

STUDENTS ENTREPRENEURIAL BEHAVIOUR: AN EIGHT-CONSTRUCT SCALE VALIDATION

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ABSTRACT

This study aims to propose and validate a measurement scale for an eight-dimension entrepreneurial orientation in an international context. A sample of 2,175 students from Brazilian and Finnish universities was used. Exploratory factor analysis followed by validation and reliability using structural equations modelling were performed. Seven of the proposed dimensions were validated and confirmed by this study. Results may contribute to future assessments of entrepreneurial profile within an international setting, to entrepreneurial education and to the debate about the complexity of the entrepreneurial behaviour. Entrepreneurial behaviour assessment has evolved in terms of construct complexity and scope of empirical observation. This study proposes an encompassing conceptualization in terms of the number of dimensions considered and its application in an international setting, involving two different countries in terms of entrepreneurial behaviour.

Keywords: Entrepreneurial Behaviour, Scale Development, Scale Validation, Intercultural Comparison, Entrepreneurial Education.

INTRODUCTION

The measurement of the entrepreneurial profile has long been an issue of debate among researchers. Since Schumpeter's (1934). Theory of Economic Development enhanced the importance of the entrepreneur to the advance of societies; interest has been growing on the phenomena of developing and identifying entrepreneurial orientation. The subject, however, has evolved in terms of approaches and complexity. While early articles investigated only two or three entrepreneurial dimensions, recent ones tend to encompass a broader view, including in average five dimensions. As the number of dimensions indicates the complexity of the entrepreneurial profile, which dimensions were considered in each study may suggest a fragmented literature. An encompassing review and synthesis from past studies to date, as presented in the next section, points out that, in sum, at least eight different dimensions were investigated. This means that in each study, significant entrepreneurial behaviours were discarded, probably because of the large sample sizes needed to employ robust statistical techniques, such as structural equations modelling (Coviello and Jones, 2004), to validate broader scales.

Additionally, few studies proposed a measurement scale for intercultural comparisons. One of the recent studies that proposed such a scale was the one of Bolton and Lane (2012). Their final scale, however, overlooked some entrepreneurial dimensions that have been extensively mentioned in the literature, such as self-efficacy (Boyd and Vozikis, 1994; Chen, Greene and Crick, 1998; Markman and Baron, 2003), personal locus of control (Carland, Hoy and Carland, 1988; Fretschner and Weber, 2013) and leadership (Carland et al., 1988).

We believe, after McNally, Martin, Honig, Bergmann, and Piperopoulos (2016), that “this continual review, re-assessment and refinement of measures and methods are needed in the entrepreneurship literature”. Thus, this study aims to propose and validate a measurement scale for individual entrepreneurial orientation in an international context. Students from Brazil and Finland were chosen to be investigated, due to their countries’ dissimilar characteristics in relation to economic, social, geographical, educational and political aspects. In terms of population, for example, Brazil has around 204.5 million inhabitants and Finland 5.5 million inhabitants. Another factor that distances the two countries is the Gross Domestic Product (GDP) per capita. In Brazil, GDP per capita is US\$ 8.67, while in Finland is US\$ 41,674 (GEM 2016/2017). The Global Entrepreneurship Monitor report (GEM, 2016/2017) points out important differences in respondents' perceptions (adults aged 18-64) regarding core issues about entrepreneurship. For example, in Brazil, 40.2% of the respondents believe there are opportunities to start a business in the area they live in. In Finland, 49.1% of the respondents expressed this belief. Although with less expectations about entrepreneurial opportunities, Brazilian adults seem to be more confident in their skills and knowledge than Finish respondents, since 53.6% of them believe they possess the knowledge resources to start a new business, while in Finland only 35.8% share the same belief. Brazilians’ entrepreneurial intention is higher than their Finish counterparts, 27.7% against 10.45%. However, entrepreneurship in Brazil is equally driven by necessity and opportunities (1 to 1 ratio), while in Finland for each one entrepreneur that open his/her business for necessity, there are almost ten seeking to fulfil market opportunities (1 to 9.7 ratios). These differences in the empirical context may enhance the robustness of the findings and possibilities for applying the measurement scale proposed here. The study is organized as follows: After this introduction, the entrepreneurial dimensions are referenced, discussed and defined, resulting in the measurement items initially proposed. Next, section 3 described the method used to collect data and validate the scale. Section 4 presents the results. Final remarks are presented in section 5.

ENTREPRENEURIAL DIMENSIONS

Research about entrepreneurship and its dimensions has significantly evolved along the last decades. A synthesis of the literature can show that, in its early years, each study covered a small number of dimensions. Later, as a signal of the increasing complexity that this topic has achieved, studies encompassed more dimensions. Cited dimensions varied in terms of concepts used to describe them, but similarities and relations can be found among its definitions. In an attempt to provide an overview of the research evolution in this area, Table 1 shows the works on entrepreneurial profile organized by similar dimensions and decade published. This synthesis also supported the organization of this study, as will be explored later. The last line of Table 1 shows the average number of dimensions considered in each study grouped by 10-year periods. As Table 1 demonstrates, entrepreneurial orientation increased in complexity until the 2000’s, but slightly decreased it in the last decade.

