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## Diversity Management in Academic Business Venturing: Empirical Evidences from Italian Universities

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### Abstract

Academic management could be seen as a significant factor in exploiting university intellectual property through a business venture. Although several studies recognized entrepreneurial abilities and skills as key drivers of start-up economic success in high-technology sectors, only a few of them focused on academic start-ups performance considering the top management composition. Accordingly, the aim of this work was to investigate the impact of diversity management on academic start-ups financial performance, focusing on academic members in board of directors from a resource-based perspective. In particular, we carried out a cross-sectional analysis bordering our study to 136 university spin-offs established in southern Italy. Our findings showed that diversity management in academic business venturing increases the economic performance of university spin-offs. Specifically, a well-diversified academic top management according to functional diversity as well as academic position impacts positively on academic start-ups economic growth while scientific background heterogeneity seems to lower the economic performance.

**Keywords:** Diversity Management; Heterogeneity; Academic Spin-off; Economic Performance; Southern Italy.

## Introduction

Universities active role in local development can be seen both as a way to engage stakeholders into university technology transfer process (Mian 1997; Zucker et al. 1998; Di Gregorio and Shane 2003; Audretsch 2014) and as a way to valorize academics' intellectual property, abilities and skills (Goldstein 2010). Academic start-ups (ASUs) can answer this need fostering more efficiently the local economic growth (Cohen et al. 1998) both by interacting with external companies and governments (Etzkowitz and Leydesdorff 2000; Martin 2003; Miyata 2000) and setting up innovative research projects to meet stakeholders' needs.

In Italy, university technology transfer issue received a regulatory framework in 1999 and since then research groups have the opportunity to exploit their knowledge in industrial terms and to hold managerial positions while preserving academic ones. Hence, limiting to small and medium-sized Italian companies, management theories allowed them to shift from a low to a high technological level (Rodriguez-Gulias et al. 2017; Galati et al. 2017; Barbieri et al. 2018), stimulating a new entrepreneurial ecosystem based on the academic knowledge exploitation (Audretsch and Lehmann 2005; Carree et al. 2014).

Many studies highlighted several perspectives about ASUs creation and growth, focusing on the key determinants bringing academicians to a high technological business venture (e.g. D'Este and Perkmann 2010; Fini et al. 2008); on the founding team composition linked to ASU's performance (Clarysse and Moray 2004; Grandi and Grimaldi 2003; Knockaert et al. 2011; Visintin and Pittino 2014); on the ASUs initial growth phase (Iacobucci et al. 2011). Conversely, other empirical studies focusing on the ASUs territorial distribution found a large gap between northern and southern Italy (e.g. Abramo et al. 2012; Algieri et al. 2013) and only a few of them explored the southern Italy context (Monte and Luzenberger 1989; Parmentola and Ferretti 2018). Likewise, although several researchers (e.g. Colombo and Grilli, 2010; Newbert et al., 2007; Newbert et al., 2008) recognized entrepreneurial roles and competencies as key drivers of start-up economic success in high-technology sectors, only a few of them focused on ASUs performance by considering the Top Management Team (TMT) composition in terms of human capital diversity.

Accordingly, this work aims at filling this research gap through a Resource-based approach (Barney et al. 2001). Therefore, we considered ASUs human capital heterogeneity (Pazos et al. 2012) and academicians' engagement into the managerial decision-making as a driver of competitive advantage (Colombo et al. 2014) in high-technology driven markets.

On this ground, our study aims to understand the relationship between ASUs' diversity in Top Management Team (TMT) and their economic performance. To accomplish this goal, we considered the whole population of active ASUs - both pure and hybrid ones - located in Southern Italy from NETVAL directory (2018). Particularly, we focused on three forms of diversity: (1) functional diversity, aimed to show the balance between academic and non-academic members in ASU's TMT; (2) hierarchical diversity, that sheds light on the level of hierarchy within the TMT in terms of academic position; (3) scientific background diversity, that highlights the overall scientific backgrounds involved in ASUs' TMT.

Our findings denoted that diversity management in academic business venturing improves economic performance of university spin-offs. Specifically, a well-diversified academic top management according to functional diversity as well as academic position impacts positively on academic start-ups economic growth while scientific background heterogeneity seems to lower the economic performance.

