teams." *Team Performance Management* 2 (3): 23–36. doi:10.1108/13527599610126247.
- Harrison, Richard T, and Colin Mason. 2004. "Financial Bootstrapping and Venture Development the Software Industry," no. July 2017. doi:10.1080/0898562042000263276.
- Hart, Stuart L., and Daniel R. Denison. 1987. "Creating New Technology-Based Organizations: A System Dynamic Model." *Policy Studies* 6 (3): 512–28.
- Hartono, Arif. 2015. "Developing New Ideas & Capability-Based Framework for Innovation Process: Firm Analysis for Indonesia." *Procedia - Social and Behavioral Sciences* 169 (August 2014). Elsevier B.V.: 161–69. doi:10.1016/j.sbspro.2015.01.298.
- Hattab, Hala W. 2014. "Impact of Entrepreneurship Education on Entrepreneurial Intentions of University Students in Egypt." *The Journal of Entrepreneurship* 23 (1): 1–18. doi:10.1177/0971355713513346.
- Hayes, Andrew F., and Kristopher J. Preacher. 2014. "Statistical Mediation Analysis with a Multicategorical Independent Variable." *British Journal of Mathematical and Statistical Psychology* 67 (3): 451–70. doi:10.1111/bmsp.12028.
- Heavey, Ciaran, and Zeki Simsek. 2015. "Transactive Memory Systems and Firm Performance : An Upper Echelons Perspective." *Organization Science*, no. December: 1–19. doi:10.1287/orsc.2015.0979.
- Hébert, Robert F., and Albert N. Link. 2006. "The Entrepreneur as Innovator." *Journal of Technology Transfer* 31 (5): 589–97. doi:10.1007/s10961-006-9060-5.
- Helfat, Constance E. 1997. "Know-How and Asset Complementarity and Dynamic Capability Accumulation: The Case of R&D." *Strategic Management Journal* 18 (5): 339–60. doi:Article.
- Helfat, Constance E., and Marvin B. Lieberman. 2002. "The Birth of Capabilities: Market Entry and the Importance of Pre-History." *Industrial and Corporate Change* 11 (4): 725–60. doi:10.1093/icc/11.4.725.
- Helfat, Constance E., and Margaret A. Peteraf. 2015. "Managerial Cognitive Capabilities and the Microfoundations of Dynamic Capabilities." *Strategic Management Journal* 36 (6): 831–50. doi:10.1002/smj.2247.
- Helfat, Constance E, and Margaret A Peteraf. 2003. "The Dynamic Resource-Based View: Capability Lifecycles." *Strategic Management Journal* 24 (10 SPEC ISS.): 997–1010. doi:10.1002/smj.332.
- Hellmann, Thomas, and Manju Puri. 2002. "Venture Capital and the Professionalization of Start-up Firms: Empirical Evidence." *The Journal of Finance* LVII (1): 169–97. <http://onlinelibrary.wiley.com/doi/10.1111/1540-6261.00419/abstract%5Cnhttp://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Venture+Capital+and+the+Professionalization+of+Start-Up#7>.

- Henseler, Jörg, Geoffrey Hubona, and Pauline Ash Ray. 2016. "Using PLS Path Modeling in New Technology Research: Updated Guidelines." *Industrial Management & Data Systems* 116 (1): 2–20. doi:10.1108/IMDS-09-2015-0382.
- Hill, Robert C., and Michael Levenhagen. 1995. "Metaphors and Mental Models: Sensemaking and Sensegiving in Innovative and Entrepreneurial Activities." *Journal of Management* 21 (6): 1057–74.
- Hindle, Kevin, and John Yencken. 2004. "Public Research Commercialisation, Entrepreneurship and New Technology Based Firms: An Integrated Model." *Technovation* 24 (10): 793–803. doi:10.1016/S0166-4972(03)00023-3.
- Hinkin, Timothy R. 1998. "A Brief Tutorial on the Development of Measures for Use in Survey Questionnaires." *Organizational Research Methods* 1 (1): 104–21. doi:10.1177/109442819800100106.
- Hitt, Michael A, R Duane Ireland, S Michael Camp, and Donald L Sexton. 2002. "Strategic Entrepreneurship: Integrating Entrepreneurial and Strategic Management Perspectives." *Strategic Entrepreneurship: Creating a New Mindset*, 1–16. doi:10.1111/b.9780631234104.2002.00001.x.
- Hodgkinson, Gerard P.; and Mark Healey. 2011. "Psychological Foundations of Dyanamic Capabilities: Reflexion and Reflection in Strategic Management." *Strategic Management Journal* 28 (32): 1500–1516.
- Hoegl, Martin;, and Hans Georg Gemuenden. 2001. "Teamwork Quality and the Success of Innovative Projects: A Theoretical Concept and Empirical Evidence." *Organization Science* 12 (4): 435–49. doi:10.1287/orsc.12.4.435.10635.
- Holton, Judith a. 2001. "Building Trust and Collaboration in a Virtual Team." *Team Performance Management* 7 (3/4): 36–47. doi:10.1108/13527590110395621.
- Horwitch, Mel, and Bala Mulloth. 2010. "The Interlinking of Entrepreneurs, Grassroots Movements, Public Policy and Hubs of Innovation: The Rise of Cleantech in New York City." *Journal of High Technology Management Research* 21 (1). Elsevier Inc.: 23–30. doi:10.1016/j.hitech.2010.02.004.
- Ilgén, Daniel R, John R Hollenbeck, Michael Johnson, and Dustin Jundt. 2005. "Teams in Organizations: From Input-Process-Output Models to IMO Models." *Annual Review of Psychology* 56: 517–43. doi:10.1146/annurev.psych.56.091103.070250.
- Inayat, Irum, and Siti Salwah Salim. 2014. "A Framework to Study Requirements-Driven Collaboration among Agile Teams: Findings from Two Case Studies." *Computers in Human Behavior* 51 (0). Elsevier Ltd. doi:http://dx.doi.org/10.1016/j.chb.2014.10.040.
- Jackson, DJ. 2012. "What Is an Innovation Ecosystem." *Www. Erc-Assoc, Org/Docs/Innovation_Ecosystem, Pdf, ...*, no. March: 1–11. doi:10.1017/CBO9781107415324.004.
- Jansen, Justin J.P., Konstantinos C. Kostopoulos, Oli Mihalache, and Alexandros Papalexandris. 2015. "A Socio-Psychological Perspective on Team Ambidexterity: The Contingency Role of Supportive Leadership Behaviors." *Journal of Management Studies*, n/a-n/a. doi:10.1111/joms.12183.
- Jarratt, Denise. 2008. "Testing a Theoretically Constructed Relationship Management Capability." *European Journal of Marketing* 42 (9/10). Emerald Insight: 1106–32. doi:10.1108/03090560810891172.
- Järvenpää, Sirkka L., and Dorothy E. Leidner. 1998. "Communication and Trust in Global Virtual Teams." *Journal of Computer-Mediated Communication* 3 (4): 0. doi:10.1111/j.1083-

6101.1998.tb00080.x.

- Jassawalla, Avan R., and Hemant C. Sashittal. 1998. "An Examination of Collaboration in High-Technology New Product Development Processes." *Journal of Product Innovation Management* 15 (3): 237–54. doi:10.1111/1540-5885.1530237.
- Jensen, Are, and Tommy H. Clausen. 2017. "Origins and Emergence of Exploration and Exploitation Capabilities in New Technology-Based Firms." *Technological Forecasting and Social Change* 120. Elsevier Inc.: 163–75. doi:10.1016/j.techfore.2017.03.004.
- Johannisson, Bengt. 2003. "Entrepreneurship as a Collective Phenomenon." *Creación de Empresas: Homenaje Al Profesor José María Veciana Vergés*, no. S.I.R.E: 87–110. <http://dialnet.unirioja.es/servlet/articulo?codigo=1142670%5Cnhttp://www.scopus.com/inward/record.url?eid=2-s2.0-26644437784&partnerID=tZOtx3y1>.
- Johanson, Jan, and Jan Erik Vahlne. 2009. "The Uppsala Internationalization Process Model Revisited: From Liability of Foreignness to Liability of Outsidership." *Journal of International Business Studies* 40 (9). Palgrave Macmillan: 1411–31. doi:10.1057/jibs.2009.24.
- Johnson, Jeffrey E. 2004. "Factors Influencing the Early Internationalization of High Technology Start-Ups: US and UK Evidence." *Journal of International Entrepreneurship* 2 (1999): 139–54. doi:10.1023/B:JIEN.0000026910.87323.4e.
- Joshi, Aparna, and Hyuntak Roh. 2009. "The Role of Context in Work Team Diversity Research: A Meta-Analytic Review." *Academy of Management Journal* 52 (3): 599–627. doi:10.5465/AMJ.2009.41331491.
- Kahn, Kenneth B, and John T Mentzer. 1998. "Marketing's Integration with Other Departments" 2963 (97).
- Kaiser, Ulrich, and Bettina Müller. 2015. "Skill Heterogeneity in Startups and Its Development over Time." *Small Business Economics* 45 (4): 787–804. doi:10.1007/s11187-015-9667-8.
- Kamm, Judith B, and Aaron J. Nurick. 1993. "The Stages of Team Venture Formation: A Decision-Making Model." *Entrepreneurship Theory and Practice* 17 (2): 17–27.
- Kapuruge, Malinda, Jun Han, and Alan Colman. 2014. "Service Orchestration As Organization." In *Service Orchestration As Organization*, 159–86. Elsevier. doi:10.1016/B978-0-12-800938-3.00007-2.
- Kauppila, O.-P. 2010. "Creating Ambidexterity by Integrating and Balancing Structurally Separate Interorganizational Partnerships." *Strategic Organization* 8 (4). doi:10.1177/1476127010387409.
- Kauppila, Olli Pekka. 2015. "Alliance Management Capability and Firm Performance: Using Resource-Based Theory to Look Inside the Process Black Box." *Long Range Planning* 48 (3): 151–67. doi:10.1016/j.lrp.2013.08.006.
- Kazanjian, Robert K, and Hayagreeva Rao. 1999. "Research Note: The Creation of Capabilities in New Ventures—a Longitudinal Study." *Organization Studies* 20 (1): 125–142.
- Keeble, David, Clive Lawson, Helen Lawton Smith, Barry Moore, and Frank Wilkinson. 1998. "Internationalisation Processes, Networking and Local Embeddedness in Technology-Intensive Small Firms." *Small Business Economics* 11 (4): 327–42. doi:10.1023/A:1007942612220.
- Keskin, Duygu, Jan Carel Diehl, and Nelliene Molenaar. 2013. "Innovation Process of New Ventures Driven by Sustainability." *Journal of Cleaner Production* 45. Elsevier Ltd: 50–60. doi:10.1016/j.jclepro.2012.05.012.

- Ketata, Ihsen, Wolfgang Sofka, and Christoph Grimpe. 2014. "The Role of Internal Capabilities and Firms' Environment for Sustainable Innovation: Evidence for Germany." *R&D Management* 45 (1): 60–75. doi:10.1111/radm.12052.
- Khan, Mohammad Saud,; Robert J.; Breitenecker, and Erich J.; Schwarz. 2014. "Entrepreneurial Team Locus of Control: Diversity and Trust." *Management Decision* 52 (6): 1057–81. doi:10.1108/MD-06-2013-0349.
- Khera, Neha. 2012. "Talent for Tech : Recruiting the Right People for Your Tech Startup." http://www.marsdd.com/wp-content/uploads/2012/02/MAR-MKI6966_Talent-Tech_White-paper_DRAFT.pdf.
- Kim, N, and RK Srivastava. 1998. "Managing Intraorganizational Diffusion of Technological Innovations." *Industrial Marketing Management*. <http://www.sciencedirect.com/science/article/pii/S001985019700059X>.
- Kirzner, Israel. 1973. *Competition and Entrepreneurship*. Chicago Un.
- Kleef, J. A G van, and N. J. Roome. 2007. "Developing Capabilities and Competence for Sustainable Business Management as Innovation: A Research Agenda." *Journal of Cleaner Production* 15 (1): 38–51. doi:10.1016/j.jclepro.2005.06.002.
- Klepper, Steven. 2009. "Spinoffs: A Review and Synthesis." *European Management Review* 6 (3): 159–71. doi:10.1057/emr.2009.18.
- Klofsten, Magnus. 1994. "Technology-Based Firms: Critical Aspects of Their Early Development." *Journal of Enterprising Culture* 2 (01): 535–57. doi:10.1142/S0218495894000148.
- Klotz, A. C., K. M. Hmieleski, B. H. Bradley, and L. W. Busenitz. 2014. "New Venture Teams: A Review of the Literature and Roadmap for Future Research." *Journal of Management* 40 (1): 226–55. doi:10.1177/0149206313493325.
- Knight, Gary A, and S Tamar Cavusgil. 2010. "Organizational Capabilities, and the Born-Global Firm." *Journal of International Business Studies* 35 (2): 124–41.
- Koberg, Christine S., Yolanda Sarason, and Joseph Rosse. 1996. "A Taxonomic Approach to Studying High-Technology Firms: Deciphering the Tower of Babel." *Journal of High Technology Management Research* 7 (1): 15–35. doi:10.1016/S1047-8310(96)90012-7.
- Kock, Ned, and Gary S Lynn. 2012. "Lateral Collinearity and Misleading Results in Variance-Based SEM: An Illustration and Recommendations." *Journal of the Association for Information Systems* 13 (7): 546–80.
- Kogut, Bruce, and Udo Zander. 1993. "Knowledge of the Firm and the Evolutionary Theory of the Multinational Corporation." *Journal of International Business Studies* 24 (4): 625–45.
- Kohler, Thomas. 2016. "Corporate Accelerators: Building Bridges between Corporations and Startups." *Business Horizons* 59 (3). "Kelley School of Business, Indiana University": 347–57. doi:10.1016/j.bushor.2016.01.008.
- Kohli, Ajay, and Bernard Jaworski. 1990. "Market Orientation: The Construct, Research Propositions, and Managerial Implications." *The Construct, Research Propositions, and Managerial Implications*. 54 (April): 1–18. file:///E:/Información Portatil DELL/CONGRESO INTERNACIONAL/DICYT/ORIENTACION MERCADO/market Orientation Kohli y Bernard jaworski.pdf.
- Kor, Yasemin Y,; and Andrea Mesko. 2013. "Dynamic Managerial Capabilities: Configuration and Orchestration of Top Executives' Capabilities and the Firm's Dominant Logic." *Strategic Management Journal* 34 (J): 233–44. doi:10.1002/smj.2000.

- Kraiczy, Nils D., Andreas Hack, and Franz W. Kellermanns. 2015. "The Relationship Between Top Management Team Innovation Orientation and Firm Growth: The Mediating Role of Firm Innovativeness." *International Journal of Innovation Management* 19 (01): 1550005. doi:10.1142/S136391961550005X.
- Krogh, Georg Von, Ikujiro Nonaka, and Manfred Aben. 2001. "Making the Most of Your Company's Knowledge: A Strategic Framework." *Long Range Planning* 34 (4): 421–39. doi:10.1016/S0024-6301(01)00059-0.
- Krueger, JNF. 1993. "Entrepreneurial Intentions: Applying the Theory of Planned Behaviour." *Entrepreneurship & Regional*, no. June 2012: 315–30. <http://dx.doi.org/10.1080/08985629300000020>.
- Langfred, Claus W. 2004. "Too Much of a Good Thing? Negative Effects of High Trust and Individual Autonomy in Self-Managing Teams." *Academy of Management Journal* 47 (3): 385–99. doi:10.2307/20159588.
- Lapedra, Rafael, and Ricardo Chiva. 2006. "A Measurement Scale for Product Innovation Performance." *European Journal of Innovation Management* 9 (4): 333–46. doi:10.1108/14601060610707812.
- Laranja, Manuel, and Margarida Fontes. 1998. "Creative Adaptation: The Role of New Technology Based Firms in Portugal." *Research Policy* 26 (9): 1023–36. doi:10.1016/S0048-7333(97)00057-7.
- Laursen, Keld, and Nicolai Foss. 2003. "New Human Resource Management Practices, Complementarities and the Impact on Innovation Performance." *Cambridge Journal of Economics* 27 (2): 243–63. doi:10.1093/cje/27.2.243.
- Lavallee, Danielle C., Paul Wicks, Rafael Alfonso Cristancho, and C. Daniel Mullins. 2014. "Stakeholder Engagement in Patient-Centered Outcomes Research: High-Touch or High-Tech?" *Expert Review of Pharmacoeconomics and Outcomes Research* 14 (3): 335–44. doi:10.1586/14737167.2014.901890.
- Lawson, Benn, and Daniel A. Samson. 2001. "Developing Innovation Capability in Organisations: A Dynamic Capabilities Approach." *International Journal of Innovation Management* 05 (03): 377–400. doi:10.1142/S1363919601000427.
- Lechler, Thomas. 2001. "Social Interaction: A Determinant of Entrepreneurial Team Venture Success." *Small Business Economics* 16 (4): 263–78. doi:10.1023/A:1011167519304.
- Lee, Choonwoo, Kyungmook Lee, and Johannes M. Pennings. 2001. "Internal Capabilities, External Networks, and Performance: A Study on Technology-Based Ventures." *Strategic Management Journal* 22 (6–7): 615–40. doi:10.1002/smj.181.
- Lee, Heeseok, and Byounggu Choi. 2003. "Knowledge Management Enablers, Processes, and Organizational Performance: An Integrative View and Empirical Examination." *Journal of Management Information Systems* 20 (1): 179–228. doi:10.1080/07421222.2003.11045756.
- Leonard-Barton, Dorothy. 1992. "Core Capabilities and Core Rigidities: A Paradox in Managing New Product Development." *Strategic Management Journal* 13 (special issue): 111–25. <http://onlinelibrary.wiley.com/doi/10.1002/smj.4250131009/abstract>.
- LePine, Jeffrey A. 2003. "Team Adaptation and Postchange Performance: Effects of Team Composition in Terms of Members' Cognitive Ability and Personality." *Journal of Applied Psychology* 88 (1): 27–39. doi:10.1037/0021-9010.88.1.27.
- Li, Dan, Lorraine Eden, Michael A. Hitt, and R. Duane Ireland. 2008. "Friends, Acquaintances, or Strangers? Partner Selection in R&D Alliances." *Academy of Management Journal* 51 (2): 315–34. doi:10.1002/smj.