Dimensions (and related concepts)	1970 and before	1971 to 1980	1981 to 1990	1991 to 2000	2001 to 2010	2011 and after
Self-efficacy (self-confidence, autonomy, etc.)	(Davids and Bunting, 1963)	(Hornaday and Aboud, 1971; Timmons, 1978)	(Welsh and White, 1981)	(Lumpkin and Dess, 1996; Robinson, Stimpson, Huefner and Hunt, 1991)	(Baughn, Cao, Le, Lim and Neupert, 2006; Gelderen et al., 2008; Gürol and Atsan, 2006; Harris and Gibson, 2008; Harris, Gibson and Taylor, 2007; Markman and Baron, 2003; Parnell, Shwiff, Yalin and Langford, 2003)	(Bolton and Lane, 2012; Moruku, 2013)
Persistence (perseverance, tenacity, etc.)		(Sexton, 1980; Timmons, 1978)		(Chen et al., 1998)	(Gelderen et al., 2008; Markman and Baron, 2003)	
Planner (organization effectiveness)	(Davids and Bunting, 1963; Sutton, 1954)	(Borland, 1975; Palmer, 1971; Timmons, 1978)	(Welsh and White, 1981)	(Chen et al., 1998; Robinson et al., 1991)	(Gürol and Atsan, 2006; Harris and Gibson, 2008; Harris et al., 2007; Okhomina, 2007; Parnell et al., 2003)	
Leader (need for power, source of formal authority, etc.)	(Weber, Hendersohn and Parsons, 1964)	(Hornaday and Aboud, 1971; Winter, 1973)			(Parnell et al., 2003)	
Innovative (creative, tolerance for ambiguity)	(Schumpeter, 1934)	(Hornaday and Aboud, 1971; Timmons, 1978)		(Chen et al., 1998; Robinson et al., 1991)	(Gelderen et al., 2008; Gürol and Atsan, 2006; Harris & Gibson, 2008; Harris et al., 2007; Okhomina, 2007)	(Bolton, 2012; Bolton and Lane, 2012; Moruku, 2013)
Opportunity detector (need for achievement, vision, etc.)	(Davids and Bunting, 1963; McClelland, 1953; Schumpeter, 1934)	(Hornaday and Aboud, 1971; Liles, 1976; Sexton, 1980; Timmons, 1978)		(Chen et al., 1998; Lumpkin and Dess, 1996; Robinson et al., 1991)	(Gelderen et al., 2008; Gürol and Atsan, 2006; Harris and Gibson, 2008; Harris et al., 2007; Markman and Baron, 2003; Okhomina, 2007)	(Bolton, 2012; Bolton and Lane, 2012; Moruku, 2013)

Risk-taker (risk bearer, challenge taker, etc.)	(McClelland, 1953; Mill, 1848)	(Palmer, 1971; Timmons, 1978)	(Welsh and White, 1981)	(Chen et al., 1998)	(Gelderen et al., 2008; Gürol and Atsan, 2006)	(Bolton, 2012; Bolton and Lane, 2012; Moruku, 2013)
Sociable (social capital, social support)		(Hornaday and Aboud, 1971)			(Baughn et al., 2006; Markman and Baron, 2003)	
Average number of dimensions per study	1.6	2.6	3.0	3.7	3.8	3.7
Source: elaborated by the authors.						

In our review of the literature, we tried to synthesize the entrepreneurial dimensions among the various terms and concepts into a common set of basic ideas or dimensions involving the entrepreneurial behaviour. These dimensions are explained below.

Creative

According to Schumpeter (1934), the entrepreneurial concept is fundamentally associated with innovation. Innovation is one of the attitudes to promote the development of new products, services, processes and the development of new firms (Robinson et al., 1991). Entrepreneurs put innovation into practice, being it social or technological innovation, to express their dissatisfaction with the reality and promote its change (Drucker, 1985). They do not wait for inspiration to start their business (Bolton and Lane, 2012).

Creativity is present when the entrepreneurial behaviour is analysed either from the point of view of the innovation process, or its results. Carland et al. (1988), for example, enhance the creative resource combination conducted by the entrepreneur: “the entrepreneur is characterized by a preference for creating activity, manifested by some innovative combination of resources for profit”. Chen et al. (1998) and Moruku (2013) consider the result of the entrepreneurial process as embedded by creativity. Moruku (2013) state that “innovativeness involves engaging in creative activities (visioning and experimentation) which may result in new products, services, or processes”. Creativity was also accounted by Gelderen et al., (2008) and Harris and Gibson (2008) to evaluate entrepreneurial intention and behaviour.

Some authors investigated entrepreneurial characteristics that are pre-requisites to creativity, such as tolerance to ambiguity (Timmons, 1978). Okhomina (2007) proposed that this behaviour may open the entrepreneur to alternative solutions to daily problems regarding products, services and business processes. Ambiguity arises when there are no clear courses of action, in the presence of risk and uncertainty (Gürol and Atsan, 2006).

A creative person is, therefore, one who relates ideas, facts, necessities, demands and resources, producing new concepts for products, services and processes.

Leader

The definition of leadership, generally considered as an ability to influence other persons, is not a consensus among scholars. Some authors consider leadership as a source of power and a

means of centralization, which is a typical attribute of entrepreneurs (Hartmann, 1959; Hornaday and Aboud, 1971). Rauch, Wiklund, Lumpkin and Frese (2009) also assume that entrepreneurs can be leaders “directed at bringing about a new venture and seeing it to fruition”. Other authors, however, understand leadership as the construction of inspiration and positive individual relationships, to form a team or a network of competences in order to achieve the entrepreneur’s goals (Timmons, 1978). Timmons (1978), for example, state that “venture capitalists place considerable emphasis on the demonstrated capacity of the lead entrepreneur to attract, motivate and build a high quality entrepreneurial team”. Likewise, Markmann and Baron (2003) describe the entrepreneur using a set of social behaviours that are expected from a leader: “generating enthusiasm and commitment in employees, communicating effectively with people from a wide range of backgrounds, attracting effective partners and employees, developing business networks and relationships, establishing trust and legitimacy, (...)”. These views of the leader, as centralization of power and the aim to form a good team, are also concomitantly considered by Parnell, Shwiff, Yalin and Langford (2003). Regarding this study, the entrepreneurial leadership is considered the ability to inspire or influence the behaviour of others.

