

Why Do Life Scientists Decide to Become Entrepreneurs? The Role of Motivations

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Abstract

The linkage between entrepreneurial ideas and actions continues to be central to the entrepreneurship debate. However, the possible implications of the various entrepreneurial motivations for the process are still largely understudied. On this basis, our study aims to contextualise the theoretical model linking entrepreneurial intentions, motivations and actions, with particular reference to academic entrepreneurship within the Life Sciences. We use the qualitative comparative analysis (QCA) set-theoretic method to process data gathered amongst 25 scholars active in the Life Sciences context. We carried out the analysis in two steps. The first reveals that a condition which determines entrepreneurial intentions is the absence of normative beliefs together with the presence of control beliefs. In contrast, the research highlights that the entrepreneurial intentions are able to determine the entrepreneurial action. However, as the second step shows, these alone are not sufficient and need to be complemented by extrinsic motivations, that is, those correlated to external incentives/benefits (above all of an economic nature). Our findings offer interesting insights into the whole phenomenon, revealing that the reference to specific contexts may well determine implications which differ from those already detected in the literature, with undeniable effects in terms of managerial and policy implications.

Keywords: academic entrepreneurship, intentions, life sciences, motivations, qualitative comparative analysis

1. Introduction

In recent years, the attention to questions relating to entrepreneurial intentions and entrepreneurial actions has given rise to a passionate debate. Studies commonly employ two theoretical approaches to address the issues relating to entrepreneurial intentions. In his theory of planned behaviour (TPB), Ajzen (1991) explains entrepreneurial behaviour in terms of the attitude towards it, subjective norms and perceived behavioural control. In contrast, the entrepreneurial event model (EEM; Shapero & Sokol, 1982) explains entrepreneurial intentions in terms of perceived desirability, perceived feasibility and propensity to act. In both cases, the link between intentions and actions is considered linear, so the former are regarded as a proxy for the behaviour which the individual puts in place.

Another stream of researchers argues that the process leading from the entrepreneurial intentions to the entrepreneurial actions is not always linear (Gollwitzer & Brandstatter, 1997). On this ground, an increasing number of academics have attempted to understand whether other aspects – such as motivations and contextual elements – may influence entrepreneurial processes.

In particular, Gollwitzer and Brandstatter (1998), argue that the entrepreneurial motivations may intervene in the process. Entrepreneurial intentions still remain a good predictor of entrepreneurial actions, but the way in which the former results in the latter may depend upon entrepreneurial motivations (Carsrud & Brännback, 2011).

Prior studies confirm that there is still room for further research on entrepreneurial intentions and entrepreneurial actions (Schlaegel & Koenig, 2014; Enkel & Bader, 2015) and that the possible implications of various entrepreneurial motivations on the structure of the new venture are still largely understudied. Indeed, although several studies have addressed the abovementioned issues, the compartmentalised approaches adopted – usually leading to consideration of one-to-one relationships between variables – have hidden the effects of the crucial interactions between these factors in determining entrepreneurial choices.

It is also important to note that according to Schlaegel and Koenig (2014), the TPB and EEM can be regarded as interrelated but not overlapping models and that their main differences derive from contextual elements. However, most articles refer to the geographical context, while no studies that take into account the specific type of business are currently available. This represents a surprising gap, since it is reasonable to consider the specificities of any business as crucial in influencing elements of individuals' motivations and goals (Brandl & Bullinger, 2009).

The present study puts forward a more comprehensive theoretical and testable model linking entrepreneurial intentions, entrepreneurial motivations and entrepreneurial actions. This model is then applied to academic entrepreneurship within the Life Sciences, taking into account its contextual elements.

The aim is to understand what are the behavioural and motivational factors influencing life scientists' entrepreneurial intentions and actions, as well as to elucidate whether and how their academic origin and their focus on Life Sciences confirms or modifies the theoretical implications acknowledged in extant literature. In fact, Life Sciences are characterised by huge complexity which may reasonably affect business and decision-making processes (Ahn & Meeks, 2007), due to the high length and uncertainty of the research and product validation/authorisation processes (Ahn & Meeks, 2007).

The paper employs a survey conducted among 25 scholars. The data gathered are then processed by using the qualitative comparative analysis (QCA) set-theoretic method (Ragin, 2008; 2000), an approach that, as recently argued by Enkel and Bader (2015), is valuable for addressing issues relating to entrepreneurship.

The remainder of the paper is organised as follows. Section 2 provides insights from extant literature on entrepreneurial intentions and entrepreneurial motivations. Section 3 details the method of the analysis and the variable selection. Section 4 summarises the findings of the analysis, while section 5 discusses the findings and provides some concluding remarks.

2. Theoretical Framework

The issues relating to entrepreneurship are crucial and still need to be broadened from a number of perspectives. Indeed, the passionate debate around entrepreneurial intentions, entrepreneurial motivations and entrepreneurial actions is far from over, not only because of the theoretical implications of these questions, but particularly given their practical and policy importance.

A first stream of research has attempted to detect the determinants of the entrepreneurial intention (e.g., Shapero, 1975), mainly focussing on personal traits. Such a focus, however, has now been abandoned, since – despite the interesting findings of these studies – personal traits alone are not sufficient to explain entrepreneurial attitudes. This is because they do not converge on an established pattern (Shook et al., 2003). Thus, they are regarded as thought-provoking elements, since they help to explain entrepreneurs' success, but their interpretation needs to be complemented with other characteristics (Carsrud & Brannback, 2011).