Our work fits into the research field of diversity management highlighting how a well-diversified combination of competencies and capabilities in the academic start-ups' top management can affect their economic success. In particular, this study aims to clarify how academic knowledge can be effectively exploited in a business context.

This paper is organized as follows. The "Prior literature" section shows the main theoretical framework supporting the research hypotheses; in the "Methodology" section the variables and sample are clearly defined; in the "Results and Discussion" section the empirical findings and their explanation are carried out; in the "Conclusion" section, we summarized the most important findings thus discussing several implications for policy-makers and practitioners and suggesting areas for further researchers.

## **Prior Literature**

### ***Resource Based Theory and Human Capital Theory***

The Resource Based View, meant to connect companies' competitive advantage with the organizational internal resources and capabilities (Barney et al. 2001; Brush et al. 2001) is one of the main research field to clearly understand the key antecedents of ASUs economic performance. On this ground, the main success factor of new business ventures would be a well balanced composition of both entrepreneurs and managers (Hambrick and Mason 1984; Eisenhardt and Shoonhoven 1990; Shane and Stuart 2002; Heirman and Clarysse 2004; Mustar et al. 2006), particularly in such small companies and *loosely coupled* systems whose internal processes and decisions do not follow a strong hierarchical decision-making process (Orton and Weick 1990; Finkelstein and Hambrick 1996). Consequently, in a resource-based approach, different authors (Druilhe and Garnsey 2004; Heirman and Clarysse 2004) classified four main categories of resources in the initial start-up phases: social, technological, financial and human resources ones. Focusing on human resources studies, the starting resources of a new venture concern the competencies and skills of their members. Accordingly, Grant (1991) in defining organizational resources found technical know-how, organizational culture and tacit knowledge as personnel-based resources. Barney (1991) framed human capital resources including training, experience, judgment, intelligence, relationships and insights of individual managers and workers in the firm.

ASUs can be considered as a particular category of high technology venture as they are established by a university to market technologies developed within an academic sub-group (Mustar et al. 2006; Rasmussen et al. 2011). The typical non-entrepreneurial character of universities sheds light on critical issues regarding the available support level to grow up such ventures (Lockett and Wright 2005; Siegel et al. 2003). Indeed, starting from a context where usually can not rely on any support during their start-up phase (Vohora et al. 2004), often ASUs need to increase their value by exploiting their human capital resources (Shrader and Siegel 2007). Indeed, in new ASUs human capital

represents a significant part of the firm's value (Shrader and Siegel 2007). Hence, particularly in their early stages, they can leverage mainly on TMT capabilities (Colombo and Grilli 2005; Packalen 2007; Shrader and Siegel 2007). In addition, human capital includes all individual's skills, know how and experiences able to improve knowledge capital and business awareness in a market context (Schultz 1961; Kaasa 2009; Unger et al. 2011).

According to what has been said, some scholars begun to study the importance of entrepreneurial teams, considering that successful firms are typically founded by teams of entrepreneurs, not individuals (Shrader and Siegel 2007; Ben-Hafaïedh et al. 2018; Nikiforou et al. 2018). Therefore, several studies highlighted the relationship between business venture success and its related TMT diversity (Colombo and Grilli 2005; Cooper and Daily 1996; Forbes et al. 2006; Francis and Sandberg 2000; Vanaelst et al. 2006; Wright et al. 2004).

It remains still unclear how teams should be structured to enhance new venture success since scholars showed mixed empirical findings about the potential merits of diversity within the top team (Miller et al. 1998; Simons et al. 1999). Some scholars argued that a more heterogeneous TMT in terms of functional and scientific backgrounds helps to improve the decision-making quality from different perspectives (Bantel and Jackson 1989; Cox and Blake 1991; Pelled et al. 1999). On this ground, decision-making theories proposed that a deeper variability in group composition can have a direct and positive effect on the skills, abilities, information and knowledge through its diversity (Tziner and Eden 1985). Indeed, heterogeneous teams are considered more functional for strategic change (Lant et al. 1992; Wiersema and Bantel 1992), greater strategic consensus (Knight et al. 1999), and better performance (Bunderson and Sutcliffe 2002). A contingency perspective suggests that organizational routines should be better handled by homogeneous groups while decision making procedures would be more easily ruled by heterogeneous ones, since knowledge diversity of knowledge allows a broader bundle of alternatives (Cyert and March 1963; Filley et al. 1976).

