

Intrapreneurial competencies: development and validation of a measurement scale

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Abstract

Purpose – Few models have attempted to explain intrapreneurial behavior from the perspective of competencies. Therefore, the purpose of this paper is to contribute along this line by developing and validating a scale to measure intrapreneurial competencies for a Costa Rican organizational context.

Design/methodology/approach – A three stage process was followed. The first stage considered literature review, expert judgment, cognitive interviews, and back-translation. In the second stage, the questionnaire was administered to a sample of 543 university professionals who worked mainly in private organizations in Costa Rica. The third stage led to evaluate of the proposed scale's psychometric properties, including, exploratory factor analysis procedure performing by SPSS 19; confirmatory factor analysis procedures by means of structural equation modeling using EQS 6.2 version and finally, a linear regression model to obtain evidence of external criterion-related validity, performed by SPSS 19.

Findings – This study provides evidence of five sub-dimensions of employee attributes, i.e., “opportunity promoter”, “proactivity”, “flexibility”, “drive”, and “risk taking” that constitute a higher-level construct called intrapreneurial competencies. The scale provided evidence of convergent, discriminant, and criterion-related validity – the latter, using an employee innovative behavior scale.

Originality/value – The model offers a first step to continue studies that aim at developing a robust model of intrapreneurial competencies. This potential predictive capacity of an instrument of this nature would be useful for the business sector, particularly as a diagnostic instrument to strengthen processes of staff development in areas that promote the development of innovation and the creation of new businesses for the company.

Keywords Innovation, Competencies, SEM, Intrapreneurship, Cognitive interview

Paper type Research paper

Introduction

As organizations, industries, and consumers become more dynamic, efforts to boost processes that allow employees – within an organization – to turn opportunities into innovations for the company have gained greater importance (Hisrich and Kearney, 2012). This ability to encourage employee entrepreneurial spirit is within the company; therefore, it is generally called intrapreneurship.

Intrapreneurs possess the ability to create, identify, and exploit new opportunities that allow them to create value for the company (Ma *et al.*, 2016). In fact, it has been observed that intrapreneurial efforts enhance competitive advantage, stimulating company growth

JEL Classification — M1

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and well-being (Hayton and Kelley, 2006). In this sense, explaining the relationship between intrapreneurship and innovation is of great interest, particularly in terms of how the intrapreneurial profile affects innovative performance (Camelo-Ordaz *et al.*, 2012).

However, the literature concerning possible inducers of intrapreneurship has placed more emphasis on the influence of organizational variables than on identifying the characteristics of individuals who make these efforts (Antoncic and Hisrich, 2001; Stull, 2005). Although the influence of these human capital characteristics on the field of intrapreneurship has been acknowledged, a particular gap persists in the current literature with respect to the characteristics that are desirable in an intrapreneur beyond schooling and experience. Similarly, there is also a gap in the identification of these characteristics within a clear and coherent competency framework (Hayton and Kelley, 2006). Nonetheless, the value of developing and sharpening such competencies for more chances of entrepreneurial success has been acknowledged (Jain *et al.*, 2015).

Accordingly, this study proposes to develop and validate a scale for measuring intrapreneurial competencies in the Costa Rican context. Thus, this paper makes several contributions to the topic. First, it heeds the call to contribute to research on understanding intrapreneurial profiles, along the lines of competency analysis, developing a measuring instrument while following best practices for the development of assessment tools. Second, it addresses the weakness or gap indicated by Slavec and Drnovsek (2012) concerning the small emphasis that the field of entrepreneurship has placed on the development of valid measures. Therefore, it may be useful to illustrate that it is feasible to apply the main guidelines identified by these authors in intrapreneurship research, benefiting the development of better explanatory models of the phenomenon. Third, it is an initial contribution that opens space for future research that leads to refining a measuring tool for intrapreneurial competencies that is also likely to be implemented in the field of management and research.

This study begins with a section dedicated to conceptualizing the three main study constructs, i.e., intrapreneurship, competencies, and intrapreneurial competencies, with an overview of the theoretical foundations on which the model is built. The second section presents the stages and phases that compose the methodological design followed in this study for the purposes of scale construction. Then, the obtained results for each of the methods followed in the proposed stages and phases are shown, from the demonstration of the relevance of the content domains and the items that assess them to the statistical tests that verify the compliance of the scale's psychometric properties. The last section closes with a presentation of the conclusions, study limitations, and future lines of research.

