



**IE UNIVERSIDAD**

**TESIS DOCTORAL/ DOCTORAL  
DISSERTATION**

**RADICAL BUSINESS MODEL CHANGE AND  
FOUNDER DIVERSITY: EFFECTS ON VENTURE  
SURVIVAL**

**CAMBIO RADICAL DE MODELO DE NEGOCIO Y  
DIVERSIDAD DE LOS FUNDADORES: EFECTOS  
EN LA SUPERVIVENCIA DE LA EMPRESA**

**JUAN OSCAR MORENO TARAZONA**

**SEGOVIA, 2020**



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**DOCTORAL THESIS ADVISOR: TAIYUAN WANG**

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## **ABSTRACT**

Does radical business model change have a positive impact on venture's survival? Does founder diversity detract or assist venture's ability to radically change its business model? This thesis looks specifically into these research questions by analysing the effect of founder team diversity on the venture's ability to execute successfully radical business model change. The relationship between radical business model change and venture survival has not been yet addressed in previous literature and this dissertation aims to fill this research gap. The analysis follows the call for further research into business model change and renewal (Zott and Amitt, 2010) contributing to the existing literature about business models. In addition, it furthers the new venture team research by looking at founder diversity and the effect of founder team heterogeneity in venture survival (Gruber et al., 2012).

The empirical analysis carried out in this study is based on a unique sample of 583 new ventures from a US-based acceleration program and includes detailed firm and founder team characteristics of all the ventures that went through the acceleration program. Both the logistic regression and the survival analysis indicate a significant relationship between the Radical Business Model Change and the Survival variables showing that radical business model change has a positive impact on the venture's prospects to survive. The analysis also shows an interaction effect between the founder team's Functional Diversity and Radical Business Model Change variables indicating that increasing the functional diversity when the venture performs a radical business model change will increase the odds of failure.

On the other hand, the analysis shows that a combination of generalist management knowledge and specific functional knowledge in the venture team reduces the odds of failure under a radical business model change.

## RESUMEN

¿El cambio radical del modelo de negocio trae consigo un impacto positivo o negativo en la supervivencia de las startups? ¿La diversidad en el equipo de fundadores de una startup supone un efecto positivo o negativo en la habilidad de realizar un cambio radical del modelo de negocio? Esta tesis examina estas cuestiones y analiza el efecto de la diversidad del equipo de fundadores de las startups en la capacidad para ejecutar de forma exitosa un cambio radical en el modelo de negocio.

La relación entre un cambio radical del modelo de negocio y la supervivencia de las startups no se ha examinado todavía en la literatura académica anterior y esta tesis doctoral pretende completar esta brecha en la investigación académica. El análisis que en este documento se realiza sigue las llamadas a la investigación del cambio en los modelos de negocio y su renovación (Zott and Amitt, 2010) contribuyendo a las investigaciones académicas existentes sobre modelos de negocio. Además esta tesis amplía las investigaciones sobre la diversidad de los fundadores y el efecto de la heterogeneidad del equipo de fundadores en la supervivencia de las startups (Gruber et al., 2012)

El análisis empírico realizado en ese estudio está basado en una base de datos única de 583 startups que han participado en un programa de aceleración en Estados Unidos e incluye información detallada sobre cada una de las empresas que realizó el programa de aceleración así como las características de cada uno de los equipos fundadores.

Tanto el análisis de supervivencia como la regresión logística realizada indican una relación significativa entre las variables Cambio Radical de Modelo de Negocio y Supervivencia mostrando como un cambio radical en el

modelo de negocio tiene un efecto positivo en las posibilidades de supervivencia de la startup. El análisis también muestra un efecto de interacción entre las variables de Diversidad Funcional del equipo fundador y el Cambio Radical del Modelo de Negocio indicando que, aunque un cambio radical del modelo de negocio disminuye las posibilidades de fracaso, esta relación se modera negativamente por la diversidad funcional del equipo. Por otro lado, el análisis muestra que la combinación de conocimiento generalista y conocimiento especializado funcional aumenta las posibilidades de supervivencia de las startups moderando positivamente los efectos de un cambio radical.

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## CHAPTER 1: INTRODUCTION

### 1.1 Rationale

The ability to detect opportunities and to materialise their potential lies at the core of new venture formation and performance (Kizner, 1979; Shane, 2003). Through trial-and-error and entrepreneurial bricolage (Baker and Nelson, 2005) new ventures refine their business in a process of continuous adaptation. Early stage companies go through a frequent resource reconfiguration as they gather information on the market and on potential customers (Teece, 2010). Entrepreneurs test their initial market and customer assumptions in search for the so-called market-product fit (Blank, 2005). At the initial phases of the venture, the founders often have to continuously assess the potential of the opportunity and devise a business model that allows them to capture the value created. Continuous refinement of the venture's business model is considered a best-practice in the startup community. The 'lean startup' methodology advises on this continuous assessment of the business model when launching and managing early-stage ventures (Ries, 2011).

However, in some cases, refinement may not suffice. As the founder's team encounters obstacles and gathers information, it has to decide to persist on their business model or to adapt it completely. In those cases, the venture needs to shift its business, making redundant some of the accumulated resources and rearranging radically the way it operates. The survival of a new venture may depend on its ability to *pivot* by changing drastically the elements that composed the initial business model to find a fit between the customer needs and the venture's offerings (Osterwalder et al., 2014). In this case, the new venture will embark in a *radical business model change* which will imply a

non-linear change in its product and/or service offering, reinventing the way it operates (Osiyevskyy and Dewald, 2015).

Radical business model change is a difficult process as the new venture has to deal with a liability of newness, including the lack of credibility and scarce resources (Stichcombe, 1965). However, a radical business model change may have also a positive impact on the venture's survival prospects as the startup moves from a non-viable business model to another different opportunity set. Certain venture team compositions may be better suited than others to radically change their business model and execute that change. The business model change process is highly related to the cognition process of founders (Baron, 2004; Baron and Ensley, 2006), as well as their prior knowledge and experiences (Gaglio and Katz, 2001; Shane, 2001).

Opportunity recognition and change are predominantly related to the new venture team's cognition, experiences and diversity (Fern et al., 2012). Prior experience can strengthen the new venture team (NVT) execution capability but may also constrain the way it approaches its strategic choices (Fern et al., 2012). NVT's diversity of skills and perspectives can have a positive impact on survival and performance (Finkelstein & Hambrick, 1996), but may also produce conflict and hinder decision-making (O'Reilly et al., 1989). The analysis on this thesis will focus on the specific role of the founders' team composition, as the main agent in the new venture team, on implementing radical business model change and affecting venture survival.

The process of discovery and iteration is highly influenced by the founders' ability and resources at hand (Spiegel et al., 2016; Sarasvathy, 2001). Knowledge endowments of the venture founders may cause inertia or resistance to change (Delmar et al., 2006). Business model agility maybe hindered or enabled depending on the founders' capabilities (Doz & Kosonen,

2010; Kranz et al., 2016; Battistella et al., 2017). In that sense, founder team composition affects the venture ability to adopt radical business model change - or persist in the current path - and to execute successfully such a radical change, which in turn may affect the survival odds of ventures.

## **1.2 Motivation**

The relationship between radical business model change and founder diversity has received little attention in the extant literature. Previous research has mainly looked into the ability of established firms to implement business model change (Aspara et al., 2011) and into the continuous change in organisations and ventures (Brown and Eisenhardt, 1997, Nicholls-Nixon et al., 2000), but with some exceptions (Furr et al., 2012; Gersysmenko et al., 2015) little attention has been paid by previous research to the importance of radical business model change in the early development of new ventures. The purpose of this paper is to fill in this gap by looking at the effect of founder team diversity on its ability to change radically its business model.

Following the call for further fine-grained research into business model change and renewal (Zott and Amitt, 2010), in this thesis I analyse the particular case of radical business model change in a new venture context, contributing to the extant literature by looking at the effect of founders diversity on the venture's ability to overcome inertia, adopt, and execute radical business model change. In addition, this thesis contributes to shed light on the unresolved debate on the benefits of heterogeneous versus homogeneous new venture teams, following the call by Klotz et al (2014) to carry out research to better understand the relationship between the new venture team heterogeneity and performance outcomes. This line of research allows me to propose a link between the characteristics of the founder team, radical business model change and venture survival. The findings are rooted

in the existing literature on entrepreneurial opportunity, team cognition, business model change and founder diversity.

The topic of radical change is also of interest for practitioners. Both entrepreneurs and venture capital firms have been discussing the implications and barriers for new ventures to *pivot*. The high-technology new venture ecosystem has developed a preference for business model change and experimentation (Blank, 2005; Ries, 2011; Osterwalder, 2014) and a strong debate continues among practitioners on the benefits of persistence versus radical change. The business model change construct and, in particular, radical business model change, is an adequate academic concept to analyse the *pivot* phenomena prominent in ventures and contribute to this debate.

The methodology used in this thesis is based on a unique sample of 583 new ventures from a US-based acceleration program and includes both detailed venture and team characteristics data of all the cohorts that went through the program until 2017. The initial empirical study carried out indicates interesting conclusions. Ventures that went through radical business model change had a greater chance of survival, however high functional diversity in the founder team moderates negatively this relationship.

The remainder of the paper is structured as follows. In Chapter 2, I review the relevant entrepreneurship, business model and founder diversity literature s, and then establish a theoretical link between founder diversity, business model change and survival. In Chapter 3, I articulate the specific research questions and develop the hypotheses. In Chapter 4, I describe the methodology I used both in the logistic regression as well as in the survival analysis. In Chapter 5, I present the results of the initial analysis and its implications. Finally, in the last section, I propose conclusions, limitations from the analysis and suggestions for future research.

## **CAPÍTULO 1: INTRODUCCIÓN**

### **1.1 Justificación**

La habilidad para detectar oportunidades y materializar su potencial es la base de la formación y rendimiento de las startups (Kizner, 1979; Shane, 2003). A través de metodologías de ensayo y error y de bricolaje empresarial (Baker and Nelson, 2005), las startups refinan su negocio en un proceso de adaptación continua.

Las compañías en sus fases iniciales atraviesan reconfiguraciones frecuentes de sus recursos a medida que van acumulando información sobre el mercado y sobre potenciales clientes (Teece, 2010). Los emprendedores testean sus asunciones iniciales sobre el mercado y clientes en busca del encaje entre el producto y el mercado (Blank, 2005).

En las fases iniciales de la startup, los fundadores de la nueva compañía tienen que continuamente evaluar el potencial de la oportunidad e idear un modelo de negocio que les permita capturar el valor creado.

El refinamiento continuo del modelo de negocio de las nuevas compañías es considerado como un de las mejores prácticas por parte de la comunidad de startups. La metodología de la “lean-startup” aconseja una evaluación continua del modelo de negocio cuando se lanzan y gestionan compañías en sus fases iniciales (Ries, 2011).

Sin embargo, en algunos casos, el refinamiento del modelo de negocio puede no ser suficiente. A medida que el equipo de fundadores encuentra obstáculos y recoge información, tienen que decidir entre persistir en el

modelo de negocio o adaptarlo completamente. En esos casos la startup necesita cambiar su negocio, haciendo redundantes algunos de los recursos acumulados y reorganizando radicalmente la forma que tiene de operar. La supervivencia de las nuevas compañías puede depender de su habilidad para hacer un 'pivot' cambiando drásticamente los elementos que componían el modelo inicial de negocio para encontrar así un encaje entre las necesidades de los clientes y la oferta de la compañía (Osterwalder et al., 2014).

En este caso, la startup se embarca en un *cambio radical de modelo de negocio* que implica un cambio no lineal en su oferta de productos y servicios re-inventado su forma de operar (Osiyevskyy and Dewald, 2015).

El cambio radical de modelo de negocio es un proceso difícil ya que la nueva compañía tiene que manejar su "liability of newness" incluyendo su falta de credibilidad y la escasez de recursos (Stichcombe, 1965). Sin embargo el cambio radical de modelo de negocio puede tener también un impacto positivo en las posibilidades de supervivencia de la nueva compañía ya que esta se puede mover desde un modelo de negocio que no es viable a un nuevo rango de oportunidades.

Ciertas composiciones del equipo fundador pueden estar mejor preparados que otros para realizar un cambio radical de modelo de negocio y para ejecutar ese cambio. El proceso de cambio de modelo de negocio está altamente relacionado con el proceso cognitiva de los fundadores (Baron, 2004; Baron and Ensley, 2006) y de su conocimiento previo y experiencias (Gaglio and Katz, 2001; Shane, 2001).

El reconocimiento de oportunidades y el cambio está predominante relacionado con la cognición del equipo de fundadores y sus experiencias y

diversidad (Fern et al., 2012). La experiencia anterior puede reforzar la capacidad de ejecución del equipo de fundadores pero puede también constreñir la forma que tiene de plantear sus decisiones estratégicas (Fern et al., 2012). La diversidad de habilidades y perspectivas del equipo fundador pueden tener un efecto positivo en la supervivencia y desempeño (Finkelstein & Hambrick, 1996) pero también pueden producir conflicto e impedir la toma de decisiones (O'Reilly et al., 1989). El análisis en esta tesis se centra en el papel específico de la composición del equipo de fundadores, como principal agente del equipo de gestión de la startup, en implementar un cambio radical de modelo de negocio influyendo en la supervivencia de la startup.