In contrast, other researchers argued that TMT diversity leading to less common ground between internal members, stimulates dysfunctional conflict (Amason 1996; Kamm and Nurick 1993; Miller et al. 1998). Thus, a certain degree of homogeneity may enforce the relational network within the TMT. However, academic entrepreneurial teams were often criticized for their functional and technical homogeneity (Ensley and Hmieleski 2005; Franklin et al. 2001; Lockett et al. 2005).

The key question of diversity remains still unresolved, since there are ambiguous empirical results on the effects of TMT diversity on new business ventures performance (Tagliazucchi et al. 2018). ASUs represent an interesting field to conduct this analysis because of they seem to be more homogeneous than independent ones in terms of TMT composition (Ensley and Hmieleski 2005; Mustar et al. 2006) and less performant (Wennberg et al 2011; Ensley and Hmilieski 2005).

### ***Functional Diversity***

ASUs are a particular category of new business venture as they are established by a university in order to exploit technologies developed within an academic and scientific group (Mustar et al. 2006; Rasmussen et al. 2011). According to some authors, the different origin of ASUs leads to several differences in team composition (Ensley and Hmilieski 2005; Mustar et al. 2006). Many studies also suggested that ASUs do not perform as independent ones (Wennberg et al. 2011; Ensley and Hmilieski 2005). Starting from a resource based approach (Barney 2001), the TMT functional



background is generally recognized as a good explanation of the initial bundle of ASU's competencies and its diversity in functional background tends to be more homogeneous than independent one (Ensley and Hmieleski 2005; Mustar et al. 2006). Indeed, since ASUs can rely on a large set of knowledge and technical resources thanks to the university affiliation, they are less motivated to feel the need to take on diverse functional roles (Ucbasaran et al. 2003). This allows university-based TMTs to focus on the development of a restricted group of competencies within the team. In contrast, TMTs of independent start-ups are forced to fulfill all business functions within their team. As such, the level of functional heterogeneity should be lowest for ASUs' TMT rather than independent ones. However, according to other scholars, the functional diversity seems to be also a useful source for ASUs (Heirman and Clarysse 2004) since it can result in a better integration of market-related skills and business-related networks with technical capabilities (Vohora et al. 2004; Visintin and Pittino 2014). Generally, leveraging on different perspectives in decision-making processes allows a higher efficiency level in problem-solving (Jackson 1992). Indeed, diverse groups tend to share more relevant competencies than homogeneous ones. On this ground, several studies highlighted the need to integrate both academic and non-academic profiles to improve the ASUs' economic growth (Visintin and Pittino 2014; Rasmussen et al. 2011). Particularly, Visintin and Pittino (2014) suggested that a well-balanced composition of both academic and non-academic members affects positively sales and employments growth. In addition, Tekleab et al. (2016) argued that the higher is the functional diversity within the academic start-up team the better is the related economic performance.

Aligned to our research objective, we tried to fill the gap in the previous literature analyzing the impact of academicians' engagement into the managerial decision-making. Specifically, we tried to understand if the TMT heterogeneity, in terms of different presence of academic and non-academic knowledge, is able to affect the ASUs' economic growth. Hence, our first research hypothesis was defined as follows:

**Hp.1:** The functional diversity in TMT is positively associated to the ASU's economic success.

### **Hierarchical Diversity**

Behavioral norms are a fundamental element of the organizational context, facilitating members' interactions and shaping, at the same time, the activities through the definition of a set of standard procedures and routines (March et al. 2000). Hence, group norms tend to create mutual expectations and shared mental models among organizational actors thus reducing decision uncertainty, lowering information asymmetry and facilitating team coordination (Amason and Sapienza 1997; Earley and Mosakowski 2000). Sharing behavioral norms in ASUs may be difficult since academic sub-groups have their own interaction structured norms resulting from their professional networks or previous affiliations (Beckman 2006; Gurdon and Samson 2010). Sometimes academic members tend to replace the same organizational scheme of laboratories into ASU governance, affecting members integration and communication as well as the career path of some academics (Parson et al. 1992; Williams and O'Reilly 1998). Accordingly, Visintin and Pittino (2014) argued that the distance between the academic sub-groups in terms of shared norms increases when a group shows a higher hierarchical stratification in academic status, transferring the same hierarchical diversity existing

