Chapter 4

Management Teams' Composition and Academic Spin-Offs' Entrepreneurial Orientation: A Theoretical Approach

Juan Pablo Diánez-González,
Mª del Carmen Camelo-Ordaz and
José Ruiz-Navarro

Additional information is available at the end of the chapter

http://dx.doi.org/10.5772/65270

Abstract

This chapter has been designed with the purpose of providing a theoretical approach regarding the influence of both the composition of academic spin-offs' management teams and the entrepreneurial orientation exhibited by such firms on the performance of academic spin-offs. To this end, we have drawn on the main theoretical premises of the upper echelon theory, and we have specifically focused on the impact exerted by the proportion of nonacademic managers within management teams, the heterogeneity of such teams with respect to the age and main educational area of their managers, as well as the potential mediating role of the entrepreneurial orientation. From the literature review carried out and the main arguments of the chapter will be expected a further empirical development.

Keywords: academic spin-offs, management team composition, nonacademic managers, upper echelon theory, management team age heterogeneity, management team educational heterogeneity

1. Introduction

Throughout the last few decades, the creation of academic spin-offs has gained critical importance as a consequence of the relevant role that these organizations develop in the transfer and commercialization of the knowledge generated in universities and of their

positive implications for the social and economic development of the context where they operate. Specifically, academic spin-offs facilitate the start-up of projects with a high component of tacit and specific knowledge, and therefore hard to transfer to the business context; they are an important source of income for universities and the founders; they constitute an important source of high-qualified employment; and they actively take part in the spreading of innovation and the creation of wealth [1–4]. All of this has led academic spin-offs to be considered, on the one hand, as a mechanism with a high potential to make profit, greater than the potential of the traditionally employed patent licenses, when it comes to transferring the knowledge generated in universities [5–7] and, on the other hand, as one of the main instruments to increase regional and national competitiveness [8, 9].

As a response to this increasing acknowledgment of the impact of academic spin-offs on the social and economic context, the authorities and policy-makers have started to develop diverse programs of support, to build infrastructures and to design investment strategies, with the purpose of encouraging the commercialization of the results of the research conducted in the university. Concurrently, and with the purpose of adapting to this new socioeconomic reality, universities have seen themselves equally forced to modify the roles and responsibilities they have traditionally developed, thus taking on, together with the traditional tasks of teaching and research, a third one, which consists of the direct contribution to innovation, social change, and territorial development [10].

In this new perception of the university, knowledge transfer plays an essential role within its functions and responsibilities [11]. In this context, in which the university faces the challenge of designing policies and actions that respond to the aim of satisfying the new relationship with its social environment, encouraging the creation of academic spin-offs, as a way of transferring the knowledge generated through research, has been found to be one of the main instruments used by universities.

Thus, as a consequence of the increasing acknowledgment of the role performed by academic spin-offs in the economic and social environment, and of the important encouragement provided by universities concerning their creation, it is possible to observe a considerable increase in the number of spin-offs that have been set up in the last few years. This increase, which has been seen firstly in the United States, has also reached, although later, the European context.

Concurrently, with the rise in setting up academic spin-offs, it has been noticed, in the last few years, an increasing interest from the scientific community in the analysis of the academic entrepreneurial phenomenon from different points of view [8, 12, 13]. In this sense, and taking as a reference the literature reviews by Rothaermel et al. [14] and Djokovic and Souitaris [15], it is possible to infer that the majority of these studies have been developed mainly at three different levels: *macro*-level (governmental), *meso*-level (university and support mechanisms), and *micro*-level (academic spin-off and founders).

Nevertheless, and despite this recent increase in the number of studies focused on the specific field of academic spin-offs, the review of the literature shows that it is at a rather emerging state. In this sense, it is possible to state the existence of some lines of research at an early stage,

http://dx.doi.org/10.5772/65270

offering interesting research opportunities. In particular, one of the fields that could require a greater effort from the scientific community is that of determining the factors of success and the main challenges faced by academic spin-offs throughout their creation and development [14]. In this sense, the factors that have traditionally been considered include, on the one hand, the role performed by universities and other institutions that belong to the academic environment, as providers of resources and promoters of intellectual property policies and strategies of support; on the other hand, the access to financial capital; and finally, diverse aspects related to academic spin-offs' human capital and social capital [3, 16, 17]. However, it is noteworthy the scarce attention that academics have paid to the analysis of both strategic behavior, in general, and more specifically, entrepreneurial behavior adopted by academic spin-offs, as a possible crucial factor of the success of these firms.

The exhibition of an entrepreneurial strategic orientation reflects the attitude of the organizations toward entrepreneurial decisions and actions [18, 19], and it is usually conceptualized through entrepreneurial orientation [18, 20]. This construct has been analyzed consistently from both a theoretical and an empirical perspective [21, 22], and it has been linked frequently to both the firms' success [23] and the encouragement of entrepreneurial activities [24]. This interest, however, has hardly reached the field of academic entrepreneurship, since there are few studies devoted to the analysis of the factors that foster the academic spin-offs' adoption of entrepreneurial orientation, or to the effect it has on the performance of the organizations [25, 26].

With the purpose of identifying the factors that could promote the exhibition of higher degrees of entrepreneurial orientation by academic spin-offs, this chapter puts its focus on the role exerted by the composition of academic spin-offs' management teams.

While it is true that previous literature has recognized that management teams can play an important role in the successful development of academic spin-offs [27–29], it is not less true that the research that analyzes the influence of the composition of academic spin-off management teams on academic spin-offs' development and success is quite limited when compared to the research carried out in other contexts (e.g., see [30–32]). Moreover, most of these contributions agree on two main aspects. First, there is a significant lack of research that takes into account the specific particularities of academic spin-offs' composition. In this vein, it is noteworthy the scarcity of works that specifically consider the impact exerted by the mixed presence of managers with nonacademic and academic backgrounds within management teams. Second, research has usually focused on examining the link between academic spin-off management teams' composition and financial and economic measures such as net cash flow or employment growth [28, 30]. Nonetheless, we should take into account the specific nature of academic spin-offs, and for this reason, it could have more sense to address the analysis toward the firm-level behavior, where the role of management teams has a greater influence. Specifically, the establishment of the focus on the entrepreneurial orientation exhibited by academic spin-offs may be particularly appropriate. This is due to the hostility, ambiguity, and extreme competitiveness that characterize the environments in which academic spin-offs usually operate. In such circumstances, previous literature has pointed out the relevance of adopting entrepreneurial behaviors by firms [25, 33, 34].

