



Entrepreneurial Potential Scale: evidence on confirmatory factor validity, dimensional structure and predictive effectiveness

Escala de Potencial Empreendedor: evidências de validade fatorial confirmatória, estrutura dimensional e eficácia preditiva

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Abstract: Researches worldwide show that entrepreneurs share idiosyncratic characteristics compared with the rest of the population, which have stimulated specific studies on measurement of this behaviour. Among the most relevant and recent measurement approaches to the area of entrepreneurship in Brazil, there was the Entrepreneurial Potential Scale. Nevertheless, the original presentation of this instrument failed to find psychometric properties of stricter validation, and the related studies are not yet sufficient. This article aimed to check evidence of confirmatory factor validity, parameters of dimensional structure and criterion validity (predictive efficacy) of the Entrepreneurial Potential Scale. Two studies were conducted for this purpose. Study 1 (one) included the participation of 455 university students to carry out the construct validity through confirmatory factor analysis and multidimensional scaling (MDS). In turn, study 2 (two) included the participation of 654 college students and 148 entrepreneurs to perform the criterion validity by Student's *t* test and effect size (Cohen's *d*). Results show that the Entrepreneurial Potential Scale presents a factorial design with good quality adjustment and high levels of precision, indicating that it is a tool which converges reliably to predict the entrepreneurial behaviour.

Keywords: Entrepreneurial potential; Psychometrics scale; Confirmatory factor validity; Criterion validity.

Resumo: Pesquisas no mundo vêm mostrando que indivíduos empreendedores compartilham características particulares e idiossincráticas em relação ao resto da população, o que têm estimulado estudos específicos sobre a mensuração desse comportamento. Dentre as abordagens de mensuração recentes e de maior relevância para a área do empreendedorismo no Brasil, teve-se o desenvolvimento da "Escala de Potencial Empreendedor". Apesar disso, alguns parâmetros psicométricos de validação mais rigorosos não foram encontrados na apresentação original deste instrumento e os estudos correlatos ainda não se mostram suficientes. Assim, o objetivo deste artigo é verificar evidências de validade fatorial confirmatória, estrutura dimensional e validade de critério (eficácia preditiva) da Escala de Potencial Empreendedor. Para tanto, foram realizados dois estudos. O estudo 1 (um) contou com a participação de 455 estudantes universitários para a realização da validade de constructo por meio da análise fatorial confirmatória e do escalonamento multidimensional (MDS). Por sua vez, o estudo 2 (dois) contou com a participação de 654 estudantes universitários e 148 empresários para a realização da validade de critério por meio do teste *t* de Student e do Tamanho do Efeito (*d*). Os resultados mostram que a Escala de Potencial Empreendedor apresenta um modelo fatorial com boa qualidade de ajuste e altos níveis de precisão, indicando que este é um instrumento que converge confiantemente para a predição do potencial empreendedor.

Palavras-chave: Potencial empreendedor; Escala; Validação fatorial confirmatória; Validade de critério.

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1 Introduction

Studies on entrepreneurship have turned to the central figure of this phenomenon: the entrepreneur. These studies start from the same point of analysis, the measurement of idiosyncratic behaviours usual among entrepreneurs and the convention that the entrepreneurship is not only linked to the opening of business, but to the individual dispositional traits, related to personality, attitudes, beliefs, interests, values, self-concept, capacity and emotional patterns (Rauch & Frese, 2007; Gelderen et al., 2008; Wu & Wu, 2008; Santos et al., 2009; Schmidt & Bohnenberger, 2009; Nascimento et al., 2010; Obschonka et al., 2010; Alves & Bornia, 2011; Brandstätter, 2011; Abebe, 2012; Karabey, 2012; Minello & Scherer, 2012; Mathieu & St-Jean, 2013; Moraes et al., 2013; Tajeddini et al., 2013; Roxas & Chadee, 2013).

Among the instruments that deal with the measurement of entrepreneurial behaviour (e.g., McClelland, 1972; Carland et al., 1988, 1992; Caird, 1991; Miner, 2000; Kristiansen & Indarti, 2004; Gonçalves et al., 2007; Santos, 2008; Cardon et al., 2013; Souza et al., 2013; Souza, 2014), the Entrepreneurial Potential Scale, developed by Santos (2008), is one of which has shown better functionality, theoretical support and satisfactory standards of factorial validity and internal consistency, also demonstrating broad relevance to the area of entrepreneurship in Brazil – instrument validated complementarily with the Item Response Theory (IRT) by Alves & Bornia (2011).

This occurs because the related instruments have presented methodological and theoretical limitations, and inadequate or insipient psychometric parameters. The Personal Entrepreneur Competencies (PEC), McClelland's (1972) instrument, for example, did not meet psychometric parameters, neither criteria for psychological measures (see, Pasquali, 2010; Cohen et al., 2014), which limits their application.

Also, the Carland Entrepreneurship Index, (CEI) developed by Carland et al. (1988, 1992), presents limitations due to its dichotomous response model, restricting the range of analyses to verify validation parameters, beyond an unjustifiably structure of behavioural identification that varies in a continuum from “micro-entrepreneur” to “macro-entrepreneur”. Likewise, it presents methodological problems, such as the improper use of principal components analysis (PCA) in dichotomous items, since, according to Hair et al. (2010) and Tabachnick & Fidell (2007), for performing factor analyses with dichotomous variables (binary measure) should be used the tetrachoric correlation matrix.