El proceso de descubrimiento y de iteración está altamente influenciado por la habilidad de los fundadores y por los recursos disponibles (Spiegel et al., 2016; Sarasvathy, 2001). La dotación de conocimientos del equipo de fundadores puede causar inercia o resistencia al cambio (Delmar et al., 2006). La agilidad en el modelo de negocio puede ser obstaculizada o potenciada dependiendo de las capacidades de los fundadores (Doz & Kosonen, 2010; Kranz et al., 2016; Battistella et al., 2017). En este sentido, la composición del equipo fundador afecta la habilidad de la startup en adoptar un cambio radical de modelo de negocio - o en persistir en la trayectoria actual - y en ejecutar de forma exitosa ese cambio radical afectando a su vez la posibilidad de supervivencia de las startups.

## **1.2 Motivación**

La relación entre el camino radical de modelo de negocio y la diversidad del equipo fundador ha recibido poca atención por los análisis académicos existentes. Dichos análisis se han centrado principalmente en la habilidad de compañías establecidas en cambiar su modelo de negocio (Aspara et al., 2011) y en el cambio continuo de las organizaciones y las startups (Brown

and Eisenhardt, 1997, Nicholls-Nixon et al., 2000) pero con algunas excepciones (Furr et al., 2012; Gersysmenko et al., 2015) poca atención se ha prestado en análisis previos en la importancia del cambio radical de modelo de negocio en el desarrollo inicial de las nuevas compañías. El propósito de este documento es cubrir este vacío en los análisis académicos previos analizando el efectos de la diversidad del equipo de fundadores en su habilidad para cambiar radicalmente su modelo de negocio.

Siguiendo la llamada para realizar más análisis académicos detallados sobre el cambio y renovación del modelo de negocio (Zott and Amitt, 2010), en esta tesis analizo el caso particular del cambio radical de modelo de negocio en un contexto de startups, contribuyendo a los estudios ya existentes a través del análisis del efecto de la diversidad de los fundadores en la capacidad de la startup de vencer la inercia, y adoptar y ejecutar un cambio radical de modelo de negocio.

Además, esta tesis contribuye a arrojar luz sobre el debate no resuelto sobre los beneficios de un equipo heterogéneo u homogéneo en las startups, siguiendo así la petición de Kotz et al. (2014) de llevar a cabo investigación académica para entender mejor la relación entre la heterogeneidad del equipo en la startups y su desempeño.

Esta línea de investigación académica permite proponer una relación entre las características del equipo fundador, el cambio radical del modelo de negocio y la supervivencia de la startups. Los resultados del análisis están basados en los estudios académicos existentes sobre la oportunidad emprendedora, el cambio de modelo de negocio y la cognición del equipo de fundadores y su diversidad.

La cuestión del cambio radical es también un tema de interés para los profesionales. Tanto las empresas de capital riesgo como los emprendedores han venido manteniendo debates sobre las implicaciones y las barreras de las startups para hacer un *pivot*.

El ecosistema de startups de alta tecnología ha desarrollado una preferencia por el cambio del modelo de negocio y la experimentación (Blank, 2005; Ries, 2011; Osterwalder, 2014) y un debate importante continúa entre profesionales de este ecosistema sobre los beneficios de la persistencia frente al cambio radical. El concepto de modelo de negocio, y en particular el cambio radical de modelo de negocio, es un concepto académico adecuado para analizar el fenómeno del *pivot* - tan predominante entre startups - y así contribuir a este debate.

La metodología utilizada para esta tesis está basada en una muestra única de 583 startups que han realizado un programa de aceleración en Estados Unidos e incluye datos detallados de las startups y de las características del equipo de todas las promociones que hicieron el programa desde el 2017.

El análisis empírico llevado a cabo indica conclusiones interesantes. Aquellas startups que realizaron un cambio radical de modelo de negocio experimentan mayor probabilidad de supervivencia, sin embargo la diversidad funcional alta actual como efecto moderador negativo de esta relación.

El resto de este documento está estructurado de la siguiente forma. En el Capítulo 2, se revisan las investigaciones académicas existentes sobre emprendimiento, modelo de negocio y diversidad del equipo de fundadores para establecer un enlace basado en la teoría entre la diversidad de los fundadores, el cambio de modelo de negocio y la supervivencia. En el Capítulo 3, se articulan las cuestiones de investigación concretas y se

desarrollan las hipótesis. En el Capítulo 4, se describe la metodología usada tanto en la regresión logística como también en el análisis de supervivencia. En el Capítulo 5, se presentan los resultados del análisis inicial y sus implicaciones. Finalmente, en la última sección, se termina proponiendo algunas conclusiones, limitaciones del análisis y sugerencias para investigaciones futuras.

## **CHAPTER 2: THEORETICAL BACKGROUND**

### **2.1 Business Model: Concept and Components**

Extant academic research has had different approaches to defining the business model construct (Casadesus-Masanell and Ricart, 2010; Teece, 2010; Amit and Zott, 2001). In their depth comparative study of business model definition, Massa et al (2017) give three different perspectives of the business model construct.

Firstly, the business model can be viewed as the collective, empirically determined, attributes of the firm that allow for the classification of companies according to the activities and resources that the firm uses to capture value. This interpretation of the business model concept has allowed research and practitioners to classify firms in business model archetypes like freemium, subscription, and so forth (Massa et al., 2017).

Secondly, the business model has also been described in research as cognitive schemas of their managers. Under this view, business models are logic images held by managers that are used to run the business and evaluate opportunities (Chesbrough & Rosenbloom, 2002). Research on this interpretation has focused on the effect on the social interaction within organizations and the cognitive influence of managers that uphold to the image of the firm business model (Martins et al., 2015).

Thirdly, a business model can be viewed as a formal representation of how the business operates (Massa et al., 2017). In this case, business model is presented as a conceptual model of different components that result in the 'business-as-a-system' and how they interact between each other. This

interpretation of the business model focuses on its components and their interactions.

The three perspectives are highly inter-related rather than independent. In the new venture context, founders build their business model through the adoption of activities that create value for their potential customers which result in cognitive schemas of their business models. These cognitive schemas help founders not only to run their ventures but also to conceptualise and explain the venture's business to external parties. Wirtz et al. (2016) reviewed the different concepts of the business model and proposed a definition of the business model as a "simplified and aggregated representation of the relevant activities of a company" (Wirtz et al., 2016, p. 41).

There also different views on the components or elements that constitute a business model. The business model canvas (Osterwalder & Pigneur, 2010; Osterwalder et al., 2014) - which is part of the 'lean startup' methodology (Ries, 2011) followed by practitioners and entrepreneurs in high technology ventures - contemplates nine different components interacting between each other including key partners, activities, resources, costs, value proposition, customer relationships, customers, revenues and channels.

Another approach to business model components was proposed by Amitt and Zott (2001), who break down the business model into three dimensions: i) a *content* dimension that includes resources and competences, ii) a *structure* dimension that encompasses the link between the different transactions of the organization and iii) a *governance* dimension that entails the rules between stakeholders to create value.

Demil and Lecoq (2010) follow the view of the firm used by Penrose (1959) and decompose the different dimensions of the business model in four components: resources and competencies (RC), organization (O) and value (V). The business model components of the RCOV model are inter-related as they function like a 'system of interdependent activities' (Zott & Amitt, 2010). Each of the business model components contemplated in the RCOV model has in turn multiple elements that can be used to analyse the business model within each dimension:

(i) Resources and competences: Resources refer to the firm's available assets to implement its plans while competencies entail the capabilities of the organization of the firm to develop those plans. As the entrepreneurs adapt to new requirements of a revised business model, there could be a rearrangement of some or all of the tangible and intangible resources of the venture (Demil & Lecoq, 2010).

(ii) Organization: The organization component of the business model is how those internal resources and competencies are organised as well as how they relate to external resources. The business model will impact in how the firm is organised creating business flows inside and outside the boundaries of the company (Demil & Lecoq, 2010; Zott & Amitt, 2010 ).

(ii) Value Proposition: The business model has to have a value component, that is, how the company will create value and how the value is allocated to the different stakeholders. The value proposition includes how to entice the customer in the form of product and services that are needed or wanted (Blank, 2005). The value component also includes the way the company presents its products and services to its customer through pricing or through product and services characteristics (Demil & Lecoq, 2010).

Wirtz et al. (2016) reviewed the different elements proposed by the previous research on the topic and propose to unify those components it in four categories of elements: strategic, customer, market and value creation. The strategic components would include in turn the network, resources and strategy models. The customer and market category encompasses the revenue, market offer and customer model, while the value creation components are the financial, procurement and manufacturing models (Wirtz et al., 2016).

## **2.2 Business Model Change**

The business model is a comprehensive unit of study to analyse firm evolution and change. Previous research has looked into the ability of established firms and new ventures to implement business model changes and a summary of the most recent literature reviewed on the topic for this thesis is described in Table 1.

Business model change is more frequent in new ventures as ‘the right business model may not be apparent up front, and learning and adjustments will be necessary’ (Teece, 2010, p. 187). New ventures engage in ‘fast, frequent and diverse actions to develop a better understanding of the environment’ (Kiss and Barr, 2013, p. 1247), forming an iterative process of changes. This strategic experimentation of new ventures forms a trial and error process along different dimensions of its business that induces learning and understanding of the competitive landscape (Brown & Eisenhardt, 1997, Nicholls-Nixon et al., 2000).

According to Nicholls-Nixon et al (2000), strategic experimentation results normally in changes that are more frequent in ‘peripheral’ dimensions, like competitive emphasis and time allocation, than in ‘core’ dimensions, like the

Table 1. Business Model Change: Recent Literature Review

Authors	Topic under Study	Methodology	Business Model Change
Nicholls-Nixon et al. (2000)	Strategic experimentation in new ventures	Longitudinal Study	Incremental
Burt (2003)	Epigenetics change	Longitudinal Studies	Incremental and Radical
Voepel et al. (2004)	Business model reinvention for competitive advantage	Conceptual	Incremental and Radical
Teece (2010)	Business model, strategy, innovation and economics	Conceptual	Incremental and Radical
Demil & Lecoq (2010)	Business model evolution	Case Study	Incremental
Osterwalder and Pigneur (2010)	Business model canvas	Conceptual	Incremental
Doz and Kosonen (2010)	Strategic agility and capabilities for business model change	Multiple Case Study	Incremental and Radical
Casadeseus-Masanell & Ricart (2010)	Evolution of the business model	Multiple Case Study	Incremental
Zott & Amit (2010)	Business model design	Conceptual/Multiple Case Study	Incremental and Radical
Aspara et al. (2011)	Business model evolution and transformation	Longitudinal Case Study	Incremental and Radical
Zott et al. (2011)	Business model concept and components	Conceptual/Review	Incremental and Radical
George & Bock (2011)	Business model definition and use in entrepreneurial context	Survey	Incremental and Radical
Andries et al. (2013)	Simultaneous experimentation for business model development	Longitudinal Studies	Incremental and Radical
DaSilva C.M., & Trkman (2014)	Business model terminologies, concept and change	Conceptual	Incremental and Radical
Osiyevskyy & Dewald (2015)	Explorative versus exploitive business model change	Case Study	Radical
Gerasymenko et al. (2015)	Effects of Venture Capital and outside CEOs on venture performance	Survey	Radical
Spiegel et al. (2016)	Role of founders social capital in business model evolution	Mixed-method study	Incremental and Radical
Batistella et al. (2017)	Business model agility	Multiple Case Study	Incremental and Radical
Massa et al. (2017)	Business model research review	Literature Review	Incremental and Radical
Osiyevskyy & Dewald (2018)	Explorative business model change under crisis	Multiple Case Study	Radical
Grimes (2019)	Founders creative revision of initial venture ideas	Field Study	Incremental and Radical

changes in the products and services offered by the venture. This business model change is a ‘fine-tuning process involving intended and emergent changes both between and within its core components.’ (Demil and Lecoq, 2010, p.230).

Internal and external circumstances can act as enablers or inhibitors of business model change (Kratz et al., 2012). A firm should be able to reinvent its strategy and business model when there is pressure from a hostile or highly changing business environment since this gives an incentive and legitimacy for those changes (Aspara et al., 2011). However, as Teece (2010) points out, it is advisable that companies initiate their business model change instead of letting external events dictate such change. Companies have to take into account the business and socio-cultural dynamics to change their business model through reinvention of their customer value, business network and strategy (Voelpel et al., 2004).

Business model change may be constrained by the initial choices of strategy and business model configuration chosen by the venture. The initial business model configuration creates path dependency constraints to evolve as the alternatives open for the venture may depend on the initial components that have been built to execute the predetermined strategy (DaSilva & Trkman, 2014). Business model change can also be constrained by the personal identification of the founders with the initial business idea or concept which may anchor the founders to a particular business model (Crilly, 2017; Grimes, 2018). Once the template of the business model is set, it will be difficult for the firm to change it significantly (Zott & Amit, 2010). Burt (2013) argues that strategic changes can register a continuum of dimensions where it can be incremental at the same time in different dimensions and that even paradigmatic strategic changes are usually executed on the basis of the old existing business logic.