among members in the university. Consequently, moving such interactions' procedures into the entrepreneurial context amplifies the difference between academic and non-academic sub-groups, making the whole integration more difficult. Therefore, a more homogeneous academic sub-group in academic startup ASU's TMT enhances members integration allowing, as a consequence, a better performance thanks to the resulting entrepreneurial learning (Moore and Salimbene 1981; Parson et al. 1992; Clarysse and Moray 2004; Knockaert et al. 2011).

Hence, concerning with diversity among academic members according to their academic positions, there are several evidences that consider it as a human value-driving for an ASU as highlighted in previous literature. In regards to governance issue, we focused on this gap exploring how heterogeneity represents a critical factor in ASUs success.

Therefore, we analyzed the impact of the academic personnel heterogeneity in leading an ASU to economic success through the following research hypothesis:

**Hp.2:** A heterogeneous academic sub-group in TMT affects positively the ASUs economic performance.

### **Scientific Background Diversity**

As argued previously, some authors argued that ASUs' economic success may also be reached leveraging on individual members' background uniformity (Ensley et al. 2006; Hellerstedt et al. 2007; Visintin and Pittino 2014). According to this perspective, the homogeneity in TMT composition may allow cooperative interaction, reducing coordination costs (Tsui et al. 1992; Williams and O'Reilly 1998) and promoting the expansion of both shared norms and common cognitive frames of reference (Beckman et al. 2007; Knockaert et al. 2011).

Homogeneity in disciplinary background makes communication among members easier and more frequent (Zenger and Lawrence 1989) and enhances the effectiveness of mutual monitoring (Grandori 2000). As a consequence, the team achieves high levels of behavioral integration (Amason et al. 2006). On the contrary, when there is distance in these traits between the members of the two sub-groups, integration may be more difficult.

Conversely, other studies concerning with ASUs' organizational diversity stated that TMT with different backgrounds and specialization provide a broader range of task-relevant knowledge, skills and abilities in decision-making (Bantel and Jackson 1989; Ancona and Caldwell 1992; Pelled et al. 1999; Williams and O'Reilly 1998), improving the ASUs economic success (Tagliacuzzi et al. 2018). On this ground, it could be expected that scientific background diversity would confer to entrepreneurial teams a better procedural and technical knowledge. For example, technology-related background could provide the key-antecedents for ASU's innovation, while members belonging to a managerial scientific background could make TMT more able to combine market opportunities with technological innovation (Henneke and Lüthje 2007). Empirical results, however, do not converge to this expected positive effect, since ASUs' TMTs tend to belong to a one specific research team. Indeed, only a few studies showed a positive impact of scientific background diversity on new venture economic growth (Foo et al. 2006; Amason et al. 2006).

In order to give a comprehensive view about ASUs' governance mechanisms, we tried to enhance our study by extending our research topic to the impact of scientific background diversity on ASUs' economic success. Hence, we formulated the following hypothesis:

**Hp.3:** A homogeneous scientific background among academic managers affects positively ASUs economic performance.

## **Methodology**

### **Sample and Data**

We grouped academic start-ups located in Southern Italy basing on NETVAL directory, given that several studies have been carried out collecting data from NETVAL database, which is yearly updated by the Italian TTOs.

In doing so, we filtered our sample, considering all the university start-ups located in the regions of Southern Italy: Abruzzo, Basilicata, Calabria, Campania, Molise and Puglia, founded by at least one academic member and established at university. We excluded spin-offs started by other public research centers which only deal with academics to pursue their core business.

We checked the academic position of top managers through the scientific visualization platform CINECA, which includes 70 Italian universities. For members not listed on CINECA platforms, such as PhD students and Research Fellows, we found out them on the university website where they are employed, in order to build up an academic sub-group of directors involved in spin-off governance.