Still, the Kristiansen & Indarti's (2004) scale presents limitations regarding to the factorial validity and internal consistency – for example, alphas coefficients of 0.33. In turn, the Gonçalves et al. (2007)

scale presents overall fit indices not satisfactory to validate the factorial model of the construct proposed ($p = 0.000$; $\chi^2/df = 3.51$; GFI = 0.87; AGFI = 0.85; CFI = 0.83).

In that regard, the Santos' (2008) Entrepreneurial Potential Scale arises as an instrument with satisfactory parameters of factorial validity and internal consistency, easy to apply, without restrictions on use and produced especially for the Brazilian context. Nevertheless, Santos (2008) explains that some psychometric stricter validation procedures have not been performed for this Scale, for example, confirmatory factor validity and criterion validity.

We argue that the presentation of such parameters can make the use of this instrument more widespread and bring clear contributions to the area of entrepreneurship, especially in relation to studies focused on entrepreneurial behaviour. Considering these conditions, we ask: Could the entrepreneurial potential be a predictor of the behaviour on business? Therefore, the objective of this article is verify evidence of confirmatory factor validity, parameters of dimensional structure and criterion validity (predictive efficacy) of the Entrepreneurial Potential Scale (Santos, 2008).

This study converges to understand the factors that characterize a person potentially entrepreneur. Going beyond the approaches that seek to identify attitudes towards entrepreneurship (e.g., Kristiansen & Indarti, 2004; Souza et al., 2013) or entrepreneurial characteristics (e.g., Carland et al., 1988, 1992; Caird, 1991; Gonçalves et al., 2007) – approaches, so far, without satisfactory results –, we tend here to the mapping of individual (dispositional, behavioural and affective) and contextual (social and environmental) elements which together make up a possible successful entrepreneur.

2 Theoretical framework

2.1 Entrepreneurial behaviour aspects

The entrepreneurship – central axiom of enterprising phenomenon as socioeconomic and behavioural process that relates primarily to the opening of new businesses – was established as a thematic and more recently as subarea of knowledge, from a compendium of researches that enter on various aspects, having its importance for academia and for society (Markman & Baron, 2003; Fillion, 2004; Hisrich & Peters, 2004; Oliveira, 2004; Markman et al., 2005; Dolabela et al., 2008; Oliveira, 2008; Santos, 2008; Bessant & Tidd, 2009; Dornelas, 2014). Santos (2008) argues that entrepreneurship is a phenomenon which has strong social and economic implications.

In the literature, there are studies in various areas and dating from the eighteenth century that depict

entrepreneurship's cases. Initially, on the evolution of economic thought and business risks, Cantillon (1755) made a behavioural separation between the entrepreneur and the employee, which the first is an individual who exposes oneself to risks for undertaking uncertain businesses. In sequence, Say (2003) [originally published in 1832] established the importance of the entrepreneur to the economic development of a society, calling it "adventurer".

Despite the constant use of behavioural approaches for explain the opening of new business [see Max Weber (1957), regarding to the motivating values of the entrepreneurial action within the protestant ethic], only in the twentieth century the entrepreneur (person) began to be studied, when: Schumpeter (1961) discussed the creative destruction in the construction of the entrepreneur; McClelland (1961) investigated the characteristics and aspects of the need for achievement (N-Ach) of the entrepreneur; Maslow (1965) theorized the motivational aspects that lead a person to become an entrepreneur; Shapero & Sokol (1982) studied the social role of the entrepreneur; Rotter (1990) supposed the locus of control as a personality trait inherent to the entrepreneur; and Drucker (1993) and Miner (1997a) connected the entrepreneur to an innovative economic behaviour. Further clarification and deepening in the historical postulate of the entrepreneurship, Leite (2000), Hisrich & Peters (2004) and Santos (2008) bring significant contributions in these directions.

Such studies have been benchmarks for a more specific behavioural discussion, which made the entrepreneurship an element of great interest, especially by the establishment of fundamental theories to explain this phenomenon. More than opening a business, the entrepreneurial action is directly related to aspects of personality [cognitive development, adaptation, traits, interests, impulses, self-concept, capacity and emotional patterns (see, Schultz & Schultz, 2006)] and human values [guide for actions and cognitive expression of basic needs (see, Gouveia et al., 2014)] (Littunen, 2000; Miner, 2000; Kristiansen & Indarti, 2004; Santos, 2008; Alves & Bornia, 2011; Brandstätter, 2011; Abebe, 2012; Barba-Sánchez & Atienza-Sahuquillo, 2012; Karabey, 2012; Minello & Scherer, 2012; Mathieu & St-Jean, 2013).

Within this line of thought, Bygrave (2004) defines the entrepreneur as someone "in love" with what it does and points 10 attributes (10 Ds) concerning the entrepreneurial behaviour: Dream; Decisiveness; Doers; Determination; Dedication; Devotion; Details; Destiny; Dollars; Distribute.

In addition, Santos (2008) integrates definitions and conceptualizes the entrepreneur as one who:

Feels the need to create new products and services to meet the demands of society or innovate, improving which already exists. To perform these actions, you need to be proactive (have visions and anticipate the future) and be determined to act in the way that you deems appropriate to begin the activity proposed, i.e., undertake. In this context the entrepreneur acts and exercises the creative destruction (Santos, 2008, p. 65-66).