Drawing on the main premises of upper echelon theory [35], which posits that management teams exert a decisive influence on the strategic choices of their and consequently, on their performance [36], this chapter examines theoretically the potential influence of three specific compositional measures of academic spin-offs' management teams on the entrepreneurial orientation reported by such firms. To this respect, the presence of professional (nonacademic) managers, as well as the heterogeneity of management teams in terms of both age and educational backgrounds of their members, is specifically examined.

The chapter is structured as follows. In the next section, we delimit the concept of academic spin-off. The following section is devoted to present the theoretical arguments that sustain our propositions. Finally, the main contributions of the chapter are offered.

2. Academic spin-offs

The conceptualization of academic spin-offs has been the subject of intense debate, and it has also been the source of divergence and controversy in the academic entrepreneurship literature. The lack of an agreement on a definition has brought about the appearance of several problems when it comes to setting limits to the concept and as a result, on the one hand, the disagreement of various authors, bodies, or institutions when defining the criteria to classify a company as an academic spin-off and, on the other hand, the difficulty in achieving perfect accuracy when cross-checking the results from various studies [37].

The main differences and similarities are related to certain individuals being regarded as academic entrepreneurs because of the type of link they have with the source institution, and the knowledge or technology that form the base of the organization [37]. Regarding the first of these factors, some studies have taken into account academics, researchers, or PhD students only [38, 39], whereas others have also included students or graduates as potential founders of academic spin-offs [40, 41]. On the other hand, when considering the technological component, most of the studies have agreed on emphasizing technology as an essential component of academic spin-offs [38, 40, 42, 43], although they have not reached an agreement on the nature of the knowledge or the technology that must be transferred from the university.

The disparity of definitions and different approaches to the academic spin-off concept shows the complexity when it comes to properly setting limits to this type of company. That is why the proposal for a proper definition is necessary, in order to avoid vagueness and for it to help set the direction for this research.

Hence, for the purpose of this study, academic spin-offs are defined as a specific type of companies, which are set up either by researchers that belong to the university research groups or projects or by academics who are directly connected to the university, and based on the knowledge and/or technology developed at the core of the academic institution, in order to commercially exploit the findings of the research. In addition, by taking previous literature as a reference, it is possible to note a set of specific guidelines that help identify and differentiate academic spin-offs from other types of organizations. The guidelines are the following:

http://dx.doi.org/10.5772/65270

- *New company*: The spin-off must have the same legal structure a new company has. However, they will not be considered academic spin-offs those which arise from the transformation of existing companies or exceptional subcontracting agreements between universities and companies that operate in the markets.
- *Parent organization*: The new company must have emerged from a Spanish public university. With regard to this, they will not be regarded as academic spin-offs those which have been set up based on research developed in private universities, laboratories, or research institutes.
- *Knowledge and technology transfer*: The scientific knowledge marketed by the academic spin-off could include technological innovations, patents, and individual know-how. The transfer of that knowledge can be developed in various ways, such as the direct immersion of the researchers in the spin-off, the transfer of intellectual property through a sale, or through license agreements.
- *The aim of making profit*: The achievement of financial and economic performance must be one of the main objectives of the academic spin-offs, and consequently, nonprofit organizations are excluded of the consideration of academic spin-offs.
- *Social purpose*: One of the purposes of academic spin-offs is to contribute to the economic and social development of the regions, by turning the research findings generated in the university into useful products and services for society.

3. Entrepreneurial orientation and academic spin-offs' performance

Within the broad field of entrepreneurship, entrepreneurial orientation is considered as the sustained exhibition of firm-level entrepreneurial behavior [24]. Some researchers have highlighted that entrepreneurial orientation is closely linked to the strategic decision-making process [18, 44]. Particularly, the concept of entrepreneurial orientation makes reference to the strategic process by which organizations identify new opportunities and implement entrepreneurial actions [45] and specifically describes the firm's organizational autonomy, its willingness to take risks and to innovate, its competitive aggressiveness and proactive assertiveness [18, 25]. In this sense, autonomy is regarded as the degree to which the members of the organizations remain free to act independently, to make key decisions, and to pursue opportunities. On the other hand, risk taking makes reference to the firms' tendency to support projects with uncertain results. The willingness to innovate reflects the propensity of a firm to engage in new ideas and creative processes that may result in new products, services, or technological processes. Competitive aggressiveness concerns the organizations' tendency to challenge their competitors in order to enter new markets or to improve their position. Finally, being proactive is defined by adopting initiatives in advance, the pursuit of new business opportunities, and taking part in emerging markets [46].

Since the influential work by Miller [47], many studies have regarded entrepreneurial orientation as a core concept of the entrepreneurship literature and it has received a substantial

amount of theoretical and empirical attention [21, 22]. Scholars have highlighted the crucial role performed by this strategic orientation in the success of firms [23] as well as in the encouragement of entrepreneurial activities [24]. Entrepreneurial orientation has been studied predominantly through its connection to new firms' performance and has been proven consistently to be highly significant [19, 22, 48]. To this respect, previous research has shown that this relationship could be especially noteworthy in environments characterized by high levels of uncertainty, hostility, and technological sophistication, in which the constant search for new opportunities and the development of innovative actions are major challenges [33]. As Zahra and Covin [49] have noted, the firms that exhibit a proactive behavior could exert a significant control on the market. For its part, entrepreneurial orientation allows companies to think in an innovative way, which results in the exploration and launch of new products, the development of creative processes, the process of constant innovation, and ultimately, in the achievement of important benefits [50]. Similarly, the companies that report high levels of entrepreneurial orientation encourage autonomous behavior of their employees and management teams, which could result in a constant pursuit of new opportunities and, consequently, positive results for organizations [25]. Finally, entrepreneurial orientation also allows companies to take greater risks when carrying out their strategies and to more aggressively position their products and services in markets [22, 25]. These theoretical arguments have also been empirically supported by research. To this respect, the works of [19], [21] and [22] have demonstrated the positive impact of EO on performance or growth of firms operating in highly dynamic and competitive environments.