Planner

Entrepreneurs establish goals, plan their achievement and define organizational rules in order to mitigate the risks of their business (Chen et al., 1998; Robinson et al., 1991). Timmons (1978) enhance entrepreneurs’ “ability and commitment to set clear goals for themselves. These goals tend to be high and challenging, but they are realistic and attainable”. This behaviour also emphasizes their intention to assume responsibilities and their autonomy (Carland et al., 1984).

Also within this concept, Parnell et al. (2003) suggest that entrepreneurs are organized, self-disciplined and adequately manage their time. They have the capability to control the events in their lives or in other words, have locus of inner control (Gürol and Atsan, 2006; Okhomina, 2007). Harris and Gibson (2008) also understand that locus of control an inherent characteristic of entrepreneurial persons and used it to measure entrepreneurial behaviour. Therefore, the entrepreneur puts his personal effort in controlling daily activities to reach commercial results (Harris et al., 2007).

In this article, planner behaviour is an entrepreneurial characteristic related to the person that prepares itself for the future, trying to foresee the necessary steps to reach his or her goals.

Opportunity-Detector

Since Drucker (1985), systematic innovation is a specific characteristic of the entrepreneurial spirit, by which the search of opportunities can result in the development of society. The entrepreneur promotes changes in economic systems through innovations (Schumpeter, 1934) and this is relative to “perceiving and acting upon business activities in new and unique ways” (Robinson et al., 1991). In this sense, entrepreneurs are continually seeking market opportunities, having an ability to capture, recognize and make effective use of abstract information in dynamic environments (Birley and Muzyka, 2001; Gürol and Atsan, 2006; Markman and Baron, 2003). This ability enables the entrepreneur to engage in new ideas and businesses (Lumpkin and Dess, 1996). Markman and Baron (2003) suggest that this ability to identify potential market opportunities is highly related to entrepreneurial success. Timmons (1978) suggests that the entrepreneur likes to act proactively and fill market gaps, taking his

success as a measure of his or her own success. This ability to detect market opportunities have been extensively used in the literature to assess entrepreneurial behaviour (Bolton, 2012; Hornaday and Aboud, 1971; Robinson et al., 1991).

In this article, we define this ability as alertness to market opportunities that may arise for new products and services.

Persistent

Persistency is one of the least researched entrepreneurial characteristics of behaviour. Markman and Baron (2003) state, however, that “studies suggest that perseverance in the face of business and technological difficulties may be more important than the idea or the opportunity itself”. This persistency is viewed as a lack of intimidation when faced with difficult situations (Timmons, 1978) or the self-motivation necessary to endure work problems. It includes the ability to deal with defying circumstances when a new business is started, combined with the idea of intensive working to overpass them (McClelland, 1966). Markman and Baron (2003) suggest that the entrepreneur is even capable of subjecting himself to social privacy in order to work in risky projects to achieve the desired success. A study conducted by Gelderen et al. (2008), identified that “the participating students themselves nominated perseverance as an important variable affecting feasibility”, in spite of this variable not showing explanatory power in their model.

We consider persistency as the determination needed to keep working on a project and reaching its objectives, even under critical circumstances and adversity.

Risk Taking

Risk taking behaviour is consistently related to entrepreneurs (Lumpkin and Dess, 1996) and pointed out by many authors, such as Chen et al. (1998), Gürol and Atsan (2006); Bolton and Lane (2012); Moruku (2013) as one of the most important. In the meta-analysis of Carland et al. (1984), the authors enhance that “many writers have asserted and continue to assert that risk bearing is a prime factor in the entrepreneurial character and function”. The main difference among risk taking among entrepreneurs and among managers seems to be that entrepreneurs takes the risk personally, while managers risk their company’s assets (Gürol and Atsan, 2006). Longenecker, Petty, Palich and Hoy (2016) state that the entrepreneur is motivated to take risks after his interest in the possible economic returns. Gelderen et al. (2008) suggest that the willingness to have financial security is a reverse predictor of entrepreneurial intention, corroborating the view of risk-taking as its indicator.

The definition of risk used in this study is the one provided by Moruku (2013): “Risk-taking is the willingness to commit significant resources to a project in the face of uncertainty”.

Self-Efficacy

Risk taking behaviour can be encouraged among students with teaching techniques involving self-efficacy (Gelderen et al., 2008), which reduces their financial insecurity. Chen et al. (1998) suggest that entrepreneurial self-efficacy is one of the most important entrepreneurial indicators, being present in both students and business executives.

Self-efficacy is associated with self-confidence (Gürol and Atsan, 2006) or the belief that the person can organize and execute actions to achieve the intended results (Markman and Baron, 2003). Autonomy is also implicated here since, besides the capacity to mobilize internal motivation and cognitive resources, the entrepreneur chooses situations where he will have more control of external resources (Chen et al., 1998; Gelderen et al., 2008; Lumpkin and Dess, 1996). Robinson et al. (1991) also refer to the self-esteem “pertaining to the self-confidence and perceived competency of an individual in conjunction with his or her business affairs”.

We conceptualize self-efficacy as the belief on his or her own capacity to control the internal and external necessary resources for the success of his or her project.

Sociable

Despite not receiving much attention on entrepreneurial studies, sociable behaviour is considered important by some authors.