Business model change can lead to innovation (Zott et al., 2011), specially in high-velocity sectors, where there is more opportunity for disruption (George & Bock, 2011). However business model innovation is different from business

model change as the former results in a totally 'new to the world' business model and the latter represents a 'new to the firm' model (Osiyevskyy and Dewald, 2018).

Casadeseus-Masanell & Ricart (2010) point in their conceptual research paper to the links between strategy, business model change, and tactics defining the business model as a 'reflection of the firm's realised strategy'. Firms design and change their business models to achieve their strategic goals which are executed through specific tactics (Casadeseus-Masanell & Ricart, 2010). Tactical changes are thus relatively easy and cheap to implement while business model changes are costly and implied a modification of the logic of the firm (Casadeseus-Masanell & Ricart, 2010).

Andries et al. (2013) in their longitudinal study found that ventures use not only simultaneous experimentation for business model development but also 'distant search' which can result in radical changes of their business model. In this case, business model change carries a non-incremental paradigmatic modification that involves a radical shift in overall orientation of the organisation (Tichy, 1983). In that sense radical business model change is a 'reinvention' of the way the company operates when it requires a different approach (Voelpel et al., 2004).

Founders of a new venture may adopt a radical change affecting the core dimensions of its business and this type of change will bring concurrent modifications in the components of the business model, namely resources, organization and value proposition (Gerasymenko et al., 2015. p.86).

Prior academic research distinguishes between incremental and radical business model change through its classification as *exploitative* versus *explorative* business model change (Osiyevskyy and Dewald, 2015). An

exploitative business model change relies on the existing business routines and complementarity logic and results in an incremental variation of the organization and offering; while an explorative business model change implies a reengineering of the business with a new product and service offering that alters the way value is created (Osiyevskyy and Dewald, 2015. Osiyevskyy and Dewald, 2018).

An explorative business model change can be either innovative or imitative as its radicalness does not depend on the innovation dimension but on performing an abrupt departure from the existing logic of complimentary activities developed up to that moment by the firm (Osiyevskyy and Dewald, 2018). This differentiation of *explorative* versus *exploitative* business model change allows to connect the cognitive dimensions of the venture team with business model change. In that sense, more explorative capabilities and abilities of the management team could lead to a more effective radical business model change.

A business model change is radical when the value proposition for the customer in the form of product and services has changed drastically (Osiyevskyy and Dewald, 2015). This in turn will imply a modification of the resources needed and will affect how the firm is organised creating new business flows inside and outside the boundaries of the company.

Radical business model change implies “offering different products or services and potentially reengineering the existing business processes and rethinking the way value is created and distributed by the firm” (Osiyevskyy and Dewald, 2015a, p.60). Following this definition, business model change is interpreted in this paper as radical or explorative (versus incremental or exploitative) when there is *a non-linear modification of the products and services offered* resulting in a change on the firm’s value proposition and core components

(Voelpel et al., 2004. Zott and Amitt, 2010. Gerasymenko et al., 2015, Osiyevskyy and Dewald, 2015. Osiyevskyy and Dewald, 2018).

The decision to radically change can be the result of strategic business model experimentation (Kiss and Barr, 2013) or it could be due to external pressures like lack of acceptance of the product by customers as the venture looks for product-market fit (Blank, 2015).

### **2.3 Founder Team and Radical Business Model Change**

A new venture is “a firm that is in its early development and growth stages” (Klotz et al., 2014, p. 227), as such, the firm has not yet consolidated a strategic path, it is still forming its customer base and, in some cases, maybe still defining its product and service offering. The agility to change business model is key in company survival especially in high uncertainty scenarios (Demil and Lecocq, 2010, Batistella et al., 2017).

The ability to perform a radical business change can be viewed as an essential dynamic capability for a successful new venture that resides in the NVT. The capabilities of the firm are ‘a set of current or potential activities that utilise the firm’s productive resources to make and/or deliver product and services’ (Teece, 2014, p.328).

The research literature distinguishes between ordinary capabilities from dynamic capabilities. Ordinary capabilities are those that are necessary to ‘get things done’ while dynamic capabilities involve ‘higher-level activities that can enable an enterprise to direct its ordinary capabilities towards high-payoff endeavours’ (Teece, 2014, p. 328). The dynamic capabilities are connected then to how management may reconfigure existing resources to adapt to

changing business environments (Eisenhardt and Martin, 2000; Teece et al., 1997).

Business model change performance in incumbent companies are affected by TMT and business unit managers cognitive mindsets (Aspara et al., 2011). In the entrepreneurial context, it seems that the ability of a new venture to 'sense, seize and transform' (Teece et al., 1997) drastically the business opportunity is an essential part of the venture's dynamic capabilities and, as such, resides in the new venture team.

There is still ample debate on how opportunity recognition works at the entrepreneurial and organisational level. Entrepreneurship research has focused largely on the personality, cognition process and characteristics of the sole entrepreneur and how it affects the development of the venture, however, most new ventures are founded and/or led by teams (West, 2007).

Team cognition and interaction between team members lies at the core of the venture formation and opportunity detection (Clarysse and Moray, 2004). Entrepreneurial team cognition is defined as 'the manner in which knowledge is mentally organised, represented and distributed within the team and allows entrepreneurial team members to approach problem-solving and make assessments, judgments or decisions' (De Mol et al., 2015, p.240).

Entrepreneurial team cognition is embedded in several team processes that are either 'taskwork' or 'teamwork' where task work is more related to the know-how and experience of the team member and teamwork relates to the interaction process with other team members (De Mol et al., 2015). Klotz et al (2007) describe the New Venture Team (NVT) as the 'group of individuals that is chiefly responsible for the strategic decision making and ongoing operations of a new venture' (Klotz et al., 2007, p. 227).

The founder team faces business context, decision-making, cognition processes and economic and personal risks comparable in many aspects to a top management team (TMT). This paper focuses on the founders team as a proxy to NVT as founders set up and manage the venture during its initial phases.

Prior experience of founder team members and its relationship with performance and strategic decision making has received significant research inquiry. Prior experience can strengthen the founders' execution capability but may also constrain the way it approaches its strategic choices (Fern et al., 2012).

Business and personal connections help the founders to navigate the risk of the firm and create deep information flows that can be used for opportunity recognition (Baron and Ensley, 2006; Vissa and Chacar, 2009). Personal background may result in a team formulating a different strategy (Chaganti et al., 2008).

Opportunity recognition is thus predominantly related to the founder's background and experiences (e.g. Fern et al., 2012) and important differences in opportunity identification exist between people with different professional and personal backgrounds (Gruber et al., 2012). The importance of pattern recognition indicates that the NVT's cognitive frameworks acquired in previous experience may play a key role in opportunity detection (De Mol et al., 2015).

Founders experience affects what resources are used in the new venture, how this resources are organised and how they change over time since "there is a close relation between the various kinds of resources with which a firm

works and the development of the ideas, experience, and knowledge of its managers and entrepreneurs' (Penrose, 1959. p. 85).

Strategic reactions are conditioned by the managerial beliefs, for example, industry experience makes managers more rigid when confronted with risk-taking alternatives while managers prior experiences in navigating successfully through risk alternatives reinforces their willingness to take risks (Osiyevskyy and Dewald, 2015). NVT members' domain and entrepreneurial experience may have a significant effect on the strategies that the venture pursues (Shrader and Siegel, 2007).

Founder team composition can therefore affect the decision and execution of business model change as their background and cognitive interaction may act as enablers or inhibitors of change (Krantz et al., 2012).

## **2.4 The Role of Founders Diversity**

Some entrepreneurship research has focused largely on the personality, cognition process and characteristics of the sole entrepreneur, however, most new ventures are founded and/or led by teams (West, 2007). The interaction between team members affects its thought processes and decision-making and, as a result determines the opportunity and strategic goals that the venture decides to pursue.

Extant research shows that the effect of new venture team homogeneity in venture performances is complex and full of nuances. Shared knowledge creates a comfortable middle ground where team members converge (Kerr and Tindale, 2003). Hmieleski and Ensley (2007) found for example that homogenous NVTs in a dynamic environment do better when they are led by an empowering leader, while heterogenous NVTs in a dynamic environment

performed better if they are led by a directive leader. NVT's research shows that founder team diversity may have a positive impact on performance because of the different skills and abilities that are brought into the venture (Hambrick, 1994) but it is also found to have a negative impact due to conflict brought about by the different perspectives within the team to resolve an issue and to look into the risk and opportunities set of acute problems (O'Reilly, Caldwell, & Barnett, 1989).

Research shows that venture team's diversity of skills and perspectives can have a positive impact on survival and performance (Finkelstein & Hambrick, 1996). As the different experience and knowledge endowment enriches the team capabilities, task conflict between member produces informational benefits which are especially important for non-routine decision making (Pelled et al., 1999).

On the other hand, diversity can produce conflict and hinder decision making (O'Reilly et al., 1989). The way the NVT may develop potential solutions to problems is related to team effectiveness (Chowdhury, 2005). Social integration in the NVT results in higher perceptions of NVT viability (Foo et al., 2006). In that sense, NVT cohesion, defined as the 'extent to which team members are attracted to the team and committed to its tasks' (Klotz et al., 2015, p. 243 ), relate to a number of venture performance measures by avoiding conflict (Ensley et al., 2003), increasing commitment (Chowdhury, 2005) and attracting investors (Franke et al., 2008).

The role of founder team's diversity depends very much on the specific form of diversity and the context under study. The informational benefits of heterogeneity maybe compensated by the negative effects on team communication, cohesion and relationships. In order to obtain a better picture of the effects of founder diversity, Klotz et al (2014) proposed that researchers

should delineate forms of diversity and analyse the effects of such diversity in a specific context.

In this study I focus on the venture founders as the main actors of decision making in new ventures and, more specifically, in those forms of founder diversity that may have a significant impact in the way new ventures decide on and implement business model change. In this context founder diversity may impact venture performance through the different combination of knowledge endowments like functional diversity or knowledge diversity (Gruber et al., 2012; Pelled et al., 1999) or it may have an impact through the different perspectives that founders have due to the effect bio-demographic traits like gender or age (Dai et al., 2019; Hewlett, Marshall, & Sherbin, 2013).

### ***Functional Diversity***

Functional diversity represents the differences in domain expertise acquired by the founders through the combination of experience and education which results in specific functional roles played by the founders (Leung et al., 2013). Opportunity recognition is embedded into the NVT's cognition process and the founders' functional backgrounds result in important differences in opportunity identification between ventures (Gruber et al., 2012). Pattern recognition vary depending on the NVT's experiences which formed the cognitive frameworks which play a key role in opportunity detection (De Mol et al., 2015).

Experience endowments of the team are the basis to build the execution of a radical business model change. Prior experience in certain areas will influence the strategic choices of the founders (Shredder and Siegel, 2007). Founder decisions maybe driven by their specific past professional experiences with the strength of the constraint of their strategic choices

increasing as the amount of experience increases (Dencker and Gruber, 2014).

Functional experience endowments may affect how founders react to the need to find another opportunity set. For example, Gruber *et al* (2012) looked into how experience endowments affect the size of the opportunity set that an entrepreneur will consider when launching a new venture and found that technological and marketing experience had a negative effect on the number of opportunities considered.

Founder functional diversity may enrich decision making through task conflict and information-sharing but will also carry increase conflict and slower decision making. As founders bring to the team their own entrenched positions acquired through their experiences, consensus will be difficult to build, resulting in a difficult social relationship within the venture as founders with high specialist and functional expertise are less prone to reconcile different perspectives (Hambrick et al., 1996).

### ***Generalist and Specialist Knowledge Diversity***

The knowledge endowments at the team level can have an specialist or functional nature, where the founder has an expertise in a specific field, or generalist in nature (Gruber et al., 2012). Specialist knowledge in the NVT adds expertise in a particular field while generalist knowledge contributes through a broader perspective on how to confront general day-to-day issues. I will refer from now on in this paper to “Knowledge Diversity” as the combination of specialist and generalist knowledge in the new venture team.

According to Gruber et al (2012), general knowledge can be acquired through *management* expertise or through *entrepreneurial* expertise and a balance

between these two type of knowledge creates synergies for better market identification.

Founders with *generalist management* knowledge are a valuable addition to the team as they may use their knowledge and networks to execute change, launch new products and services and reorganise the venture's business model. Previous experiences of team members who have dealt with complex task and organisational challenges, may facilitate the transition from the initial business model to the new one. Extant research has found that founders with managerial experience know better how to deal with high-risk situations (Dencker and Gruber, 2014). However a team dominated by managerial experience will have little task conflict and will not benefit from the different perspectives that a diversified functional expertise team will bring (Pelled et al., 1999).