- Lin, C., J.L. Jiang, Y.-J. Wu, and C.C. Chang. 2011. "Assessment of Commercialization Strategy Using R&D Capability." *Industrial Management and Data Systems* 111 (3). doi:10.1108/02635571111118251.
- Loasby, Brian J. 2002. "The Evolution of Knowledge: Beyond the Biological Model." *Research Policy* 31 (8–9): 1227–39. doi:10.1016/S0048-7333(02)00060-4.
- . 2011. "Human Capital, Entrepreneurship, and the Theory of the Firm." In *The Oxford Handbook of Human Capital*, edited by Alan Burton-Jones and J.-C. Spender, 1–16. doi:10.1093/oxfordhb/9780199532162.003.0010.
- Loasby, Brian J. 2006. "Microfoundations of Capabilities." *DRUID Summer Conference 2006 on Knowledge, Innovation and Competitiveness: Dynamics of Firms, Networks, Regions and Institutions*.
- Löfsten, H. 2016. "Business and Innovation Resources: Determinants for the Survival of New Technology-Based Firms." *Management Decision* 54 (1): 88–106. doi:10.1108/MD-04-2015-0139.
- López Iturriaga, Félix, and Natalia Martín Cruz. 2008. "Antecedents of Corporate Spin-Offs in Spain: A Resource-Based Approach." *Research Policy* 37 (6–7): 1047–56. doi:10.1016/j.respol.2008.04.007.
- Lubik, S., E. Garnsey, T. Minshall, and K. Platts. 2013. "Value Creation from the Innovation Environment: Partnership Strategies in University Spin-Outs." *R and D Management* 43 (2). doi:10.1111/radm.12006.
- Lüdeke-freund, Florian. 2009. *Business Model Concepts in Corporate Sustainability Contexts: From Rhetoric to a Generic Template for "Business Models for Sustainability."* Methods. Vol. 10. doi:10.2139/ssrn.1544847.
- Lüdeke-Freund, Florian. 2010. "Towards a Conceptual Framework of Business Models for Sustainability." *ERSCP-EMU Conference* 49 (0): 1–28.
- MacCormack, Alan, Theodore Forbath, Peter Brooks, and Patrick Kalaher. 2007. "Innovation through Global Collaboration: A New Source of Competitive Advantage A New Source of Competitive Advantage." 7–79. "From Outsourcing to Global Collaboration: New Ways to Build Competitiveness." http://i-n-w.org/talking_collaboration/innovation.pdf.
- Macher, Jeffrey T., and David C. Mowery. 2009. "Measuring Dynamic Capabilities: Practices and Performance in Semiconductor Manufacturing." *British Journal of Management* 20 (FEBRUARY 2009): S41–62. doi:10.1111/j.1467-8551.2008.00612.x.
- Manu, Franklyn A. 1992. "Innovation Orientation , Enviornment and Performance : A Comparison of U.S. and European Markets." *Journal of International Business Studies* 23 (2): 333–59. <http://www.jstor.org/stable/154904>.
- March-Chorda, Isidre. 2004. "Success Factors and Barriers Facing the Innovative Start-Ups and Their Influence upon Performance over Time." *International Journal of Entrepreneurship and Innovation Management* 4 (2–3): 228–47. doi:10.1504/IJEIM.2004.004758.
- Marschak, J. 1955. "Elements for a Theory of Teams." *Management Science* 1 (2): 127–37. doi:10.1287/mnsc.1.2.127.
- Marschak, Jacob;, and Roy Radner. 1972. "Economic Theory of Teams. Chapter I. Decision under Uncertainty." In *Journal of Economic Behavior & Organization*, 35:415–41. doi:10.1016/S0167-2681(98)00053-5.
- Marsh, Sarah J., and Gregory N. Stock. 2003. "Building Dynamic Capabilities in New Product Development through Intertemporal Integration." *Journal of Product Innovation*

- Management* 20 (2): 136–48. doi:10.1111/1540-5885.2002006.
- Mason, C.M., and R.T. Harrison. 1994. “Informal Venture Capital in the UK.” *Finance and Small Firm*, 64–111. <https://ssrn.com/abstract=1497772>.
- Mason, Colin, and Ross Brown. 2014. “Entrepreneurial Ecosystems and Growth Oriented Entrepreneurship.” Paris.
- Mata, José, and Pedro Portugal. 1994. “Life Duration of New Firms.” *The Journal of Industrial Economics* 42 (3): 227–45.
- McAllister, D. J. 1995. “Affect- and Cognition-Based Trust As Foundations for Interpersonal Cooperation in Organizations.” *Academy of Management Journal* 38 (1): 24–59. doi:10.2307/256727.
- Meyer, Marc H., and Edward B. Roberts. 1985. “New Product Strategy In Small Technology-Based Firms: A Pilot Study.” *Management Science*, no. 37: 806–22.
- Miles, Raymond E., Grant Miles, and Charles C. Snow. 2006. “Collaborative Entrepreneurship: A Business Model for Continuous Innovation.” *Organizational Dynamics* 35 (1): 1–11. doi:10.1016/j.orgdyn.2005.12.004.
- Miller, Kent D, Brian T Pentland, and Seungho Choi. 2012. “Dynamics of Performing and Remembering Organizational Routines.” *Journal of Management Studies* 49 (8): 1536–58. doi:10.1111/j.1467-6486.2012.01062.x.
- Miller, Paul, and Kirsten Bound. 2011. “The Startup Factories. The Rise of Accelerator Programmes to Support New.” *NESTA*, no. June. <http://www.eban.org/wp-content/uploads/2014/09/14-StartupFactories-The-Rise-of-Accelerator-Programmes.pdf>.
- Moore, James F. 2006. “Business Ecosystems and the View from the Firm.” *Antitrust Bulletin* 51 (I): 31–75. doi:Article.
- Morgan, Robert M, and Shelby D. Hunt. 1994. “Theory of Relationship Marketing.” *Journal of Marketing* 58 (3): 20–38. doi:10.1177/1356766710391135.
- Morris, Michael, Minet Schindehutte, and Jeffrey Allen. 2005. “The Entrepreneur’s Business Model: Toward a Unified Perspective.” *Journal of Business Research* 58 (6): 726–35. doi:10.1016/j.jbusres.2003.11.001.
- Muller-Boling, D. 1993. “Venture Team Start-Ups: An Undiscovered Field of Research.” In *Entrepreneurship and Business Development*, 55–65.
- Müller, Christian. 2016. “A Glance at the Startup Ecosystem Forming in Valencia (Spain).” *MediumTech.Eu*. <https://medium.com/@tech.eu/a-glance-at-the-startup-ecosystem-forming-in-valencia-spain-58274933fbb9>.
- Mumford, Michael D., Ginamarie M. Scott, Blaine Gaddis, and Jill M. Strange. 2002. “Leading Creative People: Orchestrating Expertise and Relationships.” *Leadership Quarterly* 13 (6): 705–50. doi:10.1016/S1048-9843(02)00158-3.
- Nahapiet, Janine, and Sumantra Ghoshal. 1998. “Social Capital , Intellectual Capital , and the Organizational Advantage Janine Nahapiet; Sumantra Ghoshal.” *The Academy of Management Review* 23 (2): 242–66. doi:10.2307/259373.
- Nanda, Ramana, and Matthew Rhodes-Kropf. 2013. “Investment Cycles and Startup Innovation.” *Journal of Financial Economics* 110 (2). Elsevier: 403–18. doi:10.1016/j.jfineco.2013.07.001.
- Narver, John C., and Stanley F. Slater. 1990. “The Effect of a Market Orientation on Business Profitability.” *Journal of Marketing*. doi:10.2307/1251757.

- Nerkar, Atul, and Shane Scott. 2007. "Determinants of Invention Commercialization: An Empirical Examination of Academically Sourced Inventions." *Strategic Management Journal* 28 (11): 1155–1166. doi:10.1002/smj.643.
- Newey, Lance R., and Shaker a. Zahra. 2009. "The Evolving Firm: How Dynamic and Operating Capabilities Interact to Enable Entrepreneurship." *British Journal of Management* 20 (SUPP. 1). doi:10.1111/j.1467-8551.2008.00614.x.
- Neyens, Inge, Dries Faems, and Luc Sels. 2010. "The Impact of Continuous and Discontinuous Alliance Strategies on Startup Innovation Performance." *International Journal of Technology Management* 52 (3/4): 392. doi:10.1504/ijtm.2010.035982.
- Nicholls-Nixona, Charlene L, Arnold C Cooper, and Carolyn Y Woo. 2000. "Strategic Experimentation: Understanding Change and Performance in New Ventures." *Journal of Business Venturing* 15 (6): 493–521. doi:10.1111/1468-0262.00022.
- Nonaka, Ikujiro. 1991. "The Knowledge Creating Company." *Harvard Business Review* 69: p96-104. doi:10.1016/0024-6301(96)81509-3.
- Nonaka, Ikujiro, Mitsuru Kodama, Ayano Hirose, and Florian Kohlbacher. 2014. "Dynamic Fractal Organizations for Promoting Knowledge-Based Transformation - A New Paradigm for Organizational Theory." *European Management Journal* 32 (1). Elsevier Ltd: 137–46. doi:10.1016/j.emj.2013.02.003.
- Nonaka, Ikujiro, Ryoko Toyama, and Noboru Konno. 2000. "SECI, Ba and Leadership: A Unified Model of Dynamic Knowledge Creation." *Long Range Planning* 33 (1): 5–34. doi:10.1016/S0024-6301(99)00115-6.
- Nunnally, J. C. 1976. *Psychometric Theory*. New York: McGraw-Hill.
- O'Connor, Gina Colarelli, Albert S. Paulson, and Richard DeMartino. 2008. "Organisational Approaches to Building a Radical Innovation Dynamic Capability." *International Journal of Technology Management* 44 (1/2): 179. doi:10.1504/IJTM.2008.020704.
- Oakey, R., W. Faulkner, C. Cooper, and V. Walsh. 1990. *New Firms in the Biotechnology Industry: Their Contribution to Innovation and Growth*. London: Pinter.
- Oakey, Ray. 1991. "High Technology Small Firms: Their Potential for Rapid Industrial Growth." *International Small Business Journal* 9 (4): 30–42.
- Oakey, Ray P. 2003. "Technical Entrepreneurship in High Technology Small Firms: Some Observations on the Implications for Management." *Technovation* 23 (8): 679–88. doi:10.1016/S0166-4972(03)00045-2.
- OECD. 2016. "Encouraging Business Innovation and Innovative Entrepreneurship." *The Innovation Policy Platform*. <https://www.innovationpolicyplatform.org/content/spain>.
- Ortín-Ángel, Pedro, and Ferran Vendrell-Herrero. 2010. "Why Do University Spin-Offs Attract More Venture Capitalists?" *Venture Capital* 12 (4): 285–306. doi:10.1080/13691066.2010.486166.
- . 2014. "University Spin-Offs vs. Other NTBFs: Total Factor Productivity Differences at Outset and Evolution." *Technovation* 34 (2): 101–12. doi:10.1016/j.technovation.2013.09.006.
- Oviatt, Benjamin M, and Patricia Phillips McDougall. 1994. "Toward a Theory of International New Ventures." *Journal of International Business Studies* 25 (1): 45–64. doi:10.1057/palgrave.jibs.8490193.
- Paradkar, Amit, John Knight, and Paul Hansen. 2015. "Innovation in Start-Ups: Ideas Filling the Void or Ideas Devoid of Resources and Capabilities?" *Technovation* 41: 1–10.

doi:10.1016/j.technovation.2015.03.004.

- Parens, Erik. 1998. "What Differences Make a Difference?" *Cambridge Quarterly of Healthcare Ethics: CQ: The International Journal of Healthcare Ethics Committees* 7 (1): 1–6. doi:10.1017/S096318019870101X.
- Paternoster, Nicolò, Carmine Giardino, Michael Unterkalmsteiner, Tony Gorschek, and Pekka Abrahamsson. 2014. "Software Development in Startup Companies: A Systematic Mapping Study." *Information and Software Technology* 56 (10): 1200–1218. doi:10.1016/j.infsof.2014.04.014.
- Pavlou, Paul. 2002. "IT-Enabled Competitive Advantage: The Strategic Role of IT on Dynamic Capabilities in Collaborative Product Development Partnerships Dissertation Summary." <http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.201.6178>.
- Pavlou, Paul, and Omar El Sawy. 2011. "Understanding the Elusive Black Box of Dynamic Capabilities." *Decision Sciences* 42 (1): 239–73. doi:10.1111/j.1540-5915.2010.00287.x.
- Pennings, J.M., and Jaana Woiceshyn. 1987. "A Typology of Organizational Control and Its Metaphors." *Research in the Sociology of Organizations* March (5): 75–104.
- Penrose, Edith Tilton. 1952. "Biological Analogies in the Theory of the Firm." *The American Economic Review* 42 (5): 804–19. <http://www.jstor.org/stable/1812528>.
- Pentland, Brian T., and Martha S. Feldman. 2007. "Narrative Networks: Patterns of Technology and Organization." *Organization Science* 18 (5): 781–95. doi:10.1287/orsc.1070.0283.
- Pentland, Brian T, Martha S Feldman, Markus C Becker, and Peng Liu. 2012. "Dynamics of Organizational Routines: A Generative Model." *Journal of Management Studies* 49 (8): 1484–1508. doi:10.1111/j.1467-6486.2012.01064.x.
- Peteraf, Margaret, Giada Di Stefano, and Gianmario Verona. 2013. "The Elephant in the Room of Dynamic Capabilities: Bridging Two Diverging Conversations Together." *Strategic Management Journal* J (34): 1389–1410. doi:10.1002/smj.2078.
- Pinto, M.B., and J.K. Pinto. 1990. "Project Team Communication and Cross-Functional Cooperation in New Program Development." *Journal of Product Innovation Management* 7 (SEPTEMBER): 200–212. doi:10.1016/0737-6782(90)90004-X.
- Porter, Michael E. 1996. *What Is Strategy*. Published November.
- Porter, Michael, and Kramer Mark. 2011. "Creating Shared Value." *Harvard Business Review* 89 (1–2): 62–77. <https://hbr.org/2011/01/the-big-idea-creating-shared-value#>.
- Prajogo, Daniel I, and Pervaiz K Ahmed. 2016. "Innovation Capacity , and Innovation Relationships between Innovation Stimulus , Innovation Capacity , and Innovation Performance," no. April: 499–515. doi:10.1111/j.1467-9310.2006.00450.x.
- Preacher, Kristopher J., and Andrew F. Hayes. 2004. "SPSS and SAS Procedures for Estimating Indirect Effects in Simple Mediation Models." *Behavior Research Methods, Instruments, & Computers* 36 (4): 717–31.
- PriceWaterhouseCoopers. 2013. "The Startup Economy: How to Support Tech Startups and Accelerate Australian Innovation."
- Prieto, Isabel M., Elena Revilla, and Beatriz Rodríguez-Prado. 2009. "Building Dynamic Capabilities in Product Development: How Do Contextual Antecedents Matter?" *Scandinavian Journal of Management* 25 (3): 313–26. doi:10.1016/j.scaman.2009.05.005.
- Quist, Jaco, and Arnold Tukker. 2013. "Knowledge Collaboration and Learning for Sustainable Innovation and Consumption: Introduction to the ERSCP Portion of This Special Volume."

- Journal of Cleaner Production* 48. Elsevier Ltd: 167–75. doi:10.1016/j.jclepro.2013.03.051.
- Rammer, Christian. 2006. “Technology-Based Start-Ups.” Edited by C. Rammer and H. Legler (eds.) U. Schmoch. *National Systems of Innovation in Comparison: Structure and Performance Indicators for Knowledge Societies* National S. Springer: 153–67. doi:10.1007/1-4020-4949-1_9.
- Rice, M, and Donna; Kelley. 2001. “Radical Innovation: Triggering Initiation of Opportunity Recognition and Evaluation.” *R&D* <http://onlinelibrary.wiley.com/doi/10.1111/1467-9310.00228/full>.
- Ries, Eric. 2011. *The Lean Startup How Constant Innovation Creates Radically Successful Businesses*. First publ. London; New York: Penguin Group.
- Rin, M., T. Hellmann, and M. Puri. 2013. *A Survey of Venture Capital Research. Handbook of the Economics of Finance*. doi:10.1016/B978-0-44-453594-8.00008-2.
- Ringle, C. M., S. Wende, and J.-M. Becker. 2015a. “SmartPLS 3.” Boenningstedt: SmartPLS GmbH.
- . 2015b. “SmartPLS 3.” Boenningstedt: SmartPLS GmbH. <http://www.smartpls.com>.
- Ringle, Christian M., and Marko Sarstedt. 2016. “Gain More Insight from Your PLS-SEM Results: The Importance-Performance Map Analysis.” *Industrial Management & Data Systems* 116 (9): 1865–86. doi:<https://doi.org/10.1108/IMDS-10-2015-0449>.
- Ripsas, Sven, and Björn Hentschel. 2015. “European Startup Monitor–Country Report Germany 2015.”
- Roberts, Edward B., and Todd A. Senturia. 1996. “Globalizing the Emerging High-Technology Company.” *Industrial Marketing Management* 25 (6): 491–506. doi:10.1016/S0019-8501(96)00072-7.
- Roberts, Edward B, and Alan R Fusfeld. 1981. “Staffing the Innovative Technology-Based Organization.” *Sloan Management Review (Pre-1986)* 22 (3): 19. <http://search.proquest.com/docview/206765521/citation/89EDB8FFF2B84D01PQ/1?accountid=49672>.
- Rocca, Antonella La, and Ivan Snehota. 2014. “Relating in Business Networks: Innovation in Practice.” *Industrial Marketing Management* 43 (3). Elsevier Inc.: 441–47. doi:10.1016/j.indmarman.2013.12.012.
- Rodan, Simon. 2002. “Innovation and Heterogeneous Knowledge in Managerial Contact Networks.” *Journal of Knowledge Management* 6 (2): 152–63. doi:10.1108/13673270210424675.
- Rohrbeck, René, Lars Konnertz, and Sebastian Knab. 2013. “Collaborative Business Modelling for Systemic and Sustainability Innovations.” *International Journal of Technology Management* 63 (1–2): 4. doi:10.1504/IJTM.2013.055577.
- Roininen, Sari, and Håkan Ylinenpää. 2009. “Schumpeterian versus Kirznerian Entrepreneurship.” *Journal of Small Business and Enterprise Development* 16 (3): 504–20. doi:10.1108/14626000910977198.
- Romero, Isidoro, and Juan A. Martínez-Román. 2012. “Self-Employment and Innovation. Exploring the Determinants of Innovative Behavior in Small Businesses.” *Research Policy* 41 (1). Elsevier B.V.: 178–89. doi:10.1016/j.respol.2011.07.005.
- Roni, Saiyidi Mat, Hadrian Djajadikerta, and Mohamad Azmi Nias Ahmad. 2015. “PLS-SEM Approach to Second-Order Factor of Deviant Behaviour: Constructing Perceived Behavioural Control.” *Procedia Economics and Finance* 28 (April). Elsevier B.V.: 249–53.

doi:10.1016/S2212-5671(15)01107-7.