In the specific context of academic entrepreneurship, entrepreneurial orientation could play a particularly important role in the survival and successful development of academic spin-offs [25]. In this sense, these firms often operate in extremely dynamic and uncertain environments, in which they are often forced to develop their own markets as a result of the specificity and high technological content of the products and services offered [34]; challenge markets, companies, and established technologies in order to commercialize highly innovative products and services [25]; and protect their own innovations from other potential competitors that could try to imitate such innovations or even acquire the firms [25]. Moreover, the reduced size of the academic spin-offs [51] could also be a determining factor when considering the relevant role of entrepreneurial orientation for these companies. As Vanaelst et al. [52] point out, smaller organizations show greater flexibility in their strategies and actions, allowing them to adapt more easily to environmental changes and take advantage of new opportunities in the markets. In this sense, the meta-analysis conducted by Rauch et al. [22] showed that the influence of entrepreneurial orientation on firm performance is significantly higher in firms with fewer than 50 employees.

In view of these arguments, it seems reasonable to argue that the exhibition of high degrees of EO could result in an improvement in the academic spin-offs' performance. Nonetheless, the number of studies devoted to the analysis of this relationship in the context of academic spin-offs is extremely limited. Therefore, it is only possible to mention the analyses carried out by Walter et al. [25] and Tietz [26]. The first of these works examined the relationship between the EO reported by a sample of 149 German academic spin-offs and various performance meas-

http://dx.doi.org/10.5772/65270

ures. The results demonstrated the presence of a significant and positive relationship between the EO and the subjective view of managers about both the quality of the relationship maintained between the firm and the customers, and the achievement of competitive advantages. Meanwhile, Tietz [26] examined the individual impact of each of the dimensions of EO on the growth and profitability of a sample of 193 German academic spin-offs, although the results were not absolutely conclusive.

In view of the previously established arguments, the following proposition is formulated:

Proposition 1: There is a direct and positive relationship between entrepreneurial orientation and academic spin-offs´ performance.

4. The influence of the composition of academic spin-offs' management teams on entrepreneurial orientation

The management teams of academic spin-offs show some peculiarities that make them different from the teams of other startup companies, or from the top management teams of well-established companies, and also require them to be analyzed from a specific perspective. Some of these distinctive components stem from the background of the members of these teams, most of who come from the academic or research environment where the knowledge for the basis of the academic spin-off was created. Thus, diverse studies, such as the ones developed by Visintin and Pittino [32] and Clarysse and Moray [42], or Vanaelst et al. [52], have pointed out that, firstly, these academic entrepreneurs, who have been trained at the core of the university, usually stand out because of their knowledge and skills in the technological, scientific, or research context, but normally lack the necessary skills and experience to manage an entrepreneurial initiative properly and to lead their colleagues efficiently. In addition, the composition of these teams usually highlights because of its high degree of inherent homogeneity concerning educational and functional experience, and range of skills [30], which has been constantly reported by the literature as a burden for the performance of the firms and their adoption of entrepreneurial behaviors [30, 53, 54].

On the other hand, as Ensley and Hmieleski [30] notes, academic spin-offs usually experience two processes that affect the composition of their management teams: coercive isomorphism and mimetic isomorphism. The first one arises from the formal and informal pressures put on the firms by the organizations they depend on Guler et al. [55]. In this context, academic spin-offs could shape their teams depending on the policies and precepts of the universities, which could mean a redundancy of similar academic profiles in the core of the teams. On the other hand, mimetic isomorphism concerns the tendency of the firms to shape themselves by following the example of other organizations within their environment [56]. This process, which takes place especially when the goals and the environment are uncertain, could lead the organizations to create their own management teams by using as a reference the academic spin-offs within their environment, which could also bring about, as a consequence, an increase in the degree of homogeneity that these teams show in their composition.

Finally, another distinguishing feature that defines the management teams of academic spin-offs is the evolution they experience throughout time. This way, by bringing to the company external professionals or managers, the knowledge, skills, experience, and contacts that are necessary in order to reduce the shortcomings of academic entrepreneurs in issues related to business areas could be gained, and therefore the likelihood of success could be increased [32]. In this sense, some authors such as Clarysse and Moray [42] or Vanaelst et al. [52] have identified this process of change with the various stages that can be identified in the life cycle of academic spin-offs.

Taking into account these arguments, it seems reasonable to expect that the design of appropriate management teams becomes a relevant topic for the entrepreneurial development and success of academic spin-offs. In this vein, and considering the previously described features that surround the composition of academic spin-offs' management teams, the efforts of these firms should be focused on building management teams that are balanced in terms of scientific and business orientation [32]. Therefore, attracting professionals from business contexts, as well as members with diverse academic backgrounds, could provide academic spin-offs with prominent advantages, since management teams could substantially increase their levels of cognitive diversity and professionalism. In this vein, as previous literature has noted [57–59], firms with heterogeneous management teams could be more likely to report high levels of entrepreneurial orientation, since they have the ability to both consider a greater range of strategic options and take innovative and proactive strategic decisions.

4.1. The proportion of nonacademic managers within management teams and academic spin-offs' entrepreneurial orientation

Previous research has pointed out that the entry of nonacademic members in academic spin-offs' management teams could be beneficial for academic managers to help them obtain the stock of abilities, resources, and knowledge they usually lack [31, 42, 65]. Additionally, it is expected that the integration of individuals with previous entrepreneurial or management experiences could positively impact the adoption of entrepreneurial and proactive behaviors by academic spin-offs because outside managers could incorporate new entrepreneurial and business perspectives [52]. Some researchers have pointed out the relevance of the professionalization of management teams to help firms recognize and exploit entrepreneurial opportunities [66], enhance their degree of entrepreneurial behavior [67], and ultimately exhibit higher degrees of entrepreneurial orientation [68].

An additional argument could explain why the entry of nonacademic managers into management teams is expected to enhance an academic spin-offs' entrepreneurial orientation. The incorporation of managers with prior entrepreneurial or industrial experience could significantly increase the stock of human capital directly related to entrepreneurial attitudes, since such outside members may possess relevant abilities to recognize entrepreneurial opportunities [69] as well as high levels of entrepreneurial self-efficacy [70] as a result of knowledge and abilities acquired through work experience, networks, workshops, and specific training [71]. Relevant empirical studies have highlighted that both the ability to recognize opportunities and entrepreneurial self-efficacy are antecedents positively related to the development of

entrepreneurial behaviors and orientations [72, 73]. Therefore, the presence of nonacademic managers exhibiting prominent levels of these cognitive factors could influence the entrepreneurial orientation of academic spin-offs.

Taking into account these premises, we expect that counting with nonacademic managers within academic spin-offs' management teams with attitudes, knowledge, and experience related to the business world will positively impact the entrepreneurial orientation reported by academic spin-offs and ultimately, on the performance of such firms.