We worked on our sample to point out whether academic personnel take managerial positions in an university spin off, evaluating it through the number of academic memberships in the BoD and comparing this number to external or industrial outsiders which have contributed to applied research from the beginning. In addition, we identified the scientific background as well as the position at parent university of academic managers, aiming at verifying their impact on university start-up success.

Applying these conditions to our sample selection we came to a spin-off group of 136 entities, which derives from an overall population of 169 firms established on average in 2010 in Southern Italy. Since our research purpose is to investigate the impact of academic governance on university start up performance, we collected top managers' and financial information of each spin-off from AIDA - Bureau van Dijk, a wide data warehouse about Italian firms.

### **Variables**

In order to provide a comprehensive view of the ASUs managerial team aligned with proxies already applied by previous studies and cited in literature, we have dichotomous and ratio measurement for both dependent and independent variables (table. 1). Moreover, to take into consideration a wider amount of governance factors, we followed a double approach: on one hand we focused on the incidence of the academic memberships and their hierarchical frame; on the other hand we dealt with the eventual different scientific background related to former research paths.



**Table 1. Variables**

Variables	Description	Measure
<b>Dependent Variables</b>		
ROA	EBIT/Assets meant to express economic performance	Ratio
$\Delta\_SALES$	Yearly sales growth (if any) of "A1" voice in income statements	0,1
<b>Independent Variables</b>		
A_INDEX (Hp1)	Academics membership in Board of Directors	Ratio
BLAU (Hp2)	Blau Index [ $p_i$ : e.g. PhD student category (k)] expressing diversity among academic members in board of directors	$1 - \sum_{i=1}^k p_i^2$
SB (Hp3)	Number of scientific backgrounds involved in Board of Directors	Value
<b>Control variables</b>		
TA	Total amount of assets owned by the ASU	Logarithm
AGE	ASU's lifetime	Value
BDS	The number of the members involved in the ASU's Board of Directors	Value
EBITDA	ASU's Earnings Before Interest, Taxes, Depreciation and Amortization	Value (in thousands)

**Dependent Variables**

We measured university start-up performance according to a double perspective: a) market-based measure computing the Growth Sales rate from the income statements over the two-year timeframe 2016-2017 (Weinzimmer et al. 1998; Schmelter 2004; Egelin et al. 2003; Lendner 2003; Steinkuhler 1994; Roberts 1991; Hunsdiek 1987; Kulicke 1987; Westerberg and Wincent 2008; Mathisen and Rasmussen, 2019); b) an accounting-based measure expressed by Return on Asset (ROA) ratio disclosed in 2017 fiscal year as a profitability success indicator of university start-up (Woo et al. 1992; Egelin et al. 2003; Steinkuhler 1994; Roberts 1991).

In addition, the first performance measure (Growth Sales) is a dichotomous variable which becomes 1 in case an ASU has a growing performance over our timeframe. We considered this performance as a binary outcome for reducing the effect of outlier values that we often found in ASUs' sales, ranging from one year to another one.

Two different approaches to quantify economic performance take into account how the management handles the various corporate functions as well as providing an overall measurement of the company financial health.

### ***Independent Variables***

*Academic Top Management.* In assessing the incidence of academic components in university start-up managerial team, we measured the balance between research and external membership by making a ratio of members belonging to the two categories, in order to understand whether academics control the governance mechanism.

*Academic team diversity.* We estimated the heterogeneity of academic managers using a diversity index typical of management science that is Blau Index (Blau 1977). We considered each academic position ranging from PhD student to full professor status, identifying the diversity of academic sub-group: the higher is Blau Index the more heterogeneous is the academic sub-group of directors.

*Academics' Scientific background.* We categorized the scientific fields of academic managers according to Italian University Council (Consorzio Universitario Nazionale\_CUN) classification which ranges up to 14 areas. We measured this clustering by a cardinal variable meant to indicate the presence of different research background among academic directors in a university start-up.

### ***Control Variables***

In order to improve the reliability of our analysis, we employed four control variables for explaining the variability related to the dependent variables. Hence, we selected those factors which can reasonably influence the variability of our two models, whose definitions and descriptive values (table. 2) are reported below:

*Total Asset* (logarithmic form). An asset measurement regarding the economic consistency of the entity being monitored.