- Rothwell, Roy, and Hans Wissema. 1986. "Technology, Culture and Public Policy." *Technovation* 4 (2): 91–115.
- Roure, Juan B., and Robert H. Keeley. 1990. "Predictors of Success in New Technology Based Ventures." *Journal of Business Venturing* 5 (4): 201–20.
- Ruef, Martin. 2002. "Strong Ties, Weak Ties and Islands: Structural and Cultural Predictors of Organizational Innovation." *Industrial and Corporate Change* 11 (3): 427–49. doi:10.1093/icc/11.3.427.
- Rumelt, Richard. 2011. *Good Strategy, Bad Strategy. The Difference and Why It Matter*.
- Santarelli, Enrico, and Marco Vivarelli. 2007. "Entrepreneurship and the Process of Firms' entry, Survival and Growth." *Industrial and Corporate Change* 16 (3): 455–88. doi:10.1093/icc/dtm010.
- Sarstedt, Marko, Joseph F. Hair, Christian M. Ringle, Kai O. Thiele, and Siegfried P. Gudergan. 2016. "Estimation Issues with PLS and CBSEM: Where the Bias Lies!" *Journal of Business Research* 69 (10). The Authors: 3998–4010. doi:10.1016/j.jbusres.2016.06.007.
- Saxenian, AnnaLee. 1996. *Regional Advantage*. Harvard University Press.
- Schaltegger, Stefan. 2002. "A Framework for Ecopreneurship." *Green Management International* 38: 45–59. doi:10.9774/GLEAF.3062.2002.su.00006.
- Schaltegger, Stefan, and Marcus Wagner. 2011. "Sustainable Entrepreneurship and Sustainability Innovation: Categories and Interactions." *Business Strategy and the Environment* 20 (4): 222–37. doi:10.1002/bse.682.
- Schiederig, T., F.; Tietze, and C.; Herstatt. 2011. "What Is Green Innovation ? – A Quantitative Literature Review." *The XXII ISPM Conference* 42 (63): 180–92.
- . 2012. "Green Innovation in Technology and Innovation Management – an Exploratory Literature Review." *R&D Management* 42 (2): 180–92. doi:10.1111/j.1467-9310.2011.00672.x.
- Schjoedt, Leon, and Sascha Kraus. 2009. "Entrepreneurial Teams: Definition and Performance Factors." *Management Research News* 32 (6): 513–24. doi:10.1108/01409170910962957.
- Schmidt, Thomas;, and Timo Braun. 2015. "When Cospecialisation Leads to Rigidity: Path Dependence in Successful Strategic Networks." *Schmalenbach Business Review* 67(4) (October): 489–516. <http://search.proquest.com/openview/5760f69e08ae25619ba3b4edd2dff96e/1?pq-origsite=gscholar&cbl=44516>.
- Schneckenberg, Dirk, Yann Truong, and Hamid Mazloomi. 2015. "Microfoundations of Innovative Capabilities: The Leverage of Collaborative Technologies on Organizational Learning and Knowledge Management in a Multinational Corporation." *Technological Forecasting and Social Change* 100: 356–68. doi:10.1016/j.techfore.2015.08.008.
- Schneider, Cédric, and Reinhilde Veugelers. 2010. "On Young Highly Innovative Companies: Why They Matter and How (Not) to Policy Support Them." *Industrial and Corporate Change* 19 (4): 969–1007. doi:10.1093/icc/dtp052.
- Schoenfeldt, Lyle F. 1984. "4 . The Status of Test Validation Research The Status of Test Validation." In *Social and Technical Issues in Testing: Implications for Test Construction and Usage*. 6., 61–86.
- Schoenmakers, Wilfred, and Geert Duysters. 2010. "The Technological Origins of Radical

- Inventions.” *Research Policy* 39 (8). Elsevier B.V.: 1051–59. doi:10.1016/j.respol.2010.05.013.
- Schreiber, J B, F K Stage, J King, A Nora, and E A Barlow. 2006. “Reporting Structural Equation Modeling and Confirmatory Factor Analysis Results: A Review.” *Journal of Educational Research* 99 (6): 323–37. doi:10.3200/JOER.99.6.323-338.
- Schreiber, James B., Amaury Nora, Frances K. Stage, Elizabeth A. Barlow, Jamie King, Amaury Nora, and Elizabeth A. Barlow. 2006. “Reportig Structural Equation Modeling and Confirmatory Factor Analysis Results : A Review.” *The Journal of Educational Research* 99 (6): 232–338. doi:10.3200/JOER.99.6.323-338.
- Schumpeter, Joseph A. 1942. “Capitalism and the Process of Creative Destruction.” *Monopoly Power and Economic Performance*, 19–38. doi:10.1017/CBO9781107415324.004.
- Schwandt, Thomas A. 1994. “Constructivist, Interpretivist Approaches to Human Inquiry.” *Handbook of Qualitative Research*, no. January 1994: 118–37. <http://psycnet.apa.org/psycinfo/1994-98625-006>.
- Shapira, Philip, Abdullah Gök, Evgeny Klochikhin, and Marianne Sensier. 2014. “Probing ‘Green’ Industry Enterprises in the UK: A New Identification Approach.” *Technological Forecasting and Social Change* 85. Elsevier Inc.: 93–104. doi:10.1016/j.techfore.2013.10.023.
- Shapiro, Benson P. 1988. “Close Encounters of the Four Kinds: Managing Customers in a Rapidly Changing Environment.” *Harvard Business School Background*, no. August: 589-015.
- Shearman, Claire, and Gibson Burrell. 1988. “New Technology Based Firms and the Emergence of New Industries: Some Employment Implications.” *New Technology, Work and Employment* 3 (2): 87–99. 10.1111/j.1468-005X.1988.tb00092.x.
- Shin, Shung J., Tae Yeol Kim, Jeong Yeon Lee, and Lin Bian. 2012. “Cognitive Team Diversity and Individual Team Member Creativity: A Cross-Level Interaction.” *Academy of Management Journal* 55 (1): 197–212. doi:10.5465/amj.2010.0270.
- Siguaw, Judy A., Penny M. Simpson, and Cathy A. Enz. 2006. “Conceptualizing Innovation Orientation: A Framework for Study and Integration of Innovation Research.” *Journal of Product Innovation Management* 23 (6): 556–74. doi:10.1111/j.1540-5885.2006.00224.x.
- Smith, Adrian. 2007. “Translating Sustainabilities between Green Niches and Socio-Technical Regimes.” *Technology Analysis & Strategic Management* 19 (4): 427–50. doi:10.1080/09537320701403334.
- Song, Michael, Barbara Dyer, and R. Jeffrey Thieme. 2006. “Conflict Management and Innovation Performance: An Integrated Contingency Perspective.” *Journal of the Academy of Marketing Science* 34 (3): 341–56. doi:10.1177/0092070306286705.
- Song, X Michael, Mitzi M. Montoya, and Jeffrey B. Schmidt. 1997. “Antecedents and Consequences of Cross- Functional Cooperation: A Comparison of R&D, Manufacturing, and Marketing Perspectives.” *Management, Product Innovation* 14 (January): 35–47.
- Soosay, Claudine, Terrence R Sloan, and R L Chapman. 2005. “Developing Organisational Capabilities: A Strategic Approach to Continuous Innovation.” *Proceedings of the 6th International CINet Conference. Brighton, UK*. <http://hdl.cqu.edu.au/10018/27347>.
- Srivastava, Abhishek, Kathryn M Bartol, and Edwin A Locke. 2006. “Empowering Leadership in Management Teams: Effects on Knowledge Sharing, Efficacy, and Performance.” *Academy of Management Journal* 49 (6): 1239–51. doi:10.5465/AMJ.2006.23478718.
- Stefano, Giada Di, Margaret Peteraf, and Gianmario Veronay. 2010. “Dynamic Capabilities

- Deconstructed: A Bibliographic Investigation into the Origins, Development, and Future Directions of the Research Domain.” *Industrial and Corporate Change* 19 (4): 1187–1204. doi:10.1093/icc/dtq027.
- Stieglitz, Nils, and Klaus Heine. 2007. “Innovations and the Role of Complementarities in a Strategic Theory of the Firm.” *Strategic Management Journal* 28 (1): 1–15. doi:10.1002/smj.565.
- Storey, D.J., and B.S Tether. 1998. “New Technology-Based Firms in the European Union: An Introduction.” *Research Policy* 26 (9): 933–46. doi:10.1016/S0048-7333(97)00052-8.
- Stuart, Toby E. 2000. “Interorganizational Alliances and the Performance of Firms: A Study of Growth and Innovation Rates in a High-Technology Industry.” *Strategic Management Journal* 21 (8): 791–811. doi:10.1002/1097-0266(200008)21:8<791::AID-SMJ121>3.0.CO;2-K.
- Swink, Morgan. 1999. “Threats to New Product Manufacturability and the Effects of Development Team Integration Processes.” *Journal of Operations Management* 17 (6): 691–709. doi:10.1016/S0272-6963(99)00027-3.
- Tamer Cavusgil, S., Roger J. Calantone, and Yushan Zhao. 2003. “Tacit Knowledge Transfer and Firm Innovation Capability.” *Journal of Business & Industrial Marketing* 18 (1): 6–21. doi:10.1108/08858620310458615.
- Tan, K L, S Suhaida, and Y P Leong. 2013. “Self-Efficacy and Green Entrepreneurship.” *IOP Conference Series: Earth and Environmental Science* 16: 012119. doi:10.1088/1755-1315/16/1/012119.
- Tanev, Stoyan, Erik Stavnsager Rasmussen, Erik Zijdemans, Roy Lemming, and Lars Limkilde Svendsen. 2015. “Lean and Global Technology Start-Ups: Linking the Two Research Streams.” *International Journal of Innovation Management* 19 (03): 1540008. doi:10.1142/S1363919615400083.
- Teece, D.J., and Gary Pisano. 1994. “The Dynamic Capabilities of Firms: An Introduction.” *Industrial and Corporate Change* 3 (3): 537–56. doi:10.1093/icc/3.3.537-a.
- Teece, David J. 1996. “Firm Organization, Industrial Structure, and Technological Innovation.” *Journal of Economic Behavior and Organization* 31 (2): 193–224. doi:10.1016/S0167-2681(96)00895-5.
- . 2007. “Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance.” *Strategic Management Journal* 29 (13): 1319–50. doi:1097-0266.
- . 2010a. “Business Models, Business Strategy and Innovation.” *Long Range Planning* 43 (2–3). Elsevier Ltd: 172–94. doi:10.1016/j.lrp.2009.07.003.
- . 2010b. “Technological Innovation and the Theory of the Firm: The Role of Enterprise-Level Knowledge, Complementarities, and (Dynamic) Capabilities.” In *Handbook Economics of Innovation, Vol. 01*, edited by Bronwyn H. Hall, USA University of California, Berkeley, California, The Netherlands University of Maastricht, Nathan Rosenberg, and USA Stanford University, Stanford, California, Second, 679–730. Amsterdam, Boston, Heidelberg, London, New York, Oxford, Paris, San Diego, San Francisco, Singapore, Sydney, Tokyo: Elsevier. doi:10.1016/S0169-7218(10)01016-6.
- . 2011. *Human Capital, Capabilities, and the Firm. Literati, Numerati, and Entrepreneurs in the Twenty-First-Century Enterprise*. Edited by J.-C. Burton-Jones, Alan; Spencer. *The Oxford Handbook of Human Capital*. 2011th ed. New York: Oxford University Press, Inc. doi:10.1093/oxfordhb/9780199532162.003.0022.

- . 2012. “Dynamic Capabilities: Routines versus Entrepreneurial Action.” *Journal of Management Studies* 49 (8): 1395–1401. doi:10.1111/j.1467-6486.2012.01080.x.
- Teece, David J., Gary Pisano, and A Shuen. 1990. “Firm Capabilities, Resources and the Concept of Strategy.” *Strategic Management Journal*. Vol. 18. CCC Working Paper No. 90-8.
- Teece, David J., Gary Pisano, and Amy Shuen. 1997. “Dynamic Capabilities and Strategic Management.” *Strategic Management Journal* 18 (March): 509–33. doi:10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z.
- . 1999. *Dynamic Capabilities and Strategic Management. Knowledge and Strategy*. Elsevier. doi:10.1016/B978-0-7506-7088-3.50009-7.
- Teece, David J. 1996. “Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy.” *Research Policy* 15 (February): 285–305. doi:10.1016/0048-7333(93)90063-N.
- Thamhain, Hans J. 2004. “Leading Technology-Based Project Teams.” *Engineering Management Journal* 16 (2): 35–43. doi:10.1080/10429247.2004.11415247.
- The World Bank. 1987. “Our Common Future.” *Oxford University Press*. Vol. 4. Oxford. doi:10.1080/07488008808408783.
- Tyler, Beverly B. 2001. “Complementarity of Cooperative and Technological Competencies: A Resource-Based Perspective.” *Journal of Engineering and Technology Management - JET-M* 18 (1): 1–27. doi:10.1016/S0923-4748(00)00031-X.
- Tyszka, Tadeusz, Jerzy Cieřlik, Artur Domurat, and Anna Macko. 2011. “Motivation, Self-Efficacy, and Risk Attitudes among Entrepreneurs during Transition to a Market Economy.” *Journal of Socio-Economics* 40 (2): 124–31. doi:10.1016/j.socec.2011.01.011.
- Tzokas, Nikolaos, Young Ah, Hammad Akbar, and Haya Al-dajani. 2015. “Industrial Marketing Management Absorptive Capacity and Performance : The Role of Customer Relationship and Technological Capabilities in High-Tech SMEs.” *Industrial Marketing Management* 47. Elsevier Inc.: 134–42. doi:10.1016/j.indmarman.2015.02.033.
- Ulbrich, Sebastian; Heide; Troitzsch, Fred; Van den Anker, Adrian; Plüss, and Charles Huber. 2009. “Collaborative Capability of Teams in Network Organizations.” *IFIP Advances in Information and Communication Technology* 307 (February 2016): 149–56. doi:10.1007/978-3-642-04568-4_16.
- Unterkalmsteiner, Michael, Carmine Giardino, Tony Gorschek, and Pekka Abrahamsson. 2016. “Software Development in Startup Companies : The Greenfield Startup Model” 42 (6): 585–604.
- Utterback, James. 2004. “The Dynamics of Innovation.” *Educause Review* 39. Harvard Business Press: 42–51. doi:10.2307/256406.
- Ven, A.H.; Van de. 1986. “Central Problems in the Management of Innovation.” *Management Science* 32 (5): 590–607. doi:10.2307/2631848.
- Ven, A.H. Van de, D.E.; Polley, R.; Garud, and S.; Venkataraman. 1999. *The Innovation Journey*. First Edition. New York: Oxford University Press, Inc.
- Verona, Gianmario, and Davide Ravasi. 2003. “Unbundling Dynamic Capabilities: An Exploratory Study of Continuous Product Innovation.” *Industrial & Corporate Change* 12 (3): 577–606. doi:10.1093/icc/12.3.577.
- Visintin, Francesca, and Daniel Pittino. 2014. “Founding Team Composition and Early Performance of University-Based Spin-off Companies.” *Technovation* 34 (1). Elsevier: 31–43. doi:10.1016/j.technovation.2013.09.004.