Specialist and functional knowledge like technological and marketing experience will be needed for the survival possibilities of a venture that is confronted with specific execution challenges. The combination of specialist knowledge or functional expertise with generalist knowledge will bring a balanced to the team that is best suited to acquired 'structure knowledge' (Dai et al., 2019).

Founders with *generalist entrepreneurial* knowledge may have a pattern-recognition ability as described by Baron and Ensley (2006) that helps them in venture management and opportunity identification. Novice entrepreneurs have not develop prototypes of business opportunities like experienced entrepreneurs who may use their cognitive framework to detect them. Serial entrepreneurs have valuable generalist knowledge as they have experienced previously the challenges of setting up and scaling ventures. This generalist knowledge is specially valuable when combined with technical specialist

knowledge. Thus balance between entrepreneurial knowledge and specialist knowledge will yield better market opportunities identification and execution (Gruber et al., 2012).

### ***Gender Diversity***

Team diversity can be a result of *acquired* traits through work and life experience, like for example functional and generalist expertise, or it can be as result of *inherent* traits like age or gender (Hewlett, Marshall, & Sherbin, 2013). This classification of acquired versus inherent diversity also points to their different nature. Acquired traits are task-oriented while inherent-traits are bio-demographic characteristics which can have different implications for team performance and social integration (Horwitz & Horwitz, 2007).

Previous research has shown that inherent-traits diversity brings new perspectives and knowledge variance that may improve team capabilities and help performance while the results on bio-demographic diversity have been mixed (Horwitz and Horwitz, 2007; Ali and Fench, 2019). New venture teams with gender diversity can have an easier task at resolving the negative aspects that come with certain acquired-traits heterogeneity (Fern et al., 2012).

In their recent study Dai et al. (2019) focus on gender as a key diversity factor that may improve innovation and moderate the negative effects of functional diversity. According to their research, gender diversity brings both different perspectives in the team as well as the necessary capabilities to synthesise diverse approaches in the team, avoiding excess conflict and reaching common ground (Dai et al., 2019).

In line with these findings, Hoogendoorn et al. (2013) in a field experiment found that teams with a balanced gender mix performed better than male-dominated teams but found no support for the mechanisms that previous literature used to explain this difference. Gender heterogeneity has been found to stimulate the relationship between innovation and the capability to exchange and enrich knowledge (Ruiz-Jimenez et al., 2016).

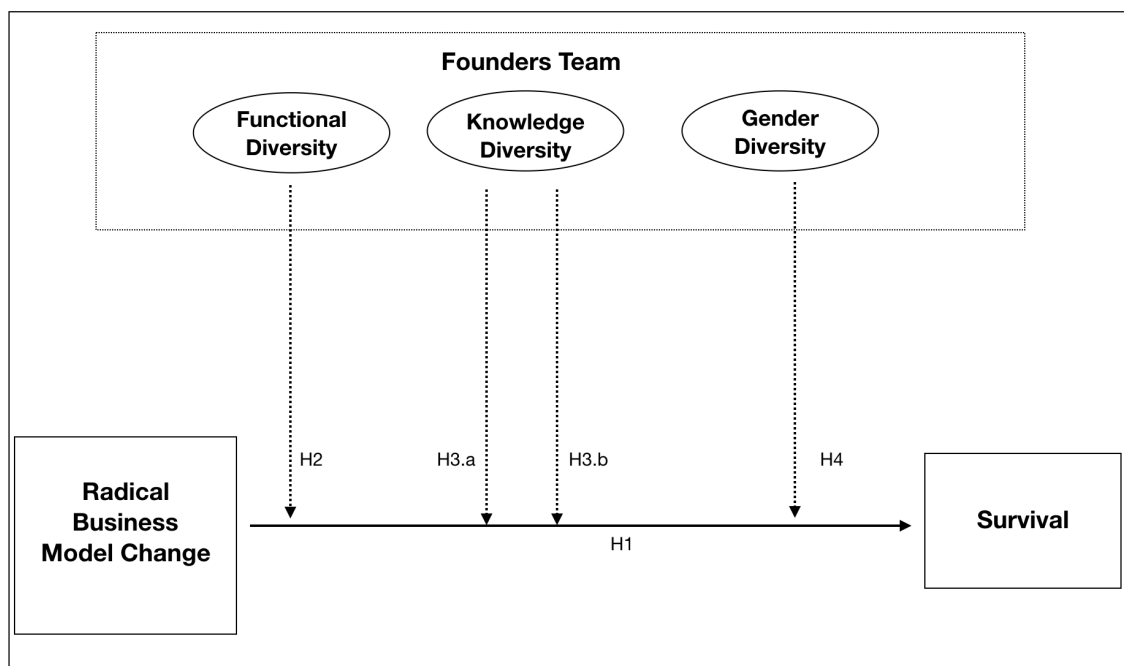
Female presence in the team in a male-dominated environment like technology-related new ventures may help the team's information processing abilities (Putrevu, 2001) and its 'knowledge structure' building capabilities as female founder members are more able to read subtle cues, find consensus in different approaches and reduce emotional conflict (Dai et al., 2019).

## CHAPTER 3. RESEARCH MODEL AND HYPOTHESES

As a new venture progresses on its business, it gathers new information and feedback from potential customers and the market that may back or contradict the initial assumptions of the new venture team. More often than not, the new venture experiences difficulties in achieving its initial goals and the new venture team must choose to persist, desist or change its strategic and business objectives resulting in a business model change.

This paper's research model focuses on the ability of the new venture team to change course and pivot into a completely new business model. In particular it aims to address the following research questions: i) *how does radical business model change affect the survival of new ventures?*, and ii) *how does founder diversity affect the venture's survival when it goes through a radical business model change?*

Table 2. Hypotheses



### **3.1 Business Model Change and Survival**

Firms need to reassess their business model when confronted with threats and opportunities in their initial target markets (DaSilva and Trkman, 2014). In the face of significant roadblocks, new ventures may persist on their existing business model with minor alterations or they may change radically their business model. New ventures often engage in small iterative changes to adapt their business model as they receive new information about the success of their initial product and service offering but in many cases this may not suffice.

Radical change may be needed as the initial business model is found not to be viable or not attractive enough (Osiyevskyy and Dewald, 2018). In order to survive new ventures need business model agility to i) detect the need for radical change and avoid inertia, ii) reconfigure the business model with scarce resources, and iii) identify and implement a new opportunity set (Demil and Lecocq, 2010. Batistella et al., 2017).

Detecting the need for change and avoiding inertia is a key capability in new ventures. Some founders may proactively resist change, sticking with the initial business model in the face of insurmountable obstacles (Dewald and Bowen, 2010). Founders' flexibility is highly influenced by the entrepreneurs' personal commitment to their initial ideas and the feedback they get from initial testing (Crilly, 2017). Extant research has showed how founders are personally attached to their initial idea as they view themselves as creators and develop 'identity-based relationships' with their work (Grimes, 2018).

In addition to personal attachment, founders may have aversion to change radically the business model due the potential credibility loss it may carry (Osiyevskyy and Dewald, J. 2015). As they set up the venture, entrepreneurs

need to raise capital and hire employees which results in having to defend vigorously to potential stakeholders the viability of their initial business idea. Deviating from that initial idea and defending a new business model to stakeholders is a difficult but important task for venture founders.

Ventures are emerging organizations with scarce resources and, as such, they are specially challenged with difficult strategic alternatives to create a sustainable business model from scratch. New ventures have to manage their limited access to resources in the best possible way to overcome its liability of newness and find the right business model (Stichcombe, 1965). Confronted with the lack of viability of the initial business model, founders need to reevaluate their alternative. Founders have to make-do with the means and resources at hand to decide on the range of possibilities of business combinations that will make the venture viable (Sarasvathy, S. D. 2001).

The capability of the new venture's team to detect new opportunities - and business models adapted to those opportunities - can make the difference between success and failure (Demil and Lecocq, 2010). Founders test their initial market and customer assumptions and gather valuable information on potential market-product fit (Blank, 2005). Ventures engage in a process of trial-and-error and entrepreneurial bricolage (Baker and Nelson, 2005) and they try to refine and redefine their business model. Founders need to continue implementing resource reconfiguration and adaptation in the initial phases, as they have more information on the market and on potential customers, readdressing their opportunity set (Teece, 2010).

In sum, on high uncertainty scenarios the ability of a venture to 'sense, seize and transform' (Teece et al., 1997) radically the business opportunity is paramount for its survival. Business model agility in the initial phases allow ventures to adapt to the market and identify new organisational structures,

renovating the venture and making it to responsive to uncertainty (Doz & Kosonen, 2010; Batistella et al., 2017). The lack of such agility forces the venture into the pre-establish path of the initial business model.

Once they launch their ventures, founders have a clearer picture i) on the market potential, the customer preferences and the product-market fit, ii) the venture access to the resources needed to implement a specific business model, and iii) the team's capabilities to address the different opportunities available. As such they are at that phase in a better position to consider different business model reconfigurations and to change radically if needed to a more viable opportunity set.

In fact, Andries et al. (2013) found that ventures that engage in simultaneous experimentation in their business model development have less initial growth but higher survival rates than those ventures that adopted a persistence and focused commitment to their initial business model. This line of reasoning suggests that, in a venture context, business model agility to perform radical change is key to its survival.

*H1. Ventures that change radically their business model will have a greater survival rate.*

### **3.2 Founder Diversity and Radical Business Change**

The ability to perform a radical business change in a venture is a capability that resides in the founder team (Teece, 2014). The interaction between founders in the team will affect the decision-making process and will be the key component on the opportunity and strategic goals that the venture decides to pursue.

Previous research shows that the effect of the new venture team diversity on firm performance is significant but complex. Team homogeneity creates converge in decision making (Kerr and Tindale, 2003) while team heterogeneity has a positive impact in the range of skills and perspective that are brought into the venture (Hambrick, 1994; Finkelstein & Hambrick, 1996) as the different experiences and knowledge endowments enrich the team capabilities.

Diversity brings task conflict between members which produces informational benefits that are especially important for non-routine decision making (Pelled et al., 1999). However, founder heterogeneity may create a lack of consensus and conflicts that affect knowledge integration and decision making (Dai et al., 2019). This tension between the positive aspects of diversity (enrichment through task conflict) and its negative consequences (lack of team consensus due to relationship conflict) makes it difficult to analyse the effects on team diversity on performance.

In that sense, and following previous research recommendations (Klotz et al., 2014), I break down the study of founder composition in different forms of team heterogeneity in order to carry out a more effective analysis on the effects of diversity on performance under the context of radical business model change.

### ***Functional Diversity***

In the opportunity identification process, founders are involved in pattern recognition or the ability to “ ‘connect the dots’ between seemingly unrelated events or trends and then detect patterns in these connections suggestive of new products or services” (Baron and Ensley, 2006, p. 1331). Founders with

different functional knowledge increases task-conflict creating a wide range of knowledge endowments. Functional diversity has informational benefits which are important in the venture development and decision making (Pelled et al., 1999).

However previous research found that venture founders may only consider a few of the potential product-market combinations available to them to determine the initial market opportunity they will pursue (Gruber, 2010). Founders with functional experience will tend to exploit existing knowledge on those areas where they have specialised knowledge. In addition, founders' professional experience will bring social networks in specific areas (Spiegel et al., 2016).

Knowledge endowments and social contacts create a high path-dependency for founders with specific functional experience that acts as an cognitive anchor making change more difficult (Shredder and Siegel, 2007). Radical business model change is expected to be viewed by founders as a risky and painful decision if it requires to move out of their comfort zone and area of expertise.

Diversity in functionality experience induces divergent thinking reducing cohesive behaviour (Dai et al., 2019). A radical business model change requires a strong consensus as it implies a deviation from the previous discourse. Radical change will be perceived as a painful decision by the founders as they are attached to their initial ideas and lose credibility in front of external stakeholders (Grimes, 2018).

In an uncertain scenario, like a radical business model change, collaboration in business decision-making and execution will be key. Teams with high functional diversity will have a difficult time finding common ground when

confronted with a complete change of course into a new business model (Osiyevskyy and Dewald, 2018).

Functional diversity also makes consensus difficult. Different perspectives from the team will take longer and be more difficult to reach in new ventures with high functional diversity. NVTs with high functional diversity will be less cohesive and will encounter more strategic and implementation issues to agree on.

Execution of radical business model change will create conflicts as functional roles may be affected due to the reconfiguration of the venture resources. The new business model may depend on a different functional mix or be less reliant on technological or marketing expertise shifting the power role of NVT members. Different perspectives from the team will take longer and be more difficult to reach in new ventures with high functional diversity.

*H2: Functional diversity among founders will negatively affect the survival rate of ventures that performed radical business model change*

### ***Knowledge Diversity (Specific vs Generalist Knowledge)***

Founder diversity knowledge yields benefits for the new venture team when there is a balance between the synthesising capabilities of generalist expertise and the information diversity that brings specialist knowledge (Steffens et al., 2011). The specialist knowledge is highly technical while management or generalist knowledge helps to converge, avoiding excess conflict and facilitating execution and decision making (Dai et al., 2019; Gruber et al., 2012). Balance between generalist and specialist knowledge allows the team to achieve 'structural' or integration knowledge which helps to build a combined effort for challenging innovation-related tasks.