Dimension	Concept	References
Creative	One who relates ideas, facts, necessities, demands and resources, producing new concepts for products, services and processes	(Bolton and Lane, 2012; Carland et al., 1988; Chen et al., 1998; Gelderen et al., 2008; Gürol and Atsan, 2006; Harris and Gibson, 2008; Moruku, 2013; Okhomina, 2007; Robinson et al., 1991; 1934; Timmons, 1978)
Leader	The ability to inspire or influence the behaviour of others	(Hartmann, 1959; Hornaday and Aboud, 1971; Parnell et al., 2003; Timmons, 1978)
Planner	The person that prepares itself for the future, trying to foresee the necessary steps to reach his or her goals	(Carland et al., 1984; Chen et al., 1998; Gürol and Atsan, 2006; Harris and Gibson, 2008; Harris et al., 2007; Okhomina, 2007; Parnell et al., 2003; Robinson et al., 1991; Timmons, 1978)
Opportunity detector	An alertness to market opportunities that may arise for new products and services	(Birley and Muzyka, 2001; Bolton, 2012; Gürol and Atsan, 2006; Hornaday and Aboud, 1971; Lumpkin and Dess, 1996; Markman and Baron, 2003; Robinson et al., 1991; Schumpeter, 1934; Timmons, 1978)
Persistent	The determination needed to keep working on a project and reaching its objectives, even under critical circumstances and adversity	(Gelderen et al., 2008; Markman and Baron, 2003; McClelland, 1966; Timmons, 1978)
Risk taking	The willingness to commit significant resources to a project in the face of uncertainty	(Bolton and Lane, 2012; Carland et al., 1984; Chen et al., 1998; Gelderen et al., 2008; Gürol and Atsan, 2006; Longenecker et al., 2016; Lumpkin and Dess, 1996; Moruku, 2013)
Self-efficacy	The belief on his or her own capacity to control the internal and external necessary resources for the success of his or her project	(Chen et al., 1998; Gelderen et al., 2008; Gürol and Atsan, 2006; Lumpkin and Dess, 1996; Markman and Baron, 2003; Robinson et al., 1991)
Sociable	The easiness to effectively interact with other persons.	(Baron and Markman, 2000; Markman and Baron, 2003)
Source: Elaborated by the authors.		

Baron and Markman (2000), for example, suggest that many social skills influence entrepreneurial success, such as social perception, impression management, persuasion and social influence (also associated with leadership) and social adaptability. We contend that sociable behaviour is the easiness to effectively interact with other persons. Table 2, next, presents the entrepreneurial dimensions, the concepts used in this study and the references that subsided these concepts. In a further study, Markman and Baron (2003) state that “since the creation of new companies entails the ability to work effectively with many constituencies in numerous contexts and under varying degrees of uncertainty, we propose that, *ceteris paribus*, proficiency in dealing with others may be a key ingredient in entrepreneurs’ success.” The next section explains how these dimensions were operationalized through a measurement instrument and analysed.

METHOD

Measurement items were developed for each the entrepreneurial dimensions extracted from the literature (see Table 3, next). These items were submitted to experts in entrepreneurial development in each country and university where the measurement instrument was to be applied: VIA University in Denmark, HAMK University in Finland, Feevale and UCS universities and Brazil. Later, VIA University declined to participate in this study. The concepts and items were presented to these experts and a series of online discussions using Skype took place to debate about their content validity, considering local cultural aspects and interpretations, until a consensus was reached.

Questions regarding the respondents’ profiles were also added, such as education level, gender, age, percentage of course completed and number of financial dependents. The questionnaire was translated and back-translated from English to Portuguese and from English to Finnish (Malhotra, Agarwal and Peterson, 1996). A seven-point Likert scale was used, ranging from “completely agree” to “completely disagree”. It was then placed online by Feevale University, which supplied an internet link for respondents. Measurement items are represented in Figure 3 below. A preliminary data analysis was performed to identify outliers and patterns of missing values. Exploratory factor analysis and confirmatory factor analysis were performed using IBM SPSS Statistics v23 and IBM SPSS Amos v22, respectively. Entrepreneurial data from the three universities was collected during the period of March until May 2016. A total of 2,180 responses were obtained through a non-probabilistic sampling, in which the link of the questionnaire was sent by e-mail to all students of the three universities. Preliminary data analysis considered the identification of outliers and missing values. Five univariate outliers with higher z scores ($>|2.5|$) and that visually responded differently from other respondents were identified. Responses from these cases were all “i do not know / do not want to answer” in the entrepreneurial profile questions. Three cases from feevale (ids 957144, 983544 and 1034528) and two from hamk (ids 204 and 517) were excluded from the sample. We also tested for multivariate outliers using the mahalanobis distance, which presented no cases with insignificant probabilities. Missing data analysis reported no variables with more than 10% missing values (hair jr, black, babin and anderson, 2009). Multivariate normality was not assessed, since this represents a problem to sem models only when small samples (lower the 200 cases) are used (hair jr et al., 2009).

Table 3	
ORIGINAL MEASUREMENT ITEMS OF ENTREPRENEURIAL PROFILE	
Self-effective	I believe I am very capable of organizing and executing actions to be successful
	I have control upon the critical factors that influence my success.
	I have all the capacity needed to realize my professional/academic future.
	I am sure I am competent enough to develop my career successfully
	My academic/professional success depends heavily upon me.
Opportunity detector	I frequently think of products/services that could be offered in the market.
	I am interested in knowing the market needs for determined products/services.
	I think I have a good ability to detect business opportunities in the market.
	Whenever I observe people complaining about with some products/services, I think about the market opportunities that may be opening.
	I frequently imagine the possibility of success that certain products/services could have in a certain market.
Persistent	I consider myself very persistent.
	I never lose my determination when I face daily difficulties.
	Whenever I find adversities, I employ extra effort to overcome them.
	I face the difficult situations of my daily activities as personal challenges.
	The obstacles I face make me increase my energy to overpass them.
Sociable	I have a lot of friends.
	I can easily relate with other persons, even with those I still do not know
	I always remember the persons I don't see for a long time.
	I can easily memorize people's names and faces.
	I like to be in contact with other persons.
Creative	I always find creative solutions to my academic/professional problems.
	I do not like routine activities
	I repeatedly change the way I study/work.
	I like to invent new things.
	I like to do tasks that are completely new everyday
Planner	I am rarely got by surprise in situations that I could have planned.
	I have issues regarding my work/study always planned well in advance.
	I have a detailed plan of my academic/professional issues
	My professional/academic goals are very clear to me.
	I like to have the activities of my next year always well planned.
Risk-taker	Sometimes I financially bet in projects that can bring me advantages in the future.
	I occasionally run financial risks for potential benefits.
	I like to be exposed to situations that involve some kind of risk.
	To be successful in life, it is necessary to run some risks.
	A person that do not run some risks will rarely achieve a successful academic/professional life.
Leader	I frequently influence other people's opinions.
	It's easy for me to inspire other persons to do what I want.
	I am frequently chosen as leader in academic/professional projects or activities.
	I consider myself very convincing.
	Other persons frequently ask for my advice about academic/professional issues.