In the wake of the increasing awareness of these limitations, at the end of the 1980s, a newer approach to these problems was elaborated. The attention shifted towards issues relating to the linkage between ideas and actions, to allow deeper comprehension of the entrepreneurial process (Carsrud & Brannback, 2011). These studies commonly employed two theoretical approaches (TPB and EEM) to address the issues relating to entrepreneurial intentions (see Enkel & Bader, 2015).

In his TPB, Ajzen (1991) explains entrepreneurial behaviour in terms of the attitude towards it, subjective norms and perceived behavioural control. The studies applying this theory identify a general adherence to the particular context of reference (Krueger et al., 2000). Ajzen (1991) clarifies that an individual decides to act in a certain manner because of his/her attitude towards a given behaviour, subjective norms and perceived behavioural control. These factors are likely to influence people's actions (Ajzen & Fishbein, 1977) and are considered to be related to appropriate sets of salient behavioural, normative and control beliefs, although the exact nature of these relations still remains uncertain (Ajzen, 1991). More specifically, the personal attitudes towards a behaviour (behavioural beliefs) depend upon the individual perception of the possible consequences of this behaviour and their attractiveness. Subjective norms (normative beliefs) are related to the social norms of the context of reference which shapes the perceived reaction that a behaviour induces in other people. Control beliefs consist in the perceived behavioural control that the individual has upon his behaviour. These are linked to the perceived skills and abilities crucial for a given task which the individual has or is able to develop (Almobaieek & Manolova, 2012; Carey et al., 2010).

The EEM (Shapero & Sokol, 1982) explains entrepreneurial intentions in terms of perceived desirability, perceived feasibility and propensity to act. In all cases, the link between intentions and actions is considered

linear, so the former are regarded as a proxy for the behaviour that the individual puts in place.

Despite the undeniable advancements which these studies have afforded, they exhibit a limitation in that the process leading from entrepreneurial intentions to entrepreneurial actions is not always linear (Gollwitzer & Brandstatter, 1997). Although intentions can be regarded as the best predictor for actions, there is still little comprehension of how this link actually works or which conditions favour the switch from an intention to an action.

To address these weaknesses, other studies have attempted to determine whether and how other aspects such as motivations and contextual elements influence entrepreneurial processes by mediating the linear relationship identified in previous research. Gollwitzer and Brandstatter (1997) hypothesise that entrepreneurial motivations may intervene in a consistent way, especially taking into account the hierarchy of goals (Bay & Daniel, 2003). For this reason, entrepreneurial intentions are still a good predictor of entrepreneurial actions, but how the former result in the latter may depend upon the entrepreneurial motivations (Carsrud & Brännback, 2011).

Several classifications of motivations and their impacts are available in the extant literature. A number of studies view motivations as intrinsic or extrinsic. Intrinsic motivation refers to a personal interest in the entrepreneurial task (Carsrud & Brännback, 2011; Ryan & Deci, 2000), while extrinsic motivation refers to an external reward which follows certain behaviour. Employing this categorisation, Carsrud, and Brännback (2011) propose a detailed analysis of the literature on motivations, connecting them with personal aspirations (Atkinson, 1964), goals (Locke & Latham, 2004) and intentions (Ryan & Deci, 2000). Ryan and Deci (2000) identify a possible link between intentions, motivations and actions, arguing that motivations moderate the relationship between intentions and actions.

There is still room for further research on this topic because as Schlaegel and Koenig (2014) show, the possible implications of the various entrepreneurial motivations on the structure of the new venture are still largely understudied. These authors compare the TPB and EEM and maintain that these can be regarded as interrelated but not overlapping models. In fact, contextual factors variously influence either individuals' behaviours or their perceptions and entrepreneurial propensity. These authors mainly refer to the geographical context, while no studies which take into account the specific type of business are currently available. This represents a quite surprising and serious gap in the literature, since it is reasonable to consider the specificities of any business as crucial elements influencing individuals' motivations and goals (Brandl & Bullinger, 2009) and thus their intentions.

Schlaegel and Koenig (2014) suggest that how beliefs, attitudes and perceptions interact and influence entrepreneurial intentions is still far from clear. In this regard, it is also worth remarking that in 1992, Bagozzi already stated that the TPB cannot fully capture the formation of entrepreneurial intentions because it does not consider motivational factors and their influence on such intentions. He put forward the model of goal-directed behaviour (MGB; Perugini & Bagozzi, 2001). This theory assumes that the intention to adopt certain behaviours is grounded on the desire to achieve certain goals; thus, in contrast to Carsrud and Brännback's (2011) argument, it proposes that motivations should be regarded as mediating elements between attitudes, subjective norms and perceived behavioural control on the one hand and intentions on the other (Schlaegel & Koenig, 2014).

In addition to the mediating role exerted by motivations in the formation of the entrepreneurial intentions, some authors have focussed on the same role in relation to entrepreneurial actions (Collins et al., 2004). Notably, this strand is much narrower than the first. However, the results reported by Estay et al. (2013) are of interest for our study. Indeed, these authors highlight that specific categories of motivations can lead to a broad range of entrepreneurial actions for new business projects, and propose a theoretical framework showing such relationships. McMullen et al. (2008) distinguish two categories of entrepreneurial actions, namely opportunity-motivated and necessity-motivated actions. The authors show the different relationships of each of these with certain economic- and labour-freedom factors.