Consequently, the following proposition is formulated:

Proposition 2. Entrepreneurial orientation mediates the relationship between the proportion of nonacademic managers within academic spin-offs' management teams and academic spin-offs' performance.

4.2. Management team heterogeneity and entrepreneurial orientation

The heterogeneity of management teams has been frequently analyzed by previous literature, being traditionally described as the degree to which members of management teams differ with respect to certain traits such as education background, previous experience, gender, age, or tenure [36, 74].

Starting from the main upper echelon's premises, heterogeneous management teams could be more likely not only to consider a greater range of options, but also to make highly creative, innovative, and entrepreneurial strategic decisions [75, 76]. Moreover, heterogeneous teams have been shown to be more likely to manifest entrepreneurial and innovative behaviors and enter new product markets than homogeneous teams [67]. Consequently, heterogeneous management teams could be especially beneficial in management processes that require creative thinking, innovative decisions, and entrepreneurial attitudes [77, 78].

However, the positive influence of management teams' heterogeneity on the development of entrepreneurial orientation has not been consistently demonstrated. This is because the empirical evidence is scarce and not conclusive and is nonexistent in the specific context of ASOs. Some empirical evidences, such as Sciascia et al. [53], found a positive relationship between functional heterogeneity of family firms' management teams and entrepreneurial orientation. On the other hand, the study of Auh and Menguc [79], carried out in the context of manufacturing firms, reported that top management teams' functional heterogeneity negatively influenced the entrepreneurial orientation of such firms.

In this chapter, our focus is specifically on both age heterogeneity and educational heterogeneity, which have been traditionally noted as relevant predictors of the manifestation of entrepreneurial decisions and attitudes by firms [54]. Besides, and considering the expected predominance of academics and researchers within management teams, the analysis of other heterogeneity measures such as professional background heterogeneity or educational level heterogeneity could be meaningless. In this vein, previous researchers such as Bjørna°li [31] or Mosey and Wright [80] have pointed out the relevant impact of both age and educational heterogeneity in the context of ASOs. Therefore, we expect that ASO management teams with

broad perspectives and visions provided by managers with heterogeneous ages and educational backgrounds could significantly influence the strategic orientation reported by such firms.

4.2.1. Management team age heterogeneity and entrepreneurial orientation

Previous literature has frequently pointed out the relevance of the age of management teams' members as a relevant demographic variable affecting firms' decisional processes [35]. However, when analyzing the effects of the heterogeneity of management teams' age on both entrepreneurial behaviors and firms' performance, it is possible to find conflicting arguments and nonconclusive empirical results [81].

On the one hand, management teams could benefit from having managers with a broad range of ages because age heterogeneity within management teams reflects a varied set of experiences, perspectives, belief systems, affiliations, and social ties [31] that can increase the variety of perspectives on strategic issues facing firms [81]. The underlying assumption is that differences in age reflect an important variety of cognitive resources as a result of the multifaceted experiences and backgrounds of individuals who have lived in different social, political, and economic settings [82]. This breadth of perspectives enhances cognitive information processing and allows teams to be more effective in solving complex and nonroutine problems, as well as addressing strategic issues and the challenges imposed by turbulent environments [83–85]. The teams could develop higher abilities to search entrepreneurial opportunities through the employment of the broadmindedness provided by heterogeneous management teams in terms of ages [86]. Similarly, they could respond more effectively the environmental demands [87]; identify the need for changes in strategic orientation [82]; and, ultimately, provide academic spin-offs, the appropriate entrepreneurial orientation for developing innovative and proactive behaviors with the potential for contributing positively to firms' performance.

However, the literature is not entirely conclusive to this respect, since some studies have found null or negative effects of diverse management team ages on both entrepreneurial orientation and firms' performance. In this vein, Bantel and Jackson [88] and Coff [89] were not found a significant relationship between management team age heterogeneity and innovative performance, whereas Olson et al. [90] reported a negative relationship between such variables. For this part, Wiersema and Bantel [81], Naranjo-Gil and Hartmann [82], and Wu et al. [91] were not able to demonstrate the existence of a significant relationship between management team age heterogeneity and the adoption of an entrepreneurial strategy by firms.

The argument traditionally employed for explaining these controversial findings is the emergence of relationship conflicts as a result of age heterogeneity [90, 91]. Previous literature has argued that heterogeneity based on relatively impermeable attributes such as race, gender, or age is more likely to cause a pernicious conflict through the tendency of team members to sort each other into different social categories [92]. This tendency may have its origin in the differences in values, attitudes, and perspectives reported by team members with diverse ranges of ages. In this vein, previous literature has noted that younger managers are usually

http://dx.doi.org/10.5772/65270

more risk-oriented, may have less commitment to the status quo, and therefore may be more willing to undertake novel and entrepreneurial strategies [35, 81, 93]. Moreover, it is generally accepted that as people grow older, they become less flexible with regard to change and tend to take fewer risks [94].

In light of these arguments, it seems reasonable to propose the existence of a mediation relationship between management team age heterogeneity, entrepreneurial orientation, and firms' performance. In the specific context of academic spin-offs, management team age heterogeneity may be a relevant predictor of entrepreneurial orientation. However, as a result of the potential emergence of pernicious levels of conflict within management teams that such heterogeneity could provoke [60–64], we suggest that the impact of age heterogeneity on entrepreneurial orientation would be negative and consequently, that academic spin-offs' performance would be hindered.

Therefore, the following proposition is established:

Proposition 3. Entrepreneurial orientation mediates the relationship between management team age heterogeneity and academic spin-offs' performance.

4.2.2. Management team educational heterogeneity and entrepreneurial orientation

Educational heterogeneity can be defined as the extent to which management team members have received training in different academic fields [30]. In this chapter, we put our focus on team members' academic disciplines because it is expected that, as a result of their academic origins, members of management teams of academic spin-offs possess high and similar levels of academic degrees.

A number of empirical studies carried out in different contexts have pointed to the positive impact of management teams' educational heterogeneity on both firms' performance [30, 54, 95] and firm-level behavior [54, 81, 82]. This research has relied on the consideration of educational heterogeneity as a task-related heterogeneity, which may be particularly beneficial for firms. Specifically, this positive impact has been attributed to the task conflict emerged from such heterogeneity [92]. Therefore, management teams with high degrees of cognitive diversity could be highly likely to experience task conflict, which could promote the exchange of ideas, debate among members, the synthesis of diverse perspectives into balanced and well-reasoned decisions, and the effective identification and creative exploitation of opportunities [53, 96].