*Spin-off age.* It measures the survival degree of the university start-up over the time. The capability to stay on market can be considered as a proxy of spin off economic success.

*BoD size.* The total number of members in Board of Directors, including both academic and non-academic membership.

*EBITDA.* It gives a profitability measure of the spin off core business and represents a reliable indicator of financial analysis.

**Table 2. Descriptive Statistics**

<b>Variables</b>	<b>N. Obs.</b>	<b>Mean</b>	<b>Standard Dev.</b>	<b>Min</b>	<b>Max</b>
<b><i>Dependent Variables</i></b>					
ROA	135	2.03	19.42	-105.10	67.78
$\Delta$ _SALES	136	0.47	0.50	0.00	1.00
<b><i>Independent Variables</i></b>					
A_INDEX	134	0.48	0.37	0.00	1.00
BLAU	98	0.22	0.26	0.00	0.72
SB	135	0.99	0.82	0.00	3.00
<b><i>Control variables</i></b>					
TA (logarithm)	133	4.99	0.62	3.70	6.63
AGE	136	7.70	4.09	1.00	23.00
BDS	136	2.71	1.56	0.00	7.00
EBITDA (in thousands)	136	18.59	113.33	-1107.00	321.00

## Results and Discussion

We applied to our dataset a cross-sectional study using a Logit estimation for the market performance ( $\Delta$ \_SALES) and an OLS analysis for the accounting performance (ROA). In order to test the impact of independent variables on academic start-up economic performance, we developed two separate models, one for each dependent measure, including in both some control factors of our research framework, as shown in table 4. In particular, Model 1 estimates how the three research hypotheses are verified in regards to sales growth performance; while the Model 2 analyzes the same relationship on ROA performance. Before running our regression models, we filtered the study applying a factor analysis to the independent variables basing on principal components analysis (PCA), in order to identify which components are able to explain the most variability of our observations. The main components can summarize the essential information only being fewer than the original variables. In doing so, the eigenvalues greater than 1 express much of the variability of the study associated to that factor. Since each factor has variance 1 due to standardization, if the amount of variance is less than 1 it implies that the factor is not better than the original variable. Each factor reflects a phenomenon in our study and as a result they rank into the first three main components, which in turn coincide with our research hypotheses (table. 3). Hence, we developed the two regression models OLS and Logit, taking into account only these three most influential factors and basing on our previous analysis.

**Table 3. Factor Analysis. Method: Principal-component factor**

Factor	Eigenvalue	Difference	Proportion	Cumulative
A_INDEX	2.68	1.51	0.38	0.38
SB	1.17	0.08	0.16	0.55
BLAU	1.08	0.27	0.15	0.70
AGE	0.81	0.10	0.11	0.82
BDS	0.70	0.31	0.10	0.92
TA	0.39	0.24	0.05	0.97
EBITDA	0.14	0.00	0.02	1.00

**Table 4. Analysis Models**

	MODEL 1 (OLS) Dependent variable ROA	MODEL 2 (LOGIT) Dependent variable $\Delta$ _SALES
<i>Dependent variables</i>		
A_INDEX (Hp1)	16.26***	0.37
BLAU (Hp2)	14.08*	-0.41
SB (Hp3)	-11.55***	-0.77**
$R^2$ _Adj	0.081	0.058
Model F/Chi <sup>2</sup>	4.91***	10.93**
Hosmer-Lemeshow test		31.51

Refer to Table 1 for the description of the variables. \* P < 0.1; \*\* P < 0.05; \*\*\* P < 0.01

Following our double performance measurement of university start-ups, we discuss our results separately for each response measure.

Looking at the effect of our impact factors on corporate profitability (Model 1\_table. 4), we found that academics involvement in ASUs' Board of Directors increases corporate return on assets [A\_INDEX: 16.26 (p<0.01)], agreeing with some authors (Visintin and Pittino 2014; Rasmussen et al. 2011) which support the importance of the academic management in improving ASUs economic performance. In regards to scientific background and membership composition, our results highlight the significative, and negative, effect of academic managers belonging to different scientific fields on corporate performance [SB: -11.55 (p<0.01)], besides a hierarchically well-diversified academic team affects positively ASU's financial health [BLAU: 14.08 (p<0.1)].