In summary, a first stream of research identifies motivations as mediating elements between entrepreneurial determinants and entrepreneurial intentions, while a second regards motivations as mediating elements between entrepreneurial intentions and entrepreneurial actions. However, no studies have considered both cases. Hence, we developed a more comprehensive theoretical and testable model linking entrepreneurial intentions, entrepreneurial motivations and entrepreneurial actions (see Figure 1). The model is employed below to examine entrepreneurial processes within Life Sciences and to encompass contextual elements in the analysis.

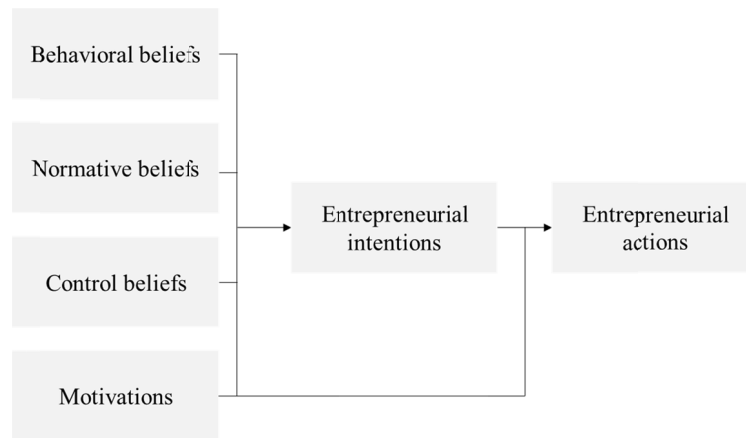


Figure 1. Theoretical model

3. Research Design

3.1 Data Collection

Data for the empirical study were collected from a sample of 25 researchers in the life sciences. All of the researchers involved in the study are currently working at universities or other research institutions in Southern Italy. The survey was administered over the period of September–December 2014 (see Appendix 1 for further details). The fuzzy-set QCA (fsQCA) employed in this work does not require preliminary assumptions about the probability distribution of the data; hence, the issue of sample representativeness was solved. Furthermore, the sample dependence is reduced thanks to the calibration procedure adopted for the data processing. Since our data were self-reported from a single key respondent, they could suffer from common method bias (Podsakoff et al., 2012). The study was designed to avoid this bias via some variations in the scales and the order of the questions.

3.2 Data Analysis

The fsQCA is based upon a set-theoretic approach and uses Boolean algebra expressions (Ragin, 2000, 2008). Due to this methodological choice, it is possible to verify the existence and the extent of causal relationships between a set of conditions and an outcome. According to fsQCA, each case may be fully in or fully out of the set derived from each condition and the outcome; however, it can also be partially in, so that membership in the set becomes a matter of degree. The method, then, conceptualises the cases as combinations of attributes to emphasise their uniqueness.

The fsQCA employs specific algorithms to proceed to the ‘logical reduction’ of complex causal conditions. The aim of the procedure is to identify the set of configurations of conditions which lead to the outcome (Fiss, 2011). The use of configurational analysis allows nonlinear relations among variables to be taken into consideration (Meyer et al., 1993), going beyond the bivariate and symmetric interaction (Black & Boal, 1994; Delery & Doty, 1996). The contribution of this methodology is the ability to test the effect of the interplay of different conditions on the outcome, beyond the net effect of each condition individually (Rihoux & Ragin, 2009). We considered each case as a combination of attributes. Via the comparison of the cases, we were able to understand the actual importance of the attributes for the occurrence of the outcome.

The fsQCA can reveal results even when the number of observations is not high (Ishiyama & Batta, 2012). Using this methodology, we managed to test the necessity and sufficiency of individual conditions and conjunctions of conditions, with reference to the outcome of the analysis. Moreover, the configurational analysis allows for equifinality, that is to say, a situation in which the final state of a system may be reached ‘from different initial conditions and by a variety of different paths’ (Katz & Kahn, 1978).

The construction of a truth table is the starting point for the fsQCA. Each row of the truth table contains a combination of the conditions and the list of all cases corresponding to that combination. The total number of rows in a truth table is equal to 2^k , where k is the number of conditions. Limited diversity in the starting data may cause an absence of cases corresponding to a particular combination of conditions (Ragin, 2000). The complete truth table is subject to a first simplification: This consists of deleting the rows which do not meet two relevant thresholds – one concerning the minimum number of cases which have to correspond to each line and the other related to consistency. Consistency is measured by the ratio between the number of cases which

correspond to a certain combination of attributes and lead to the outcome and the number of cases which correspond to the same combination of attributes but do not lead to the outcome. The minimum recommended consistency threshold is 0.75 (Ragin, 2008). In this study, we use a consistency threshold of 0.85 and a frequency threshold of 1. The final step of the procedure is the logical reduction of the truth table. In order to accomplish this, we employed specific algorithms implemented using the statistical software R (Ragin, 2008).

The parsimonious solution reveals the results of our fsQCA. We obtained this solution by performing a counterfactual analysis based on easy counterfactuals. In other words, we were able to identify and eliminate all the redundant conditions in order to calculate the solution. The parsimonious solution summarises the conditions and/or combinations of conditions which are sufficient for the occurrence of the outcome.