- Vogel, Rick, and Wolfgang H. Güttel. 2013. "The Dynamic Capability View in Strategic Management: A Bibliometric Review." *International Journal of Management Reviews* 15 (4): 426–46. doi:10.1111/ijmr.12000.
- Vyakarnam, Shailendra;, Robin; Jacobs, and Jari Handelberg. 1999. "Exploring the Formation of Entrepreneurial Teams: The Key to Rapid Growth Business?" *Journal of Small Business and Enterprise Development* 6 (2): 153–65. doi:10.1108/EUM00000000006673.
- Wang, Catherine L., and Pervaiz K. Ahmed. 2007. "Dynamic Capabilities: A Review and Research Agenda." *International Journal of Management Reviews* 9 (1): 31–51. doi:10.1111/j.1468-2370.2007.00201.x.
- Wang, Sijun, and Yuanjie He. 2008. "Compensating Nondedicated Cross-Functional Teams." *Organization Science* 19 (5): 753–65. doi:10.1287/orsc.
- Weber, Eric. 2016. *Advisory Boards in Startups: Investigating the Roles of Advisory Boards in German Technology-Based Startups*. Springer.
- Weerawardena, Jay, Gillian Sullivan Mort, Peter W. Liesch, and Gary Knight. 2007. "Conceptualizing Accelerated Internationalization in the Born Global Firm: A Dynamic Capabilities Perspective." *Journal of World Business* 42 (3): 294–306. doi:10.1016/j.jwb.2007.04.004.
- Wennekers, Snader;, and Roy Thurik. 1999. "Linking Entrepreneurship and Economic Growth." *Small Business Economics* 13: 27–55. doi:10.1023/A:1008063200484.
- Wernerfelt, Birger. 1984. "A Resource-Based View of the Firm." *Strategic Management Journal* 5 (2): 171–80. doi:10.1007/sl0734-011-9485-0.
- Wetzels, Martin, Gaby Odekerken-Schröder, and Claudia van Oppen. 2009. "Using PLS Path Modeling for Assessing Hierarchical Construct Models: Guidelines and Empirical Illustration." *MIS Quarterly* 1 (33): 177–95. doi:10.2307/20650284.
- Wijk, Raymond van, Justin J. P. Jansen, and Marjorie A. Lyles. 2008. "Inter- and Intra-Organizational Knowledge Transfer: A Meta-Analytic Review and Assessment of Its Antecedents and Consequences." *Journal of Management Studies* 45 (4): 830–53. doi:10.1111/j.1467-6486.2008.00771.x.
- Wilden, Ralf, Timothy M Devinney, and Grahame R Dowling. 2016. "The Architecture of Dynamic Capability Research." *Academy of Management Annals* 10 (1): 997–1076. doi:10.1080/19416520.2016.1161966.
- Wilden, Ralf, Timothy Michael Devinney, and Grahame R Dowling. 2013. "The Architecture of Dynamic Capability Research: A Scientometric Investigation." *Academy of Management Proceedings* 2013 (1): 11807–11807. doi:10.5465/AMBPP.2013.11807abstract.
- Winter, Sidney G. 2003. "Understanding Dynamic Capabilities." *Strategic Management Journal* J (24): 991–95. doi:10.1002/smj.318.
- Wold, Svante, Nouna Kettaneh-Wold, and Bert Skagerberg. 1989. "Nonlinear PLS Modeling." *Chemometrics and Intelligent Laboratory Systems* 1–2 (7): 53–65.
- Wong, K. K. 2013. "Partial Least Squares Structural Equation Modeling (PLS-SEM) Techniques Using SmartPLS." *Marketing Bulletin* 24 (1): 1–32. doi:10.1108/EBR-10-2013-0128.
- Wu, Lei-Yu. 2007. "Entrepreneurial Resources, Dynamic Capabilities and Start-up Performance of Taiwan's High-Tech Firms." *Journal of Business Research* 60 (5): 549–55. doi:10.1016/j.jbusres.2007.01.007.
- Wu, Lei Y. 2006. "Resources, Dynamic Capabilities and Performance in a Dynamic Environment: Perceptions in Taiwanese IT Enterprises." *Information and Management* 43 (4): 447–54.

doi:10.1016/j.im.2005.11.001.

- Wu, Sarah Jinhui, Steven A. Melnyk, and Barbara B. Flynn. 2010. "Operational Capabilities: The Secret Ingredient." *Decision Sciences* 41 (4): 721–54. doi:10.1111/j.1540-5915.2010.00294.x.
- Yli-Renko, Helena, Erkkö Autio, and Harry J. Sapienza. 2001. "Social Capital, Knowledge Acquisition, and Knowledge Exploitation in Young Technology-Based Firms." *Strategic Management Journal* 22 (6–7): 587–613. doi:10.1002/smj.183.
- Zahay, Debra L., and Robert B. Handfield. 2004. "The Role of Learning and Technical Capabilities in Predicting Adoption of B2B Technologies." *Industrial Marketing Management* 33 (7): 627–41. doi:10.1016/j.indmarman.2003.10.004.
- Zahra, Shaker A., and Satish Nambisan. 2011. "Entrepreneurship in Global Innovation Ecosystems." *AMS Review* 1 (1): 4–17. doi:10.1007/s13162-011-0004-3.
- Zahra, Shaker A., Harry J. Sapienza, and Per Davidsson. 2006. "Entrepreneurship and Dynamic Capabilities: A Review, Model and Research Agenda." *Journal of Management Studies* 43 (4): 917–55. doi:10.1111/j.1467-6486.2006.00616.x.
- Zheng, Yanfeng, Jing Liu, and Gerard George. 2010. "The Dynamic Impact of Innovative Capability and Inter-Firm Network on Firm Valuation: A Longitudinal Study of Biotechnology Start-Ups." *Journal of Business Venturing* 25 (6). Elsevier Inc.: 593–609. doi:10.1016/j.jbusvent.2009.02.001.
- Zizlavsky, Ondrej. 2016. "Innovation Performance Measurement: Research into Czech Business Practice." *Economic Research-Ekonomska Istraživanja* 29 (1). Routledge: 816–38. doi:10.1080/1331677X.2016.1235983.
- Zolin, Roxanne, Andreas Kuckertz, and Teemu Kautonen. 2011. "Human Resource Flexibility and Strong Ties in Entrepreneurial Teams." *Journal of Business Research* 64 (10). Elsevier Inc.: 1097–1103. doi:10.1016/j.jbusres.2010.11.026.
- Zollo, M., and S.G. Winter. 2002. "Deliberate Learning and the Evolution of Dynamic Capabilities." *Organization Science* 13 (3): 339–51. doi:10.1287/orsc.13.3.339.2780.
- Zollo, Maurizio, and Harbir Singh. 2004. "Deliberate Learning in Corporate Acquisitions: Post-Acquisition Strategies and Integration Capability in U.S. Bank Mergers." *Strategic Management Journal* 25 (13): 1233–56. doi:10.1002/smj.426.
- Zucker, Lynne G., Michael R. Darby, and Marilyn Brewer. 1998. "Intellectual Human Capital and the Birth of U.S. Biotechnology Enterprises." *The American Economic Review* 88 (1): 290–306.



Glossary, Appendix and Annexes

Glossary

This glossary is intended to assist you in understanding commonly used terms and concepts when reading, interpreting, and evaluating this thesis.

Assets are resources with economic value that an individual, corporation or country owns or controls with the expectation that it will provide future benefit. Assets are reported on a company's balance sheet, and they are bought or created to increase the value of a firm.

Capability, refers to the firm's organization ability to manage resources, such as employees, skills, processes, routines and assets, effectively that, in the long run, becomes a competitive advantage. The company's organizational capabilities focus on the business's ability to meet customer demands.

Dynamic Capabilities (DCs) is a theoretical term that pursues to explain the firm's strategic management processes to create and attract value, translated into profit in innovation environments. DCs are a phenomenon produced by some organizations that build new or improve (leveraging) the existent capabilities to survive in turbulent conditions.

Innovation capability is conceived as the firm's ability to transform and create value-adding through its innovation processes. Innovation capability aims to translate these innovation efforts into new product or service and successfully place it in the market.

Innovation management involves a set of activities throughout the innovation processes that allows an organization to respond to external or internal opportunities, and use its resources, such as to introduce new ideas, processes or products. It involves among many others, R&D, manufacturing, marketing monitoring and engagement activities contribute to a company's innovation.

Innovation orientation is based on knowledge structures as composed of three elements such as a learning philosophy, strategic direction, and trans-functional beliefs within an organization. A firm innovation- oriented defines and direct its organizational strategies and actions toward enabling innovation capability.

Innovation performance focuses on the technical development and the market introduction of an innovation linked to the innovation capability* of a firm. This mean Innovation performance is the innovation value-adding chain of activities and assets that altogether successfully market it. The complementing synergies in innovation processes are considered an added value to the firm.

Innovation processes of technology-based are founded on existing or newly invented technology, that the organization has access and combines with other resources to produce a new technologic product. It includes new idea development, brainstorming, virtual prototyping, product lifecycle management, idea management, project management, product line planning and clients and suppliers' management. All this implies the firm's innovation integrates information of external actors, this means innovation is a collective-effort outcome.

Operational capabilities are the entrepreneurial activities of the firm. They are a consequence of well-established learning processes in the firm organization and they constitute the foundation actions of the firm strategy. OCs term is conceived as the firm's activities that pursuing profit, define its identity and aims its goals.

Organizational capabilities of the firm are strategically designed to support the adequate use of the resources and its activities aiming the business goals. They define the firm structure as unique and could not be replicated by competitors, added to the fact, they pursue the differentiation and improvement of the business.

Resource-based are the firm's internal resources such as skills, processes, routines, assets, capabilities, and competencies that have the potential to deliver competitive advantages. They can be tangible, such as human resources equipment, vehicles, tools, and facilities or intangible, such as patents and copyright, brands, R&D, and logos.

Resource-based view (RBV) this theoretical approach proposed the firm's resources as static elements; however, the theoretical co-evolution of the concept refers RBV as a managerial framework used to determine the firm's resources as strategic instruments that potentially deliver competitive advantage.

Routines the concept refers to a set of standards activities, rules and behavioral patterns, developed for workplace culture. A routine involves habits as a form of reflective action and as a major driver of individual and collective behavior, that bring effective organizational decision-making processes and reinforce search issues, conflict resolution, and environmental adaptation.

Skill the term in management practice refers to individual knowledge capacity and proficiency to exchange, develop and implement ideas. For instance, the individual decision-making and problem solving between employees, such as communication ability, collaboration behavior, negotiation, and bridging other gaps.

Team Collaboration Capabilities (TCCs) is a new conceptual term introduced in this thesis and it aims from an organizational approach the understanding of the TBS team interaction factors as the engine that allow and originate adaptive capabilities known as Dynamic Capabilities. The TCCs' interaction factors that facilitate collaboration in the TBS organization are trust, communication, problem-solving and team efficacy.

Appendix 1 Deepen the discussion of TBSs on Chapter 2

2.3.1 The technology-based startups: business model and scaling up

The business model in the TBS, as well as in any company, is essentially the roadmap of what constitutes the value chain, i.e. what is the contribution of its activity and how is its profit translated to the market. The TBS business model must represent a circular flow, in which entrepreneurs work for incentives, provided by profits; through the exchange of goods. According to Brown and Thornton (2013), Cantillon (1931[1881]) described the value chain as a circular exchange, in which the engine of actions is carried out by companies. The business model contribute to process of transforming an invention into a commercially viable product (Morris et al. 2005; Carayannis et al. 2014; Chesbrough 2010; Teece 2010a) composed of a collection of complementary assets (Helfat 1997; Stieglitz and Heine 2007; Schmidt and Braun 2015). The business model involves networks and complementary assets. Complementary assets pursue collaboration with other actors (Lüdeke-freund 2009; Breuer and Lüdeke-Freund 2014) which comprises manufacturing facilities, marketing and distribution networks, after-sales services, specialized components, additional technologies, etc.

The scalability of a TBS is the degree of the market growth that can be achieved by their business activities. Black (2010) defined that a scalable business model, is repeatable and is that it will turn a startup into a profitable company with high growth, making it huge. Scalability demands operational flexibility and a pioneering activity focused on new markets and by doing so in a fast track. The TBS' business scalability depends to a great extent on how its business model is designed, based on the achievable projection defined in different periods or phases of growth of a business activity.

The effects of the TBSs' scalability matter because they are a consequence of the growth of the business, it means the level of scope and value that has the product or service offered. Moreover, it is determined by the market through its customers, suppliers, data and resources available, and its forecast for the future. In the case of a disruptive innovation in growth, it requires the expansion of its value chain involving different possible suppliers, customers of other networks involved in alternative processes linked to its market, e.g., as grassroots social innovation supported by activists who empower communities (Horwitch and Mulloth 2010). In the long term, these are aspects considered by both entrepreneurs and investors. Nevertheless, the scalability of the market can be massive, as it can serve millions of clients/users worldwide, but

using few resources, as would be the case of a TBS with a single office and a small team (Ries 2011).

On the other hand, it is important to highlight the role of venture capital, given its presence to enable the rapid growth of a TBS. The function of venture capital is to invest in entrepreneurs, consultants and a wide range of related network actors around the TBS and its innovation. Most venture capital firms operate to identify contracts and manage other TBSs (Florida et al. 1988).

An outstanding element related to the business plan design process and its scalability is that during early stage, the TBS founding members must agree contingency plans based on the degree of business growth. The awareness of the rapid scalability sometimes reduces the risks of being acquired by a big corporations or to go public with an initial public offering pursuing to become a mature organization on its own.

2.3.2 The technology-based Startup's uncertain conditions

Entrepreneurial technology-based initiatives are surrounded by external, and also internal uncertainty. Basically, the market uncertainty of an invention is characterized by sluggish demand and high risks investment because they require high amounts of founding and represents also slow returns on investment. Also, many high talents and daring ideas are dismissed because of difficulties in finding financial support to continue to the next level in the market and the expectations around them (Alkemade and Suurs 2012). Nevertheless, it is at the core of the TBS where should develop internal conditions to attract resources that support the reduction of asymmetric conditions such as information sharing to ensure the optimal use of resources. These are also considered as internal uncertain conditions that jeopardize the organization (Bjørnskov and Foss 2016).

The process of inventing new things and making them successful is also a condition of ups and downs which is rarely easy (Van de Ven 1986; Van de Ven *et al.* 1999; Hart and Denison 1987). In some cases, because there can be no demand for an innovation before it has been adopted by the public, startups operate in conditions of extreme uncertainty. This explains, in part, why most startups fail (Van de Ven *et al.* 1999). Innovation and risk-taking among founders are strong, for example, the risk-taking have the same sense of gambling also from their investors, the sense of competence between TBS is very well known of, but it is inside the organization where efficacy plays the role to boost their surviving (Eccles and Wigfield 2002; Hattab 2014).

Among the diverse and multiple external difficulties that the TBSs' context represents of placing an innovation to the market, the most difficult challenge is internally to construct a coordinated and operative organization that supports and builds together new capabilities around a TBS' innovation. The barriers and adverse conditions that hinder the invention's commercialization are the legal responsibilities of new-ness and lack of legitimacy (Nerkar and Scott 2007, p.1161; Boccardelli and Magnusson 2006). Nerkar and Scott (2007) describe the high uncertainty associated with the commercialization of technological inventions, in particular taking into account the degree of novelty and disruption of the invention. In some cases the uncertainty can be reduced by the wide availability of information to potential consumers and users, favoring its acceptance and commercialization (Nerkar and Scott 2007; Utterback 2004). Moreover, Hart and Denison (1987) suggest that a strong network connecting founders with customers, suppliers and other partners may contribute not only to the survival of the TBS but also to the technical excellence of the TBS' products or processes.

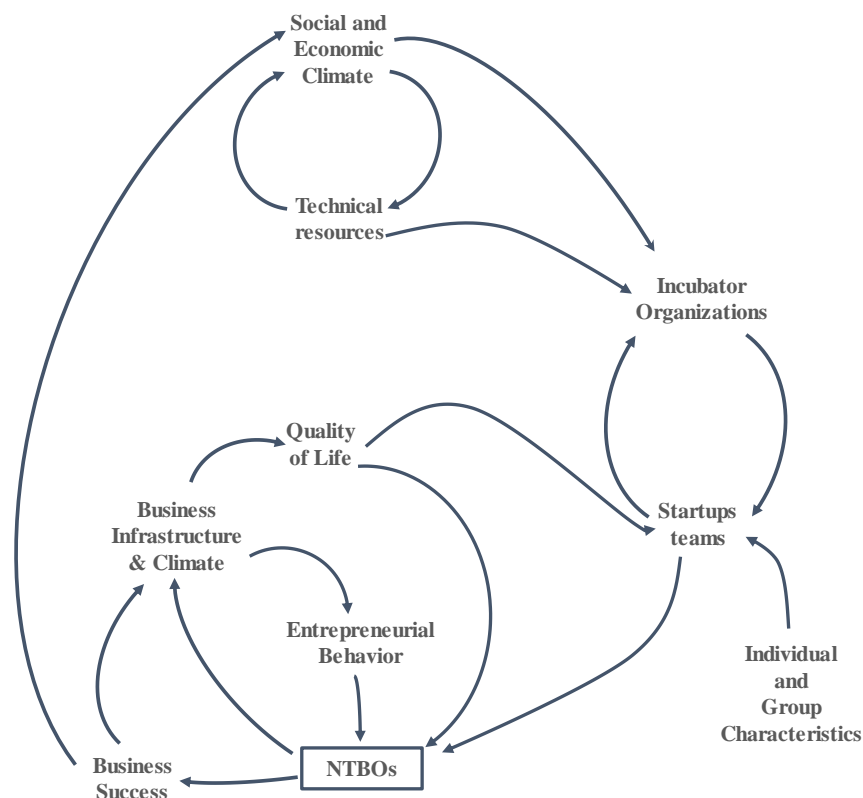
Uncertainty conditions are prevalent in the startup environment, a TBS exists only as long as its founders and investors, in some cases, are convinced of its potential for success, and this allows it to be an evolutionary organization (Van de Ven *et al.* 1999; Lechler 2001). The founders' ambitions, operational capabilities, and how they will establish key relationships can make a difference in their long-term sustainability (Garnsey 1998; Blatt 2015).

Appendix 2 Deepen the discussion of TBSs team formation on Chapter 4

4.1.1 TBS and team formation

The foundation of a new tech-business venture starts with an idea formed. The team creation and group development always take place within a specific context or “ecosystem” (Hart and Denison 1987). The creation of a technology-based team can occur in universities, private and public laboratories; mainly in environments that incubate and nurture technical expertise. Hart and Denison (1987) remark that a technological systemic conditions determined by institutions and the social context encourages the formation and existence of entrepreneurs and the creation of ‘startup teams’ (see Figure 2.7). This means the environment works as a conglomerate of academic, scientific, financial and training are sources that attract and provide the conditions and availability of highly-qualified technical and scientific human resources. Further, the close proximity of these environments increase the chances for technology transfer, seeding new ideas and organizational capabilities for new business opportunities (Moore 2006; Balmford et al. 2011; Zahra and Nambisan 2011; Jackson 2012).

Figure 0.1 Dynamic Model of System for creating new technology-based organizations (Hart and Denison 1987)



The dynamic model developed by Hart *et al.* (1987) describes the interactions that support the creation of new technology-based organizations (NTBOs). Incubators and accelerators are especially valuable agents for the recruitment, they attract capable, talented and ambitious individuals. Mainly, these individuals are motivated to create spin-offs and develop new business concepts because they have experienced dissatisfaction in their previous employment and seek to pursue a better quality of life (Hart and Denison 1987).