In another analysis perspective, Drucker (2003) supports the proposal that the company is a "Cost Centre", because businesses only exist to produce results and profits for the market or the economy; i.e., for outside the company. In fact, there are only costs within the company that the entrepreneur perceives as restrictions and challenges. In this sense, entrepreneur is one who stands in front of a reality/situation to convert it into opportunity, targeting results and profits.

Undertake or being an entrepreneur is not just a way of being, which is limited to a behavioural model of creativity or innovation, for example. Undertake is, certainly, the development of a real action, in opening a business, in creating a new product or service, in an innovative activity (Drucker, 1993, 2003) or in the attempt to keep the business or be persistent to try a new business if there was a failure in the previous business – undertake is a continuous cycle (Miner, 1997a, b; Santos, 2008; Castor, 2009; Santos et al., 2009).

Other psychosocial approaches (e.g., Sarasvathy, 2004; Wu & Wu, 2008; Santos et al., 2010; Karabey, 2012; Roxas & Chadee, 2013; Souza, 2014) admit further that contextual and social factors also act as entrepreneurial behaviour predictors – logically, respecting the individual predisposition. That is, a person potentially entrepreneur may be influenced by economic changes (e.g., increased unemployment), marketing (e.g., emergence of a technology or trend) or individual factors (e.g., training or institutional incentives), and because of that, this person starts a business, as Santos (2008) defended.

2.2 Entrepreneurial potential

Psychological, behavioural, social and individual aspects that lead a person to undertake can be seen as converging elements of an entrepreneurial potential. The entrepreneurial potential links a number of features commonly found in successful entrepreneurs (Krueger & Brazeal, 1994; Krueger et al., 2000). For Schmidt & Bohnenberger (2009), the successful entrepreneur is basically someone who: (1) is self-efficacy, (2) detect opportunities, (3) plans, (4) takes calculated risks, (5) is sociable, (6) is a leader and (7) is persistent. In this analytic perspective, a person is likely to have all the attributes of an entrepreneur and does not

undertake, and this is just a potential to undertake – the entrepreneurial potential.

As Krueger & Brazeal (1994) and Krueger et al. (2000) explain, entrepreneurship or entrepreneurial behaviour – while proactive and planned intention to business – have as latent predictor the potential to effectuation the entrepreneurial activity, that is, characteristics and dispositional traits that are similar to people who have achieved success in this activity.

Thus, based on the metacognitive McClelland’s (1972) model, Santos (2008) proposed that the entrepreneurial potential is divided into three dimensions (clusters) – characteristics of the successful entrepreneur – namely: Achievement, Planning and Power; and an additional characteristic related to the desirable criteria, the Entrepreneurial Intention – criterion of inhibition or activation to the entrepreneurship in favourability conditions, for instance, easy access to capital, and therefore it considered complementary to the entrepreneurial potential.

Within each dimension there are factors that are established as entrepreneurial attributes. In the dimension of **Achievement**, the attributes Opportunities Recognition, Persistence, Search for Quality, Efficiency, and Risk Management are found. In the dimension

of **Planning**, the attributes Goal Setting, Search for Information, Continuous Planning and Permanent Control are found. In the dimension of **Power**, the attributes Ability to Persuade Others, Ability to Organize Business Networking and Self-Reliance. And the dimension of **Entrepreneurial Intention** focuses on the desire to start or have a business (Santos, 2008).

From this theoretical model, Santos (2008) conceived the trial version of the Entrepreneurial Potential Scale. When empirically tested, the factors Quality, Risk and Self-Reliance did not show satisfactory values of internal consistency, which it prevented the maintenance of these factors as underlying latent structure of the Entrepreneurial Potential Scale. Thus, Santos (2008) developed the Entrepreneurial Potential Scale taking into account that the factors are configured as latent observable behaviours, defining them as follows (Table 1).

In terms of operationalisation, the Entrepreneurial Potential Scale (Santos, 2008) is a self-reported psychometric test under a Likert-type scale of 11 continuous points [ranging from 0 (zero) = Strongly Disagree (no chance) to 10 = Strongly Agree (absolute certainty)], with 49 items based on priming (explanatory

Table 1. Entrepreneurial Potential Scale – factors definition.