In this analysis, I followed Gruber et al (2012) who consider that generalist knowledge can be present in the team in the form of managerial experience or through entrepreneurship experience.

Managerial experience provides knowledge about business functions and processes as well as about the different nature of external relationship with suppliers and customers. Radical business change implies the recombination of existing components of the business model as well as the creation of the new elements required. Thus, it seems that the presence of managerial experience will help founders to execute changes as NVTs with management experience will be more familiar with the resource requirements to address the new situation. Managerial experience is expected to give the NVT an advantage to know 'what' to change, through opportunity detection and market interpretation, as well as 'how' to change, through reconfiguration of internal organization process and establishment of new external relationships.

Management experience by its own may however be a hinder to change as more experienced managers may be less prone to take risks and may not have the enrichment of different perspectives. A combination of both divergent specialist knowledge and convergence managerial knowledge is the best suited to confront business model change.

*H3.a: A combination of specialist and management-generalist knowledge among founders will positively affect the survival rate of ventures that performed radical business model change*

According to extant research, the identification and development of an opportunity set relies on the subjective perception of the entrepreneurs that decide on the products and services the firm will provide and for which

markets (Penrose, 1959; Gruber et al., 2012). Tolerance for risk and self-efficacy may affect opportunity recognition capabilities and willingness to perform significant changes to business structure and offering (Dewald and Bowen, 2010).

Entrepreneurial alertness is the cognitive engine driving the opportunity identification process (Gaglio and Katz, 2011). Entrepreneurs develop the opportunity detected through interactions with the market and depending on the resources available to them (Sarasvathy, 2001).

This opportunity detection ability of experienced entrepreneurs may apply not only to the initial opportunity that the venture pursues but also to subsequent opportunities that the venture may switch into once the initial business has proven unsuccessful or unattractive. Founders' teams with prior entrepreneurial experience, i.e. teams composed of one or several serial entrepreneurs, may have the advantage of being able to detect new opportunities as the unique experience of serial entrepreneurs filters into the team.

Serial entrepreneurs with past venture experience maybe best suited to guide the functional expertise present in the team through radical change. Founders with entrepreneurial experience have acquired generalist knowledge on how ventures work and will be best suited to contribute to specialists team members in reaching conclusion on the best course of action to take in the midst of radical business model change. Entrepreneurial knowledge will serve as a guide for functional/specialist knowledge as radical change will mean to reconfigure the venture's resources and roles and finding new opportunities and business models.

Based on these arguments from previous research, I expect that a balance between entrepreneurial (generalist) and functional (specialist) knowledge will be well suited to implement successfully radical business model change.

*H3.b: A combination of specialist and entrepreneurial-generalist knowledge among founders will affect positively the survival rate of ventures that performed radical business model change*

### ***Gender Diversity***

Diverse insights in the venture team may come not only from acquired traits but also from inherent and demographic traits like gender. Gender diversity in the new venture team could benefit decision making through i) informational and social diversity and through ii) gender differences in managerial behaviour (Dezso and Ross, 2012).

Extant research has found that gender differentiation in a group brings diverse perspectives as members have different socialisation experiences and relationship networks (Mateos de Cabo et al., 2012). Founder gender heterogeneity broadens the spectrum of alternatives contemplated in resolving issues through the enrichment of views and the integration of perspectives (Fern et al., 2012; Dai et al., 2019).

In their analysis DeTienne and Chandler (2007) found that women and men differ in their approaches to opportunity identification and recognition as they use differentially their stock of human capital. Female presence in top management has been found to bring informational benefits, specially in innovation-related tasks (Dezso and Ross, 2012).

In the presence of radical business model change, new venture teams with gender heterogeneity will have higher knowledge differentiation which will produce a broader range of potential alternatives and opportunities in order to detect the right path to follow. Informational benefits brought by gender diversity will also benefit in the implementation of a radical business model change as differentiation in perspectives and social networks helps the team to execute the reconfiguration and redesign of the business model components (Watson et al., 1993).

The presence of a more balanced gender mix in the founder team helps bring out knowledge differentiation but, more importantly, it also helps knowledge integration within the team through the combination of different managerial styles (Dai et al., 2019).

In addition to informational and social diversity, female presence can contribute to have in the venture a managerial behaviour that facilitates knowledge convergence within the team. Women have different cognitive and leadership styles than men (Eagly and Johnson, 1990). Men-led organisations are more associated with a command and control style while women-led are more oriented to a flexible and democratic approach (Dai et al., 2019; Zhang and Bartol, 2010).

Research found that women have a more democratic or participative management style and a less autocratic or directive style than men (Eagly and Johnson, 1990). Female presence in the new venture team 'improves the firm's knowledge differentiation and integration and promotes its innovation' (Dai et al., 2019, p.509). In a venture that is engaged in performing a radical business model change, the presence of female founders may help to reduce conflict since women entrepreneurs in the team have a management style that seeks consensus building (Dai et al., 2019).

In sum, females and male members have different ways of generating, interpreting and integrating knowledge. In a context of a new venture team that is in the midst of changing radically its business model, founder gender diversity will improve the founders team ability to detect and integrate a wider range of opportunities, envisaging different viable business model combinations and improving the odds of venture survival.

*H4: Gender diversity among founders will affect positively the survival rate of ventures that performed radical business model change*

## **CHAPTER 4. METHODOLOGY**

### **4.1 Data Sources**

The sample used in this paper is a unique data base formed by startups that have gone through the 500startups accelerator program in the US from 2011 to 2017. “Accelerators are organisations that aim to accelerate successful venture creation by providing specific incubation services, focussed on education and mentoring” (Pauwels et al., 2015, p.13). The 500startups program focuses on high-technology and internet-related ventures.

The high-tech startup ecosystem is an appropriate sample to study the effects of radical business model as ventures are asset-light and founders are encouraged to adopt tools to incorporate business model flexibility in their development (Blank, 2005; Ries, 2011). The accelerator and the startup going through the program are very active in traditional and social media, releasing constant public information about the venture evolution and about the founders themselves, which allows for the gathering of information and analysis of their business model and the characteristics of the founder team. In addition, the startups in the accelerator program have a strong web presence to market their services and products which makes feasible to check on radical changes on their offering.

500startups has been running its Seed Capital program since 2011, offering support services and seed capital to a selected group of early-stage ventures. The Seed Program runs on a cohort basis with a cohort size that varies between 10 and 35 startups in each cohort. The accelerator announces publicly the startups accepted in each of the cohorts through a press release that includes a description of the venture’s business. The

program runs for approximately 3 months once or twice annually. At the end of the program, the startups present their business and performance to a group of investors and to the general press in a meeting called DemoDay.

I identified and collected data on all the startups that went through the accelerator program in each cohort until 2017 by analysing the press release published by the accelerator announcing the companies accepted to the program, the media coverage of the announcement, the information about their presentation at DemoDay and the public startup databases accessible in the web that follow accelerators and startups.

The public databases used are i) Crunchbase, a crowdsourced startup database founded by the media publication Techcrunch, ii) AngelList, a database and platform for startups created in 2010, and iii) SeedDB, an accelerator database that follows incubators, accelerators and their participant companies.

From this information I obtained a sampling frame of startups that have gone through the accelerator program from 2011 to 2017. Once I had the sample, I gathered the information on the startups' and their founders. I used the previously mentioned public databases and the accelerator's press releases to get the startup founders names and their professional profiles in the social network LinkedIn. AngelList and Crunchbase usually provide links to the LinkedIn profiles of the startup founders.

I excluded from the sample the startups where the founders cannot be determined or their professional profiles cannot be found. The resulting sample of startups with their respective founders' profiles had a total size of 583 startups and 1,232 founders.

## 4.2 Collection Process

The database information collected for each startup is as follows:

*Cohort:* The cohort number refers to the accelerator batch that each startup belongs to. The batch number is sourced from the press releases and the public databases SeedDB and Crunchbase.

*Cohort Date:* The cohort date indicates the starting date of the program by the respective batch. The cohort date is sourced from the press release and the public database SeedDB.

*Initial Business Model:* a short description of the startup business model is included in the accelerator press release that the accelerator publishes with the list of companies accepted to the program. In a few cases when there is no official press release of a cohort, the initial business description is gathered through digital media coverage of the startups included in the program.

*DemoDay Information:* Once the accelerator 3-month program finishes the startups present their business to potential investors in an event called DemoDay. Most of the DemoDay presentations are available in the website Slideshare. Slideshare is a presentation sharing platform owned by LinkedIn. Most of the presentations are also available in video. A link to these DemoDay presentations and/or to the videos are included in the database.

*Business Description:* The business description at the time of building the database is included in the fields “Business Description in AngelList/ Crunchbase (today)” and fields “Business Description in Co webpage and

Linkedin (today)". This description is the one contained in public databases, the company's website and their company page in LinkedIn.

*Radical Business Model Change:* I compare the Initial Business Model given by the venture and the description of the business at DemoDay to the Business Description of the startup at the time of building the database. In addition, further research has been conducted looking at media coverage, media interviews with founders and content included in the startup's website to determine if a radical business model change has occurred.

*Time of Radical Business Model Change:* If a radical change in business is detected, further research has been conducted to determine the year the pivot was performed. In most of the cases, the time of pivot can be ascertained by looking at media coverage of the startup. As startups going to the accelerator program use digital media profusely, in most of the cases I could find an interview of one of the founders or a media coverage where the radical business model change is described or mentioned. In the few cases the time of pivot cannot be determined by a press release or media coverage, I performed a search in web archive websites that store the historical information of the startup webpage. In particular I used [web.archive.org](http://web.archive.org), a website that allows the search of the historical evolution of the homepage of a particular domain. As most startups commercialise their product and services through their webpage, the timing of a radical change in business model is detected by a radical change in the description of the company, its products and services, in their home page.

*Public Information about Pivot:* This field includes the links to the webpages where the pivot is described or eluded to. Most of them are media coverage of the startup in digital media in the form of founder interviews or press articles about the startup business evolution.

*Active:* This field reports if the company is still active or not. I used the public database SeedDB that includes information about the status of each startup going through the accelerator program and identifies the ones non-active as “Dead”. I checked also the startup website and their LinkedIn information to see if the company is still active or not.

*Acquired:* I used the SeedDB database to determine if the company has been acquired or not. In addition, I run a Google search with the name of the company and the word ‘acquired’ to check for potential acquisition news in digital media. I also checked on the company’s website and LinkedIn information for a potential change in ownership.

*Links Public Information about Acquisition:* This fields includes the links to public information about the acquisition of the startup in digital media.

*Number and Name of Founders:* The founders of the startup are detected through the official accelerator press release, the AngelList startup profile page, the Crunchbase startup profile page and the LinkedIn profile pages of the founders. If by revising this information I could not clearly determined the founders, the startup was excluded from the database.

*Information about each founder:* I found the information of each founder in their LinkedIn profiles. Usually AngelList’s startup page provides links to the founders’ AngelList profiles and these profiles in turn provides links to the LinkedIn profile of the founder. In the cases that no link to the LinkedIn profile is provided in AngelList, I performed a search in LinkedIn with the name of the founder and the name of the company. In case I cannot find the information with a direct search I looked into the company’s profile page

in LinkedIn which provides a link to all employees in the social network that have a profile page.

If I could not find information about the founder in LinkedIn, I looked into the founders' AngelList to see if such profile provides enough information about the background of the founder. Alternatively, I searched in the web for professional profiles of the founders in Google. If I could not find enough relevant professional information about any of the founders, I excluded the startup from the sample.

The information about the founders included in the database is:

- i) Founder Name
- ii) Founder Profile: this is a copy and paste of all the relevant information on the founders' LinkedIn or professional profile
- iii) Founder Profile Links: this is the link to the founders' professional profiles
- iv) Entrepreneurial Experience: The founder is considered to have entrepreneurial experience if she has founded another company before the setup of the startup under study. Entrepreneurial experience has been detected by analysing the founder's profile in LinkedIn and other social networks. A founder is then considered to have entrepreneurial experience when she had the role of "Founder" (or similar term) in a company prior to the startup under study.

- v) Functional Experience: a founder is registered as having functional experience if she had previously performed the same function for more than two years or she has a function-related education and has performed a job in that function for at least a year. I have determined the Functional Experience by analysing the founders' professional profile in LinkedIn or similar social networks. The functional categories included in the database are technology, marketing, design and finance.
- vi) Managerial Experience: a founder is registered to have managerial experience if she has worked in a role with management responsibilities for more than a year at any time before founding the startup. I have determined Managerial Experience by analysing the roles performed by the founders according to their professional profiles in LinkedIn or similar professional profile webpages.
- vii) Education Level: the field Education refers to the highest academic degree obtained by the founder according to their professional profile in LinkedIn or similar webpages.
- viii) Gender: the gender of the founders has been determined through their names and photos in LinkedIn and other social media.

In addition to the previous description fields, all the webpages used in sourcing the information of each startup were saved in dedicated folders. Each folder holds the AngelList company profile page, the Crunchbase company profile page, the LinkedIn founders profile pages, the Slideshare

DemoDay presentation as well as the webpages related to pivot and acquisition, if applicable.