3.3 Measurements

In this study, we analysed the relevance of the individual motivations in the theoretical model of entrepreneurial intentions and actions. We decided to perform a two-step analysis. In the first step, we considered the causal relationships between behavioural beliefs – beha, normative beliefs – norm, control beliefs – cont, motivations – mot (conditions) and the entrepreneurial intentions – int (outcome). In the second step, we took into consideration the relationship between the entrepreneurial intentions – int, the motivations – mot (conditions) and the entrepreneurial actions – act (outcome).

Behavioural beliefs – beha

Ajzen (1991) defines behavioural beliefs as personal attitudes towards the outcome of the observed behaviour. They depend upon the individual's perception of the likely consequences of his/her behaviour and their attractiveness. We obtained the degree of behavioural beliefs through a survey among the sample. We asked the participants to express the desirability of being entrepreneurs on a scale ranging from 0 (extremely worthless) to 3 (extremely valuable).

Normative beliefs – norm

In Ajzen's (1991) model, normative beliefs are determined by the social norms related to the behaviour. They consist of the perceived positive (or negative) reaction which the behaviour might induce in people who matter to the individual (family, friends, etc.). We obtained the degree of normative beliefs through the survey. We asked respondents to indicate whether people whose opinions they care about would approve of their being an entrepreneur on a scale ranging from 0 (strongly disagree) to 3 (strongly agree).

Control beliefs – cont

Ajzen (1991) stresses that control beliefs consist of the perceived control that the individual has over his/her behaviour. Such beliefs are linked to the skills and abilities to start a new business that the individual thinks he/she has or will be able to develop (Almobaarek, 2011; Carey et al., 2010). We obtained the degree of control beliefs through the survey among the sample entrepreneurs by asking the interviewees whether they viewed being an entrepreneur, according to their background and competencies, as a manageable or a difficult task. The measure ranged from 0 (extremely easy) to 3 (extremely difficult).

Motivations – mot

In this study, we considered the individual's motivations to become an entrepreneur by distinguishing between intrinsic and extrinsic ones (Carsrud & Brännback, 2011). What should be noted is that in the Life Sciences context, the complexity and increased riskiness of the sector may well affect entrepreneurial intentions and actions. In this regard, willingness to take risks is an essential element in decision making. The literature clarifies that intrinsic motivation mediates the relationship between certain antecedents and one's willingness to take risks (Dewett, 2007). Amabile (1983, 1996) maintains that intrinsic motivation positively affects risk-taking behaviours. Such a positive role is also played by extrinsic motivations, but only if these are of an informational nature and if the initial levels of intrinsic motivations are high. In line with this, focussing on the crowding-out effects of monetary incentives on intrinsic motivations, Frey and Oberholzer-Gee (1997) argue that extrinsic motivations relating to financial rewards may crowd out intrinsic motivations if the individual perceives the reward as a device to control his/her behaviour.

Given these considerations, during the personal interviews carried out to gather data on motivations, we asked people how much they care about the external rewards related to the entrepreneurial activities (profit, power, prestige), taking for granted the presence of intrinsic motivations (i.e. passion for the research activity in itself; see Deci, 1975; Dewett, 2007). The measure for the motivations ranged from 0 (not at all) to 3 (very much).

Intentions – int

Entrepreneurial intentions represent the real intention of the individual to undertake an entrepreneurial experience. Such intentions were measured via the survey. The indicator ranged from 0 (if the respondent had no intention to start a business) to 3 (if the respondent had strong intentions to do so).

Actions – act

The measure of the entrepreneurial actions derived from a survey about the entrepreneurial experience (past and still in progress) of the researcher interviewed. We calculated a unique measure on a scale of 0 to 3, by assigning the maximum score to the researchers who had been and were still involved in entrepreneurial experiences and the minimum score to those who had no entrepreneurial experience. Respondents who had previous experience but were not entrepreneurs at the time received a score of 1. Those who had no previous entrepreneurial experience but were entrepreneurs at the moment received a score of 2.

3.4 Calibration

The procedure of direct calibration allowed the conditions and outcomes to be calibrated into a set of membership values (Ragin, 2008). This procedure ‘rescaled’ the conditions and the raw outcome values by calculating their scores of deviation from the cross-over point. The calibration procedure was replicated for each of the two steps of the analysis. Given that each case might be fully in, partially in or fully out of the configuration of the conditions and the outcome, each value might range from 0 (fully out) to 1 (fully in; Tóth, 2015).

After defining the three anchors, we were able to assess full membership, full non-membership, and the maximum ambiguity of the conditions and the outcome in the set (Schneider & Wagemann, 2010). No external criteria were available for defining the anchors. As a consequence, we proceeded to a cluster analysis so that we could rely upon the internal distribution of cases in searching for discontinuities. Table 1 illustrates the values of the qualitative anchors which we used for the calibration in step 1; Table 2 illustrates the results of the calibration procedure for step 2.