Attribute	Characteristics
Opportunity	Individual must show that he/she has sense of opportunity, i.e., is aware of what happens around him and then, when identify the needs of people or of the market, be able to take advantage of unusual situations to start new activities or business.
Persistence	Individual’s capacity to remain steadfast in the pursuit of success, demonstrating persistence to achieve its objectives and goals, overcoming obstacles along the way. Capacity to distinguish persistence from stubbornness, admit mistakes and know how to redefine goals and strategies.
Efficiency	Individual’s capacity to do things on the right way and, if necessary, quickly make changes to adapt itself to changes occurred in the environment. Capacity to find and achieve to operationalize ways of doing things better, faster and cheaper. Capacity to develop or use procedures to ensure that the work is completed on time.
Goals	Individual’s capacity to show determination, sense of direction and set objectives and goals, defining clearly where he/she plans to arrive. Capacity to set directions and measurable objectives.
Information	Individual’s availability to learn and demonstrate thirst for knowledge. Interest in finding new information in his area or beyond. Attention with all the internal and external factors related to his organization/company/business. Interest in how manufacture products or provide services. Availability to seek expert help on technical or commercial matters.
Planning	Individual’s availability to plan his activities by setting objectives. Capacity to detail the tasks and being able to work with planning, execution and control.
Control	Individual’s capacity to monitor the implementation of the elaborated plans, keep records and use them in the decision making process, check the reach of the results obtained.
Persuasion	Individual’s ability to influence people for the execution of tasks or actions that enable the achievement of his goal. Capacity to convince and motivate people, lead teams and encourage them using the words and actions appropriated to influence and persuade.
Network	Individual’s capacity to establish a good network of relationships with acquaintances, friends and people who may be helpful to him, making possible the achievement of his objectives.
Entrepreneurial Intention	Foreshadows the individual’s intention to have, either by acquiring or from scratch, his own business.

Source: Santos (2008, p. 197-198).

vignettes). Once the test aims to map characteristics that may indicate entrepreneurial potential, the participants are required to answer items as: “For sure one day I will have my own business”, “I am able to identify business opportunities and get profiting from it” and “I know I am able to lead a work team and achieve goals”. For the full and unrestricted access to the Entrepreneurial Potential Scale, as well as its norms and technical specifications, see Santos (2008, p. 189).

Santos (2008) conducted a study with 664 college students to validate the Entrepreneurial Potential Scale [Portuguese version]. Firstly, the author carried out a principal component analysis (PCA) with 49 items of the Entrepreneurial Potential Scale, extracting 10 components with 67.2% of variance explained. Initial measures, Kaiser-Meyer-Olkin (KMO) = 0.917 and Bartlett’s Sphericity Test, $\chi^2(1,176) = 13,663.818$; $p = 0.000$, both satisfactory, showed the sampling adequacy and the factorability of the correlation matrix among the scale items.

In sequence, the author found satisfactory parameters of factorial validity and internal consistency, and reported the following values for each factor (Table 2).

Although Santos (2008) showed satisfactory parameters of factorial validity and internal consistency, the own author admits as limitation, in the development of the Entrepreneurial Potential Scale, the lack of more robust validation analysis, for example, confirmatory factor validity and criterion validity. Therefore, the use of this instrument in other samples and the procedure of other validation techniques can demonstrate credibility and adequacy of the scale, beyond the dissemination of their use in various possible areas.

3 Empirical studies

In view of the objective proposed, we presented two empirical studies involving the confirmatory factor validity and dimensional structure (Study 1)

and criterion validity (Study 2) of the Entrepreneurial Potential Scale (Santos, 2008).

3.1 Study 1: confirmatory factor validity and dimensionality of the Entrepreneurial Potential Scale

The study 1 aimed to verify the parameters of confirmatory factor validity and dimensionality (dimensional structure) of the Entrepreneurial Potential Scale (Santos, 2008). Confirmatory factor validity, according to Pasquali (2009, p. 996), “[...] is the direct way to verify the hypothesis of the legitimacy for the behavioural representation of latent traits”, establishing by the characterization of the instrument quality. In turn, the dimensional structure, according to Hair et al. (2010), indicates, spatially, underlying patterns among the variables analysed, providing explanations of how these variables behave.

3.1.1 Methods

3.1.1.1 Procedures: participants and data collection

The application of the Entrepreneurial Potential Scale [Portuguese version] (Santos, 2008) was given individually and/or collectively, by accessibility, between March and November 2013, in a non-probabilistic sample of 455 college students (which 51.2% are male) from all eight periods of the Business Administration course (total of 480 students) of the Federal University of Alagoas (UFAL). At first, the participants were informed about the anonymity and confidentiality of its answers. The voluntary nature of participation and the respect to ethical guidelines were assured. The participants were approached in the corridors and classrooms of the Business Administration Academic Department during the interval of the morning and night classes.

Table 2. Factorial Loads and Internal Consistency of the Entrepreneurial Potential Scale.

Factor	Items	Factorial Loads (range)	Cronbach’s Alpha
Opportunity	5	0.515-0.733	0.776
Persistence	6	0.481-0.770	0.851
Efficiency	3	0.610-0.831	0.783
Goals	7	0.481-0.799	0.888
Information	5	0.626-0.745	0.793
Planning	4	0.517-0.754	0.803
Control	5	0.567-0.852	0.878
Persuasion	6	0.648-0.841	0.915
Network	4	0.685-0.842	0.886
Entrepreneurial Intention	4	0.825-0.866	0.902

Source: Santos (2008, p. 197-198).

3.1.1.2 Analysis

To prove the factor structure of the Entrepreneurial Potential Scale (Santos, 2008) and to explain its dimensional structure, the Confirmatory Factor Analysis (CFA) by the structural equation modelling (SEM) and the Multidimensional Scaling (MDS) were carried out.