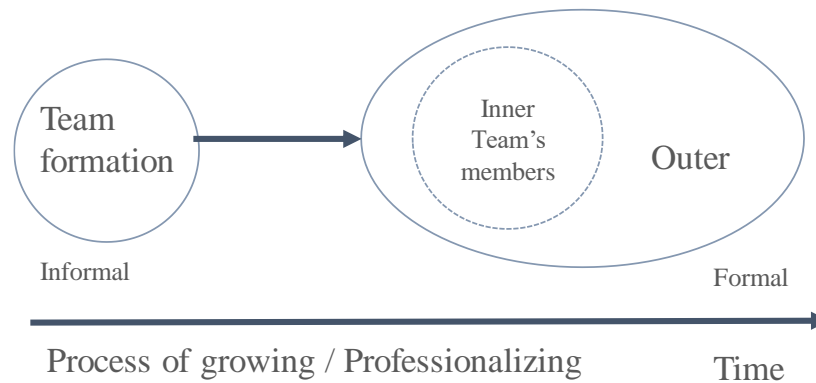
The recruitment process for team members usually follows random patterns; potential sources of partners are from among family and friends, previous coworkers, or school companions, etc. (Hart and Denison 1987; Vyakarnam *et al.* 1999; Derue and Rosso 2009). Literature shows that the criteria includes experience, educational level, previous work experience, affiliation background (university, company), and prior success (Colombo and Piva 2012; Colombo and Grilli 2005; Derue and Rosso 2009). Several researchers observe that diversity of points of view stimulates and contributes to building creative processes such as linking ideas, performing tasks, design solutions, and organizational structures. Specific team characteristics that have been studied include team composition, shared personal and professional objectives, professional recognition (merits), and organizational support and trust (Derue and Rosso 2009; Shin *et al.* 2012; Fulmer and Gelfand 2012). The Kor and Mesko (2013) contribution analyzed the interplay between the dynamic managerial capabilities of the executive team that include managerial human capital, social capital, and formal, codified or explicit knowledge (cognition) as the firm's dominant logic (Kor and Mesko 2013).

Teece (2011) affirms that the formation of a team requires a stock of human capital directly related to individual competences. The term competence encompasses traits, knowledge, previous experiences and abilities that should be 'orchestrated' to shape both the individual and organizational capabilities, linked to the strategy and performance (Teece 2011; Teece 2010b; Mumford *et al.* 2002; Edwards-Schachter *et al.* 2015). Highly-skilled human capital is scarce but in great demand, and its participation in technological innovation activities represents an important source of profit (Teece 2011, p.550).

Human capital refers to individuals as source of knowledge who obtained and developed skills and competences through education, training and previous work experience (Attewell 1999). The team depends on the motivation and commitment of the members, who should know and trust each other enough to share the same goals, intention, responsibility and decision making to start a company (Vyakarnam *et al.* 1999). The formation and professionalizing of the team

consolidates over time, and it is shaped by new members and the growth of the organization (see Figure 2.8).

Figure 0.2 Formation of effective teams (Vyakarnam *et al.* 1999, p.159)



According to Vyakarnam *et al.* (1999) team creation comprises two stages: the one in which the people meet or come together, and then the selection of the team members. The selection stage involves informal and ‘eclectic’ criteria. The factors which may influence the selection of team members are: (1) *Previous experience of growth* of a business, to understand the individual’s business potential; (2) *Ability to fit the culture*, meaning that they should understand the industry context and the firm’s values; (3) *Market/personal credibility*, referring to their interaction with possible stakeholders and the other team members; (4) *Financial input*, relating to their capacity to bring value to and create value for the company; (5) *Family/friends*, they may be proven as trustworthy but possibly do not have relevant competences; (6) *Technical competence*, meaning they possess an expertise that the organization needs; (7) *Personal contacts*, referring to their capacity to network in a relevant and trustworthy way; (8) *Headhunting strangers*, this bring up valuable contacts from others references, even personal or professional networking, and finally (9) *Previous business together*, referring to someone who, through previous common experience, has proven to be competent and trustworthy. (Vyakarnam *et al.* 1999).

4.2.2 Technology-Based Teams: characteristics and members

The team characteristics may vary according the team activities, nature of the technology, and market goals. Lechler (2001) distinguishes between innovation teams and entrepreneurial teams in high-tech firms. He found a set of similarities such as the development and implementation of new tasks, shared common goals, tenure, common responsibility and

professional and personal risks among the team members (see table 2.5). Despite both innovation and entrepreneurial teams having similar characteristics and equal level of responsibility, this varies according to the level of maturity of the entrepreneurial team.

Table 4.1 Comparison of different team characteristics (Lechler 2001, p.268)

Characteristics	Innovation Teams	Entrepreneurial teams in high-tech ventures
Task characteristics	Innovative task Creating a new product	Innovative task Creating a new business
Common goals Tenure	Successful innovation 2 or more years, defined end	Successful business Open end
Common responsibility	Responsible for technical results	Responsible for business results
Common risks	Career risks	Personal and career risks

Teece (2011) maintains that “*human capital is not particularly valuable unless employed cooperatively and deployed astutely*” (Teece 2011, p.531). He defined three categories of talent required for developing innovation within firms: *the literati*, *the numerati*, and *entrepreneurial managers*. The literati and the numerati are highly-educated specialists. The literati’s expertise is in areas of arts and sciences, economics, business, and law. The numerati are likewise highly-educated but in areas of mathematics, statistics, information systems, computer science, engineering, or accounting and finance. They will produce good organizational outcomes as long as long they work together, joining their individual skills. The third category is represented by entrepreneurial managers, who bring cutting edge innovation to market. Their activities are identifying and shaping new opportunities. The entrepreneurial component of this profile drives their proactive behavior in the creation of opportunities, assessment of potential for success, and mobilization of the available resources (Teece 2011; Teece 2010b).

Several authors refer to cross-functional teams which “comprise a group of people representing a variety of departments, disciplines, or functions, and whose combined effort is required to achieve the team’s purpose” (Wang and He 2008; Ehrhardt *et al.* 2014). Building dynamic capabilities for accelerating or improve innovation performance rely on the TBS team’s coordinated activities on NPD’s R&D and marketing. In this respect, the new product development demand upgrading qualified routines such as quality control technology transfers and/or knowledge transfer. (Eisenhardt *et al.* 2000).

In particular, high technology-based teams look to attract more scientists, engineers, and technically qualified people. They offer to the team a surplus of expert knowledge as long as they

share mutual motivation and pursue a collective satisfaction, as payback they should receive the same benefits (Jassawalla and Sashittal 1998). All these inputs influence the coordination and delivery of collective activities within the organization of the team. Despite the dynamism around the team founding process, there are other elements which may stimulate the development of competitive advantages to greater or lesser degrees. Some studies observe that the previous affiliation of highly qualified and talented members to the founding team can be an important factor in the firm's potential for success (Teece 2011; Khera 2012). For instance, if a team member has obtained experience from previous affiliations, he/she can share that knowledge and business know-how with the others (Beckman 2006). Therefore, when a firm's founding members have both similar and diverse prior company affiliations, there is greater dynamism and team formation occurs more quickly, thus contributing to an increase in competitive advantage and ambidexterity, exploitative and explorative, in their organization (Colombo *et al.* 2006; Beckman 2006; Kauppila 2010; Jansen *et al.* 2015).

The process of staffing technology-based teams is not linear. Roberts and Fusfeld (1981) identify six cycling and sometimes overlapping '*innovation project stages*' in companies in the United States, related to a new product developed by teams: (1) '*Pre-project*' stage is mainly communication activities for engaging and identifying technical-solving opportunities. (2) '*Project possibilities*' stage, focus on activities related generating new technical ideas or seeking the potential use of a new or improved product. (3) '*Project initiation*', once matching the technical idea-solution (state-of-art in prototyping or testing level) is developed, then its commercial and selling feasibility is tested. (4) '*Project Execution*' these require a coordinated group of activities related to executing efforts for accomplish objectives, solving technical problems, tracking technical and market conditions and maintaining the staff team up to date. (5) '*Project Outcome evaluation*' and, finally, (6) '*Project Transfer*' the development is sent to other areas, for instance to production and commercial areas to continuing the process.

The execution of specific functions during the development of innovation processes requires particular profiles. Roberts and Fusfeld (1981) highlight five '*critical functions*' as essential for carrying out innovation processes (see Table 4.2). These functions are not job descriptions, but these are considering as crucial functions or roles that provide a specific input, and each one requires unique personal characteristics as expertise and abilities (skills).

Table 4.2 Critical Functions in innovation processes (Roberts and Fusfeld 1981, p.25)

Critical function	Personal characteristics	Organizational activities
a) <i>Idea Generating</i>	<ul style="list-style-type: none"> • Expert in one or two fields. • Enjoys conceptualization; comfortable with abstractions. • Enjoys doing innovative work. • Usually is an individual contributor. • Often will work alone. 	<ul style="list-style-type: none"> • Generates new ideas and test their feasibility. • Good at problem solving. • Sees new and different ways of doing things. • Searching for the breakthroughs.
b) <i>Entrepreneuring</i> <i>or</i> <i>Championing</i>	<ul style="list-style-type: none"> • Strong application interest. • Possesses a wide range of interests. • Less propensity to contribute to the basic knowledge of a field. • Energetic and determined; puts self on the line 	<ul style="list-style-type: none"> • Sells new ideas to others in the organization. • Gets resources. • Aggressive in championing his or her "cause". • Take risks.
c) <i>Project Leading</i>	<ul style="list-style-type: none"> • Focus for decision making, information, and questions. • Sensitive to the needs of others. • Recognizes how to use the organizational structure to get things done. • Interested in the broad range of disciplines and in how they fit together (e.g. marketing, finance). 	<ul style="list-style-type: none"> • Provides the team leadership and motivation. • Plans and organizes the project. • Insures that administrative requirements are met. • Provides necessary coordination among team members. • Sees that the project moves forward effectively. • Balances the project goals with organizational needs.
d) <i>Gatekeeping</i>	<ul style="list-style-type: none"> • Possesses a high level of technical competence. • Is approachable and personable. • Enjoys the face-to-face contact of helping others. 	<ul style="list-style-type: none"> • Keeps informed of related developments that occur outside the organization through journals, conferences, colleagues, other companies. • Passes information on to others; finds it easy to talk to colleagues. • Serves as an information resource for others in the organization (i.e. authority on who to see, or on what has been done). • Provides informal coordination among personnel.
e) <i>Sponsoring</i> <i>or</i> <i>Coaching</i>	<ul style="list-style-type: none"> • Possesses experience in developing new ideas. • Is a good listener and helper. • Can be relatively objective. • Often is a more senior person who knows the organizational ropes. 	<ul style="list-style-type: none"> • Helps develop people talents. • Provides encouragement, guidance, and acts as a sounding board for the project leader and others. • Provides access to a power base within the organization-a senior person. • Buffers the project team to get what it needs from the other parts of the organization. • Provides legitimacy and organizational confidence in the project.

Annex 1. Survey sample version 160616

Survey introduction

Dear “*surveyed*”,

I contact you because your start-up’s activities are relevant in the bottom-up of innovation context. This survey is developed for research purposes carried out by INGENIO (CSIC-UPV), Universitat Politècnica de València. The survey was designed to determine the capacity and potential of collaborative innovation development in start-ups.

The aim of this survey is to obtain information on how you organize and manage collaborations in creating new products / services / technologies / systems. As in any academic study, the data will be treated with absolute confidentiality. The exploitation of data will be in aggregate form, not allowing the identification of any participating company.

Once the study is completed, we will send to all participating companies a report on the results and current situation compared to other companies.

Thanking you in advance for your cooperation,

Yours Sincerely,

Anna K. Lopez Hernandez

For more information, please contact Anna Karina Lopez Hernandez to the phone number +34 963 877 007 ext: 78430 or to e-mail anloher3@doctor.upv.es.

Legal conditions

Discretion and respect for all personal data is included in our protocol. Please do not hesitate to contact me for any further questions.

Confidentiality. Please select:

- I accept that the name of the organization can be published in the study’s findings.
- I do NOT accept that the name of the organization can be published in the study’s findings.

Study Findings. Please select:

- I am interested in the study’s findings.
- I am interested in the study’s findings and also I would like to receive a report with the findings
- I am NOT interested in the study’s findings.

Start-up survey

profile	I. Start-up general information 1) Start-up name: 2) Website: 3) Date of Founding: mm/yyyy 4) Number of employees: 5) Contact name: 6) Position:
----------------	---

7) What is your start-up's main motivation?

Select one option.

- a) Contribute to solving environmental problem and create economic value.
- b) Contribute to solving societal problem and create value for society.
- c) Contribute to changing regulatory, societal and market institutions.
- d) Contribute to solving societal and environmental problems through the realization of a successful business.
- e) Contribute to economic growth in the private sector from developing high tech (software and programming) basis solutions through technology basis.
- f) Contribute to economic growth in the private sector from developing product/services to cover a need.

II. Your team

Definition: An entrepreneurial team consists of two or more persons who have an interest, both financial and otherwise, in and commitment to a venture's future and success. The team founder members work is interdependent on the pursuit of common goals and make decisions for the venture success.

8) According to the previous definition, could you provide us with the information of your current team members? (Clarke Højbjerg, Nissen Aarøe, and Rostgaard Evald 2014; Joshi and Roh 2009)

Team member founder						
Gender						
<input type="checkbox"/> M						
<input type="checkbox"/> F						
Age:	<25	25-34	35-44	45-54	55-64	<65
Studies – highest completed education e.g. Ph.D., Master, University, Sciences						
Graduate	Technician	Engineer	Master	Phd	Medical Doctor	Post-Doc
Previous job experience e.g. Firm /government/industry/ similar start-up/other						
Years of experience in the sector						
Principal Role e.g. CEO, Business Development, Marketing/Sales, R&D, etc.						
Years of previous experience in similar roles						

III. Your value proposition

A **value proposition** is a business or marketing statement that summarizes why a consumer should buy a product or use a service. This statement should convince a potential consumer that one particular product or service will add more value or better solve a problem than other similar offerings. A value proposition can apply to an entire organization, or parts thereof, or customer accounts, or products or services.

9) What is the aim of your value proposition?

Select the option that suits with your proposition
Our value proposition is a ...

- Product (e.g. eco-mobile charger, bio plastic bags)
- Service (e.g. design for sustainability, low carbon emission transport, sharing economy)
- Technology (e.g. air quality monitoring, low carbon technology)
- System (e.g. software, program, linking app or platform, catastrophes communication system)
- ... mix of a product and service.
- ... mix of a service and technology.
- ... mix of technology of technology and system.
- ... mix of system product and system.
- Other: _____

10) How does your start-up create value for...

Select one from each set of options from each row

Type of organization:	<input type="checkbox"/> B-to-B	<input type="checkbox"/> B-to-C	<input type="checkbox"/> Both	
	<input type="checkbox"/> Local	<input type="checkbox"/> Regional	<input type="checkbox"/> National	<input type="checkbox"/> International
Where customer is in value chain:	<input type="checkbox"/> upstream supplier	<input type="checkbox"/> Government	<input type="checkbox"/> Wholesaler	<input type="checkbox"/> Service provider
	<input type="checkbox"/> downstream supplier	<input type="checkbox"/> Institutional	<input type="checkbox"/> Retailer	<input type="checkbox"/> Final customer
	<input type="checkbox"/> Broad or general market	<input type="checkbox"/> multiple segment	<input type="checkbox"/> niche market	
	<input type="checkbox"/> Transactional	<input type="checkbox"/> Relational		

IV. Your Innovation performance

11) Please indicate your level of agreement with the following statements about your start-up innovation performance? (Ferrerias-Méndez et al. 2015; J. H. . Dyer and Singh 1998)

1 = strongly disagree; 7 = strongly agree

	1	2	3	4	5	6	7
1. The overall of our innovation performance development program has met our objectives.							
2. From an overall profitability standpoint, our innovation development program has been successful.							
3. Compared with our major competitors, our overall innovation development program is far more successful.							

12) Which is your company target sector according to the NACE classification?

NACE Code is a pan-European classification system which groups organisations according to their business activities.

- | | |
|--|--|
| <input type="checkbox"/> 1. Mining and quarrying | <input type="checkbox"/> 14. Water supply and recycling |
| <input type="checkbox"/> 2. Food, beverages and tobacco | <input type="checkbox"/> 15. Construction |
| <input type="checkbox"/> 3. Textile, clothing, leather and shoe production | <input type="checkbox"/> 16. Motor and fuel retail trade |
| <input type="checkbox"/> 4. Wood and paper production | <input type="checkbox"/> 17. Wholesale trade |
| <input type="checkbox"/> 5. Fuel processing and chemicals production | <input type="checkbox"/> 18. Retail trade and repair |
| <input type="checkbox"/> 6. Rubber and plastics production | <input type="checkbox"/> 19. Hotel, restaurant and catering services |
| <input type="checkbox"/> 7. Glass, ceramic, clay and cement production | <input type="checkbox"/> 20. Transport and storage |
| <input type="checkbox"/> 8. Metals and metal products | <input type="checkbox"/> 21. Media and communications |
| <input type="checkbox"/> 9. Fabricated metal product manufacturing | <input type="checkbox"/> 22. Real estate, renting and leasing |
| <input type="checkbox"/> 10. Electrical machinery and optical equipment production | <input type="checkbox"/> 23. Research and development sector |
| <input type="checkbox"/> 11. Transport equipment production | <input type="checkbox"/> 24. Business services |
| <input type="checkbox"/> 12. Furniture, jewelry, musical instruments, sports goods, toy production | <input type="checkbox"/> 25. Financial and insurance sector |
| <input type="checkbox"/> 13. Electricity, gas and steam production and distribution | <input type="checkbox"/> Other: (e.g. green employment) |

V. Principal funding support:

13) Please select the most recent incubator or/and accelerator's programs you have taken part in.