Table 1. Overview of the membership scores – step 1

Construct	Calibration Rule	Membership Score
Entrepreneurial intentions (int)	If int < 0.5	0 (full non-membership)
	If int = 1.5	0.5 (cross-over point)
	If int > 2.0	1 (full membership)
Behavioral beliefs (beha)	If int < 0.5	0 (full non-membership)
	If int = 1.5	0.5 (cross-over point)
	If int > 2.0	1 (full membership)
Normative beliefs (norm)	If int < 0.5	0 (full non-membership)
	If int = 1.5	0.5 (cross-over point)
	If int > 2.0	1 (full membership)
Control beliefs (cont)	If int < 0.5	0 (full non-membership)
	If int = 1.5	0.5 (cross-over point)
	If int > 2.0	1 (full membership)
Motivations (mot)	If int < 0.5	0 (full non-membership)
	If int = 1.5	0.5 (cross-over point)
	If int > 2.0	1 (full membership)

According to the results of the cluster analysis for step 1, in relation to entrepreneurial intentions (the outcome), the full inclusion value was set at 2.0, while full exclusion was set at 0.5. For the conditions – that is, the behavioural beliefs, normative beliefs, control beliefs and the motivations – the full membership scores and the full non-membership scores were set at 2.5 and 0.5, respectively.

Table 2. Overview of the membership scores – step 2

Construct	Calibration Rule	Membership Score
Entrepreneurial actions (act)	If int < 0.5	0 (full non-membership)
	If int = 1.5	0.5 (cross-over point)
	If int > 2.0	1 (full membership)
Entrepreneurial intensions (int)	If int < 0.5	0 (full non-membership)
	If int = 1.5	0.5 (cross-over point)
	If int > 2.0	1 (full membership)
Motivations (mot)	If int < 0.5	0 (full non-membership)
	If int = 1.5	0.5 (cross-over point)
	If int > 2.0	1 (full membership)

According to results of the cluster analysis for step 2, referring to the entrepreneurial actions (the outcome), the full inclusion value was set at 2.5, and the full exclusion one was 0.5, As for the conditions, the full membership scores and the full non-membership scores were set at 2.0 and 0.5 for the entrepreneurial intentions, and 2.5 and 0.5 for the motivations.

4. Results

4.1 Necessity Test

Using the necessity test, we were able to check whether there were individual conditions or combinations of conditions which were necessary to achieve the outcome. A condition is necessary when the outcome cannot occur without it. To perform the test of necessity (Table 3 and 4), we decided to define the consistency threshold for necessity as 0.9 (Legewie, 2013).

Table 3. Overview of the necessity test – step 1

	Entrepreneurial intentions	
	Consistency	Coverage
Behavioral Beliefs	0.937	0.524
~ Behavioral Beliefs	0.665	0.627
Normative Beliefs	0.459	0.532
~ Normative Beliefs	0.574	0.679
Control Beliefs	0.732	0.750
~ Control Beliefs	0.267	0.461
Motivations	0.723	0.395
~ Motivations	0.68	0.625

Table 4. Overview of the necessity test – step 2

	Entrepreneurial intentions	
	Consistency	Coverage
Entrepreneurial intentions	0.594	0.619
~ Entrepreneurial intentions	0.282	0.463
Motivations	0.781	0.444
~ Motivations	0.64	0.573

The data analysis showed that the consistency of the conditions compared to the outcomes ranged from 0.267 to 0.937 in step 1 and from 0.282 and 0.781 in step 2. Therefore, for step 1, the behavioural beliefs satisfied the consistency threshold for necessity. However, even with the consistency threshold set at 0.90, we can reject the necessity of this condition. In fact, fixing the coverage at 0.80 (Fernandez & Enache, 2008), it can be regarded as an empirically trivial necessary condition (very low set-theoretic coverage, 0.524; see Ragin, 2006). Hence, we do not accept it.

4.2 Sufficiency Test

After simplifying the truth tables for each step, we were able to identify the solutions of the sufficiency test for

step 1 and step 2. These can be interpreted via their Boolean algebraic expressions (see Tables 5 and 6).

Table 5. Overview of the sufficiency test-step 1

Entrepreneurial intentions f{Behavioral beliefs, Normative beliefs, Control beliefs, Motivations	consistency	coverage
Solution: \sim normative beliefs* control beliefs	0.92	0.429

Table 6. Overview of the sufficiency test-step 2

Entrepreneurial actions f{Entrepreneurial intentions, Motivations	consistency	coverage
Solution: entrepreneurial intentions * motivations	0.778	0.54

Table 5 shows that for step 1, the absence of normative beliefs and the presence of control beliefs (occurring together) is a sufficient condition for entrepreneurial intentions to occur. The solution consistency is very good (0.920).

Table 6 reveals a unique solution for step 2. The Boolean expression reads as follows: The entrepreneurial intentions and the extrinsic motivations (occurring together) may lead to the entrepreneurial actions. In relation to step 2, after taking into consideration the lower number of conditions in comparison to step 1, the consistency of the solution is good (0.778; see Schneider & Wagemann, 2010).

5. Discussion and Implications

This study arose from the lack of a systematic comprehension of the interactions between entrepreneurial intentions, motivations and actions, taking into account the under-consideration of contextual elements other than the geographical ones in the extant literature on these issues. Building on this view, the theoretical model which we developed and tested offered us interesting theoretical and practical insights which were mainly grounded in the Life Sciences field but also relevant to other settings.

The analysis revealed that in contrast to previous research, the reference to specific contexts may well determine implications differing from those already detected because of the critical conditions that characterise these particular settings. This confirms that extant theoretical models are not generalisable and more effort in contextualising the research in this field is strongly needed.