In spite of its potential beneficial effects, some research has shown that educational heterogeneity can be detrimental and, consequently, that the aforementioned positive effects could be hindered. In this sense, it is possible to find both null effects [97] and negative effects [98]. The limited research in the academic spin-off context reveals the same nonconclusive results. Visintin and Pittino [99] found that the educational heterogeneity of academic spin-offs' management teams was negatively related to employment growth. Ensley and Hmieleski [30] was not able to demonstrate the influence of management teams' educational heterogeneity on firms' net cash flow and Müller [28] found a null impact of educational heterogeneity on academic spin-offs' employment growth.

In an attempt to explain the controversy of previous empirical evidence, some researchers have noted the task conflict emerged from higher educational diversity as the reason of the existence of such counter-productive effects. In this vein, task conflict and dysfunctional conflict have been found to be strongly and positively correlated, in such a way that the relation is more intense when the level of conflict within management teams increases [96]. Some researchers have shown that when task conflict and dysfunctional conflict are examined simultaneously, the effect of task conflict beyond dysfunctional conflict is weak or nonexistent [100, 101], and consequently, the beneficial effects of task conflict could be completely nullified by high levels of dysfunctional conflict [102].

Therefore, we consider that a mediation relationship exists between management team educational heterogeneity, entrepreneurial orientation, and academic spin-offs' performance. We hold that educational heterogeneity is necessary and beneficial to the development of entrepreneurial orientation. Nonetheless, as educational heterogeneity may result in the emergence of high levels of conflict, we suggest that academic spin-offs' performance could be affected positively and negatively by the degree of entrepreneurial orientation exhibited by firms.

Proposition 4. Entrepreneurial orientation mediates the relationship between educational team age heterogeneity and academic spin-offs' performance.

4.3. Theoretical model

The previously formulated propositions can be graphically summarized in the following conceptual model, which is described in **Figure 1**. As we suggested, Proposition 1 notes the existence of a positive relationship between the entrepreneurial orientation reported by academic spin-offs and its performance, while Propositions 2–4 point out the mediating role of entrepreneurial orientation in the relationships between the proportion of nonacademic managers (Proposition 2); the management team age heterogeneity (Proposition 3); the management team educational heterogeneity (Proposition 4); and academic spin-offs' performance.

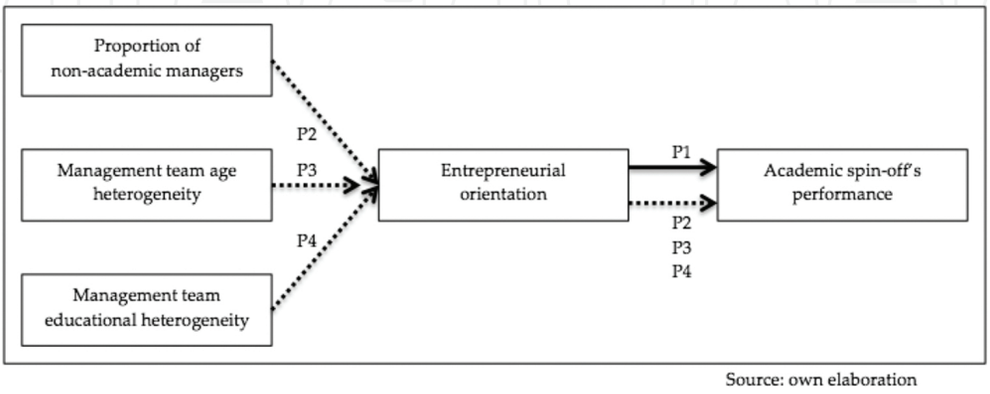

Figure 1. Conceptual model.

http://dx.doi.org/10.5772/65270

5. Conclusion

The creation of academic spin-offs is one of the major mechanisms of transfer of technology and knowledge from universities to society, and moreover, it is an important source of wealth creation for its environment. For this, academic spin-offs are being subject of increasing interest, both from governmental and from academic institutions. However, in spite of this rising importance, academic spin-offs have not been analyzed intensely in the literature yet and previous studios have not been able to demonstrate the influence of certain factors on the success of such firms.

In an attempt to fill this gap and drawing on the crucial role that the composition of management teams and entrepreneurial orientation could exert on the performance of academic spin-offs, the aim of this chapter has been focused on proposing a theoretical framework for analyzing the relationships that could exist between the composition of academic spin-offs' management teams, the entrepreneurial orientation reported by such firms, and its performance.

Our chapter contributes to the upper echelon and entrepreneurship literature in different ways. Firstly, our theoretical approach may contribute to clarify the existing debate in the entrepreneurship literature regarding the factors that limit the development of academic spin-offs. To this respect, we highlight the relevance of taking into account the specific and idiosyncratic composition of their management teams in order to analyze the entrepreneurial behavior of academic spin-offs and their latter performance. Secondly, we extend the scope of upper echelon perspective. Most research that is based on the main premises of this theoretical framework is traditionally focused on established firms' top management teams [54, 103] and more recently, on new ventures' management teams [98, 104]. However, our chapter could be considered as one of the first attempts of considering the specific nature of academic spin-offs through the lens of upper echelon theory.

Equally, our chapter could provide some important practical implications to academic spin-offs' management teams. In general terms, our arguments could lead to reflect about the convenience of designing balanced management teams in terms of scientific and business profiles, in order to both enhance academic spin-offs' entrepreneurial orientation and channelize such strategic orientation on higher performance. To this respect, academic members could be forced to change their traditional isomorphic orientation and address their efforts toward the incorporation of other management team members with complementary attitudes, values, knowledge, and experiences, who may provide a broad range of innovative and entrepreneurial perspectives and ideas. At this point, the role of some university institutions such as technology transfer offices (TTOs) or technological parks could be crucial, since such units are more closely linked to business contexts and therefore, they could provide academic spin-offs with the tools and contacts for attracting valuable outside professionals. However, academic managers could be conscious that the presence of managers with diverse values and profiles could have some pernicious consequences on management teams' internal dynamics, in such a way that it could be recommendable the development of appropriate contexts of

debates and exchanges of ideas, in which the emergence of proactive and innovative points of views could be facilitated.