We used the software AMOS 7 (Analysis of Structures) to perform the Confirmatory Factor Analysis (CFA), considering the covariance matrix and adopting the maximum likelihood estimation. The model fit indices are summed up following:

- The Chi-square (χ^2) confirms the probability that the model fits to the data and assumes the multivariate normality distribution of the set of variables. A statistically significant value indicates discrepancies between the data and the theoretical model tested, and the model must be rejected.
- The Goodness-of-Fit Index (GFI) and Adjusted Goodness-of-Fit Index (AGFI) take into account the degrees of freedom of the model regarding to the number of variables considered. Values higher than or near 0.95 and 0.90, respectively for GFI and AGFI, are recommended (Hu & Bentler, 1999).
- The Comparative Fit Index (CFI) is an additional index for the model fit, with values closer to 1 (one) indicating better fit. A value from 0.90 is the reference to accept the model.
- The χ^2 /degrees of freedom ratio (also referred as CMIN/DF) is considered a subjective and practical index of fit (Byrne, 2001). A value between 1.00 and 3.00 can be interpreted as an adjustment indicator of the theoretical model to describe the data.
- The Root Mean Square Residual (RMR) is based on the average residual value (Byrne, 2001), and a value close to zero means that the model fits the data, indicating that all residuals are closer to this value. We will consider the standardized RMR; a value around 0.05 is considered proof of model fit (Saris & Stronkhorst, 1984).
- The Root Mean Square Error of Approximation (RMSEA) requires values near 0.08 with 90% confidence interval (Hu & Bentler, 1999), interpreting the values below 0.08 as a model adjusted.

We also carried out the Multidimensional Scaling (MDS) [ALSCAL], considering the creation of two-dimensional distance matrix for all factors (sums of items) of Entrepreneurial Potential Scale (Santos, 2008) in a Euclidean distance model. In order to assess the model fit, we use the RSQ – alternative to squared correlation coefficient – which ranges from 0 (zero) to 1 (one), considering values close to 1 (one) indicative of model adjusted; and the S-stress - measure that assesses the adequacy of the dimensionality – whose values below 0.100 indicate an acceptable dimensionality (Kruskal, 1964). In addition, the Pearson’s correlation (r) was used to provide support in the explanation of the dimensional structure.

3.1.2 Results and discussion

To test the factor structure of the Entrepreneurial Potential Scale (Santos, 2008) model with 10 factors (49 items) was prepared as predictor of the entrepreneurial potential – a second-order factor. Therefore, considering the covariance matrix and adopting the method of maximum likelihood estimation (MLE), we found the following model fitting parameters (Table 3).

The model fit indices show that the proposed model presents satisfactory, bringing psychometric information to confirm the factorial structure of the Entrepreneurial Potential Scale with 10 factors. Aiming to find a model without discrepancies (that is, $p > 0.05$, not significant), we point that the value found shows adequate to data ($p = 0.06$), whereas a low accuracy analysis. In turn, the Comparative Fit Index (CFI = 0.965) proves this 10-factors model with respect to the construct evaluated. Regarding to the estimators and regression weights, we found that the best predictors of Entrepreneurial Potential are, respectively, the factors Goals (1.0/0.68; $p \leq 0.000$), Control (0.99/0.57; $p \leq 0.000$) and Persuasion (0.93/0.63; $p \leq 0.000$), and the other are moderately satisfactory,

Table 3. Model fit for the EPE¹ with 10 factors.

Indices	Results
Chi-Square (χ^2)	39.24
Degrees of Freedom (df)	27
<i>P</i>	0.060
χ^2 /df ratio	1.453
RMR	0.07
GFI	0.983
AGFI	0.965
CFI	0.992
RMSEA (90% CI)	0.032 (0.00-0.05)
CAIC	238.6

Source: Research data. ¹ Entrepreneurial Potential Scale.

namely: Persistence (0.88/0.77; $p \leq 0.000$), Planning (0.88/0.51; $p \leq 0.000$), Opportunity (0.87/0.63; $p \leq 0.000$), Network (0.87/0.57; $p \leq 0.000$), Efficiency (0.81/0.58; $p \leq 0.000$), Entrepreneurial Intention (0.79/0.34; $p \leq 0.000$) and Information (0.53/0.58; $p \leq 0.000$).

Although the model appears satisfactory, it demonstrates multicollinearity among the items on several factors, i.e., covariation. This multicollinearity, in turn, stems from dimensional proximity of the factors, as can be seen in the model's dimensional structure [$RSQ = 0.964$ e $S-stress = 0.096$] in Figure 1.

As can be seen, the Multidimensional Scaling supports the theoretical framework proposed by Santos (2008) for the development of the Entrepreneurial Potential Scale. Factors such as Planning (P_1), Control (C) and Goals (G) have moderate correlation [$P_1-C: r = 0.580; p = 0.000$; $C-G r = 0.464; p = 0.000$; $P_1-G: r = 0.464; p = 0.000$] as well as the groups of factors Persuasion (P_2), Network (N) e Opportunity (Op) [$P_2-N: r = 0.549; p = 0.000$; $N-Op: r = 0.416; p = 0.000$; $P_2-Op: r = 0.504; p = 0.000$], and Persistence (P_3), Efficiency (E) and Information (I) [$P_3-E: r = 0.474; p = 0.000$; $E-I: r = 0.351; p = 0.000$; $P_3-I: r = 0.446; p = 0.000$]; which present, consequently, considerable dimensional proximity (Figure 1).