Concerning with the other performance measurement (Model 2\_table. 4), the results point out only one significative effect which confirms our first model's evidence about the negative impact of

different scientific background on ASU's economic performance [SB: -0.77 ( $p < 0.05$ )]. This in turn means that the more homogeneous is the academic experience of academic managers the better is the ASU's economic performance.

Moreover, both analysis models are significant [Model 1: 4.91 ( $p < 0.01$ ); Model 2: 10.93 ( $p < 0.05$ )] and in Logit model we tested our factors' goodness of fit through *Hosmer-Lemeshow* goodness of fit test for logistic regression, checking that the model we developed is correctly explained and the data do not conflict with model's assumptions. As shown in table. 4 this test is not significant, accepting the null hypothesis of a good factors fitness.

## Conclusions

This research focuses upon university start-up success in relation to governance factors which feature its organization. In particular, this paper concentrates the study on the academic members in Top Management team as well as the diversity status of academic sub-group in Board of Directors.

Moreover, we tested the impact of academics' scientific background on spin off performance, analyzing whether a multidisciplinary academic team in Board of Directors may improve management decision-making affecting in turn spin off financial health.

In order to measure university start-up economic performance from different perspectives, we used two indicators underlying our research analysis, testing the impact of management team composition on both sides.

Thus, our study suffers some limits regarding the academic diversity index, since we evaluate the heterogeneity among academic top managers, regardless of their shareholder position. This in turn could be relevant for studying spin off strategic dependency, which could be affected by main shareholders. Although this lack, we deal with academic diversity considering the cultural background of university members, aiming at explaining the managerial inclination of people coming from an academic environment in regards to their scientific fields.

Given the limits described above and consistently with our empirical study, we suggest two topics for future research studies: 1) analysis of founding team composition in regards to shareholders academic position and its impact on economic performance and innovation readiness, and 2) exploring how external entities, such as firms or non-profit organizations, are involved in university entrepreneurship, valorizing as a consequence academics' knowledge and capabilities in a business context. A further research suggestion could address to the impact of a well-diversified management team on ASU's longevity, pointing out whether the heterogeneity of academic team is able to make sustainable the spin-off's returns over a more extended timeframe.

Coming back to our findings, we can say at some levels that a university spin off located in Southern Italy with a high academic membership in its Board of Directors enhances its profitability (ROA) through a well-diversified composition (high *Blau Index*) and bounded to the same scientific background (CUN Areas). This is aligned with the literature supporting a good economic performance of innovative start-up due to a high diversity management in decision making processes. The economic performance concerning with the market sales ( $\Delta\_SALES$ ) supports the hypothesis that the same disciplinary sector affects positively the success of a university spin off once academic managers belong to the same scientific background. Our research study focuses on southern Italy analyzing for



the first time the entire population of university spin offs from a resource based view and looking at academic influence in governance practices.

Basing on our empirical results, we conclude some practical implications for practitioners. First, a university start-up located in Southern Italy should be more incline to diversify its academic management team, preserving at the same time the previous hierarchical frame of the research group involved in the technology transfer process. Moreover, parent organizations and TTOs could advice to make more heterogeneous the start-up Board of Directors, suggesting new tailored governance models meant to improve the spin off economic performance. According to our findings, there are two conditions to meet when academics start a new business venture experience: in order to valorize scientific results or research capabilities in industrial terms, the more are the academic positions sitting in BoD the better is the financial health of a university start-up, provided that management sub-groups belong to the same scientific field.

Conversely, in regards to scientific field of BoD academic members, we can state that the same educational background as well as a closeness in research experience among academics could be a value-driver for an ASU, highlighting that a start-up should be developed by a research group coming from the same research field. This condition could outline two scenarios: 1) on one hand, if an ASU has a high science-based management team, academic members should involve outside professional managers in BoD, in order to not modify the scientific homogeneity of the research group; 2) on the other hand and given its positive impact on economic performance, BoD academic members could save their former scientific composition instead of hiring external managers, leveraging on managerial capabilities they have in technology transfer process.

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