### **4.3 Variables and Measures**

#### *Dependent Variables*

- *Non-survival*: This is a binary variable coded with 1 if the venture has failed during the time of observation from its founding date to the end of the observation period in June 2018, when the data was completed. The venture is not considered to have failed in the case it has been acquired during the period.

#### *Independent Variables*

- *Radical Business Model Change*: This is a binary variable coded with 1 if the venture has performed a Radical Business Change during the period of observation from the founding date of the venture to June 2018. Consistent with the theoretical definition, a venture has completed a radical business model change when there has been a complete modification of the products and services offered resulting in a change on the firm's value proposition. As mentioned, I compare the Initial Business Model given by the accelerator at the start of the program. This description is further confirmed by analysing the information given by the venture at the end of the accelerator program during DemoDay. The Initial Business Model is then compared to the last available information on the venture's business model through its website, media coverage, media interviews with founders and social media content to determine if a radical business model change has occurred.

- *Functional Diversity*: Diversity in NVT's members functional expertise was measured as a scale variable. Founders are registered as having functional experience if they had previously performed the same function for more than two years or they had a relevant function-related education and had perform a job in that function for at least a year. The category variables used were technology, marketing, design and finance. A category of 'none' was used in the case of founders with no functional expertise. I used the Blau's Index calculated as  $(1 - \sum p_i^2)$  where  $p$  is the proportion of team members in each of the  $i$  categories. This index takes into account how team members are distributed among the possible categories of a variable.
  
- *Knowledge Diversity*: I counted the number of founders in the team with functional knowledge and registered that count as 'specific knowledge'. I counted the number of founders with managerial experience and registered that count as 'managerial generalist knowledge'. For the purposes of the analysis management experience was considered in the case the founder has worked in a role with management responsibilities for more than a year at any time before founding the startup. In order to calculate the Knowledge Diversity index with management generalist knowledge, I used a Blau's Index calculated as  $(1 - \sum p_i^2)$ , where  $p$  is the proportion of team members in each of the  $i$  categories. This index takes into account how team members are distributed among the possible categories of a variable. The same process was used to calculate Knowledge Diversity index with entrepreneurship generalist knowledge, but in that case prior entrepreneur experience of the founders instead of management experience was used to registered 'generalist knowledge'.
  
- *Gender diversity*: The Blau index was used to measure gender diversity in the new venture team. The percentage of females in the team was also used as an alternative variable for gender diversity analysis.

### *Control Variables*

Several control variables were used in the study. The study controls for the number of founders which according to extant literature (Jin et al., 2017) may affect the performance of the venture the business category of the venture.

The study also includes as control variables education level of the NVT that according to previous research it may affect survival of the venture (Gruber et al., 2012). The analysis also controls by the cohort group of the accelerator program since early cohorts will influence the survival rate and it is expected that have a higher failure rate. A control was also included to take into account the potential effects of the business sector where the venture operates. In addition, the study controls for financing by adding a binary control variable which registers if the venture has received or not funding above 500.000 dollars.

## **CHAPTER 5. ANALYSIS AND RESULTS**

In order to test the hypotheses that look into the influence of radical business model change and venture survival, a logistic regression analysis was applied since the dependent variable is a binary one, indicating whether the venture has survived or not. In addition to the logistic regression, a survival analysis using the Cox proportional hazards model was also run to take into account for the effect of time-to-event and test further the hypotheses. Both analysis were performed using the statistic software tool STATA.

### **5.1 Logistic Regression**

As first steps of the logistic regression analysis, Variance Inflation Factors (VIF) were calculated to check on potential multicollinearity issues. None of the VIF scores approached the threshold of 10 commonly used. The VIF scores range from 1.03 to 1.40, suggesting that multicollinearity is not a problematic issue. A correlation matrix as well as means and standard deviations were calculated for all variables and the results are shown in the following table (Table 3).

A first model with the control variables was initially run (Model 1). The regression analysis showed that, not surprisingly, the cohort variable has some significant relationship with Non-Survival indicating that there are more failures in those ventures belonging to the early cohorts since failure rate increases with time. The Funding control variable also has significance as those ventures that receive funding have also higher survival rate. I found no other significant impact in any of the control variables except for one particular business category class (Mobile Apps) which have lower odds of failure.

I then run the model with the independent variables under study one by one to check main effects (Model 2 to Model 6). The results show a significance of the Radical Business Model Change variable (binary variable where change in business model equals to 1) when the regression analysis is run with only this variable as a main effect (Model 2).

In Model 7 includes the main effects of all the independent variables. Radical Business Model Change continues to offer significant effects on the dependent variable (Non-Survival). The Odds Ratio is 0.334 indicating that ventures that have change radically their business model have a lower failure ratio in line with the proposed Hypothesis 1. There is no significant main effects of the other independent variables in these models indicating that diversity has no main effect directly on survival which is in line with the theoretical grounding that diversity has both a positive (task-conflict that brings different perspectives) and a negative effect (conflict and less social coherence) that may cancel each other diluting its potential direct relationship with survival.

In Model 8 the regression analysis includes the interaction effects between Radical Business Model Change and the other independent variables representing diversity. This model shows an interaction between Functional Diversity of the team and Radical Business Model Change, indicating that a radical change in business model decreases odds of failure, but this relationship is moderated by the diversity of domain in the team in line with Hypothesis 2. Functional Diversity decreases the odds of failure but in the case of a business model change performed by teams with high diversity in domains, the odds of failure increase significantly.

Regarding Knowledge Diversity (Management), the logistic regression analysis shows a significant interaction effect when business model change is

carried out and there is a presence of management expertise balanced with specialist knowledge indicating in line with Hypothesis 3.a that a balance knowledge diversity in the team increases the chances of survival when there is a radical business change.

However, there is no significance interaction effect with Knowledge Diversity (Entrepreneurial) variable and business model change. This points to a rejection of Hypothesis 3.b about effects of Knowledge Diversity with entrepreneurial experience.

Gender diversity showed no main nor moderation effects. Contrary to the Hypothesis 4, there seems no effects of Gender Diversity in survival under radical business model change. A further analysis was carried out to measure the potential effects of the percentage of females in the founder team and there was no significant effect detected.

Table 3. Pearson Correlation Matrix and Descriptive Statistics

	Mean	S.D.	V.I.F.	1	2	3	4	5	6	7	8	9	10	11
1. Number of Founders	2.114	0.830	1.40	1.000										
2. Education Level	3.107	0.773	1.06	-0.154**	1.000									
3. Funding	0.511	0.500	1.07	0.098*	0.011	1.000								
4. Business Category	5.338	3.415	1.03	0.015	0.029	-0.057	1.000							
5. Cohort	11.967	5.933	1.22	0.088*	-0.012	0.003	0.129**	1.000						
6. Radical Business Model Change	0.153	0.360	1.07	0.027	0.035	0.062	-0.045	-0.191**	1.000					
7. Functional Diversity	0.253	0.262	1.37	0.488**	-0.063	0.076	0.039	-0.027	0.040	1.000				
8. Knowledge Diversity(Management)	0.244	0.237	1.16	0.184**	0.118**	0.123**	0.080	0.275**	-0.051	0.116**	1.000			
9. Knowledge Diversity(Entrepreneurship)	0.289	0.230	1.04	0.101*	-0.079	0.034	-0.032	0.071	-0.023	0.073	0.120**	1.000		
10. Gender Diversity	0.089	0.186	1.08	0.177**	0.068	-0.035	0.072	0.049	0.016	0.229**	0.071	0.027	1.000	
11. Non-survival	0.193	0.396	1.14	-0.089*	-0.045	-0.182*	-0.074	-0.246**	-0.087*	-0.069	-0.140**	0.020	-0.065	1.000

\*Significant at 0.05 level; \*\* Significant at 0.01 level

Table 4. Odds Ratios in Logit Regression Models – Dead (Non-Survival) as Dependent Variable

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Radical Business Model Change (RBMC)	---	0.328**	---	---	---	---	0.334**	0.230	0.151*
Functional Diversity	---	---	0.519	---	---	---	0.558	0.354	0.333*
Knowledge Diversity(Management)	---	---	---	0.672	---	---	0.675	1.108	1.181
Knowledge Diversity(Entrepreneurship)	---	---	---	---	1.813	---	1.935	2.101	---
Gender Diversity	---	---	---	---	---	0.463	0.530	0.536	---
Interaction RBMC x Functional Diversity	---	---	---	---	---	---	---	238.1**	116.61**
Interaction RBMC x Knowledge Diversity(Mgmt.)	---	---	---	---	---	---	---	0.002*	0.003*
Interaction RBMC x Knowledge Diversity(Entrepr.)	---	---	---	---	---	---	---	0.178	---
Interaction RBMC x Gender Diversity	---	---	---	---	---	---	---	0.214	---
Number of Founders	0.826	0.843	0.926	0.845	0.814	0.854	0.964	0.965	0.963
Education Level	0.839	0.863	0.842	0.856	0.850	0.850	0.906	0.906	0.867
Funding	0.387**	0.405**	0.388**	0.396**	0.380**	0.383**	0.401**	0.394**	0.407**
Business Category	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Cohort	0.893**	0.882*	0.891**	0.891**	0.891**	0.894**	0.882**	0.870**	0.873**

\*Significant at 0.05 level; \*\* Significant at 0.01 level

(1) Business Category is a categorical variable

Model 9 was calculated dropping those variables that have no significant interaction. The Likelihood Ratio and the Hosmer-Lemeshow test using this regression model was calculated to find backing for the Goodness of fit (Table 5). The Classification Table technique and ROC analysis was also used to see the ability of Model 9 to discriminate getting results close or above 70% (71.70% in the Class Table and 78.18% in ROC analysis).

Table 5. Likelihood Ratio and Goodness-of-Fit

Likelihood Ratio		Hosmer- Lemeshow Test	
Number of Observations	583	Number of Observations	583
LR chi2(18)	99.52	Number of Groups	10
Prob > chi2	0.0000	Hosmer- Lemeshow chi2(8)	7.09
Pseudo R2	0.1736	Prob>chi2	0.5271

## 5.2 Survival Analysis

The survival analysis was done using the Cox proportional hazard model (Table 6). I set up the time variable as the time since venture setup date to either its failure or the end of the observation time (June 2018).

Firstly an analysis using the control variables was run (Model 1) showing as expected that both Funding and Cohort variable has some significant effects on Survival. Then I run the models sequentially with the independent variables (Model 2 to Model 6), resulting in significant results for the Radical Business Model Change variable which shows that hazard ratios are significantly below 1 (0.361 in Model 6) indicating that ventures that performed radical business model change had a greater survival rate. This is in line with the logistic regression results and further supports Hypothesis 1.

When the model of the survival analysis is run with interaction effects (Model 8), Functional Diversity moderates the positive effect of Business Model Change in Survival confirming the conclusion from the logistic regression that high functional diversity in teams has a negative effect on venture survival in the presence of Business Model Change.

The Knowledge Diversity (Management), when there is a combination of management and specialist knowledge, has no significant main effect. However, there is a positive moderating effect on survival in the presences of Business Model Change. This interaction effect supports the Hypothesis 3.a on the benefits of combining management knowledge with specialist-functional knowledge.

No significant main effects or interaction effects are detected on Knowledge Diversity (Entrepreneur) and Gender Diversity which points to the rejection of Hypothesis 3.b and 4. Finally Model 9 on this Cox Regression shows which includes only the significant interaction effects of Functional and Knowledge Diversity shows similar results to the Logistic analysis confirming Hypothesis 1, Hypothesis 2 and Hypothesis 3.a.

Table 6. Hazard Ratios in Survival Cox Regression Models – Dead (Non-Survival) as Dependent Variable

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Radical Business Model Change (RBMC)	---	0.365**	---	---	---	---	0.361**	0.241	0.177*
Functional Diversity	---	---	0.535	---	---	---	0.515	0.378*	0.369*
Knowledge Diversity(Management)	---	---	---	0.776	---	---	0.837	1.219	1.286
Knowledge Diversity(Entrepreneurship)	---	---	---	---	1.600	---	1.713	1.862	---
Gender Diversity	---	---	---	---	---	0.604	0.702	0.719	---
Interaction RBMC x Functional Diversity	---	---	---	---	---	---	---	82.55**	54.51**
Interaction RBMC x Knowledge Diversity(Mgmt.)	---	---	---	---	---	---	---	0.005*	0.006*
Interaction RBMC x Knowledge Diversity(Entrepr.)	---	---	---	---	---	---	---	0.319	---
Interaction RBMC x Gender Diversity	---	---	---	---	---	---	---	0.307	---
Number of Founders	0.817	0.833	0.915	0.829	0.809	0.833	0.955	0.948	0.946
Education Level	0.897	0.932	0.901	0.908	0.907	0.906	0.968	0.974	0.930
Funding	0.398**	0.407**	0.395**	0.404**	0.393**	0.396**	0.397**	0.394**	0.404**
Business Category	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Cohort	0.938**	0.929**	0.934**	0.941**	0.937	0.939**	0.924**	0.917**	0.918**

\*Significant at 0.05 level; \*\* Significant at 0.01 level

(1) Business Category is a categorical variable

## **CHAPTER 6: ADDITIONAL ANALYSIS**

### **6.1 Survival, Employee Base and Business Model Change**

The most important factor for new ventures in its early development is survival. As time progresses and the venture is still in its infancy, survival allows the startup to gather valuable information, important execution knowledge and much needed resources. The analysis carried out in this dissertation is thus based on exploring how radical business change affects the survival dependent variable. The analysis seems to back the conclusion that new ventures that performed radical business model change had greater survival odds that does that persisted in the initial business model.