The final sample consisted of 2.175 students, containing 1.730 (79.5%) brazilian respondents and 445 (20.5%) finish respondents. From these, 1.106 studied in feevale, 624 in ucs, and 445 in hamk. Students were characterized by age of 21 to 25 years (37.5%), female (57.1%), no economic dependents (73.2%), with 25 to 50% of their course completed (28.6%) and not having their own business (87.9%). Table 4 below describes the characteristics of the sample.

RESULTS

Exploratory factor analysis (EFA) with Varimax rotation was performed with the intention to empirically observe whether the underlying structure among the variables was adherent to the preconceived theoretical dimensions.

Age	n	%
<=20	432	19.9
21-25	816	37.5
26-30	414	19.0
31-35	223	10.3
36-40	119	5.5
41-45	68	3.1
>=46	103	4.7
Total	2175	100.0
Sex	n	%
Male	933	42.9
Female	1242	57.1
Total	2175	100.0
Have its own business	n	%
yes	264	12.1
no	1911	87.9
Total	2175	100.0
Financial dependents	n	%
none	1593	73.2
1 dep	315	14.5
2 deps	180	8.3
3 deps	62	2.9
4+dep	25	1.1
Total	2175	100.0
Course completed	n	%
<25%	528	24.3
25-50%	621	28.6
50-75%	448	20.6
75-100%	578	26.6
Total	2175	100.0

EFA results showed a significant Bartlett test of sphericity ($p < 0.01$) and an adequate measure of sampling adequacy ($KMO = 0.958$). Two variables presented communalities below 0.5 (Hair Jr et al., 2009) and were excluded: a) “16. I am rarely got by surprise in situations that I could have planned” and b) “39. I like to invent new things”. Total variance explained by the resulting model was 61.7% and the rotated component matrix is represented in Table 5 below.

	SelfEff	Opp Detect	Leader	Planner	Social	Risk Taker	Creative	(Factor 8)
35. I am sure I am competent enough to develop my career successfully	0.73							
27. I have all the capacity needed to realize my professional/academic future	0.7							
11. I believe I am very capable of organizing and executing actions to be successful.	0.62							
13. I consider myself very persistent	0.62				0.32			
40. My professional/academic goals are very clear to me.	0.61			0.35				
29. Whenever I find adversities, I employ extra effort to overcome them.	0.56							
45. The obstacles I face make me increase my energy to overpass them	0.51			0.34	0.39			
19. I have control upon the critical	0.47		0.33					

factors that influence my success.								
37. I face the difficult situations of my daily activities as personal challenges.	0.46	0.32					0.3	
15. I always find creative solutions to my academic/professional problems.	0.41	0.31	0.34		0.33			
12. I frequently think of products/services that could be offered in the market		0.77						
44. I frequently imagine the possibility of success that certain products/services could have in a certain market.		0.76						
36. Whenever I observe people complaining about some products/services, I think of the market opportunities that may be opening		0.73						
20. I am interested in knowing the market needs for determined products/services		0.72						
28. I think I have a good ability to detect business	0.33	0.61	0.32					

opportunities in the market.								
17. Sometimes I financially bet in projects that can bring me advantages in the future.		0.52		0.36				
18. I frequently influence other people's opinions.			0.73					
26. It's easy for me to inspire other persons to do what I want			0.71					
34. I am frequently chosen as leader in academic/professional projects or activities			0.68					
42. I consider myself very convincing.	0.37		0.58					
50. Other persons frequently ask for my advice about academic/professional issues	0.45		0.55					
32. I have a detailed plan for my academic/professional issues	0.34			0.68				
48. I like to have the activities of my next year always well planned.				0.66				
24. I have issues regarding my work/study always planned well in advance.	0.38			0.64				

25. I occasionally run financial risks for potential benefits.		0.39		0.44		0.33		
31. I repeatedly change the way I study/work.				0.43			0.35	
14. I have a lot of friends.					0.74			
22. I can easily relate with other persons, even with those I still do not know.					0.7			
46. I like to be in contact with other persons					0.58			0.32
21. I never lose my determination when I face daily difficulties.	0.36			0.34	0.48			
41. To be successful in life, it is necessary to run some risks.						0.76		
49. A person that do not run some risks will rarely achieve a successful academic/professional life.						0.73		
43. My academic/professional success depends heavily upon me						0.57	-0.33	
33. I like to be exposed to situations that involve some kind of risk			0.32	0.32		0.44		
23. I do not like routine							0.67	

activities								
47. I like to do tasks that are completely new everyday					0.31		0.58	
38. I can easily memorize people's names and faces.								0.76
30. I always remember the persons I don't see for a long time.								0.72
Notes: a) extraction Method: Principal Component Analysis; b) rotation Method: Varimax with Kaiser Normalization; c) rotation converged in 10 iterations; d) for readability purposes, only factor loadings above 0,3 or below -0.3 are showed; d) observed items selected for each construct have greyed factor loadings.								