Finally, this chapter could be considered as the starting point for further research. To this respect and with the purpose to check the validity of our arguments, the following step should be the empirical development of the propositions formulated. Moreover, it would be interesting to expand the further focus of the research and extrapolate the potential results obtained to academic spin-offs of different regions and countries. This could allow us to corroborate the potential impact of the national culture and institutional factors on the theorized relations. Lastly, and drawing on previous research that analyzes academic spin-offs under the lens of the perspective of life cycle stage [52], a possible further research line could aim to identify academic spin-offs' differentiated behaviors depending on whether academic spin-offs are recently established or are consolidated in markets.

Acknowledgements

The authors appreciate financial support from the Spanish Ministry of Science and Technology Project ECO2015-67721-P.

Author details

Juan Pablo Diánez-González*, Mª del Carmen Camelo-Ordaz and José Ruiz-Navarro

*Address all correspondence to: juanpablo.dianez@uca.es

Faculty of Economics and Business, University of Cádiz, Cádiz, Spain

References

[1] Breznitz SM, Anderson W. Boston metropolitan area biotechnology cluster. Canadian Journal of Regional Science. 2006;28(2):249–264.

[2] Clarysse B, Wright M, Lockett A, Van de Velde E, Vohora A. Spinning out new ventures: a typology of incubation strategies from European research institutions. Journal of Business venturing. 2005;20(2):183–216.

[3] Di Gregorio D, Shane S. Why do some universities generate more start-ups than others?. Research Policy. 2003;32(2):209–227.

[4] O'Shea RP, Allen TJ, Chevalier, A, Roche, F. Entrepreneurial orientation, technology transfer and spinoff performance of US universities. Research Policy, 2005; 34(7):994–1009.

[5] Lambert R. Lambert review of business-university collaboration: Final report. University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship; 2003.

[6] Bray MJ, Lee, JN. University revenues from technology transfer: Licensing fees vs. equity positions. Journal of Business Venturing. 2000;15(5):385–392.

[7] Rogers EM, Yin J, Hoffmann J. Assessing the effectiveness of technology transfer offices at US research universities. The Journal of the Association of University Technology Managers. 2000;12(1):47–80.

[8] Shane S. Encouraging university entrepreneurship: the effect of the Bayh-Dole act on university patenting in the United States. Journal of Business Venturing. 2004;19(1):127–151.

[9] Slater SF, Mohr JJ. Successful development and commercialization of technological innovation: insights based on strategy type. Journal of Product Innovation Management. 2006; 23(1):26–33.

[10] Etzkowitz H. The norms of entrepreneurial science: cognitive effects of the new university–industry linkages. Research Policy. 1998;27(8):823–833.

[11] Etzkowitz H, Webster A, Gebhardt C, Terra BRC. The future of the university and the university of the future: evolution of ivory tower to entrepreneurial paradigm. Research Policy. 2000;29(2):313–330.

[12] Mustar P, Renault M, Colombo MG, Piva E, Fontes M, Lockett A, Moray N. Conceptualising the heterogeneity of research-based spin-offs: A multidimensional taxonomy. Research Policy. 2006;35(2):289–308.

[13] Wright M, Clarysse B, Mustar P, Lockett A. Academic Entrepreneurship in Europe. Edward Elgar Publishing: Cheltenham, U.K.; 2007.

[14] Rothaermel FT, Agung SD, Jiang L. University entrepreneurship: a taxonomy of the literature. Industrial and Corporate Change. 2007;16(4):691–791.

[15] Djokovic D, Souitaris V. Spinouts from academic institutions: a literature review with suggestions for further research. Journal of Technology Transfer. 2008;33(3): 225–247.

[16] Lockett A, Wright M, Franklin S. Technology transfer and universities' spin-out strategies. Small Business Economics. 2003;20(2):185–200.

[17] Shane S, Stuart T. Organizational endowments and the performance of university start-ups. Management Science. 2002;48(1):154–170.

[18] Lumpkin GT, Dess GG. Clarifying the entrepreneurial orientation construct and linking it to performance. Academy of Management Review. 1996;21(1):135–172.

[19] Wiklund J, Shepherd D. Knowledge-based resources, entrepreneurial orientation, and the performance of small and medium-sized businesses. Strategic Management Journal. 2003;24(13):1307–1314.

[20] Jogaratnam G, Ching-Yick Tse E. Entrepreneurial orientation and the structuring of organizations: performance evidence from the Asian hotel industry. International Journal of Contemporary Hospitality Management. 2006;18(6):454–468.

[21] Covin JG, Green KM, Slevin DP. Strategic process effects on the entrepreneurial orientation—Sales growth rate relationships. Entrepreneurship Theory and Practice. 2006;30(1):57–81.

[22] Rauch A, Wiklund J, Lumpkin GT, Frese M. Entrepreneurial orientation and business performance: an assessment of past research and suggestions for the future. Entrepreneurship Theory and Practice. 2009;33(3):761–787.

[23] Wang CL. Entrepreneurial orientation, learning orientation and firm performance. Entrepreneurship, Theory and Practice. 2008;32(4):635–657.

[24] Covin JG, Lumpkin GT. Entrepreneurial orientation theory and research: Reflections on a needed construct. Entrepreneurship: Theory and Practice. 2011;35(5):855–872.

[25] Walter A, Auer M, Ritter T. The impact of network capabilities and entrepreneurial orientation on university spin–off performance. Journal of Business Venturing. 2006;21(4):541–567.

[26] Tietz R. Executive Teams in Research–based Spin–off Companies: An Empirical Analysis of Executive Team Characteristics, Strategy, and Performance. Springer: St. Gallen, Switzerland; 2013.

[27] Heirman A, Clarysse B. How and why do research-based start-ups differ at founding? A resource-based configurational perspective. The Journal of Technology Transfer. 2004;29:247–268.

[28] Müller B. Human capital and successful academic spin-off. ZEW Discussion Paper. 2006;06/14;06–81.

[29] Mustar P, Wright M, Clarysse B. University spin-off firms: Lessons from ten years of experience in Europe. Science and Public Policy. 2008;35(2):67–80.

[30] Ensley MD, Hmieleski KM. A comparative study of new venture top management team composition, dynamics and performance between university-based and independent tart ups. Research Policy. 2005;34(7):1091–1105.

[31] Bjørnåli ES. Board of directors, top management team and the development of academic spin-off companies. Norwegian University of Science and Technology: Trondheim; 2009.

[32] Visintin F, Pittino D. Founding team composition and early performance of university-based spin-off companies. Technovation. 2014;34(1):31–43.