However, the choice of dependent variable may also raise an issue on the potential scenario where new ventures that have performed a radical business model change are growing less than those that did not change radically or have even remain as a dormant entity with little or no activity. In order to address this potential issue a further analysis has been conducted on the size of the ventures that have survived comparing those that have change radically their business model to those that have not changed.

As a proxy to size, I have used here the number of employees of each new venture. As mentioned in the methodology most firms in the data base are active in professional social networks (i.e., LinkedIn) and provide in these networks the size of their employee base.

This further analysis excludes the firms in the database that have been acquired or have not survived. This is not only because of the lack of data in terms of employee base but also because the final reasoning on this

additional analysis is to rule out the issue of the different size of those companies that have survived.

In order to carry out the additional analysis I have collected the number of employees of each firm in LinkedIn as well as the self-reported employee base range that the firms provide in LinkedIn. This allows for a comparison of the employee base of two samples: the firms that have radically changed and those that have not.

The breakdown of the different ranges of the employee base of the ventures in the two samples is quite similar with higher presence in the ranges with more employees in those startups that had radically changed their business model.

The average employee base is similar in both samples with again a slightly higher employee base in the case of the ventures that have performed a radical business model change.

Table 7. Employee Base Range and Average

Employee Range	Business Model Change	%	No Business Model Change	%
1-10	18	29.5%	138	40.1%
11-50	33	54.1%	166	48.3%
>50	10	16.4%	50	14.5%
Total	61		344	
Average Employees	31.8		29.9	

The employee distribution shows similar shape in both samples. The distribution is heavily skewed to the left due to the larger number of new ventures which have logically a relatively low number of employees:

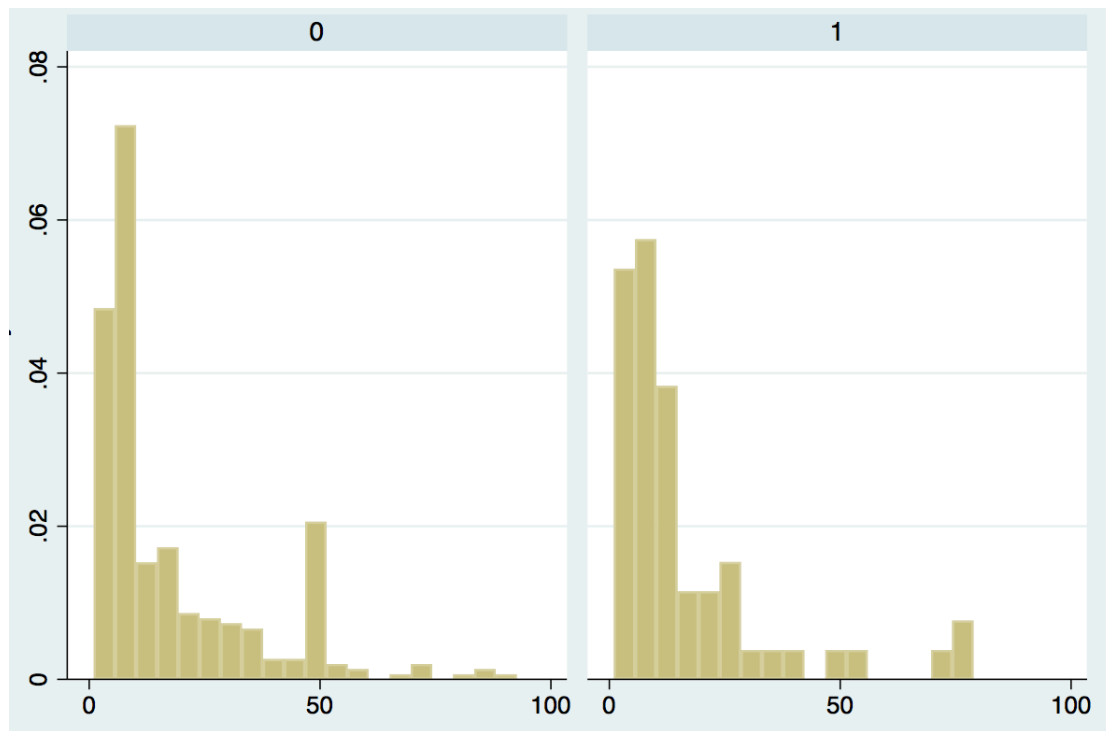


Table 9: Employee base measures in number of employees for ventures that have not experienced radical business model change (0) and those that have (1). Outliers above 100 not represented.

Since the distributions are similar but not normally distributed, I used the Kruskal-Wallis H test. The Kruskal-Wallis H is a nonparametric test used to determine if there are statistically significant differences between two or more groups of an independent variable on a continuous dependent variable.

The results of the test indicate that we cannot reject the null hypothesis and that there is no statistically significant difference between the two groups.

Table 9. Kruskal-Wallis Equality-of-Populations Rank Test

Change Business Model	Observations	Rank Sum
0	344	138
1	61	166

Chi-Squared= 0.014 with 1d.f.  
 Probality= 0.9055  
 Chi-Squared with ties= 0.014 with 1d.f.  
 Probality= 0.9053

A regression analysis has also been run (Results in Table 10 below) to determine if there is a negative or positive relationship between the variable Business Model Change and the dependent variable Employee Base Range.

I used the same control variables used in the logistic regression analysis of the main hypotheses. As expected, the number of founders and the funding control variables show significant positive relationship with the number of employees while the cohort shows a negative significant relationship (the earlier the cohort, the more employees the venture has).

However, the results show no significant relationship either positive or negative between the Business Model Change variable and the number of employees. This is consistent with the previous analysis comparing the two samples of ventures (with and without business radical change) which showed no significant difference between them.

Table 10: Regression Number of Employees - Business Model Change

Source	SS	df	MS	Number of obs	=	405
Model	277181.485	14	19798.6775	F(14, 390)	=	3.54
Residual	2178827.62	390	5586.73748	Prob > F	=	0.0000
				R-squared	=	0.1129
				Adj R-squared	=	0.0810
Total	2456009.1	404	6079.23045	Root MSE	=	74.744

NumberEmployee~s	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
EducationNum	.508483	4.761086	0.11	0.915	-8.852123 9.869089
1.Funding	20.28824	7.765447	2.61	0.009	5.020867 35.55562
BizCategory					
2	-24.5036	14.1853	-1.73	0.085	-52.39282 3.385619
3	-33.52443	17.30901	-1.94	0.053	-67.55507 .5062066
4	-24.68721	14.59514	-1.69	0.092	-53.38221 4.007799
5	-29.15037	19.24513	-1.51	0.131	-66.98755 8.686816
6	-28.61881	18.14711	-1.58	0.116	-64.29721 7.059588
7	-31.13716	20.16322	-1.54	0.123	-70.77938 8.505057
8	-13.33289	16.2677	-0.82	0.413	-45.31624 18.65047
9	-21.88996	15.96229	-1.37	0.171	-53.27286 9.492935
10	-25.94001	11.33033	-2.29	0.023	-48.21617 -3.663848
Cohort	-2.805829	.7113931	-3.94	0.000	-4.204475 -1.407184
ChangeBmodelnum1	-10.63171	10.79719	-0.98	0.325	-31.85969 10.59627
FounderNum1	16.14773	4.488292	3.60	0.000	7.323454 24.972
_cons	41.8216	23.12882	1.81	0.071	-3.651163 87.29436

## 6.2 Conclusions on the Additional Analysis

The addition analysis on the Employee Base of the ventures that have survived shows no relationship between radical business model change and the employee base of the startups. This means that radical business model change is not either a negative or positive significant factor in the number of employees. In fact, there is no significant difference between the number of employees for the ventures that have radically change their business model and those ventures that have not experienced that change. Thus, there is no reason to believe the startups that carried out radical business model change

have less employees and, consequently, are not different or more “dormant“ that the ventures that did not pursue a radical business model change.

This conclusion reinforces the choice of survival as the dependent variable in this context of studying the influence of radical business model change in new ventures as it allows to look at the primary success factor for startups in their early stages (survival).

## **CHAPTER 7. CONCLUSIONS**

### **7.1 Contributions**

In this dissertation I have analysed the theoretical underpinnings of radical business model change and looked into the effect of founder composition in the adoption and execution of radical business model change. From an academic point of view, this research contributes to the existing literature by linking 'pivot', an interesting phenomena encountered by practitioners, with team composition and how the latter may influence the strategic flexibility of new ventures to carry out radical business model change. This paper extends the new venture team and business model change literature and shows some interesting conclusions on the effects of founder team composition on the ability to execute radical business model change. The dissertation also has important findings for practitioners, especially those involved in the startup ecosystem.

The analysis indicates there is a significant relationship between the radical business model change and venture survival. As the logistic regression and the survival analysis results show, survival ratios from ventures that have change radically their business model are significant higher, pointing to the importance of adaptation through radical business model change. According to the analysis, persistence in executing the initial business model in a early venture context may lead to a lower survival ratio. A plausible explanation of this finding is that the process of launching and managing a venture opens new opportunity paths and business model alternatives that were not previously detected by the team. The limited information accessible to the venture's founders in the ideation phase about the target market and customers can produce false impressions about the size and feasibility of the initial opportunity. Once new knowledge is acquired, flexibility to do a radical

business model change may avoid failure. This is in line with existing research on the importance of business model agility and renewal highlighted in previous literature (Doz & Kosonen, 2010; Zott & Amit, 2010).

This is an interesting finding for practitioners as it indicates that a persistence to execute the initial business model of the venture once it has not yielded the expected results may result in a higher failure rate than changing completely the business model. The initial business plan must be corroborated by the market and targeted customers, otherwise it is better to change radically the venture's business model. The initial business concept could be viewed as a data gathering exercise in order for the team to make more informed decisions. This conclusion is in line with the effectuation model versus the causation model (Sarasvathy, 2001) where entrepreneurs make-do with the existing resources and information instead of sticking to a pre-conceived business model.

The analysis shows also an interaction effect between the founders team's functional diversity and radical business model change indicating that, although a change in business model decreases odds of failure, this relationship is negatively moderated by the functional diversity of the team, meaning that when a business model change is performed by a team with high functional diversity, the odds of failure increases. This shows how the composition of the founder team, as main decision-maker in the venture, has a key effect on the firm's ability to change its business model in order to adapt and survive (Fern et al., 2012).

This finding suggests that a team with high functional diversity may experience issues to execute effectively radical change like lack of cohesion and conflict between members. Functional diversity is beneficial when task-conflict adds different perspectives but in a difficult and uncertain situation -

like the one a venture team has to confront when changing radically its business model - a fluid communication and cohesion may be more important than task diversity.

This negative aspect of functional diversity has to be taken into account by founders when they gather and put together their co-founders' team. It may result that too much functional diversity detracts from survival probability under stressful situation as a radical change. A cohesive founder team may be of more importance than technical knowledge diversity in certain scenarios where velocity in decision making and consistent behaviour in executing is needed.

The findings in Knowledge Diversity (Management) are also in line with the presented hypothesis. A balanced team with management and specialist knowledge has an ability to produce structured knowledge that is key in radical business model change. The different perspectives from functional knowledge can more easily converged into valuable decision making with the help of generalist management knowledge.

The effect of this convergence does not show in our analysis of the Knowledge Diversity (Entrepreneurial) variable, rejecting our hypothesis that balance between entrepreneurial and specialist knowledge moderates positively radical business model change. According to this analysis, serial entrepreneurs will not bring the consistence and coherence needed to make good use of the team specialist knowledge. This may be due to the different integration capabilities of management versus entrepreneurial knowledge. While serial entrepreneurs are risk-takers and have self-imposing attitudes, managers have more integration and synthesis abilities.

The Knowledge Diversity results may have an interesting reading for founders as it seem to indicate that the presence of managerial experience in the team may have a significant impact in venture survival under circumstances that force the venture to radically change. The technology startup ecosystem values highly the entrepreneurial experience of founders but it is quite skeptic on the added value of management capabilities. The results of this analysis seem to indicate that the combination of managerial and specialist expertise brings benefits to the venture in scenarios like a radical business model change.

Gender diversity has not yield any significant effect on the analysis which points to the rejection of the hypothesis that a balanced combination of genders in the team will bring capabilities to produced structured knowledge in uncertain situations like a radical business model process. This is a finding that does not confirm the theoretical development of recent research (Dai et al., 2019) that found a contribution of gender diversity in knowledge convergence in teams with functional experience. The results are also non significant in the case of females presence. In this analysis, the percentage of females does not seem to have any significant effect in venture survival when the firm has to go through radical business model change.