Literature review

Intrapreneurship

The literature has suggested a variety of terms to refer to “intrapreneurial” efforts, such as “internal corporate entrepreneurship”, “corporate entrepreneurship”, “intrapreneuring”, and “corporate venturing” (Antoncic and Hisrich, 2001). However, there is still no universally accepted definition (Sharma and Chrisman, 1999). Therefore, this line of study is still under construction and seeking its conceptual identity (Sandberg, 2000). Nonetheless, it is possible to identify three elements in the variety of definitions that, in general, characterize these efforts. One of these is recognizing that the phenomenon concerns the entrepreneurial efforts, orientations, or activities performed within the organization (Burgelman, 1983; Goodale *et al.*, 2011; Ma *et al.*, 2016; Miller, 1983; Schollhammer, 1982). Second, these actions may be undertaken as the result of the interlocking entrepreneurial activities of multiple participants (Burgelman, 1983) at different organizational levels, i.e., management, a unit, or operations (Miller, 1983), including an individual or group of individuals within the company (Sharma and Chrisman, 1999; Stevenson and Jarillo, 1990).

The third indicates that entrepreneurial actions are targeted toward the development of innovation for the company. As stated by Covin and Miles (1999, p. 49) “innovation is at the center of the nomological network that encompasses the construct of corporate entrepreneurship.”

Some authors have asserted that intrapreneurship is synonymous with innovation that is initiated and implemented by employees (Carrier, 1996). In this sense, these entrepreneurial efforts within the company lead to three possible innovative results: organizational renewal, transforming existing businesses that need to be revived or transformed (Schendel, 1990), whether doing so involves renewing the key ideas on which the organization is built – strategic renewal – (Guth and Ginsberg, 1990) or redefining the business concept, reorganizing, and introducing change into the system for innovation (Zahra, 1993); the creation of new businesses, such as the birth of new companies within existing companies (Schendel, 1990); and product and process innovation (Zahra, 1993) as well as organizational innovations (Antoncic and Hisrich, 2001; Zahra, 1993).

Regarding the possible inducers of intrapreneurship, the literature has focused its attention more on the influence of organizational variables than on identifying the characteristics of individuals who make these types of efforts (Antoncic and Hisrich, 2001; Stull, 2005). This last point acknowledges an active role in the intrapreneurial process. Some emphasize the ability to behave as entrepreneurs by recognizing, creating, or pursuing opportunities for organizational change (Easley and Longenecker, 2006; Felicio *et al.*, 2012; Kierulff, 1979; Stevenson and Jarillo, 1990). This is done by securing resources (Kierulff, 1979) or even without considering the resources that they control (Stevenson and Jarillo, 1990), not as simple dreamers but as those who do, in the sense that they can change an idea into a profitable reality (Pinchot and Pellman, 1999). Similarly, they act as individuals or groups of individuals who are willing to take calculated risks, meeting the organization’s needs for growth and improvement (Easley and Longenecker, 2006; Sinha and Srivastava, 2013), or as individuals who possess the entrepreneurial spirit, causing them to begin or push a bottom-up process of change (Block and MacMillan, 1993).

It is for this reason that in this study, we frame intrapreneurship as a process in which an individual or group of individuals, within the framework of an existing organization, identify, pursue, and encourage innovative opportunities and create a new organization, renewing the organization or introducing product and process innovations.

Some empirical contributions and theoretical reviews have suggested possible value, attitude, and personality profiles that are associated with intrapreneurs (Jain *et al.*, 2015; Ma *et al.*, 2016; Martiarena, 2013; Sayeed and Gazdar, 2003; Sinha and Srivastava, 2013; Ulijn *et al.*, 2007). Nonetheless, with the exception of the conceptual contribution by Hayton and Kelley (2006), a limited number of studies attempt to specify intrapreneurial behavior from the perspective of the competencies of these individuals. Given the interest of the present study in proposing a model along this line, we dedicate the following section to the conceptualization of competencies.

Competencies

In his literature review, Hoffmann (1999) notes three main positions on the definition of competencies. One of these defines competencies as an observable performance whose focus is the result or the task to be completed; therefore, particular performances are described as competencies and taken as a basis for the assessment, observation, and measurement of a person’s performance. Second, competencies are considered a quality standard of the outcomes of the person’s performance, in which competencies are associated with the achievement of productivity gains or efficiency in the workplace. Thus, competencies here are defined within the context of organizational performance objectives or standards. Third, competencies are defined as a person’s inherent attributes, i.e., knowledge, skills,

and attitudes for competent performances. Although the first two are focused on the result that the person produces, the last focuses on the individual input that is required to perform competently.