[33] Covin JG, Slevin DP. Adherence to plans, risk taking, and environment as predictors of firm growth. Journal of High Technology Management Research. 1998;9(2):207–237.

[34] Pérez MP, Sánchez AM. The development of university spin-offs. Early dynamics of technology transfer and networking. Technovation. 2003;23(10):823–831.

[35] Hambrick DC, Mason PA. Upper echelons: The organization as a reflection of its top managers. Academy of Management Review. 1984; 9(2):193–206.

[36] Finkelstein S, Hambrick DC. Strategic Leadership. St. Paul, Minn.: West; 1996.

[37] Pirnay F, Surlemont B. Toward a typology of university spin-offs. Small Business Economics. 2003;21(4):355–369.

[38] Carayannis EG, Rogers EM, Kurihara K, Allbritton MM. High-technology spin-offs from government R&D laboratories and research universities. Technovation. 1998;18(1):1–11.

[39] Steffensen M, Rogers EM, Speakman K. Spin-offs from research centers at a research university. Journal of Business Venturing. 2000;15(1):93–111.

[40] Smilor RW, Gibson DV, Dietrich GB. University spin-out companies: technology start-ups from UT-Austin. Journal of Business Venturing. 1990;5(1):63–76.

[41] Rappert B, Webster A, Charles D. Making sense of diversity and reluctance: academic–industrial relations and intellectual property. Research Policy. 1999;28(7):873–890.

[42] Clarysse B, Moray N. A process study of entrepreneurial team formation: the case of a research-based spin-off. Journal of Business Venturing. 2004;19(1):55–79.

[43] De Coster R, Butler C. Assessment of proposals for new technology ventures in the UK: characteristics of university spin-off companies. Technovation. 2005;25(5):535–543.

[44] Naman JL, Slevin DP. Entrepreneurship and the concept of fit: A model and empirical tests. Strategic Management Journal. 1993;14:137–153.

[45] Dess GG, Lumpkin GT. The role of entrepreneurial orientation in stimulating effective corporate entrepreneurship. Academy of Management Executive. 2005;19:147–156.

[46] Miller D, Friesen P. Innovation in conservative and entrepreneurial firms: Two models of strategic momentum. Strategic Management Journal. 1982;3:1–25.

[47] Miller D. The correlates of entrepreneurship in three types of firms. Management Science. 1983;29(7):790–791.

[48] Bolton DL, Lane MD. Individual entrepreneurial orientation: development of a measurement instrument. Education + Training. 2012;54(2):219–233.

[49] Zahra SA, Covin JG. Contextual influences on the corporate entrepreneurship-performance relationship: A longitudinal analysis. Journal of Business Venturing. 1995;10(1):43–58.

[50] Frank H, Kessler A, Fink M. Entrepreneurial orientation and business performance. A replication study. Schmalenbach Business Review (SBR). 2010;62(2).

[51] Chiesa V, Piccaluga A. Exploitation and diffusion of public research: The case of academic spin-off companies in Italy. R&D Management. 2000;30(4):329–340.

[52] Vanaelst I, Clarysse B, Wright M, Lockett A, Moray N, S'Jegers R. Entrepreneurial team development in academic spinouts: An examination of team heterogeneity. Entrepreneurship Theory and Practice. 2006;30(2):249–271.

[53] Sciascia S, Mazzola P, Chirico F. Generational involvement in the top management team of family firms: Exploring nonlinear effects on entrepreneurial orientation. Entrepreneurship Theory and Practice. 2013;37(1):69–85.

[54] Talke K, Salomo S, Kock A. Top management team diversity and strategic innovation orientation: The relationship and consequences for innovativeness and performance. Journal of Product Innovation Management. 2011;28(6):819–832.

[55] Guler I, Guillen MF, Macpherson JM. Global competition, institutions, and the diffusion of organizational practices: The international spread of ISO 9000 quality certificates. Administrative Science Quarterly. 2002; 47(2):207–232.

[56] Williamson IO, Cable DM. Organizational hiring patterns, interfirm network ties, and interorganizational imitation. Academy of Management Journal. 2003;46(3):349–358.

[57] Zahra SA. A theory of international new ventures: A decade of research. Journal of International Business Studies. 2005;36(1):20–28.

[58] Zahra SA, Van de Velde E, Larrañeta B. Knowledge conversion capability and the performance of corporate and university spin-offs. Industrial and Corporate Change. 2007;16(4):569–608.

[59] Kellermans FW, Eddleston KA, Barnett T, Pearson A. An exploratory study of family member characteristics and involvement: Effects on entrepreneurial behavior in the family firm. Family Business Review. 2008;21(1):1–14.

[60] Jehn KA. A qualitative analysis of conflict types and dimensions in organizational groups. Administrative Science Quarterly. 1997;42(3):530–557.

[61] De Wit FRC, Jehn KA, Scheepers D. Task conflict, information processing, and decision-making: The damaging effect of relationship conflict. Organizational Behavior and Human Decision Processes. 2013;122:177–189.

[62] Chen G, Liu C, Tjosvold D. Conflict management for effective top management teams and innovation in China. Journal of Management Studies. 2005;42(2):277–300.

[63] De Dreu CKW. When too little or too much hurts: Evidence for a curvilinear relationship between task conflict and innovation in teams. Journal of Management. 2006;32(1):83–107.

[64] Li H, Li J. Top management team conflict and entrepreneurial strategy making in China. Asia Pacific Journal of Management. 2009;26(2):263–283.

[65] Knockaert M, Ucbasaran D, Wright M, Clarysse B. The relationship between knowledge transfer, top management team composition, and performance: The case of science-based entrepreneurial firms. Entrepreneurship Theory and Practice. 2011;35(4):777–803.

[66] Colombo M, Mustar P, Wright M. Dynamics of science-based entrepreneurship. The Journal of Technology Transfer. 2010;35(1):1–15.

[67] Boeker W. Strategic change: The influence of managerial characteristics and organizational growth. Academy of Management Journal. 1997;40(1):152–70.

[68] Salvato C, Chirico F, Sharma P. A farewell to the business: Championing exit and continuity in entrepreneurial family firms. Entrepreneurial and Regional Development. 2010;22(3/4):321–348.

[69] Colombo MG, Grilli L. Founders' human capital and the growth of new technology-based firms: A competence-based view. Research Policy. 2005;34(6):795–816.