This type of correlation associated with the dimensionality can be explained, for example, by the semantic and theoretical proximity that items from these factors have, namely, the items “v27 - I define where I want to get and I detail all the steps that I must follow” (Planning), “v31 - I know where I want to get and how much I want to achieve” (Goals) and “v38 - I see the planning as a guide to control my actions” (Control). These items relate to some characteristics correspondent to the locus of control (McClelland, 1961; Rotter, 1990), that is, predisposition to maintain personal control over the results, including planned and previously established behaviours (Littunen, 2000; Mueller & Thomas, 2001; Paulino & Rossi, 2003; Kristiansen & Indarti, 2004; Moriano et al., 2004; Santos, 2008; Lima & Freitas, 2010), demonstrating that not only the items are semantically close, but the structure of these factors share theoretical relationship. The same applies to the other groups of factors, as Santos (2008) has predicted.

Moreover, Entrepreneurial Intention is in a separate dimension and distant of all other factors. Santos (2008) developed the Entrepreneurial Potential Scale taking into account that the Entrepreneurial Intention was a complementary element to the potential to be

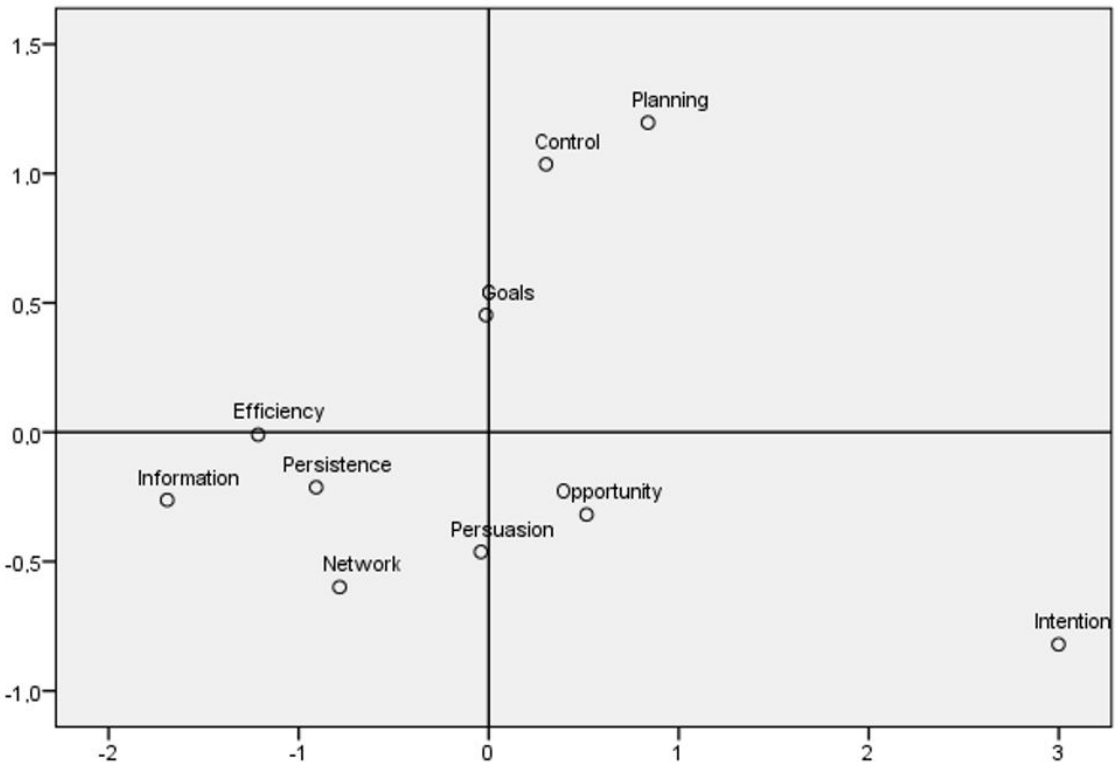


Figure 1. Dimensionality of the Entrepreneurial Potential Scale. Source: Research data.

entrepreneur, influencing only indirectly the overall construct.

This occurs because results show that the desire or will to have the own business is not something private to entrepreneurs or potential entrepreneurs (Kristiansen & Indarti, 2004; Nascimento et al., 2010). The Entrepreneurial Intention can be interpreted as an individual's social disposition to want to be a "successful entrepreneur". Gouveia et al. (2009) argue that social norms and desirable standards often influence the person to give a supposedly correct answer. Thus, the person tends to believe that being a successful entrepreneur is something good and desirable, which makes him/her supposedly has the desire to be an entrepreneur, when, in fact, he/she really will not undertake a business. Therefore, since the Entrepreneurial Intention is a multifaceted element, it becomes complementary to the identification of the potential to be entrepreneur.

Empirically, the Multidimensional Scaling confirms that the Entrepreneurial Intention is part of a separated dimension from other factors. In this perspective, the intention of having a business exists independent of the person to be potentially entrepreneur or not, and can be considered a "catalyser" to the entrepreneurial potential in favourability conditions. Other authors have also treated the Entrepreneurial Intention as a complementary element (e.g., Kristiansen & Indarti, 2004) or with low influence (e.g., Lopes & Souza, 2005; Gonçalves et al., 2007) to build a universal entrepreneurial profile.