The findings also showed that the conditions presented in influential research as determinants of the entrepreneurial intention assume a different role within the Life Sciences setting. More specifically, behavioural beliefs do not appear as determinants of entrepreneurial intention. In contrast, a condition which determines entrepreneurial intentions is the absence of normative beliefs together with the presence of control beliefs. This can be interpreted by considering how people playing a crucial role in life scientists' life judge their choice to become entrepreneurs. More specifically, it is important to understand what life scientists perceive about this judgment. This, in fact, is mainly related to the human perspective, and especially to their primary job rather than to the entrepreneurial adventure. Hence, it is understandable that they are willing to become entrepreneurs only if they feel comfortable in this new role, that is, if they perceive that they have the skills and abilities to control the entire process. Yet, behavioural beliefs and extrinsic motivations do not affect entrepreneurial intentions. In other words, the presence/absence of these factors does not seem to be relevant in the formation of entrepreneurial intentions. The irrelevance of behavioural beliefs probably derives from the fact that within the Life Sciences context, desirability is usually linked to answering scientific/medical questions (e.g. discovering new therapies) rather than entrepreneurial issues. Entrepreneurship may or may not happen in the life of a researcher, but regardless, it does not constitute a triggering goal. In addition, the absence of extrinsic motivation in the solution can be interpreted by considering the peculiarities of the context. Indeed, entrepreneurial intentions are likely to derive from a scientific/medical idea in itself and from the researchers' feeling of personal satisfaction connected to its materialisation rather than from economically driven desires.

The research also showed that entrepreneurial intention can determine the entrepreneurial action. However, such intentions alone are not sufficient and need to be complemented by extrinsic motivations, that is, those correlated with external incentives/benefits (above all of an economic nature). This represents an interesting factor which deserves further explanation. Indeed, it is possible to maintain that, as opposed to intrinsic ones, extrinsic motivations have high importance because life-scientists already receive intrinsic satisfaction from their main research activity. In contrast, the well-known scarcity of financial and economic benefits deriving from the

research activity is what pushes them to look for the entrepreneurial opportunity. Arguably, for these subjects, entrepreneurial action assumes a role which complements their main occupation because it allows them to satisfy aspirations that otherwise could not be fulfilled.

Our results have some implications for entrepreneurs, managers and policymakers. For instance, the influence of control beliefs on the formation of entrepreneurial intentions highlights that universities should put more effort into fostering multidisciplinary collaboration between economic and scientific departments. More specifically, the provision of multidisciplinary training programmes for life scientists could be helpful in making them feeling more comfortable with entrepreneurial roles. This is in line with Sieger and Monsen (2015) and McGee et al. (2009), who observe that to nurture entrepreneurial intentions, programmes should create a positive attitude and entrepreneurial self-efficacy. From the policy perspective, this could be reached through joint effort between regulators and universities, providing guidelines and specific funds and/or solutions to support such initiatives. Yet, the availability of public funds for entrepreneurs could improve collaboration between them and academics, fostering an open and innovative environment by creating a kind of reciprocal mentoring for the respective key skills.

Focussing on the issues relating to entrepreneurial actions, the importance of extrinsic motivation assumes special relevance for both universities and policymakers. In line with Marion et al. (2012), our results suggest that to reinforce academic entrepreneurship, universities should incorporate entrepreneurial achievements into their promotion and tenure policies, clearly taking into account policies to promote entrepreneurial thinking and learning, as highlighted above. Moreover, with a view to complementing Huyghe and Knockaert's (2015) conception that the changing organisational culture is essential to stimulate researchers to engage in entrepreneurship, we put forward the idea that organisational culture always needs to be complemented by a revised reward system to achieve this aim. This is also linked to the issues relating to the balancing of working time across different activities (Moog et al., 2014), because the absence of adequate regulations for academic spin-offs, encompassing cultural and financial questions, may prevent full-time professors from dedicating time to external activities.

This suggests that there is a need to implement specific solutions in relation to funding which are able to stimulate the realisation of entrepreneurial intentions. More specifically, policymakers should avoid any measures which imply heavy initial financial investments on the part of the academic-entrepreneur, who can only receive a reimburse at a certain stage of the process and is often discouraged in favour of other solutions able to render the funds, or a relevant part of them, available since the beginning. Indeed, as highlighted by Etzkowitz et al. (2000), policymakers should consider the specific features of academic entrepreneurial activities when deciding upon university funding, thereby orienting decisions towards different and more employable solutions.

Before concluding, several caveats need to be considered. These findings clearly do not preclude that other variables not included in the current analysis may influence the formation of entrepreneurial intention and the entrepreneurial actions, thereby leaving room for further research on these issues in the Life Sciences context. This is confirmed by the coverage values associated with the solutions, which are satisfactory but suggest that other conditions may lead to the entrepreneurial intentions and actions. Moreover, the administration of the survey to a greater number of people is advisable because, although sample size does not constitute a problem when fsQCA is employed, a larger sample could possibly be helpful in elucidating other possible solutions. Finally, we maintain that to further test the theoretical model proposed here, it could be stimulating to further investigate the relationship between entrepreneurial intentions, motivations and actions in other settings where the achievement of intrinsic motivations is not granted by people's primary work.