Along this line, Boyatzis (1982) defines job competency as an employee's inherent features relating to effective or superior performance in a job, possessing the advantage of being learned in adulthood (Boyatzis, 2008). Woodruffe (1993) defines competency as a set of behavioral patterns that the incumbent must bring to a position to perform his or her tasks and functions with competence. In this sense, he considers competencies to be a particular dimension of individual behavior that should be appropriate to perform a position. Thus, behavioral repertoires can be conducted much better by some individuals than by others.

This last point is consistent with Hayton and Kelley (2006), who state that for a given context and the performance criteria in which competencies are framed, a person may or may not possess "sufficient amounts" of a given competency (e.g. one person may demonstrate competencies as an effective leader, contrary to another); therefore, they represent extremes within a "continuum." In addition, they stress the attitudinal component, indicating that the capacity and desire to behave competently must underlie this set of behaviors. In a way, they determine that people will produce a competent performance in a situation only if they know how and if they value the consequences of the outcomes that are expected from the action. In their definition, they conceptualize individual competencies as the inherent characteristics of individuals, which involve specific combinations of knowledge, skills, and personality traits that are described in aggregate terms (e.g. skills as a leader, team member, etc.).

The authors also note that empirical evidence shows the influence of human capital on the field on intrapreneurship; one of these is competencies related to individuals. However, they consider that a gap persists in the current literature, on the one hand, relating to the connection between human capital and intrapreneurship, particularly in terms of a clear definition of the characteristics that are desirable in an individual. For this reason, the theoretical competence model is described in the following section, drawing on two major components: knowledge, skills, and attitudes as well as innovative outcomes or roles, i.e., introducing product and process innovations, creating new businesses for the company, and contributing to organizational renewal. This model is the basis for proposing a set of initial hypotheses, which are refined in a first qualitative phase and then submitted to quantitative empirical verification in a subsequent stage.

Theoretical model of intrapreneurial competencies

We have taken some elements of the holistic model of professional competence proposed by Cheetham and Chivers (1996, 1998). This model assumes the existence of three basic components of competencies (cognitive, functional, and behavioral); each of these possesses constituent competencies that form an integral part of these components, with the particularity that they interact with one another; for example, the effective execution of functional competencies requires behavioral competencies or vice versa.

Cognitive competence is defined as the possession of appropriate work-related knowledge and the ability to put this knowledge to effective use. Functional competence is conceptualized as an individual's ability to perform a range of work-based tasks effectively to produce specific outcomes. Behavioral competence is noted as the individual's ability to adopt appropriate, observable behaviors in work-related situations. In this sense, it seems to us that they consider knowing (*savoir*), know how (*savoir-faire*), and knowing how to be (*savoir-etre*), from the French inclusive approach, as mapping onto knowledge, skills, and attitudes from the North American KAS approach (Le Diest and Winterton, 2005).

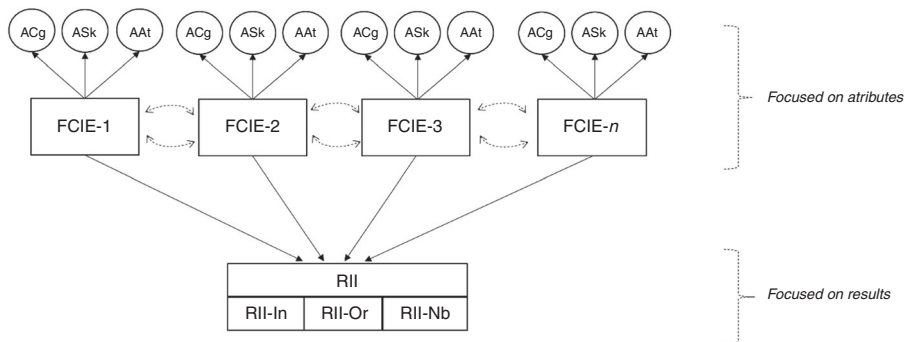
At a higher level, their model proposes that the basic components are influenced by certain – more generic – key competencies that encompass or cover the other competencies,

called meta-competencies. These, the basic components, and their various constituents interact together to produce “outcomes” (or what would amount to corporate entrepreneurial roles, according to Hayton and Kelley, 2006), representing final indicators of professional competence. These outcomes provide feedback so that, in the reflective component, the individual improves his or her competencies. The model foresees the existence of contextual variables for competencies, such as the organizational environment or work context, because an individual may be very competent in a particular context but less competent when this environment changes. This context is defined as the physical, cultural, and social conditions surrounding a person’s work environment.