As the results showed above, one of the constructs was not confirmed by empirical data: Persistent. Later tests showed that it presented high correlation with other constructs, notably Self-efficacy, failing to achieve discriminant validity. This correlation can be due to a conceptual proximity between these constructs. Arguably, it can be suggested that, if the entrepreneur believes he/she is capable to materialize his/her ideas and projects, that is, behaves self-efficiently, he/she will persist and perform the necessary tasks until the goals are met. In other words, the entrepreneur will not quit trying to achieve his/her objectives in the face of difficulties.

As the purpose of the measurement scale is to further apply it using the maximum number of constructs and the minimum sample size, the number of items in each construct had to be reduced. Therefore, we selected the three items with higher factor loadings in each construct to compose its final structure, that is, the minimum number of items per construct suggested by Hair Jr et al. (2009). One of the observed items that converged to the underlying data structure, however, was not selected because, although correlating with other items in the same construct, it did not present a similar theoretical base. It was the case of "43. My academic/professional success depends heavily upon me" that did not conceptually relate to risk taking. Instead, we selected the next best correlating item "33. I like to be exposed to situations that involve some kind of risk".

To confirm the subjacent data structure found with EFA, we tested the measurement model for validity and reliability with confirmatory factor analysis (CFA) using structural equations modelling (SEM). Standardized regression weights from CFA confirmed the convergent validity with a lower value of 0.549, achieving the minimum estimate suggested by Hair Jr et al. (2009). Except for three constructs, average variance extracted (AVE) and construct reliability (CR) showed acceptable levels, respectively higher than 0.5 (Hair Jr et al., 2009). Risk taker, Creative and Sociable presented low AVEs (0.419, 0.377 and 0.48, respectively). However, we decided not to drop these constructs from the model, since AVEs were relatively close to the limit and they are recurrently referenced by the literature, constituting an important base for further analysis of the entrepreneurial profile. Discriminant validity was also confirmed by presenting higher AVE values for any two constructs than the squared correlation estimates

between these two constructs (Hair Jr et al., 2009), except for the construct Creative, which presented squared correlation estimates higher than AVE. As this was the only exception and given the importance of this construct to the comprehension of the entrepreneurial profile, we decided not to drop it from the model. This also gives the opportunity of further researchers to decide whether to include it or not in their models. CFA results are represented in Table 6.

	SelfEff	Opp Detect	Sociable	Planner	Risk Taker	Leader	Creative
CR	0.78	0.845	0.733	0.77	0.684	0.765	0.642
AVE	0.545	0.646	0.48	0.529	0.419	0.522	0.377
Square of the correlation estimate between constructs							
SelfEff	---	0.341	0.190	0.386	0.209	0.366	0.267
OppDetect	0.341	---	0.161	0.239	0.401	0.331	0.476
Sociable	0.190	0.161	---	0.150	0.242	0.325	0.433
Planner	0.386	0.239	0.150	---	0.233	0.310	0.328
RiskTaker	0.209	0.401	0.242	0.233	---	0.406	0.626
Leader	0.366	0.331	0.325	0.310	0.406	---	0.359
Creative	0.267	0.476	0.433	0.328	0.626	0.359	---

SEM also provided fit indexes for the measurement model, which largely presented acceptable levels. Table 7 shows the fit indexes generated by the Structural Equations Modelling.

Fit index	Parameter	Value
Chi-squared (c2)		1.297.55
Degrees of freedom (df)		168
$\chi^2 / \delta\phi$	<5	7.724
Root Mean Square Error of Approximation (RMSEA)	<0.08	0.056
Comparative Fit Index (CFI)	>0.90	0.933
Normed Fit Index (NFI)	>0.90	0.924
TuckerLewis Coefficient (TLI)	>0.90	0.916

The fact that some fit indexes resulted below the accepted parameter, such as the AVE for Creative, is not unusual among measurement instruments that were just created (Bagozzi and Baumgartner, 1994). Even considering that the ideal result is when the empirical data perfectly fit the model, re-specification is often necessary (Raykov and Marcoulides, 2000), leveraging the debate about the frontier between exploratory versus confirmatory research and the use of SEM (Anderson and Gerbing, 1988; Kline, 2005). Therefore, re-specification is usually accepted to address specification errors between the proposed and the real model. The use of modification

indexes (MIs) is indicated by Jöreskog and Sörbom (1982) to that purpose. However, the use of MIs in this specific model, considering the inclusion of correlations among error variables of the same construct or another fine-tuning theoretical justification, did not showed to improve model fit. The final measurement model for the entrepreneurial profile is represented by Table 8 below.

Table 8 FINAL MEASUREMENT SCALE
Self-efficacy
11. I believe I am very capable of organizing and executing actions to be successful.
27. I have all the capacity needed to realize my professional/academic future
35. I am sure I am competent enough to develop my career successfully
Opportunity detector
12. I frequently think of products/services that could be offered in the market
36. Whenever I observe people complaining about some products/services, I think of the market opportunities that may be opening
44. I frequently imagine the possibility of success that certain products/services could have in a certain market.
Sociable
14. I have a lot of friends
22. I can easily relate with other persons, even with those I still do not know.
46. I like to be in contact with other persons
Planner
24. I have issues regarding my work/study always planned well in advance.
32. I have a detailed plan for my academic/professional issues
48. I like to have the activities of my next year always well planned.
Risk Taker
33. I like to be exposed to situations that involve some kind of risk
41. To be successful in life, it is necessary to run some risks.
49. A person that do not run some risks will rarely achieve a successful academic/professional life.
Leader
18. I frequently influence other people's opinions.
26. It's easy for me to inspire other persons to do what I want
34. I am frequently chosen as leader in academic/professional projects or activities
Creative
31. I repeatedly change the way I study/work
47. I like to do tasks that are completely new everyday
23. I do not like routine activities

After achieving the final model, we tried to compare the means among constructs. To this purpose, we tested for measurement and scalar invariance across groups, observing the variance of fit indexes when some parameters were fixed. Measurement invariance across groups was confirmed, since $\Delta RMSEA$ was 0.01, ΔCFI was 0.006, ΔNFI was and ΔTLI was 0.001, thus indicating small variation in model fit. Scalar invariance, however, was not confirmed, since

Δ RMSEA was 0.007, Δ CFI was 0.051, Δ NFI was 0.052 and Δ TLI was 0.048. These results suggest that the entrepreneurial profile cannot be compared among groups (Comsa, 2010).