References

- Ahn, M. J., & Meeks, M. (2008). Building a conducive environment for life science-based entrepreneurship and industry clusters. *Journal of Commercial Biotechnology*, 14(1), 20-30. <http://dx.doi.org/10.1057/palgrave.jcb.3050076>
- Ajzen, I. (1991). The theory of planned behavior, *Organizational behavior and human decision processes*. [http://dx.doi.org/10.1016/0749-5978\(91\)90020-t](http://dx.doi.org/10.1016/0749-5978(91)90020-t)
- Ajzen, I., & Fishbein, M. (1977) Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin*, 84(5), 888. <http://dx.doi.org/10.1037/0033-2909.84.5.888>
- Almobaareek, W. N., & Manolova, T. S. (2012). Who wants to be an entrepreneur? Entrepreneurial intentions among Saudi university students. *African Journal of Business Management*, 6(11), 4029-4040. <http://dx.doi.org/10.5897/ajbm11.1521>

- Alvarez, S. A., & Barney, J. B. (2007). Discovery and creation: Alternative theories of entrepreneurial action. *Strategic Entrepreneurship Journal*, 1(1-2), 11-26. <http://dx.doi.org/10.2139/ssrn.900200>
- Amabile, T. M. (1983). The social psychology of creativity: A componential conceptualization. *Journal of Personality and Social Psychology*, 45(2), 357. <http://dx.doi.org/10.1037/0022-3514.45.2.357>
- Amabile, T. M. (1996). *Creativity in context*. Boulder, Colorado: Westview Press.
- Atkinson, J. W. (1964). *An introduction to motivation*. Oxford, England: Van Nostrand.
- Bagozzi, R. P. (1992). The self-regulation of attitudes, intentions, and behavior. *Social Psychology Quarterly*, 178-204. <http://dx.doi.org/10.2307/2786945>.
- Bay, D., & Daniel, H. (2003). The theory of trying and goal-directed behavior: The effect of moving up the hierarchy of goals. *Psychology & Marketing*, 20(8), 669-684. <http://dx.doi.org/10.1002/mar.10091>
- Black, J. A., & Boal, K. B. (1994) Strategic resources: Traits, configurations and paths to sustainable competitive advantage. *Strategic management journal*, 15(S2), 131-148. <http://dx.doi.org/10.1002/smj.4250151009>
- Brandl, J., & Bullinger, B. (2009). Reflections on the societal conditions for the pervasiveness of entrepreneurial behavior in Western societies. *Journal of Management Inquiry*, 18(2), 159-173. <http://dx.doi.org/10.1177/1056492608329400>
- Carey, T. A., Flanagan, D. J., & Palmer, T. B. (2010). An examination of university student entrepreneurial intentions by type of venture. *Journal of Developmental Entrepreneurship*, 15(4), 503-517. <http://dx.doi.org/10.1142/s1084946710001622>
- Carsrud, A., & Brännback, M. (2011). Entrepreneurial motivations: What do we still need to know? *Journal of Small Business Management*, 49(1), 9-26. <http://dx.doi.org/10.1111/j.1540-627x.2010.00312.x>
- Collins, C. J., Hanges, P. J., & Locke, E. A. (2004). The relationship of achievement motivation to entrepreneurial behavior: A meta-analysis. *Human performance*, 17(1), 95-117. http://dx.doi.org/10.1207/s15327043hup1701_5
- Deci, E. L. (1975). *Intrinsic motivation*. New York: Plenum.
- Delery, J. E., & Doty, D. H. (1996). Modes of theorizing in strategic human resource management: Tests of universalistic, contingency, and configurational performance predictions. *Academy of management Journal* 39(4), 802-835. <http://dx.doi.org/10.2307/256713>
- Dewett, T. (2007). Linking intrinsic motivation, risk taking, and employee creativity in an R&D environment. *R&D Management*, 37(3), 197-208. <http://dx.doi.org/10.1111/j.1467-9310.2007.00469.x>
- Enkel, E., & Bader, K. (2015). Why do experts contribute in cross-industry innovation? A structural model of motivational factors, intention and behavior. *R&D Management*, 46(S1), 207-226.
- Estay, C., Durrieu, F., & Akhter, M. (2013). Entrepreneurship: From motivation to start-up. *Journal of International Entrepreneurship*, 11(3), 243-267. <http://dx.doi.org/10.1007/s10843-013-0109-x>
- Etzkowitz, H., Webster, A., Gebhardt, C., & Terra, B. R. C. (2000). The future of the university and the university of the future: Evolution of ivory tower to entrepreneurial paradigm. *Research policy*, 29(2), 313-330. [http://dx.doi.org/10.1016/s0048-7333\(99\)00069-4](http://dx.doi.org/10.1016/s0048-7333(99)00069-4)
- Fernandez, V., & Enache, M. (2008). Exploring the relationship between protean and boundaryless career attitudes and affective commitment through the lens of a fuzzy set QCA methodology. *Intangible Capital*, 4(1), 31-66.
- Fiss, P. C. (2011). Building Better Causal Theories: A Fuzzy Set Approach to Typologies in Organizational Research. *Academy of Management Journal*, 54(2), 393-420. <http://dx.doi.org/10.5465/amj.2011.60263120>
- Frey, B. S., & Oberholzer-Gee, F. (1997). The cost of price incentives: An empirical analysis of motivation crowding-out. *The American Economic Review*, 87(4), 746-755. <http://www.jstor.org/stable/2951373>
- Gollwitzer, P. M., & Brandstätter, V. (1997). Implementation intentions and effective goal pursuit. *Journal of Personality and Social Psychology*, 73(1), 186. <http://dx.doi.org/10.1037/0022-3514.73.1.186>
- Huyghe, A., & Knockaert, M. (2015). The influence of organizational culture and climate on entrepreneurial intentions among research scientists. *The Journal of Technology Transfer*, 40(1), 138-160. <http://dx.doi.org/10.1007/s10961-014-9333-3>