One option

(source <http://www.etondigital.com/guide-to-european-incubators-and-accelerators/>
<http://www.alphaqamma.eu/entrepreneurship/best-startup-accelerator-programs-in-europe/>)

- | | | |
|--|--|--|
| <input type="checkbox"/> 33entrepreneurs | <input type="checkbox"/> Fit Start-Up Factory | <input type="checkbox"/> Kubator |
| <input type="checkbox"/> 3Challenge | <input type="checkbox"/> Fongit | <input type="checkbox"/> LAUNCHHub |
| <input type="checkbox"/> 50 PartnersAccelerace | <input type="checkbox"/> GameFounders | <input type="checkbox"/> Lisbon Challenge |
| <input type="checkbox"/> Autobahn | <input type="checkbox"/> GammaRebels | <input type="checkbox"/> LuissEnLabs |
| <input type="checkbox"/> Axel Springer Plug & Play | <input type="checkbox"/> Garage | <input type="checkbox"/> Microsoft Accelerator |
| <input type="checkbox"/> Axel Springer Plug and Play | <input type="checkbox"/> Garage48 | <input type="checkbox"/> NDRC LaunchPad |
| <input type="checkbox"/> Barclays Accelerator | <input type="checkbox"/> German Silicon Valley Accelerator | <input type="checkbox"/> NEST'Up |
| <input type="checkbox"/> BBC Worldwide LABS | <input type="checkbox"/> Green Spaces | <input type="checkbox"/> Nextstars |
| <input type="checkbox"/> betaFactory | <input type="checkbox"/> Hackfwd | <input type="checkbox"/> Numa (Le camping) |
| <input type="checkbox"/> Bethnal Green Ventures | <input type="checkbox"/> Happy Farm | <input type="checkbox"/> NYC ACRE |
| <input type="checkbox"/> BlueLion | <input type="checkbox"/> H-Camp (H-Farm Seed Ventures) | <input type="checkbox"/> OpenFund |
| <input type="checkbox"/> Climate-KIC Accelerator | <input type="checkbox"/> Healthbox | <input type="checkbox"/> Oxigenaccelerator |
| <input type="checkbox"/> Climate-KIC Incubator | <input type="checkbox"/> H-farm | <input type="checkbox"/> Pentalabbs |
| <input type="checkbox"/> Delitelabs | <input type="checkbox"/> Hub:raum | <input type="checkbox"/> PortXL |
| <input type="checkbox"/> Distill Ventures | <input type="checkbox"/> i5invest (Austria) | <input type="checkbox"/> Sartupfesteurope |
| <input type="checkbox"/> Dotforge Accelerator | <input type="checkbox"/> iCatapult | <input type="checkbox"/> SeedRocket |
| <input type="checkbox"/> EIT Digital | <input type="checkbox"/> Idealabs | <input type="checkbox"/> Startupbootcamp |
| <input type="checkbox"/> EIT Health | <input type="checkbox"/> ImactHub Zurich | <input type="checkbox"/> TechStars UK |
| <input type="checkbox"/> Eleven | <input type="checkbox"/> INiTS | <input type="checkbox"/> Tetuan Valley |
| <input type="checkbox"/> Entrepreneur First | | <input type="checkbox"/> Wayra |
| <input type="checkbox"/> Etohum | | <input type="checkbox"/> Other _____ |

14) What benefits did you get from them?

Select at least three options

- A. Mentoring
- B. Coaching
- C. Training
- E. Contacts from the industry
- F. Funding
- G. Angel investors

- H. Client introductions
 I. Other _____

15) Please, mark with and “X” the most relevant financial source and amount received to develop the start-up.

Financial support	10,000<	100,000<	1 000,000<
Personal investment			
From Friends and family			
Bank loan			
International organizations (e.g. World Bank).			
International organizations (e.g. World Bank).			
R&D project collaboration with other organizations			
Angel investor			
University start-up's contest			
National start-up contest's contest			
International start-up contest's contest			
From interested clients			
Other*			

16) Please state your start-up performance compared to that of your competitors with regard to the following items: (Ferrerias-Méndez et al. 2015)

1 = much worse; 7 = much better

	1	2	3	4	5	6	7
Customer loyalty							
Sales growth							
Profitability							
Return on investment							

17) Regarding your value proposition's market perception, to what extent do you agree with the following statements:

1 = strongly disagree; 7 = strongly agree.

	1	2	3	4	5	6	7
1. Technology in this sector is changing rapidly..							
2. Technological developments in our sector are frequent							
3. Technological changes provide great opportunities in our market..							
4. It is difficult to predict where the technology will be in our country in the next five years.							
5. A large number of new products in our sector have been made possible through radical technologies							
6. Customers in our market are very receptive to new product ideas							
7. In our industry, our customers' preferences change relatively quickly							

8. New customers tend to have product needs that are different from those of existing customers.
9. We basically manage a different customer base than we had last year

VI. Your start-up members' interaction

18) Regarding your start-up members' interaction in your daily operations, to what extent do you agree with the following statements:

1 = "completely disagree", 7= "completely agree"

Team trust and trustworthiness*(Costa and Anderson 2011)	1	2	3	4	5	6	7
a) 1. Most people in this start-up do not hesitate to help a person in need.							
b) 2. In this start-up most people speak out for what they believe in.							
c) 3. In this start-up most people stand behind their convictions.							
d) 4. The typical person in this start-up is sincerely concerned about the problems of others.							
e) 5. Most people will act as "Good Samaritans" if given the opportunity.							
f) 6. People usually tell the truth, even when they know they will be better off by lying.							
g) 7. In this start-up people can rely on each other.							
h) 8. We have complete confidence in each other's ability to perform tasks.							
i) 9. In this start-up people will keep their word.							
j) There are some hidden agendas in this team. (r)							
k) Some people in this start-up often try to get out of previous commitments. (r)							
l) In this start-up people look for each other's interests honestly.							
Team cohesion							
1. In this start-up we are ready to defend each other from criticism from outsiders.							
2. In this start-up we help each other on the job.							
3. In this start-up we get along well with each other.							
4. The members in this star-up really stick together.							
Team efficacy							
1. Achieving this start-up's goals is well within our reach.							
2. Our start-up is able to solve difficult tasks if we invest the necessary effort.							
3. Our start-up is able to manage effectively unexpected problems.							
4. Our start-up as a whole is totally competent to perform the tasks.							
5. Our start-up is able to allocate and integrate available resources to perform the tasks well.							

Communication and conflict solving	1	2	3	4	5	6	7
Open communication of relevant information occurs among the start-up members.							
If conflicts occur among start-up members, they are easy resolved.							
In general, it is difficult to contact other start-up members (R)							
Some start-up members intentionally provide misleading information about the project all are working in (R)							
When problems arise, start-up members perceive them as “mutual” problems that need to be solved.							
If disagreements arise, project start-up members are actually able to resolve them.							
When problems arise, team leaders search for solutions that are agreeable to each start-up member.							
Start-up members often fail to communicate information to each other. (R)							

VII. Your start-up capabilities

In an organization a capability is embedded in the firm’s knowledge-base in its operations, continual improvement and innovation. They are compound asset and structures which are built over time, in your daily routines.

19) Regarding your start-ups operational capabilities, to what extent do you agree with the following statements:

1 = strongly disagree; 7 = strongly agree.

(Coded as TC) Technical capability (Pavlou and El Sawy 2011)	1	2	3	4	5	6	7
1. In this start-up, we evaluate the technical feasibility of developing new products with continuously changing features.							
2. In this start-up recurrently we perform tests to determine basic performance against shifting technical specifications.							
3. In this start-up frequently executing prototypes or sample product testing or pilot of service applications.							
(Coded as CFs) Customer Focus.							
1) We have defined our market characteristics and trends.							
2) We identify regularly appraising competitors and their products—both existing and potential.							
3) Executing several test-marketing programs in line with commercialization plans.							
(Coded as MC) Managerial capability							
1) We monitor the progress on product development and improvement.							
2) Management is actively involved in activities at the working level.							
3) Management effectively administers relevant tasks and functions.							

20) Regarding your start-ups strategic capabilities toward a market development, to what extent do you agree with the following statements:

1 = strongly disagree; 7 = strongly agree.

(Coded as SC) Sensing capability*(Pavlou and El Sawy 2011)	1	2	3	4	5	6	7
1) The start-up members frequently scan the environment/market to identify new business opportunities.							
2) We periodically review the likely effect of changes in our business environment with our customers.							
3) We often review our product development efforts to ensure they are in line with what the customers want.							
4) We devote a lot of time implementing ideas for new products and improving our existing products.							
(Coded as LC) Learning capability/Absortive capacity*							
1) We have effective routines to identify, value, and import new information and knowledge.							
2) We have adequate routines to assimilate new information and knowledge.							
3) We are effective in transforming existing information into new knowledge.							
4) We are effective in utilizing knowledge into new products.							
5) We are effective in developing new knowledge that has the potential to influence product development.							
(Coded as IC) Integrating capability*							
1) We are forthcoming in contributing our individual input to the start-up.							
2) We have a global understanding of each other's tasks and responsibilities.							
3) We are fully aware who in the start-up has specialized skills and knowledge relevant to our work.							
4) We carefully interrelate our actions to each other to meet changing conditions.							
5) Start-up members manage to successfully interconnect their activities.							
(Coded as CC) Coordinating capability*							
1) We ensure that the output of our work is synchronized with the work of others.							
2) We ensure an appropriate allocation of resources (e.g., information, time, reports) within our start-up.							
3) Start-up members are assigned to tasks commensurate with their task-relevant knowledge and skills.							

4) We ensure that there is compatibility between the start-up members expertise and work processes.								
5) Overall, our start-up is well coordinated.								

VIII. Your start-up level of collaboration

Collaboration is a process whereby two or more parties work closely with each other to achieve mutually beneficial outcomes. Collaboration can be directed toward any mutually desired objective such as solving a problem through generating something new. It can be by jointly generated ideas, sources and capabilities that emerge from sharing of information and knowledge. Toward creating a new product/technology/service or business.

21) Does your start-up currently collaborate with other organizations?

- Yes
 No

22) Please assess the relevancy of collaborate with the following organizations for innovation in your sector:

1= Less relevant; 7= Highly relevant

1.	Suppliers of equipment, materials, components or software	1 – 2 – 3 – 4 – 5 – 6 – 7
2.	Customers/users	1 – 2 – 3 – 4 – 5 – 6 – 7
3.	Competitors start-ups	1 – 2 – 3 – 4 – 5 – 6 – 7
4.	Competitors SME's	1 – 2 – 3 – 4 – 5 – 6 – 7
5.	Competitors Big companies	1 – 2 – 3 – 4 – 5 – 6 – 7
6.	Consulting firms	1 – 2 – 3 – 4 – 5 – 6 – 7
7.	R&D labs and/or companies	1 – 2 – 3 – 4 – 5 – 6 – 7
8.	Universities	1 – 2 – 3 – 4 – 5 – 6 – 7
9.	Public Research institutions	1 – 2 – 3 – 4 – 5 – 6 – 7
10.	Other government agencies	1 – 2 – 3 – 4 – 5 – 6 – 7
11.	Private Research Institutions	1 – 2 – 3 – 4 – 5 – 6 – 7

23) Please assess the importance of these sources of information for your innovation activities:

1= Less relevant; 7= Highly relevant

1.	Congress and professional meetings	1 – 2 – 3 – 4 – 5 – 6 – 7
2.	Commercial Associations/Chambers	1 – 2 – 3 – 4 – 5 – 6 – 7
3.	Technical databases (e.g. patent databases, etc.)	1 – 2 – 3 – 4 – 5 – 6 – 7
4.	Trade fairs	1 – 2 – 3 – 4 – 5 – 6 – 7
5.	Technical regulations	1 – 2 – 3 – 4 – 5 – 6 – 7
6.	Health and Safety Regulations	1 – 2 – 3 – 4 – 5 – 6 – 7
7.	Environmental regulations	1 – 2 – 3 – 4 – 5 – 6 – 7

24) Regarding your start-up motives to collaborate to what extent do you agree with the following statements:(Edwards–Schachter et al. 2013)

1 = strongly disagree; 7 = strongly agree.

	1	2	3	4	5	6	7
i. To reduce/share the cost of technological development and the uncertainty of investment in R&D.							
ii. To reduce the time taken to develop a new product/service/technology.							
iii. To obtain financial resources/support.							
iv. To reduce the risk of market entry.							

v. To reduce time-to-market (e.g., shortening of product life cycle, reducing the period between innovation and market introduction).								
vi. To achieve scale economies in production.								
vii. To acquire new knowledge and/or search of scientific/technical complementarities.								
viii. To learn/acquire new skills or technological capabilities								
ix. To facilitate the monitoring of environmental changes and opportunities.								
x. To access/broaden social/commercial networks.								
xi. To meet customers/users demand (including the facilitation of co-creation).								
xii. Other: _____								

End of the survey

Thank you very much for your time. Your input is hugely appreciated.

Annex 2a. Definitive Survey content, first phase phone contact: Spanish version

Encuesta telefónica

El objetivo de esta breve encuesta telefónica para obtener información sobre la naturaleza de tu organización. El objetivo del estudio se centra en la identificación de capacidades de trabajo en equipo y organizacionales en las se fundan colaboraciones con otras organizaciones para desarrollar innovación verde para la sostenibilidad/medio ambiente/energía renovable/cleantech. Como en todo estudio de bases científicas, los datos serán tratados con absoluta confidencialidad. La explotación de los datos se realizará de forma agregada, no permitiendo así la identificación de ninguna empresa participante. Es muy importante no dejar ninguna pregunta en blanco.

Para mayor información, por favor contactar a Anna Karina López Hernández al número +34 963 877 007 ext: 78430 o al correo electrónico anloher3@doctor.upv.es

Fecha: __/__/__

i. El encuestado declara que acepta participar en el estudio de manera voluntaria.

Sí, acepta

ii. ¿Desea recibir una copia del informe?

Deseo recibir informe con los resultados*

No me interesan los resultados

*Se enviará a la dirección de correo electrónico del contacto.

IX. Información general

25) Nombre de la Start-up: _____

26) Website: _____

27) ¿Fecha en que se fundó? _____

28) Nombre del encuestado: _____

29) Puesto que ocupa en la empresa: _____

30) Correo electrónico: _____

31) Ciudad de fundación de la start-up: _____

32) Ciudad(es) de operaciones de la start-up: _____

33) Número de empleados: _____

34) Número de miembros fundadores: _____

X. Estudios y experiencia del encuestado

35) Podría por favor proporcionarnos información general de sus antecedentes de estudios y formación profesional.

<p>1. Nacionalidad</p> <hr/> <p>2. Edad (años):</p> <hr/> <p><input type="checkbox"/> Fundador <input type="checkbox"/> Colaborador <input type="checkbox"/> Socio <input type="checkbox"/></p> <p>3. Últimos estudios completados:</p> <p><input type="checkbox"/> Graduado <input type="checkbox"/> Diplomatura <input type="checkbox"/> Licenciatura o Grado <input type="checkbox"/> Master <input type="checkbox"/> Doctorado</p>	<p>4. ¿Hay diversidad en el equipo?</p> <p><input type="checkbox"/> Sí <input type="checkbox"/> No</p> <p>5. Estudios de los socios</p> <p><input type="checkbox"/> Graduado <input type="checkbox"/> Diplomatura <input type="checkbox"/> Licenciatura o Grado <input type="checkbox"/> Master <input type="checkbox"/> Doctorado</p>	<p>6. Antigüedad en la start-up –</p> <p>(indique meses o años): _____</p> <p>7. En qué sector ha centrado su experiencia:</p> <p>_____</p> <p>8. Años de experiencia en el sector</p> <p>(años): _____</p>																								
<p>9. Área de estudios:</p> <table border="0"> <tr> <td><input type="checkbox"/> A. Ciencias de la Agricultura</td> <td><input type="checkbox"/> F. Ingeniería y Tecnología</td> <td><input type="checkbox"/> M. Ciencias Sociales</td> </tr> <tr> <td><input type="checkbox"/> B. Arquitectura, urbanismo y ordenación regional</td> <td><input type="checkbox"/> G. Geografía y Geología</td> <td><input type="checkbox"/> N. Ciencias de la comunicación y la información,</td> </tr> <tr> <td><input type="checkbox"/> C. Artes y diseño</td> <td><input type="checkbox"/> H. Humanidades</td> <td><input type="checkbox"/> O. Química</td> </tr> <tr> <td><input type="checkbox"/> D. Ciencias empresariales</td> <td><input type="checkbox"/> I. Lingüística y Filología,</td> <td><input type="checkbox"/> P. Medio ambiente y sostenibilidad</td> </tr> <tr> <td><input type="checkbox"/> E. Ciencias de la educación y formación del profesorado</td> <td><input type="checkbox"/> J. Derecho,</td> <td><input type="checkbox"/> Q. Otras: _____</td> </tr> <tr> <td></td> <td><input type="checkbox"/> K. Matemática e Informática</td> <td></td> </tr> <tr> <td></td> <td><input type="checkbox"/> L. Ciencias médicas</td> <td></td> </tr> <tr> <td></td> <td><input type="checkbox"/> LL. Ciencias Naturales</td> <td></td> </tr> </table>			<input type="checkbox"/> A. Ciencias de la Agricultura	<input type="checkbox"/> F. Ingeniería y Tecnología	<input type="checkbox"/> M. Ciencias Sociales	<input type="checkbox"/> B. Arquitectura, urbanismo y ordenación regional	<input type="checkbox"/> G. Geografía y Geología	<input type="checkbox"/> N. Ciencias de la comunicación y la información,	<input type="checkbox"/> C. Artes y diseño	<input type="checkbox"/> H. Humanidades	<input type="checkbox"/> O. Química	<input type="checkbox"/> D. Ciencias empresariales	<input type="checkbox"/> I. Lingüística y Filología,	<input type="checkbox"/> P. Medio ambiente y sostenibilidad	<input type="checkbox"/> E. Ciencias de la educación y formación del profesorado	<input type="checkbox"/> J. Derecho,	<input type="checkbox"/> Q. Otras: _____		<input type="checkbox"/> K. Matemática e Informática			<input type="checkbox"/> L. Ciencias médicas			<input type="checkbox"/> LL. Ciencias Naturales	
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	<input type="checkbox"/> L. Ciencias médicas																									
	<input type="checkbox"/> LL. Ciencias Naturales																									
<p>10. Experiencia laboral previa en:</p> <p><input type="checkbox"/> Sin experiencia laboral previa <input type="checkbox"/> Empresa perteneciente al mismo sector <input type="checkbox"/> Empresa de otro sector distinto al actual <input type="checkbox"/> Administración pública <input type="checkbox"/> Organización no gubernamental (ONG) <input type="checkbox"/> Otro: _____</p>	<p>11. Actividades que realiza en su start-up (marque más de una si lo considera oportuno):</p> <p><input type="checkbox"/> Director General o CEO <input type="checkbox"/> Administración <input type="checkbox"/> Contabilidad y Finanzas <input type="checkbox"/> Aspectos legales <input type="checkbox"/> Producción <input type="checkbox"/> Desarrollo de Negocios <input type="checkbox"/> Marketing <input type="checkbox"/> Recursos Humanos <input type="checkbox"/> Ventas <input type="checkbox"/> Desarrollo de Producto I+D <input type="checkbox"/> Control de calidad, seguridad e higiene, gestión de medio ambiente <input type="checkbox"/> Otro: _____</p>																									

36) ¿Cuál es la motivación que mejor describe su start-up?