It can be observed that there are, in fact, multiple dimensions that make up the entrepreneurial profile. It is possible that the entrepreneur has developed more intensively some dimensions in relation to others. Some are more relevant to start the business, such as risk taker, opportunity detector and creative, while others may be important to develop it, such as self-efficacy, sociable and leader.

CONCLUSION

Many conceptual and empirical investigations have been performed about the entrepreneurial profile and behaviour. Generally, however, these investigations are constricted to a geographical environment and, therefore, face validity issues when the application to other cultures is intended. This study aims to contribute by coping with cultural differences between two countries and seeking to validate a scale for entrepreneurial behaviour in an international context. It also enhances the need to further theoretical and methodological discussions about entrepreneurial behaviour. A more comprehensive understanding is provided by the inclusion of a greater number of dimensions, some of which have been ignored by recent studies, probably because of the need of larger samples for validation. Studies have proposed from three (Bolton and Lane, 2012) to five dimensions (Harris and Gibson, 2008), mostly including self-efficacy, opportunity detection, creativity and innovation and risk-taking behaviours. Least-cited dimensions, such as sociable, leader and planner, were equally important to understand the entrepreneurial profile, and were included here. Therefore, the seven-dimension scale proposed here intends to subsidize a more holistic view of the entrepreneurial profile and the necessary or desirable behaviours to promote and sustain new businesses.

This study was not conducted without limitations. While the validation of the proposed scale in such a culturally diverse setting widens its future application, it may also raise concerns about the meaning of measurement items. More flexible approaches, such as the one proposed by Baumgartner and Steenkamp (1998), were considered, but as the intention was to achieve only one and the same scale for both countries, they were discarded. This study represents an effort to maintain the same original questions translated to each language, according to the recommendations of Malhotra et al. (1996).

Results obtained here can contribute to both colleges and universities, by indicating the entrepreneurial dimensions that are supposed to be developed within the high school and graduation curricula. Courses, experiences, projects and other activities that stimulate these characteristics, especially those involving international students, may contribute to student's entrepreneurial behaviour.

Results may also be of use from the part of international agencies that aim to promote and support entrepreneurial initiatives, either with financial, knowledge or human resources. These agencies may use the validated scale to assess and plan the development of entrepreneurs; increasing their contribution to the economic and social development of the countries they are located.

Universities and international agencies may also use the proposed scale to conduct the professional development of students, by referring them to innovation environments, such as incubators, scientific-technological parks, accelerators or venture capital firms (Bolton & Lane, 2012).

Future studies may consider testing and validating this scale in additional countries to confirm or adjust these findings. It is also possible to test the measurement instrument developed here in employees of medium and large firms, to assess entrepreneurial behaviour, since the measurement items can also be applied to firms' internal environments.

REFERENCES

- Anderson, J.C. & Gerbing, D.W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, 103(3), 411-423.
- Bagozzi, R. & Baumgartner, H. (1994). The evaluation of structural equations models and hypothesis testing. In R. Bagozzi (Ed.), *Principles of Marketing Research*. Oxford.
- Baron, R.A. & Markman, G.D. (2000). Beyond social capital: How social skills can enhance entrepreneurs success. *Academy of Management Executive*, 14(1).
- Baughn, C.C., Cao, J.S.R., Le, L.T.M., Lim, V.A. & Neupert, K.E. (2006). Normative, social and cognitive predictors of entrepreneurial interest in China, Vietnam and the Philippines. *Journal of Developmental Entrepreneurship*, 11(1), 57-77.
- Baumgartner, H. & Steenkamp, J.B.E.M. (1998). Multi-group latent variable models for varying numbers of items and factors with cross-national and longitudinal applications. *Marketing Letters*, 9(1), 21-35.
- Birley, S. & Muzyka, D.F. (2001). *Dominando os desafios do empreendedor*. São Paulo: Makron books.
- Bolton, D.L. (2012). Individual entrepreneurial orientation: Further investigation of a measurement instrument. *Academy of Entrepreneurship Journal*, 18(1), 91-98.
- Bolton, D.L. & Lane, M.D. (2012). Individual entrepreneurial orientation: Development of a measurement instrument. *Education+Training*, 54(3), 219-233.
- Borland, C.M. (1975). Locus of control, need for achievement and entrepreneurship. *ProQuest Information & Learning*.
- Boyd, N.G. & Vozikis, G.S. (1994). The influence of self-efficacy on the development of entrepreneurial intentions and actions. *Entrepreneurship Theory and Practice*.
- Carland, J.W., Hoy, F., Boulton, W.R. & Carland, J.A.C. (1984). Differentiating entrepreneurs from small business owners: A conceptualization. *The Academy of Management Review*, 9(2), 354.
- Carland, J.W., Hoy, F. & Carland, J.A.C. (1988). Who is an Entrepreneur? Is a Question Worth Asking. *American Journal of Small Business*, 12(4), 33-39.
- Chen, C.C., Greene, P.G. & Crick, A. (1998). Does entrepreneurial self-efficacy distinguish entrepreneurs from managers? *Journal of Business Venturing*, 13.
- Comsa, M. (2010). How to compare means of latent variables across countries and waves: Testing for invariance Measurement. *Sociológia - Slovak Sociological Review*, 42(6), 639-669.
- Coviello, N.E. & Jones, M.V. (2004). Methodological issues in international entrepreneurship research. *Journal of Business Venturing*, 19, 485-508.
- Dauids, L.E. & Bunting, J.W. (1963). Characteristics of small business founders in Texas and Georgia. *University of Georgia*.
- Drucker, P.F. (1985). *Innovation and Entrepreneurship* (2nd ed.). Oxford, UK: Butterworth-Heinemann.
- Fretschner, M. & Weber, S. (2013). Measuring and understanding the effects of entrepreneurial awareness education. *Journal of Small Business Management*, 51(3), 410-428.
- Gelderen, M. van, Brand, M., van Praag, M., Bodewes, W., Poutsma, E. & van Gils, A. (2008). Explaining entrepreneurial intentions by means of the theory of planned behaviour. *Career Development International*, 13(6), 538-559.
- Gürol, Y. & Atsan, N. (2006). Entrepreneurial characteristics amongst university students: Some insights for entrepreneurship education and training in Turkey. *Education+Training*, 48(1), 25-38.
- Hair Jr, J.F., Black, W.C., Babin, B.J. & Anderson, R.E. (2009). *Multivariate Data Analysis* (7th ed.). USA: Prentice Hall.
- Harris, M.L. & Gibson, S.G. (2008). Examining the entrepreneurial attitudes of US business students. *Education+Training*, 50(7), 568-581.
- Harris, M.L., Gibson, S.G. & Taylor, S.R. (2007). Examining the impact of small business institute participation on entrepreneurial attitudes. *Journal of Small Business Strategy*, 18(2).