The additional analysis on the new ventures that have survived shows that there is no main differences in employee base size between those companies that have performed a radical business model change and those ventures that have not change radically. The conclusion on this additional analysis shows that radically change does not necessarily affect the potential size of the ventures that survive.

## 7.2 Limitations

There are some limitations in the study carried out in this dissertation.

Firstly, the analysis looks into new ventures that are technology related. Radical business model change maybe more predominant or different in high velocity sectors (George & Bock, 2011) compared to more traditional ones. New ventures that develop products based on technology are intensive on human resources and knowledge but less dependant on hard assets. Large investments in fixed assets could be an obstacle to implement radical business model change both from a practical point of view as well as from a sunk costs perspective.

Secondly, the sample under study is composed of startups that went through an acceleration program. New ventures in this environment may have a higher propensity to change during their early stages as a result of the application of 'lean startup' and experimentation methodologies accepted as best practices in the startup community. In turn the participation in the acceleration program may have given access to the startups to mentoring and other valuable resources that make these new ventures better equipped to confront successfully radical business model change.

Thirdly, other external variables outside the founder team may influence the propensity or ability to change radically. New ventures may be subject to the influence of other stakeholders. In particular, external shareholders like angel investors or venture capitalists may have an interest to deter or to promote a pivot by the startups in question depending on their risk appetite and profile. The analysis in this dissertation does not extend to these potential influences.

### **7.3 Future Research**

Future research may investigate these issues on the influence of founders team background and radical business change. It would be interesting to investigate the radical business model change as a process within the existing literature on opportunity recognition and strategic definition. This can lead to a better understanding of how radical change process is performed by entrepreneurial teams and how they manage the motivation, information and stakeholders backing to perform these difficult changes.

It might be also an interesting topic to look into radical business change in the context of established firms and organisations. Although few establish firms contemplate radical change due to the difficulty of shedding existing resources, the effect of new disruptive technologies is prompting the disappearance of established companies not suited for such a radical change in their business model. The relationship of top management team composition and the ability for radical change in larger organization should be an interesting point to start to understand how some larger organization manage to change radically while others cannot.

Finally, the influence of outsiders such as investors in the venture's pivot ability would be also an interesting research issue. As mentioned, investors, venture capitalists and angel investors may deter or support the founders' intention to pivot depending on their confidence in the team, knowledge of the industry or their risk profile.

## **CAPITULO 7. CONCLUSIONES**

### **7.1 Contribuciones**

En esta tesis he analizado las bases teóricas del cambio radical del modelo de negocio y he examinado el efecto de la composición del equipo de fundadores en la adopción y ejecución del cambio radical del modelo de negocio. Desde un punto de vista académico, esta investigación contribuye a las investigaciones académicas existentes analizando la relación del 'pivot', un fenómeno interesante al que se enfrentan los profesionales, con la composición del equipo de fundadores y como este último factor puede influir la flexibilidad estratégica de las startups para llevar a cabo un cambio radical del modelo de negocio. Este documento extiende las investigaciones académicas sobre cambio en el modelo de negocio y contiene algunas conclusiones interesantes sobre la composición del equipo de fundadores en la habilidad para ejecutar el cambio radical del modelo de negocio. La tesis tiene también importantes conclusiones para los profesionales, especialmente para aquellos involucrados en el ecosistema emprendedor.

El análisis indica que hay una relación significativa entre el cambio radical del modelo de negocio y la supervivencia de las startups. Tanto la regresión logística como el análisis de supervivencia muestran que los ratios de supervivencia de las startups que han cambiado radicalmente su modelo de negocio son significativamente más alto, indicando la importancia que tiene la adaptación a través de cambios radicales del modelo de negocio. De acuerdo con este análisis, la persistencia en ejecutar el modelo de negocio inicial, en el contexto de las startups que están en sus primeras fases, puede resultar en ratios de supervivencia más bajos. Una posible explicación de estos

resultados puede ser que el proceso de lanzar y gestionar una startup abre nuevas oportunidades y modelos de negocio alternativos que no habían sido previamente detectados por el equipo. La limitada información a la que tienen acceso los fundadores de la startup en la fase de ideas sobre el mercado y clientes objetivos puede producir falsas impresiones acerca del tamaño y la viabilidad de la oportunidad inicial considerada. Una vez nuevo conocimiento es adquirido, la flexibilidad para hacer un cambio radical del modelo de negocio puede evitar el fracaso. Esta conclusión está en línea con la importancia que investigaciones académicas previas dan a la agilidad y la renovación del modelo de negocio (Doz & Kosonen, 2010; Zott & Amit, 2010).

Esta conclusión es interesante también desde el punto de vista de los profesionales ya que indica que la persistencia en ejecutar el modelo de negocio inicial una vez la startup no obtiene los resultados esperados puede resultar paradójicamente en una probabilidad de fracaso mayor que si se cambia el modelo de negocio radicalmente. El plan inicial debe ser por tanto corroborado por el mercado y clientes objetivos, y si este no es el caso, es mejor según este análisis cambiar radicalmente el modelo de negocio de la startup. El concepto inicial de negocio tiene que ser visto como un ejercicio de recolección de datos para que el equipo tome decisiones con mayor información. Esta conclusión está en línea con el modelo emprendedor de 'effectuation' frente a 'causation' (Sarasvathy, 2001) en el que los emprendedores hacen lo posible con los recursos e información disponibles en lugar de centrarse solo al modelo de negocio preconcebido.

El análisis muestra también un efecto de interacción entre la diversidad funcional del equipo de fundadores y el cambio radical del modelo de negocio indicando que, aunque el cambio radical disminuye la probabilidad de fracaso, esta relación se modera negativamente por la diversidad funcional del equipo, es decir que si el cambio radical de modelo de negocio se lleva a cabo por un equipo con alta diversidad funcional, las posibilidades de fracaso

aumentan. La composición del equipo de fundadores, como principal agente decisorio en la startup, tiene por tanto un efecto fundamental en la habilidad de cambiar el modelo de negocio para adaptarse y sobrevivir (Fern et al., 2012).

Este resultado sugiere que un equipo con una diversidad funcional puede experimentar problemas para ejecutar de forma efectiva cambios radicales como por ejemplo la falta de cohesión y conflicto entre sus miembros. La diversidad funcional es beneficiosa cuando el conflicto en tareas añade diferentes perspectivas pero en una situación incierta y difícil - como la que experimenta un equipo que se enfrenta a un cambio radical de modelo de negocio - una comunicación fluida y cohesión en el equipo puede que sean más importantes que la diversidad de poder realizar tareas diferentes.

Este aspecto negativo de la diversidad funcional tiene que tomarse en cuenta por los fundadores cuando aglutinan y conforman su equipo de cofundadores. Puede resultar que una excesiva diversidad funcional disminuye la probabilidad de sobrevivir bajo situaciones estresantes como un cambio radical. Un equipo fundador cohesionado puede ser de mayor importancia que la diversidad de conocimiento técnico en determinados escenarios donde la velocidad en la toma de decisiones y el comportamiento consistente en la ejecución son necesarios.

Los resultados de la Diversidad de Conocimientos (Gestión) son también consistentes con las hipótesis presentadas. Un equipo balanceado con conocimiento especialista y de gestión tiene la habilidad de producir conocimiento estructurado que es clave en un cambio radical de modelo de negocio. Las diferentes perspectivas del conocimiento funcional pueden más fácilmente converger en un proceso valioso de toma de decisiones con la ayuda del conocimiento generalista de gestión.

El efecto de esta convergencia no se muestra en el análisis de la variable de la Diversidad de Conocimiento (Emprendedor), rechazando la hipótesis de que el equilibrio entre conocimiento emprendedor y conocimiento especialista modera positivamente el cambio radical del modelo de negocio. De acuerdo con este análisis, emprendedores en serie no aportarían la consistencia y coherencia necesaria para conseguir un buen uso del conocimiento especialista del equipo. Esto se puede deber a la diferente capacidad de integración del conocimiento de gestión frente al conocimiento de emprendurismo. Mientras que los emprendedores en serie son tomadores de riesgos con actitudes personales que se imponen al equipo, los gestores tiene mayor habilidad de integración y síntesis.

Los resultados sobre la Diversidad de Conocimiento podrían tener una lectura interesante para los fundadores ya que parecen indicar que la presencia de experiencia de gestión en el equipo puede tener un impacto significativo en la supervivencia de la startup en circunstancias donde sea necesario un cambio radical. El ecosistema de startups tecnológicas valora altamente la experiencia de emprendimiento de los fundadores pero es bastante escéptico en el valor añadido de las capacidades de gestión. El resultado de este análisis indica que la combinación de experiencia de gestión y de experiencia especialista trae beneficios a las startups en escenarios como el cambio radical del modelo de negocio.

El análisis de la variable Diversidad de Género no ha arrojado ningún efecto significativo lo que indica el rechazo de la hipótesis de que la combinación equilibrada de género en el equipo trae consigo capacidades que producen conocimiento estructurado en situaciones de incertidumbre como la de un cambio radical del modelo de negocio. Esto es un resultado que no confirma el desarrollo teórico de otras investigaciones académicas recientes (Dai et al., 2019) que encontraron una contribución de la diversidad de género en

equipos con diversidad funcional. Los resultados tampoco son significativos en cuanto a la presencia de mujeres en el equipo. En este análisis, el porcentaje de mujeres no parece tener un efecto significativo en la supervivencia de las startups cuando las compañías tienen que hacer un cambio radical de modelo de negocio.

El análisis adicional de las startups que han sobrevivido muestra que no hay diferencias importantes en la base de empleados que tienen las compañías que han hecho un cambio radical de modelo de negocio y aquellas que no han cambiado radical. La conclusión de este análisis adicional muestra que el cambio radical no influye necesariamente en el tamaño potencial de las startups que sobreviven.

## **7.2 Límites**

Hay ciertos límites en el estudio realizado en esta tesis.

Primero, el análisis se centra en startups que están relacionadas con la tecnología. El cambio de modelo de negocio puede ser más predominante o diferente en sectores altamente cambiantes (George & Bock, 2011) comparado con sectores más tradicionales. Startups que desarrollan sus productos basados en la tecnología son intensivos en recursos humanos y conocimiento pero menos dependientes en activos tangibles. Grandes inversiones en activos fijos pueden ser un obstáculo para implementar un cambio radical del modelo de negocio tanto desde un punto de vista práctico como desde el punto de vista de 'costes hundidos'.

En segundo lugar, la muestra del estudio está compuesta de startups que hicieron un programa de aceleración. Las startups en este entorno pueden tener una mayor propensión al cambio durante sus fases iniciales como

resultado de la aplicación de metodologías de experimentación y de 'lean startup' aceptadas como mejores prácticas en la comunidad de startups. A su vez la participación en programa de aceleración puede haber dado acceso a las startups a mentoring y otros recursos valiosos que pueden hacer que estas compañías estén mejor equipadas para afrontar de manera exitosa un cambio radical de modelo de negocio.

En tercer lugar, otras variables externas fuera del equipo fundador pueden influir en la propensión o habilidad a cambiar radicalmente. Las startups pueden estar sujetas a la influencia de otros agentes. En particular, accionistas como inversores 'angel' or empresas de capital riesgo pueden tener un interés que promueva u obstaculice un 'pivot' de la startup en cuestión dependiendo del apetito por el riesgo y el perfil del inversor. El análisis de esta tesis no se extiende a estudiar estas influencias.

### **7.3 Futuras Líneas de Investigación Académica**

Futuras líneas interesantes de investigación académica pueden analizar otras cuestiones relativas a los antecedentes del equipo fundador y el cambio radical del modelo de negocio. Sería interesante investigar el proceso del cambio radical de modelo de negocio dentro de la literatura existente sobre el reconocimiento de oportunidades y la definición estratégica. Esta línea puede llevar a entender mejor como se ejecuta el proceso de cambio radical por equipos emprendedores y como gestionan la motivación, la información y el respaldo de los diferentes 'stakeholders' para realizar estos difíciles cambios.

Podría ser una cuestión interesante también analizar el cambio radical de negocio en el contexto de compañías y organizaciones establecidas. Aunque pocas compañías establecidas consideran este tipo de cambios debido a la dificultad de deshacerse de recursos existentes, el efecto de tecnologías

disruptivas está provocando la desaparición de compañías establecidas que no están preparadas para tal cambio radical en su modelo de negocio. La relación de la composición de los principales equipos gestores y su habilidad para cambiar radicalmente el modelo de negocio es un punto inicial interesante para entender mejor como algunas organizaciones grandes gestionan bien el cambio radical mientras otras no.

Finalmente la influencia de agentes externos como inversores en la habilidad de la startup para llevar a cabo un 'pivot' sería un campo interesante a investigar. Como se ha comentado, los inversores, empresas de capital riesgo o inversores 'angel' pueden apoyar o impedir la intención de los fundadores a realizar un 'pivot' dependiendo de su confianza en el equipo, conocimiento la industria o su perfil de riesgo.

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