- Ishiyama, J., & Batta, A. (2012). The emergence of dominant political party systems in unrecognized states. *Communist and Post-Communist Studies*, 45(1), 123-130. <http://dx.doi.org/10.1016/j.postcomstud.2012.03.006>
- Katz, D., & Kahn, R. L. (1978). The social psychology of organizations.
- Krueger, N. F., Reilly, M. D., & Carsrud, A. L. (2000). Competing models of entrepreneurial intentions. *Journal of Business Venturing*, 15(5), 411-432. [http://dx.doi.org/10.1016/S0883-9026\(98\)00033-0](http://dx.doi.org/10.1016/S0883-9026(98)00033-0)
- Legewie, N. (2013). An Introduction to Applied Data Analysis with Qualitative Comparative Analysis. *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research*, 14(3). Retrieved from <http://nbn-resolving.de/urn:nbn:de:0114-fqs1303154>
- Locke, E. A., & Latham, G. P. (2004). What should we do about motivation theory? Six recommendations for the twenty-first century. *Academy of Management Review*, 29(3), 388-403.
- Marion, T. J., Dunlap, D. R., & Friar, J. H. (2012). The university entrepreneur: A census and survey of attributes and outcomes. *R&D Management*, 42(5), 401-419. <http://dx.doi.org/10.1111/j.1467-9310.2012.00691.x>
- McGee, J. E., Peterson, M., Mueller, S. L., & Sequeira, J. M. (2009). Entrepreneurial self-efficacy: Refining the measure. *Entrepreneurship theory and Practice*, 33(4), 965-988. <http://dx.doi.org/10.1111/j.1540-6520.2009.00304.x>
- McMullen, J. S., Bagby, D., & Palich, L. E. (2008). Economic freedom and the motivation to engage in entrepreneurial action. *Entrepreneurship Theory and Practice*, 32(5), 875-895.
- Meyer, A. D., Tsui, A. S., & Hinings, C. R. (1993). Configurational approaches to organizational analysis. *Academy of Management Journal*, 36(6), 1175-1195. Retrieved from <http://www.jstor.org/stable/256809>
- Moog, P., Werner, A., Houweling, S., & Backes-Gellner, U. (2014). The impact of skills, working time allocation and peer effects on the entrepreneurial intentions of scientists. *The Journal of Technology Transfer*, 40(3), 493-511. <http://dx.doi.org/10.1007/s10961-014-9347-x>
- Perugini, M., & Bagozzi, R. P. (2001). The role of desires and anticipated emotions in goal - directed behaviours: Broadening and deepening the theory of planned behavior. *British Journal of Social Psychology*, 40(1), 79-98. <http://dx.doi.org/10.1348/014466601164704>
- Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, 63, 539-569. <http://dx.doi.org/10.1146/annurev-psych-120710-100452>
- Ragin, C. C. (2000). *Fuzzy-set social science*. Chicago: University of Chicago Press.
- Ragin, C. C. (2006). Set relations in social research: Evaluating their consistency and coverage. *Political Analysis*, 14(3), 291-310. <http://dx.doi.org/10.1093/pan/mpj019>
- Ragin, C. C. (2008). *Redesigning social inquiry: Fuzzy sets and beyond*. Chicago: University of Chicago Press.
- Rihoux, B., & Ragin, C. C. (Eds.) (2009). *Configurational comparative methods: Qualitative comparative analysis (QCA) and related techniques*. London: Sage.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68-78. <http://dx.doi.org/10.1037/0003-066X.55.1.68>
- Schlaegel, C., & Koenig, M. (2014). Determinants of Entrepreneurial Intent: A Meta-Analytic Test and Integration of Competing Models. *Entrepreneurship Theory and Practice*, 38(2), 291-332. <http://dx.doi.org/10.1111/etap.12087>
- Schneider, C. Q., & Wagemann, C. (2010). Standards of good practice in qualitative comparative analysis (QCA) and fuzzy-sets. *Comparative Sociology*, 9(3), 397-418. <http://dx.doi.org/10.1163/156913210X12493538729793>
- Shapiro, A. (1975). The displaced, uncomfortable entrepreneur. *Psychology Today*, 9(6), 83-88.
- Shapiro, A., & Sokol, L. (1982). The social dimensions of entrepreneurship. In C. Kent, D. Sexton, & K. Vesper (Eds.), *Encyclopedia of entrepreneurship* (pp. 73-90). Englewood Cliffs, NJ: Prentice-Hall.
- Shook, C. L., Priem, R. L., McGee, J. E. (2003). Venture creation and the enterprising individual: A review and

- synthesis. *Journal of Management*, 29(3), 379-399. http://dx.doi.org/10.1016/s0149-2063_03_00016-3
- Sieger, P., & Monsen, E. (2015) Founder, Academic, or Employee? A Nuanced Study of Career Choice Intentions. *Journal of Small Business Management*, 53(S1), 30-57. <http://dx.doi.org/10.1111/jsbm.12181>
- Tóth, Z., Thiesbrummel, C., Henneberg, S. C., & Naudé, P. (2015). Understanding configurations of relational attractiveness of the customer firm using fuzzy set QCA. *Journal of Business Research*, 68(3), 723-734. <http://dx.doi.org/10.1016/j.jbusres.2014.07.010>

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