- Hartmann, H. (1959). Managers and Entrepreneurs: A useful distinction? *Administrative Science Quarterly*, 3(4), 429-451.
- Hornaday, J.A. & Aboud, J. (1971). Characteristics of successful entrepreneurs. *Personnel Psychology*, 24(2), 141-153.
- Jöreskog, K.G. & Sörbom, D. (1982). Recent developments in structural equation modeling. *Journal of Marketing Research*, 19(4), 404-416.
- Kline, R.B. (2005). Principles and practice of structural equation modeling. New York: Guilford Press.
- Liles, P.R. (1976). New business ventures and the entrepreneur. Irwin.
- Longenecker, J.G., Petty, J.W., Palich, L.E. & Hoy, F. (2016). Small business management: Launching & Growing Entrepreneurial Ventures. Cengage Learning.
- Lumpkin, G.T. & Dess, G.G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *The Academy of Management Review*, 21(1), 135-173.
- Malhotra, N.K., Agarwal, J. & Peterson, M. (1996). Methodological issues in cross-cultural marketing research: A state-of-the-art review. *International Marketing Review*, 13(5), 7-43.
- Markman, G.D. & Baron, R.A. (2003). Person-entrepreneurship fit: why some people are more successful as entrepreneurs than others. *Human Resource Management Review*, 13, 281-301.
- McClelland, D.C. (1953). The Achievement Motive. New York, NY: Appleton-Century-Crofts.
- McClelland, D.C. (1966). That Urge to Achieve. Think Magazine.
- McNally, J.J., Martin, B.C., Honig, B., Bergmann, H. & Piperopoulos, P. (2016). Toward rigor and parsimony: a primary validation of Kolvereid's (1996) entrepreneurial attitudes scales. *Entrepreneurship & Regional Development*, 28(6), 358-379.
- Mill, J.S. (1848). Principles of political economy with some of their applications to social philosophy. George Routledge and Sons, Manchester.
- Moruku, R.K. (2013). Does entrepreneurial orientation predict entrepreneurial behaviour? *International Journal of Entrepreneurship*, 17, 41-60.
- Okhomina, D. (2007). Does level of education influence psychological traits? Evidence from used car entrepreneurs. *Journal of Management and Marketing Research*, 13, 1-14.
- Palmer, M. (1971). The application of psychological testing to entrepreneurial potential. *California Management Review*, 13(3), 32-38.
- Parnell, J.A., Shwiff, S., Yalin, L. & Langford, H. (2003). American and chinese entrepreneurial and managerial orientations: A management education perspective. *International Journal of Management*, 20(2), 125.
- Rauch, A., Wiklund, J., Lumpkin, G.T. & Frese, M. (2009). Entrepreneurial orientation and business performance: An Assessment of Past Research and Suggestions for the Future. *Entrepreneurship: Theory & Practice*, 33(3), 761-787.
- Raykov, T. & Marcoulides, G. (2000). A first course in structural equation modeling. New Jersey: Lawrence Erlbaum Associates.
- Robinson, P.B., Stimpson, D.V., Huefner, J.C. & Hunt, H.K. (1991). An attitude approach to the prediction of entrepreneurship. *Entrepreneurship: Theory & Practice*, 15(4), 13-31.
- Schumpeter, J.A. (1934). The theory of economic development: An inquiry into profits, capital, credit, interest and the business cycle, 55. Transaction publishers.
- Sexton, D.L. (1980). Characteristics and role demands of successful entrepreneurs. *In Academy of Management Proceedings*.
- Sutton, F.X. (1954). Achievement norms and the motivation of entrepreneurs. In *Entrepreneurs and Economic Growth*. Cambridge: Social Science Research Council and Harvard University Research Center in Entrepreneurial History.
- Timmons, J.A. (1978). Characteristics and role demands of entrepreneurship. *American Journal of Small Business*, 3(1), 5-17.
- Weber, M., Henderson, A.M. & Parsons, T. (1964). The Theory of Social and Economic Organization. New York, USA: Collier-Macmillan.
- Welsh, J.A. & White, J.F. (1981). Converging on characteristics of entrepreneurs. *Frontiers of Entrepreneurship Research*, 504-515.
- Winter, D.G. (1973). The power motive. New York, USA: Free Press.