Seleccione una opción.

- a. Contribuir a la solución de problemas del medio ambiente y la creación de valor económico.
- b. Contribuir a la solución de problemas de la sociedad y crear valor para la sociedad.
- c. Contribuir a influir en el cambio de las instituciones reguladoras, sociales y de mercado.
- d. Contribuir a la solución de problemas sociales y ambientales a través de la realización de un negocio exitoso.
- e. Contribuir al crecimiento económico en el desarrollo de alta tecnología.
- f. Contribuir al crecimiento económico en el sector privado desde el desarrollo de productos /servicios/tecnologías para cubrir una necesidad.
- g. Otro: _____

XI. Su propuesta de valor

37) **¿Cuál es el objetivo de su propuesta de valor?** *Elige la opción que más describa vuestra propuesta de valor: "Nuestra propuesta de valor es un..."*

- a) Producto (ej. cargador solar de baterías portátil, bolsas de biodegradables)
- b) Servicio (ej. diseño sostenible, transporte de bajas emisiones)
- c) Tecnología (ej. monitoreo de calidad del aire, tecnología de bajo carbono)
- d) Sistema (ej. software, aplicación móvil, plataforma de comunicación ventas y servicios)
- e) ... es una combinación de producto y servicio.
- f) ... es una combinación de servicio y tecnología.
- g) ... es una combinación de tecnología y sistema.
- h) ... es una combinación de producto y sistema.
- i) Otro: _____

XII. Modelo de negocios de su start-up

38) **¿Cómo definiría su cadena de valor?**

Seleccione una opción de cada fila

A. Tipo de negocio:	<input type="checkbox"/> A. Atender a otros negocios (B2B)	<input type="checkbox"/> B. Atender al consumidor final (B2C)	<input type="checkbox"/> C. Ambos A y B	<input type="checkbox"/> D. Proveedor de gobierno (B2G)
	<input type="checkbox"/> E. Asociación colectiva	<input type="checkbox"/> F. Asociación cooperativa	<input type="checkbox"/> G. Asociación comunitaria	<input type="checkbox"/> H. Comercial Social (beneficios van a una causa social)
B. Alcance de su negocio:	<input type="checkbox"/> Local	<input type="checkbox"/> Regional	<input type="checkbox"/> Nacional	<input type="checkbox"/> Internacional
C. Mercado objetivo:	<input type="checkbox"/> Mercado general	<input type="checkbox"/> Segmento múltiple	<input type="checkbox"/> Nicho de mercado	<input type="checkbox"/> Actividades vinculadas resolver necesidades de la comunidad/sociales

39) **¿Cuál es su principal sector(es) objetivo?** (ej. Industria extractiva y minería; información y comunicaciones)

XIII. Principal apoyo financiero

40) **¿Ha participado en algún programa de aceleración?**

- Sí
- No (Pase a la pregunta 16)

41) **Por favor, nombre cual es la incubadora o aceleradora más reciente en el que ha participado su start-up en este año:**

42) **¿Qué beneficios ha logrado al formar parte de este programa?**

Elige no más de tres opciones

- A. Mentoring
- B. Coaching
- C. Formaci3n
- E. Contactos de la industria
- F. Financiaci3n
- G. Inversores de capital riesgo
- H. Contacto con Clientes
- I. Otros _____

43) Por favor, indique en orden de importancia cuales son las principales fuentes que est1n financiando actualmente las operaciones de su start-up. (ranking)

Por favor elija 1 como la mas importante fuente y as1 sucesivamente

Fuente Financiera
Inversi3n personal
Aportaci3n de familiares y amigos
Pr3stamo Bancario
Organizaci3n Internacional (ej. Banco Mundial)
Proyectos I+D en colaboraci3n con otras empresas
Inversi3n 1ngel
Concurso Universitario para start-ups
Concurso Nacional para apoyar a emprendedores
Concurso Internacional para apoyar a emprendedores
Clientes interesados
Otros: _____

Fin

Muchas gracias por su tiempo. Su aportaci3n es muy apreciada

Annex 2a. Definitive Survey content, first phase phone contact: English version

Phone survey

This interview is to know more about the nature of your organization. The aim of this study is to know more about your organization capacities for collaboration to create new products/services/technologies/systems in the green/eco sector. Your answers will be treated with absolute confidentiality. The use of data will be in aggregate form, not allowing the identification of any participating company.

For more information, please contact Anna Karina Lopez Hernandez to the phone number +34 963 877 007 Ext: 78430 or to e-mail anloher3@doctor.upv.es.

Date: __/__/__

1. For the interviewee: Do you agree to participate in the study voluntarily?

Yes, I do

2. Do you want to receive an inform of this survey results?

Yes, I wish to receive a copy of the inform*.

No, I am not interested

*It will be sent to the contact's email.

I. General information

Start-up name: _____

Website: _____

City founding of the start-up: _____

City (s) of operations start-up: _____

Number of employees (#): _____

Number founder partners (#): _____

Contact name: _____

Position: _____

E-mail: _____

II. Your studies and background

3. According to the previous definition, could you provide us with the information of your current team members being these partners and key employees.

1. Nationality

_____ (Spanish 1-Other nationality2)

2. Age (years):

- Founder
 Collaborator
 Partner

3. The the founder team is diverse?

- Yes
 No

4. Studies - highest completed:

- Technician (1)
 Bachelor's Degree (2)
 University Degree (3)
 Master Degree (4)
 Doctorate (PhD)(5)

5. Tenure in the start-up

(Please define it in years or months): -

6. Experience sector:

7. Experience in the sector

(years): _____

8. Academic discipline:

- | | | |
|--|--|--|
| <input type="checkbox"/> a. Agriculture and Life Science (1) | <input type="checkbox"/> g. Engineering and Technology (7) | <input type="checkbox"/> o. Social sciences (15) |
| <input type="checkbox"/> b. Architecture, Design and Urban Development (2) | <input type="checkbox"/> h. Geography (8) | <input type="checkbox"/> p. Journalism, media studies and communication (16) |
| <input type="checkbox"/> c. Art - Creative Visual Arts (3) | <input type="checkbox"/> i. Humanities (9) | <input type="checkbox"/> q. Chemistry (17) |
| <input type="checkbox"/> d. Economics, Finance and Business Administration (4) | <input type="checkbox"/> j. Linguistics and Literature (10) | <input type="checkbox"/> r. Other: _____ (18) |
| <input type="checkbox"/> e. Environmental studies and forestry (5) | <input type="checkbox"/> k. Law (11) | |
| <input type="checkbox"/> f. Education (6) | <input type="checkbox"/> l. Mathematics and Computer Sciences (12) | |
| | <input type="checkbox"/> m. Medicine (13) | |
| | <input type="checkbox"/> n. Natural sciences -Earth Sciences (14) | |

9. Previous work experience in:

- Without previous work experience (0)
- A Start-up/firm in the same sector (1)
- A firm/start-up in other sector, different from the current job (2)
- Government (3)
- Academia/Research (4)
- A non-governmental organization (ONG) (5)
- Other: _____ (6)

10. Main position or activities carried out in the start-up (check more than one if appropriate):

- Chief Executive Officer CEO or President
- General Manager
- Financial and accounting duties (incl. bank)
- Legal duties (e.g. contracts, IP, business legal framework)
- Production
- Business development
- Marketing
- Human resources
- Sales
- Product development, R&D
- Quality control, safety, environmental manager
- Other: _____

4. What is your main motivation to begin a start-up?

Select one option.

- a. Contribute to solving environmental problem and create economic value.
- b. Contribute to solving societal problem and create value for society.
- c. Contribute to changing regulatory, societal and market institutions.
- d. Contribute to solving societal and environmental problems through the realization of a successful business.
- e. Contribute to economic growth in the private sector from developing high tech (software and programming) basis solutions through technology basis.
- f. Contribute to economic growth in the private sector from developing product/services to cover a need.
- g. Other: _____

III. Your value proposition
5. What is the aim of your value proposition?

Select the option that suits with your proposition: "Our value proposition is a ..."

- a. Product (e.g. eco-mobile charger, bio plastic bags)
- b. Service (e.g. design for sustainability, low carbon emission transport, sharing economy)
- c. Technology (e.g. air quality monitoring, low carbon technology)
- d. System (e.g. software, program, linking app or platform, catastrophes communication system)
- e. ... mix of a product and service.
- f. ... mix of a service and technology.
- g. ... mix of technology and system.
- H) ... mix of product and system.
- I) Other: _____

IV. Your start-up business model

6. This is in regards to how your start-up creates value,
Please select one from each set of options from each row

What kind of commercial transaction:	<input type="checkbox"/> Business to Business (B2B)	<input type="checkbox"/> Business to Consumer (B2C)	<input type="checkbox"/> Both	<input type="checkbox"/> Business to Government
	<input type="checkbox"/> Collective Association	<input type="checkbox"/> Cooperative Association	<input type="checkbox"/> Community Association	<input type="checkbox"/> Social commercial (Social cause)
Scope of your business	<input type="checkbox"/> Local	<input type="checkbox"/> Regional	<input type="checkbox"/> National	<input type="checkbox"/> International <input type="checkbox"/> Global
Target market:	<input type="checkbox"/> Broad general market	<input type="checkbox"/> Multiple segment	<input type="checkbox"/> Niche market	<input type="checkbox"/> Activities linked to solve community/societal problems

7. Which is your aim sector? (e.g. Mining and quarrying; Wholesale trade)
-

V. Principal support and founding

8. Have you participated in a program of acceleration?

- Yes
 No (Skip to question 16)

9. Which is the most recent accelerator's program you have taken part this year?
-

10. What benefits did you get from them?

Select at least three options

- a. Mentoring (1)
 b. Coaching (2)
 c. Training (3)
 d. Contacts from the industry (4)
 e. Funding (5)
 f. Angel investors (6)
 g. Client introduction (7)
 h. Other _____ (8)
 N/A (0)

11. Please, mark the three most relevant financial sources received to develop your start-up.

Please select up to three options (ranking)

Financial support	
	1. Personal investment (1)
	2. Support from friends and family (2)
	3. Bank loan (3)
	4. International organizations (e.g. World Bank) (4)
	5. R&D project collaboration with other organizations (5)
	6. Angel investors (6)
	7. University start-ups' contest (7)
	8. National start-ups' contest (8)
	9. International start-ups' contest (9)
	10. From interested clients (10)
	11. Other (11) none (0)

End

Thank you very much for your time. Your input is hugely appreciated.

Annex 3b. Definitive second part survey content: Online Spanish version

Encuesta

El objetivo del estudio se centra en la identificación de capacidades de trabajo en equipo y organizacionales en las se fundan colaboraciones con otras organizaciones para desarrollar innovación verde para la sostenibilidad/medio ambiente/energía renovable/cleantech. Como en todo estudio de bases científicas, los datos serán tratados con absoluta confidencialidad. La explotación de los datos se realizará de forma agregada, no permitiendo así la identificación de ninguna empresa participante. Es muy importante no dejar ninguna pregunta en blanco.

Para mayor información, por favor contactar a Anna Karina López Hernández al número +34 963 877 007 ext: 78430 o al correo electrónico anloher3@doctor.upv.es

Información general	Fecha: ___/___/___
1. Nombre de la Start-up: _____	
2. Nombre del encuestado: _____	
3. Puesto que ocupa en la empresa: _____	
4. Correo electrónico: _____	
Si desea recibir una copia del informe con los resultados de la encuesta, marque en la siguiente casilla:	
<input type="checkbox"/> Deseo recibir informe con los resultados*	
<input type="checkbox"/> No me interesan los resultados	
*Se enviará a la dirección de correo electrónico del contacto.	

Su desempeño innovador

5. ¿Se consideran innovadores?

- Sí
 No

6. Considera que su start-up es innovadora por:

Elija solo una opción

1. Por su propuesta de valor, es un producto /tecnología/sistema completamente nuevo.
 2. Porque es parte de un mercado nuevo o emergente, ej. estamos creando un nuevo mercado.
 3. Por nuestro original sistema de ventas y distribución es muy eficiente y atractivo.
 4. Nuestro modelo de negocios es dinámico y constante integramos nuevos socios; ej. buscamos un ganar-ganar entre nosotros, socios y clientes.
 5. Por la manera en que operamos y gestionamos la innovación de nuestros productos.
 6. Por nuestro networking, que nos permite trabajar con distintas organizaciones
 7. Ninguno de los anteriores (describe to propia respuesta): _____

7. Por favor, indique el grado de acuerdo con las siguientes afirmaciones respecto al desarrollo de innovación en su start-up.

1 = muy en desacuerdo; 7 = muy de acuerdo

	1	2	3	4	5	6	7
4. Contamos con un programa de desarrollo de nuevos productos/servicios actualmente se enfoca a nuestros objetivos de manera global.							
5. Nuestro programa de desarrollo de nuevos productos/servicios busca continuar con la mejora de nuestro producto.							
6. En comparación con nuestros competidores directos, nuestro programa de desarrollo de nuevos productos/servicios es más eficiente y busca obtener resultados superiores.							

8. Por favor indique el nivel de desempeño de su start-up comparado con la competencia directa en cada uno de los siguientes aspectos:

1= mucho peor; 7= mucho mejor

	N/A	1	2	3	4	5	6	7
b) Novedad en producto/servicio/tecnología								
c) Interés del cliente								
d) Ingresos por ventas								
e) Rentabilidad (ganancias)								
f) Retorno de inversión								
g) Creación de empleo								
h) Generación de valores sociales								
i) Disminución de impacto ambiental								
j) Crecimiento económico local								

9. Por en está

favor indique que usted de acuerdo con

cada una las siguientes afirmaciones:

1 = muy en desacuerdo; 7 = muy de acuerdo

	1	2	3	4	5	6	7
10. Los productos/tecnologías/servicios en este sector cambian rápidamente.							
11. Los avances tecnológicos ofrecen grandes oportunidades en nuestro sector en nuevos productos/ servicios/ tecnologías							
12. En nuestro negocio, las preferencias de los clientes cambian mucho con el tiempo.							
13. Las prácticas de marketing en nuestro sector de productos cambian constantemente.							
14. La introducción de nuevos productos son muy frecuentes en este mercado							

La interacción de los integrantes de su start-up

10. En cuanto a la interacción de los integrantes de su start-up, ¿En qué medida está de acuerdo con cada una las siguientes afirmaciones?

1 = completamente en desacuerdo, 7= completamente de acuerdo

	1	2	3	4	5	6	7
1. Con al menos uno de mis socios fundadores, ya he trabajado antes de la fundación de la start-up.							
2. Con al menos uno de mis socios fundadores ya tenía una relación de amistad antes de fundar la empresa.							
3. En nuestro equipo fundador compartimos libremente nuestras ideas, sentimientos y esperanzas respecto a nuestra start-up.							
4. Puedo hablar libremente con mis socios fundadores sobre las dificultades que estoy teniendo en el trabajo y saber que van a querer escuchar.							

5. Puedo compartir mis problemas con los miembros de mi equipo, sé que responderían de manera constructiva y con respeto.							
6. En el equipo fundador hemos hecho considerables inversiones emocionales en nuestra relación de trabajo.							
7. El logro de los objetivos de esta start-up está a nuestro alcance.							
8. Los miembros de esta start-up somos capaces de resolver tareas difíciles si invertimos el esfuerzo necesario.							
9. En esta start-up somos capaces de gestionar con eficacia los problemas inesperados.							
10. Nuestra start-up en su conjunto es totalmente competente para realizar las tareas.							
11. Nuestra start-up es capaz de asignar e integrar los recursos disponibles para realizar bien las tareas.							

11. En cuanto a la resolución de problemas ¿en qué medida está de acuerdo con las siguientes afirmaciones?

1 = completamente en desacuerdo, 7 = completamente de acuerdo

	1	2	3	4	5	6	7
1. Los miembros de esta start-up comunican la información relevante de forma abierta.							
2. Si se producen conflictos entre los miembros de esta start-up se resuelven fácilmente.							
3. En general, es fácil ponerse en contacto con otros miembros de la start-up.							
4. Los miembros de esta start-up siempre proporcionan información clara sobre los proyectos en los que están trabajando.							
5. Cuando surgen problemas, los miembros de esta start-up los perciben como problemas "mutuos" que necesitan ser resueltos.							
6. Si surgen desacuerdos, los miembros de esta start-up somos realmente capaces de resolverlos.							
7. Cuando surgen problemas, los líderes de esta start-up buscamos soluciones que sean aceptables para cada miembro.							
8. Los miembros de esta start-up a menudo logran tener una comunicación fluida entre sí.							

Capacidades empresariales de su start-up

12. Podría por favor indicar su grado de acuerdo o desacuerdo con las siguientes afirmaciones:

1 = muy en desacuerdo; 7 = totalmente de acuerdo.

	1	2	3	4	5	6	7
1. En esta start-up, se evalúa la viabilidad técnica para desarrollar nuevos productos con características que cambian continuamente.							
2. En esta start-up se llevan a cabo de modo pruebas recurrente para determinar el rendimiento básico contra el cambio de estándares.							