[70] Markman GD, Gianiodis PT, Phan PH, Balkin DB. Innovation speed: Transferring university technology to market. Research Policy. 2005;34(7):1058–1075.

[71] Wilson F, Kickul J, Marlino D. Gender, entrepreneurial self-efficacy, and entrepreneurial career intentions: Implications for entrepreneurship Education. Entrepreneurship Theory and Practice. 2007;31(3):387–406.

[72] Poon JM, Ainuddin RA, Junit SOH. Effects of self-concept traits and entrepreneurial orientation on firm performance. International Small Business Journal. 2006;24(1):61–82.

[73] Jain R, Ali SW. Self-efficacy beliefs, marketing orientation and attitude orientation of Indian entrepreneurs. Journal of Entrepreneurship. 2013;22(1):71–95.

[74] Carpenter M., Geletkanycz MA, Sanders WG. Upper echelons research revisited: Antecedents, elements, and consequences of top management team composition. Journal of Management. 2004;30(6):749–778.

[75] Barkema HG, Shvyrkov O. Does top management team diversity promote or hamper foreign expansion? Strategic Management Journal. 2007;28(7):663–680.

[76] Beckman CM, Burton MD, O'Reilly CA. Early teams: The impact of team demography on VC financing and going public. Journal of Business Venturing. 2007;22(2):147–173.

[77] Jackson SE. Consequences of group composition for the interpersonal dynamics of strategic issue processing. In: Shrivastava P, Huff A, Dutton J, editors. Advances in Strategic Management. JAI Press: Greenwich, CT; 1992. p. 345–382.

[78] Milliken FJ, Martins LL. Searching for common threads: Understanding the multiple effects of diversity in organizational groups. Academy of Management Review. 1996;21(2):402–433.

[79] Auh S, Menguc B. Balancing exploration and exploitation: The moderating role of competitive intensity. Journal of Business Research. 2005;58:1652–1661.

[80] Mosey S, Wright M. From human capital to social capital: A longitudinal study of technology-based academic entrepreneurs. Entrepreneurship Theory and Practice. 2007;31(6):909–935.

[81] Wiersema MF, Bantel KA. Top management team demography and corporate strategic change. Academy of Management Journal. 1992;35(1):91–121.

[82] Naranjo-Gil D, Hartmann F. Management accounting systems, top management team heterogeneity and strategic change. Accounting, Organizations and Society. 2007;32(7): 735–756.

[83] De Dreu, CK, West MA. Minority dissent and team innovation: The importance of participation in decision making. Journal of Applied Psychology. 2001;86(6): 1191–1205.

[84] Richard OC, Shelor RM. Linking top management team age heterogeneity to firm performance: Juxtaposing two mid-range theories. International Journal of Human Resource Management. 2002;13(6):958–974.

[85] Zimmerman MA. The influence of top management team heterogeneity on the capital raised through an initial public offering. Entrepreneurship Theory and Practice. 2008;32(3):391–414.

[86] Murray AI. Top management group heterogeneity and firm performance. Strategic Management Journal. 1989;10(1):125–141.

[87] Knight D, Pearce CL, Smith KG, Olian JD, Sims HP, Smith KA, Flood P. Top management team diversity, group process, and strategic consensus. Strategic Management Journal. 1999;20(5):445–465.

[88] Bantel KA, Jackson SE. Top management and innovations in banking: Does the composition of the top team make a difference? Strategic Management Journal. 1989;10(1):107–124.

[89] Coff R. The emergent knowledge-based theory of competitive advantage: An evolutionary approach to integrating economics and management. Managerial and Decision Economics. 2003;24(4):245–51.

[90] Olson B, Parayitam S, Twigg NW. Mediating role of strategic choice between top management team diversity and firm performance: upper echelons theory revisited. Journal of Business and Management. 2006;12:111–26.

[91] Wu Y, Wei Z, Liang Q. Top management team diversity and strategic change: The moderating effects of pay imparity and organization slack. Journal of Organizational Change Management. 2011;24(3):267–281.

[92] Pelled LH, Eisenhardt KM, Xin KR. Exploring the black box: An analysis of work group diversity, conflict and performance. Administrative Science Quarterly. 1999;44(1):1–28.

[93] Goll I, Brown JN, Rasheed A. Top management team demographic characteristics, business strategy and firm performance in the US airline industry. Management Decision. 2008;46(2):201–222.

[94] Grimm CM, Smith KG. Management and organizational change: A note on the railroad industry. Strategic Management Journal. 1991;12(7):557–562.

[95] Forcolin E, Italiano L, Paolucci E. An Analysis of Founding Team Resources and Their Impact on Future Success. In: Proceedings of the I. EIASM Workshop on Top Management Teams & Business Strategy Research: responses and adaptability in turbulent times; 22–23 March 2010.

[96] Mooney AC, Holahan PJ, Amason AC. Don't take it personally: Exploring cognitive conflict as a mediator of affective conflict. Journal of Management Studies. 2007;44(5): 733–758.

[97] Cannella A, Park JH, Lee H. Top management team functional background diversity and firm performance: Examining the roles of team member collocation and environmental uncertainty. Academy of Management Journal. 2008;51(4):768–784.

[98] Amason AC, Shrader RC, Tompson GH. Newness and novelty: Relating top management team composition to new venture performance. Journal of Business Venturing. 2006; 21:125–148.

[99] Visintin F, Pittino D. Founding team composition and early performance of university-based spin-off companies. Technovation. 2014;34(1):31–43.

[100] Korsgaard MA, Jeong SS, Mahony DM, Pitariu AH. A multilevel view of intragroup conflict. Journal of Management. 2008;34(6):1222–1252.

[101] Friedman RA, Tidd ST, Currall SC, Tsai JC. What goes around comes around: The impact of personal conflict style on work conflict and stress. International Journal of Conflict Management. 2000;11(1):32–55.

[102] De Dreu C. Weingart LR. Task versus relationship conflict, team performance, and team member satisfaction: A meta-analysis. Journal of Applied Psychology. 2003;88(4):741–749.

[103] Hambrick DC, Cho TS, Chen MJ. The influence of top management team heterogeneity on firms' competitive moves. Administrative Science Quarterly. 1996;2:659–684.

[104] Hmieleski KM, Ensley MD. A contextual examination of new venture performance: Entrepreneur leadership behavior, top management team heterogeneity, and environmental dynamism. Journal of Organizational Behavior. 2007; 28(7):865–889.

IntechOpen