3.2 Study 2: criterion validity of the Entrepreneurial Potential Scale

Study 2 aimed to verify the criterion validity parameters of the Entrepreneurial Potential Scale (Santos, 2008). The criterion validity, according to Pasquali (2009), is the degree of Predictive Effectiveness that an instrument has to identify the behaviour which it is intended to measure. In this case, we evaluate the criterion that the businessman (entrepreneur) has greater entrepreneurial potential than the overall population (non-entrepreneur). We define the "non-entrepreneur", for operational purposes of empirical research, as the college student.

3.2.1 Method

3.2.1.1 Procedures: participants and data collection

The study included 802 participants, of which 148 entrepreneurs from Maceió City, State of Alagoas in Brazil (59% are male) and 654 college students (58.4% are male) from 8 (eight) Brazilian universities – most were coming from the Federal

University of Alagoas - UFAL (49.5%). The data collection was carried out between December 2013 and June 2014, in a non-probabilistic sample, given by accessibility and individually, in which the participants were approached at their workplace or school and/or via e-mail and asked to answer the Entrepreneurial Potential Scale [Portuguese version] (Santos, 2008). The participants were elucidated on the anonymity of their answers, the confidentiality and the voluntary participation, considering the ethical guidelines that govern research with human beings.

3.2.1.2 Analysis

We conducted the Student *t* test for independent samples and Effect size (Cohen's *d*) for *t*-test, following the Cohen's (1992) recommendations, in which, $d = 0.20$ denotes small effect, $d = 0.50$ denotes medium effect and $d = 0.80$ denotes large effect. According Dancey & Reidy (2006), when evaluating the behavioural and psychological constructs between different groups - due to the interference of subjective and contextual elements - small and medium effects are more readily available, as is the case of the constructs disclosed herein.

The *t* test was used to compare the mean scores of entrepreneurs and college students for each of the factors of the Entrepreneurial Potential Scale (Santos, 2008), from the assumption that the entrepreneur demonstrate an entrepreneurial potential more evident than the overall population, endorsing highest score on the scale than college students – with statistically significant difference at a probability level associated with $p < 0.05$. Although the testing applies only to the universe in which the data were collected, results that support this hypothesis, denote also that the instrument may be able to predict the entrepreneurial behaviour.

3.2.2 Results and discussion

In order to test the predictive efficacy of the Entrepreneurial Potential Scale, we proceeded to the criterion validity by Student's *t* test for independent samples, verifying the existence of significant differences between the mean scores of entrepreneurs (businessmen) and the mean scores of college students in each of the factors (sum of items) of the instrument.

The parameters of the criterion validity of the Entrepreneurial Potential Scale are shown in Table 4, which presents the means and standard deviations (SD), the *t*-test values, degrees of freedom (df), the *p*-value (statistical significance), the difference in means associated with a 95% confidence interval, and values of Cohen's *d* for the effect size.

As we can see in Table 4, in all factors, on average, entrepreneurs scored higher than college students, with statistically significant differences at a *p*-value

Table 4. Parameters of the Criterion Validity.

Factors	Entrepreneurs (n=148)		College Students (n=654)		Statistics				
	Mean	SD	Mean	SD	<i>t</i>	df	<i>p</i>	Mean difference (CI95%)	<i>d</i>
Entrepreneurial Intention	8.85	1.607	7.22	2.209	10.328	287.7	0.000	1.630 (1.31-1.94)	0.77
Opportunity	8.20	1.169	7.64	1.234	5.067	800	0.000	0.564 (0.34-0.78)	0.46
Persistence	8.94	0.925	8.26	1.154	7.676	261.5	0.000	0.678 (0.50-0.85)	0.61
Efficiency	9.17	0.837	8.43	1.185	8.976	296.7	0.000	0.744 (0.58-0.91)	0.66
Information	9.20	0.787	8.72	1.061	5.130	800	0.000	0.474 (0.29-0.65)	0.47
Planning	8.25	1.182	7.42	1.444	7.369	256.5	0.000	0.828 (0.60-1.05)	0.59
Goals	8.49	0.982	7.61	1.319	9.129	280.9	0.000	0.875 (0.68-1.06)	0.69
Control	8.34	1.373	7.38	1.443	7.337	800	0.000	0.955 (0.70-1.21)	0.67
Persuasion	8.48	1.027	7.51	1.166	9.299	800	0.000	0.966 (0.76-1.17)	0.85
Network	8.82	1.096	8.14	1.114	6.578	800	0.000	0.678 (0.47-0.88)	0.60
Full Scale	8.68	0.707	7.84	0.943	12.207	279.1	0.000	0.840 (0.70-0.97)	0.93

Source: Research data.

≤ 0.05 . Furthermore, the effect size (Cohen's *d*) presents median for almost all factors, except the factor Persuasion, showing a large effect ($d = 0.85$). Medium effects show that there are a relevant difference between the mean scores of the entrepreneurs and the college students, indicating not only that the entrepreneurs score higher than the college students in these factors, but that this difference is real in empirical terms. In turn, the large effect size for the factor Persuasion denotes that it can be considered an important attribute to distinguish the entrepreneur from the college student.

Santos (2008) establishes the Persuasion as the ability to influence others to execute activities and actions that can facilitate the achievement of organizational objectives. In personal terms, this factor indicates that the entrepreneur is able to convince and motivate people, i.e., to lead.