3. En esta start-up con frecuencia se ejecutan las pruebas piloto o de las solicitudes de servicio.							
4. Tenemos definidas nuestras características y tendencias de mercado.							
5. Identificamos y evaluamos periódicamente la identidad de nuestros competidores y sus productos, tanto existentes como potenciales.							
6. Periódicamente llevamos la ejecución de varios programas de prueba de marketing en línea con los planes de comercialización para conocer las reacciones del mercado.							
7. Hacemos un seguimiento de los avances en el desarrollo de productos y mejora.							
8. La dirección general participa activamente en las actividades a nivel de trabajo.							
9. La dirección general administra con eficacia las tareas y funciones correspondientes.							

13. Relacionado a las capacidades estratégicas hacia el desarrollo de mercados, en qué medida está usted de acuerdo con las siguientes afirmaciones:

1 = muy en desacuerdo; 7 = totalmente de acuerdo.

	1	2	3	4	5	6	7
9. Los miembros de esta start-up a menudo se escanean el entorno / mercado para identificar nuevas oportunidades de negocio.							
10. Se revisa periódicamente el posible efecto de los cambios en nuestro entorno de negocios con nuestros clientes.							
11. A menudo revisamos nuestros esfuerzos de desarrollo de productos/servicios para asegurar que están en línea con lo que quieren los clientes.							
12. Dedicamos mucho tiempo en la implementación de ideas para nuevos productos/servicios y la mejora de nuestros productos/servicios existentes.							
13. Tenemos rutinas eficaces para identificar valor y agregar nueva información y conocimiento a nuestra organización.							
14. Disponemos de rutinas adecuadas para asimilar nueva información y conocimiento a nuestra organización.							
15. Somos eficaces en la transformación de la información existente en nuevo conocimiento.							
16. Somos eficaces en la utilización del conocimiento en nuevos productos/servicios.							
17. Somos eficaces en el desarrollo de nuevo conocimiento que tiene el potencial de influir en el desarrollo de nuevos productos/servicios.							
18. Estamos dispuestos a contribuir con nuestra aportación individual en el avance de nuestra start-up.							
19. Tenemos una comprensión global de las tareas y responsabilidades de cada uno.							
20. Somos plenamente conscientes de quien en nuestra start-up tiene habilidades especializadas y conocimientos relevantes para obtener resultados inmejorables.							
21. Nosotros interrelacionamos cuidadosamente nuestras acciones para cumplir y superar las condiciones cambiantes del mercado.							

22. Los miembros en esta start-up se las arreglan para interconectar con éxito sus actividades.									
23. Nos aseguramos que la salida de nuestro trabajo este sincronizado con el trabajo de otros.									
24. Dentro de nuestra start-up nos aseguramos de una asignación adecuada de los recursos (por ejemplo, información, tiempo, informes).									
25. Los miembros de esta start-up tienen asignadas tareas acordes con sus conocimientos y habilidades relevante para la tarea.									
26. Es esta start-up nos aseguramos de la compatibilidad de la experiencia de cada miembro con los procesos de trabajo.									
27. En general, nuestro equipo de start-up está bien coordinado.									

Colaboración en la innovación

14. ¿Su start-up actualmente colabora con otras organizaciones?

- Sí
 No

15. Por favor, valore la relevancia de colaborar con los siguientes agentes para la innovación de nuevos productos/servicios/tecnologías/sistemas en su sector:

0= no colaboramos con ellos; 1= menos importante; 7= muy importante

	0	1	2	3	4	5	6	7
1. Proveedores de equipos, materiales, componentes o software								
2. Clientes/usuarios								
3. Start-ups dentro de nuestro ecosistema								
4. Start-ups de otros sectores complementarios								
5. Competidores								
6. Firma de consultoría								
7. Laboratorios y compañías de I+D								
8. Universidades								
9. Instituciones de investigación pública								
10. Agencias gubernamentales								
11. Instituciones de investigación privada								
12. Organizaciones No gubernamentales (NGOs)								

16. Podría evaluar en qué medida son importantes para las actividades de innovación de su empresa las siguientes fuentes de información:

1= nada importante; 7= muy importante

	1	2	3	4	5	6	7
1. Congresos y reuniones profesionales							
2. Asociaciones comerciales / Cámaras de comercio							
3. Bases de datos tecnológicas (por ejemplo, bases de datos de patentes, etc.)							
4. Ferias y exposiciones							
5. Regulaciones técnicas							
6. Regulaciones de seguridad e higiene							
7. Regulaciones ambientales							
8. En reuniones informales (meetups)							

17. En relación a las motivaciones de su start-up para colaborar con otras organizaciones para el desarrollo de nuevos productos/servicios/tecnologías/sistemas ¿Podría indicar por favor en qué medida está usted de acuerdo con las siguientes afirmaciones?

1 = muy en desacuerdo; 7 = totalmente de acuerdo

	1	2	3	4	5	6	7
1) Para reducir / compartir el coste del desarrollo tecnológico y la incertidumbre de la inversión en I + D.							
2) Para reducir el tiempo necesario para desarrollo de un nuevo producto / servicio / tecnología.							
3) Para obtener apoyos adicionales de recursos financieros.							
4) Para reducir el riesgo de entrada en el mercado.							
5) Para reducir el tiempo de salida de un producto al mercado (por ejemplo, el acortamiento del ciclo de vida del producto, reduciendo el período comprendido entre la innovación y la introducción en el mercado).							
6) Para alcanzar economías de escala en la producción.							
7) Para adquirir nuevos conocimientos y / o búsqueda de complementariedades científico / técnicos.							
8) Para aprender / adquirir nuevas habilidades o capacidades tecnológicas							
9) Para facilitar la adaptación al cambio y la detección de oportunidades de negocios.							
10) Para acceder / ampliar las redes sociales / comerciales.							
11) Para satisfacer la demanda de los clientes / usuarios (por ejemplo: favoreciendo la participación de los usuarios o facilitando procesos de co-creación).							

Fin de la encuesta

Muchas gracias por su tiempo. Su aportación es muy apreciada.

Annex 3b. Definitive second survey content: On line English version

On-line survey

This survey collects information about organization capacities for collaboration to create new products/services/technologies/systems in the green/eco sector. Your answers will be treated with absolute confidentiality. The use of data will be in aggregate form, not allowing the identification of any participating company.

For more information, please contact Anna Karina Lopez Hernandez to the phone number +34 963 877 007 Ext: 78430 or to e-mail anloher3@doctor.upv.es

General information	Date: ___/___/___
1. Start-up name: _____ 2. Contact name: _____ 3. Position: _____ 4. E-mail: _____	
Do you want to receive an inform of this survey results?	
<input type="checkbox"/> Yes, I wish to receive a copy of the inform*. <input type="checkbox"/> No, I am not interested	
*It will be sent to the contact's email.	

I. Your innovation performance

5. Is your start-up innovative?

- Yes
 No

6. Your start up is innovative, because of:

Choose one answer

- 1. Our value proposition is a product / technology / system completely new. (1)
- 2. Because it is part of a new or emerging market, for example. Your start-up is creating a new market. (2)
- 3. Our original system of sales and distribution is efficient and attractive. (3)
- 4. Our business model is in constant evolution and integration of different new partners e.g. we promote win-win. (4)
- 5. We manage a continual improvement in our products. (5)
- 6. For our networking, which allows us to work with different organizations. (6)

7. Please indicate your level of agreement with the following statements about your start-up innovation performance?

1 = strongly disagree; 7 = strongly agree

	1	2	3	4	5	6	7
a) Our program of development of new products / services it is focus on meeting our objectives globally.							
b) Our program of development of new products / services looks to continue the improvement of our current product/services as well.							
c) Compared with our direct competitors, our development program of new products / services is more efficient and search to obtain superior results.							

8. Please rate your start-up performance compared to your competitors:

1 = much worse; 7 = much better

	N/A	1	2	3	4	5	6	7
a. Product/service/technology novelty								
b. Clients interest								
c. Revenue								
d. Profit								
e. Return on investment								
f. Job creation								
g. Generation of social values								
h. Reductions of environmental impact								
i. Local economic growth								

9. Regarding your value proposition's market perception, to what extent do you agree with the following statements:

1 = strongly disagree; 7 = strongly agree.

	1	2	3	4	5	6	7
15. The technology in my sector changes rapidly.							
16. Technological changes provide great opportunities in our sector regarding new products/services/technologies.							
17. In our business, customers' preferences in product/services/technologies change relatively quickly.							
18. Marketing practices in our product area are constantly changing							
19. The new product introduction are very frequent in this market.							

II. Your start-up members' interaction

10. Regarding your start-up members' interaction in your daily operations, to what extent do you agree with the following statements:

1 = completely disagree, 7 = completely agree

	1	2	3	4	5	6	7
1. With at least one of my founding partner, I have already worked together before founding the company							
2. With at least one of my founding partner I had a friendly relationship before founding the company							
3. In our leadership team we can freely share our ideas, feelings and hopes.							
4. I can talk freely to my partners in the leadership team about difficulties I am having at work and know that they will want to listen.							
5. If I shared my problems with my team members, I know they would respond constructively and respectfully.							
6. I would have to say that we have made considerable emotional investments in our working relationship.							
7. Achieving this start-up's goals is well within our reach.							
8. Our start-up is able to solve difficult tasks if we invest the necessary effort.							
9. Our start-up is able to manage effectively unexpected problems.							
10. Our start-up as a whole is totally competent to perform the tasks.							
11. Our start-up is able to allocate and integrate available resources to perform the tasks well.							

11. Regarding interaction in problems solution between your start-up members', to what extent do you agree with the following statements:

1 = completely disagree, 7= completely agree

	1	2	3	4	5	6	7
28. Open communication of relevant information occurs among the start-up members.							
29. If conflicts occur among start-up members, they are easy resolved.							
30. In general, it's easy to contact other members of this start-up							
31. The members of this start-up always provide clear information on what they are working on projects.							
32. When problems arise, the members of this start-up are perceived as "mutual" problems that need to be resolved..							
33. If disagreements arise, the members of this start-up are actually able to solve them.							
34. When problems arise, the leaders of this start-up looking for solutions that are acceptable to each member							
35. The members of this start-up often manage to have a fluid communication with each other.							

III. Your start-up capabilities

12. Regarding your start-ups operational capabilities, to what extent do you agree with the following statements:

1 = strongly disagree; 7 = strongly agree.

	1	2	3	4	5	6	7
1. In this start-up, we evaluate the technical feasibility of developing new products with continuously changing features.							
2. In this start-up recurrently we perform tests to determine basic performance against shifting technical specifications.							
3. In this start-up frequently executing prototypes or sample product testing or pilot of new products / service applications.							
4. We have defined our market characteristics and trends.							
5. We identify regularly appraising competitors and their products—both existing and potential.							
6. Executing several test-marketing programs in line with commercialization plans.							
7. We monitor the progress on product development and improvement.							
8. Management is actively involved in activities at the working level.							
9. Management effectively administers relevant tasks and functions.							

13. Regarding your start-ups strategic capabilities toward a market development, to what extent do you agree with the following statements:

1 = strongly disagree; 7 = strongly agree

	1	2	3	4	5	6	7
5) The start-up members frequently scan the environment/market to identify new business opportunities.							
6) We periodically review the likely effect of changes in our business environment with our customers.							
7) We often review our product development efforts to ensure they are in line with what the customers want.							

8) We devote a lot of time implementing ideas for new products and improving our existing products.									
9) We have effective routines to identify, value, and import new information and knowledge.									
10) We have adequate routines to assimilate new information and knowledge.									
11) We are effective in transforming existing information into new knowledge.									
12) We are effective in utilizing knowledge into new products.									
13) We are effective in developing new knowledge that has the potential to influence product/service development.									
14) We are forthcoming in contributing our individual input to the start-up.									
15) We have a global understanding of each other's tasks and responsibilities.									
16) We are fully aware who in the start-up has specialized skills and knowledge relevant to our work.									
17) We carefully interrelate our actions to each other to meet changing conditions.									
18) Start-up members manage to successfully interconnect their activities.									
19) We ensure that the output of our work is synchronized with the work of others.									
20) We ensure an appropriate allocation of resources (e.g., information, time, reports) within our start-up.									
21) Start-up members are assigned to tasks commensurate with their task-relevant knowledge and skills.									
22) We ensure that there is compatibility between the start-up members expertise and work processes.									
23) Overall, our start-up is well coordinated.									

IV. Collaboration in innovation

14. Does your start-up currently collaborate with other organizations?

- Yes
 No

15. Please assess the relevancy of collaborate with the following organizations for innovation of new products/services/technologies/systems in your sector:

0=No relevant; 1= less relevant; 7= highly relevant

	0	1	2	3	4	5	6	7
1. Suppliers of equipment, materials, components or software								
2. Customers/users								
3. Start-ups in our incubator/accelerator ecosystem								
4. Start-ups from other complementary sectors								
5. Competitors SME's								
6. Consulting firms								
7. R&D labs and/or companies								
8. Universities								
9. Public research institutions								
10. Government agencies								
11. Private research institutions								
12. Non-governmental organizations (NGOs)								
13. Other: _____								

16. Please assess the importance of these sources of information for your innovation activities:

1= less relevant; 7= highly relevant

	1	2	3	4	5	6	7
1. Congress and professional meetings							
2. Commercial Associations/Chambers							
3. Technical databases (e.g. patent databases, etc.)							
4. Trade fairs							
5. Technical regulations							
6. Health and Safety Regulations							
7. Environmental regulations							
8. Informal meetings (Meetups)							
9. Other: _____							

17. Regarding your start-up motives to collaborate with other organizations to develop new products/service/technologies/systems, to what extent do you agree with the following statements

1 = strongly disagree; 7 = strongly agree

	1	2	3	4	5	6	7
1. To reduce/share the cost of technological development and the uncertainty of investment in R&D.							
2. To reduce the time taken to develop a new product/service/technology.							
3. To obtain financial resources/support.							
4. To reduce the risk of market entry.							
5. To reduce time-to-market (e.g., shortening of product life cycle, reducing the period between innovation and market introduction).							
6. To achieve scale economies in production.							

7. To acquire new knowledge and/or search of scientific/technical complementarities.							
8. To learn/acquire new skills or technological capabilities							
9. To facilitate the monitoring of environmental changes and opportunities.							
10. To access/broaden social/commercial networks.							
11. To meet customers/users demand (including the facilitation of co-creation).							
12. Other: _____							

End of the survey

Thank you very much for your time. Your input is hugely appreciated.

Curriculum Vitae

Anna Karina López Hernández obtained a B.A. in International Relations and International Business at Universidad Nacional Autónoma de México (UNAM). Followed a Master in International Marketing at Universitat de Girona, focus on Marketing with Cause. After she finished her studies, she worked as an entrepreneur, marketing and consulting services.

Since 2011 she had been awarded a scholarship by the National Council of Science and Technology (CONACyT,) for Ph.D. Studies She started a Ph.D. (first year) in Climate Change Studies in Scotland, United Kingdom (Oct 2011 – Dec 2012, at the University of Edinburgh. School of Geosciences (Climate Change group). Research entitle: “Biomass Micro-Generation Systems in Urban Areas: Waste to Energy Self-Production Systems as Potential Drivers for Social Transformation”. Supervised by Dr. Heather Lovell and Dr. Simon Shackley. Then, she made a pause in her scholarship to support special R&D project related waste to energy (bioenergy systems). Her contribution to this project was involving R&D team with stakeholders and public fundraising process in Milpa Alta, Mexico City. The project was entirely funded by the Secretariat of Education, Science, Technology, and Innovation of Mexico City (SECITI), Mexico City Government. In January 2015, she retakes her scholarship to continue the Ph.D. Studies in Valencia, Spain, at Universitat Politècnica of València, INGENIO (CSIC-UPV)/ in the Design, Manufacture, and Management of Industrial Projects program, with the thesis, entitle: “Team collaboration capabilities as drivers for innovation performance: The case of Spanish technology-based startups”.

These research has participated in the following conferences, workshops and summer schools:

- Technology Transfer Society, “Annual Conference, Time and Knowledge: Dynamic Perspectives on Technology Transfer”. Paper: “Team’s collaboration capabilities as drivers of technology-based startups’ innovation performance: The Spanish case”. Valencia, Spain, October 17-19th, 2018.
- EU-SPRI/INGENIO [CSIC-UPV] for Early Career Researchers Conference: “Science, Technology and Innovation: New Challenges and Practices” Universitat Politècnica de Valencia, Valencia, Spain, May 3rd-5th, 2018.
- EU-SPRI Early Career Researcher Conference (ECC) “How to Foster Innovative Entrepreneurship? Trends, Challenges, and Policy Implications” Milan, Italy, November, 23rd-24th, 2017.
- IV Meeting of UPV PhD Students, poster entitled: “Team’s collaboration capabilities as drivers for innovation performance: The case of Spanish Technology-based startups, Universitat Politècnica de Valencia, Valencia Spain, June, 1st, 2017
- Science, Innovation and the University: keys to social impact. EU-SPRI-INGENIO PhD Days Conference 2016. Paper entitle: “Enabling Start-ups’ Capabilities to Collaborative Partnerships for Innovation”. Valencia, Spain, April 13-15th, 2016.
- DRUID Academy Conference 2016, at University of Bordeaux. Paper entitle “Start-ups Team Composition as a Driver of Dynamic Capabilities for Strategic Collaborations”. Bordeaux, France, January 13-15th, 2016.

- Climate KIC PhD Summer School entitled “Green City Frankfurt: Shaping Transition Pathways for Future Economy”. The course was held in Frankfurt/Main between 24th August and 4th September 2015.
- PhD Summer School program entitled “Measuring and modelling dynamics in innovation systems” offered by Utrecht University, August 17th -21st, 2015.
- Workshop. “Born to be Green: Economics and Management of Green Start-ups”. Paper: “Team’s collaboration capabilities as drivers of technology-based startups’ innovation performance: The Spanish case. Start-Ups Platforms to Create Urban Sustainable Business Partnership”. University of Southampton, Winchester, United Kingdom, May 21st-22nd, 2015.

Recent publication:

Lopez Hernandez, Anna K, Anabel Fernandez-Mesa, and Monica Edwards-Schachter. 2018. “Team Collaboration Capabilities as a Factor in Startup Success.” *J. Technol. Manag. Innov.* Vol. 13. <http://jotmi.org>.