Some approaches associate specifically the entrepreneurial leadership style to narcissism traits (Mathieu & St-Jean, 2013) and internal locus of control (Miner, 2000; Mueller & Thomas, 2001). Beyond the personality traits, behavioural and psychological aspects related to the entrepreneurial leadership style probably lead the entrepreneur to the acquisition of

management, communication and persuasion skills (Mueller & Goić, 2002; Schmidt & Bohnenberger, 2009; Nassif et al., 2010). Such elements are consensual in many theories of entrepreneurship, according to Santos (2008), which, following the results found in this study, appear fundamental for the differentiation between the entrepreneur (businessman) and the college student.

In an analysis of the overall mean of the Entrepreneurial Potential Scale between entrepreneurs and college students, the *t* test [$(279.1) = 12.207$; $p = 0.000$] showed a significant mean difference and large effect size ($d = 0.93$). In addition, the scores found for entrepreneurs here investigated proved be congruent with the scores of successful entrepreneurs from Santos (2008, p. 187), as shown in Table 5.

According to Table 5, there was no difference between the scores of entrepreneurs from research carried out here and the scores of successful entrepreneurs from Santos (2008). Empirically, these results help to confirm the model proposed by the Entrepreneurial Potential Scale regarding the instrument's sensitivity in the mapping of the entrepreneurial behaviour, by the verification of their predictive effectiveness in (1) differentiate reliably the entrepreneur (characterised

Table 5. Entrepreneurs from research versus Successful Entrepreneurs from Santos (2008).

Factors	Entrepreneurs (n=148)		Successful Entrepreneurs (n=50)*		<i>p</i>	Statistics	
	Mean	SD	Mean	SD		Mean difference (CI95%)	<i>d</i>
Entrepreneurial Intention	8.85	1.60	8.87	1.57	0.990	-0.02 (-0.53-0.49)	0.01
Opportunity	8.20	1.16	8.07	1.03	0.490	-0.130 (-0.24-0.50)	0.11
Persistence	8.94	0.92	8.92	0.83	0.890	0.020 (-0.27-0.31)	0.02
Efficiency	9.17	0.83	9.10	0.86	0.610	0.070 (-0.20-0.34)	0.08
Information	9.20	0.78	8.96	0.79	0.060	0.240 (-0.01-0.49)	0.31
Planning	8.25	1.18	8.24	1.21	0.960	-0.010 (-0.37-0.39)	0.01
Goals	8.49	0.98	8.53	0.88	0.999	-0.040 (-0.35-0.27)	0.04
Control	8.34	1.37	8.31	1.16	0.890	0.030 (-0.40-0.46)	0.02
Persuasion	8.48	1.02	8.36	0.93	0.460	0.120 (-0.20-0.44)	0.12
Network	8.82	1.09	8.62	1.09	0.260	0.200 (-0.15-0.55)	0.18
Full Scale	8.68	0.70	8.58	0.57	0.360	0.100 (-0.12-0.32)	0.15

Source: Research data and *Santos (2008, p. 187).

here as businessmen) from non-entrepreneur (in this case, college students of Business Administration) and (2) demonstrate convergence to characterize specific groups such as the case of entrepreneurs of this study compared to successful entrepreneurs from Santos (2008).

4 Final considerations

The objective of this study was verify evidence of confirmatory factor validity, parameters of dimensional structure, and criterion validity of the Entrepreneurial Potential Scale developed by Santos (2008). Two studies were performed, we got the confirmatory validity and the criterion validity of a low-cost instrument (self-administered) and easy to apply (self-report), which a priori already had satisfactory parameters of content and semantics validity, factor validity and internal consistency, as detailed in section 2.2 of this Article.

Confirmatory factor validity proved the latent structure of 10-factors model for the Entrepreneurial Potential Scale. Complementarily, we check that the dimensional structure showed how the factors behave, confirming the theoretical model of Santos (2008), by the covariance sharing between specific

factors, which bring empirical and theoretical relevant implications.

Overall, the Entrepreneurial Potential Scale proved to be an effective tool for the discrimination of people potentially entrepreneur, and can be used in studies that aim to know the antecedents and consequences of entrepreneurial behaviour. Also, the prospects for use of this instrument include training, selection processes, entry into business incubators, entrepreneurial identification among employees (intrapreneurship), encouragement of people to follow the business career from previously identified skills, and studies among professions that commonly tend to take a person to opening a business, such as accountants, chemists, engineers, doctors, dentists etc.

In this sense, it is clear that this study presents advances in entrepreneurship literature, due the relevance of an instrument for the assessment of entrepreneurial potential to researches all over the world, as it provides a solid theoretical base, a structure empirically proven and practical functionality in their use.

We emphasize, finally, that, although results share the sample bias – i.e., we cannot generalize these results beyond the sample studied –, the

Entrepreneurial Potential Scale has shown that is a measure that converges reliably to predict the potential to be an entrepreneur, from factors that make up behaviours and traits of a person typically entrepreneur, reinforcing previous studies with this instrument (e.g., Santos, 2008; Alves & Bornia, 2011; Souza et al., 2014). Hence the instrument presents validity, reliability and accuracy.

Future studies should attempt to test the Entrepreneurial Potential Scale in other contexts and other languages, and measure broader validity parameters, allowing the use of this instrument in several places and encouraging its dissemination.

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