As stated by Woodruffe (1993), relevant functions, tasks, and competencies can be differentiated using the contribution of Boyatzis (1982), particularly distinguishing between the particular aspects of the job to be performed competently and what a person needs to contribute to the job to perform these particular aspects at the required level of competency. Thus, our model combines the attribute-based competency approach, which begins with the content design of the three basic components, with the observable performance-based approach, which is the outcome required to demonstrate a competent performance (Hoffmann, 1999, pp. 276-277), as shown in Figure 1. At the top, we propose that the attribute combinations of knowledge, skills, and attitudes are explained by different dimensions of intrapreneurial competencies and, on the other hand, that these dimensions are related to employees’ innovative activities for the company. It should be noted that our model does not address the concept of meta-competencies or the organizational contextual factors that affect intrapreneurial competencies. However, we consider the fact that core and constituent competencies influence the intrapreneurial outcome.

Methodology

The process of the development and validation of the scale followed a set of stages, taking the adaptation proposed by Camisón and Cruz (2008) and suggestions from Slavec and Drnovsek (2012) as a reference for new measures in entrepreneurship. The first stage showed the theoretical importance and evidence of the construct to be measured, which



Notes: ACg=cognitive attributes associated to the intrapreneurial competences dimension. ASk=skill attributes associated to the intrapreneurial competences dimension. AAt=attitudinal attributes associated to the intrapreneurial competences dimension. FCIE-n=the infinite number of competences dimensions or factors that explain the entailed attributes, where n equals to 1, 2, 3, ..., n factors. RII=results obtained from the intrapreneurial innovation performance: RII-In= introduce product or process innovations to companies, RII-Or=organizational renovation and RII-Nb=development of new business opportunities for the enterprise

Source: Adapted from Cheetham and Chivers (1996, 1998)

Figure 1.
A conceptual model
of intrapreneurial
competences

involved three phases. The first phase involved two steps: the specification, through a literature review, of the theoretical domain content and the empirical meaning of the three relevant constructs of the study, i.e., competencies, intrapreneurs, and intrapreneurial competencies; and the review of ten entrepreneurial orientation models proposed in the literature to identify possible intrapreneurial attributes of knowledge, skills, and attitudes, which were initially grouped into dimensions of competencies.

In the second phase, expert judgment was used as an assessment strategy (as suggested by Escobar-Pérez and Cuervo-Martínez, 2008) prior to the field study. This strategy sought to confront the theoretical attributes identified in the previous phase from the views and experiences of experts. The expert panel assessed the degree of essentiality of the attributes and the dimensions for innovative outcomes, the perceived degree of interdependence of the dimensions, suggestions for possible dimensions that were not included in the proposal, and finally, their overall impression of the proposed theoretical model. To establish the degree of consensus among the panelists, the Lawshe index (1975), which is considered one of the best for these purposes (Pedrosa *et al.*, 2013), was used.

For panel selection, the recommendations by Slavec and Drnovsek (2012) and Escobar-Pérez and Cuervo-Martínez (2008) in the field of entrepreneurship were considered. The panel was formed by six experts: three entrepreneurs with backgrounds in engineering, of whom two are founders of companies and possess over 15 years of experience in technology-based companies in managerial positions; the other entrepreneur is a manufacturing company manager with over 40 years of experience working in this type of company; two scholars, one of whom is a founder of a spin-off in the field of technology-based companies with a background in engineering and business administration and possesses more than 15 years of experience in academic activities; the other scholar is a university professor who specializes in “competencies” with more than 30 years of academic experience; and finally, an academic with a lead position in a Government Ministry who specializes in the field of science and technology and has over 40 years of experience in the field of public management.

The third phase corresponded to creating items that were in line with the attribute content of the intrapreneurial competency dimensions. General recommendations were followed while drafting these items, for example, avoiding extensive and ambiguous statements, introducing one attribute or aspect at a time, avoiding opposite items, etc. (Colton and Covert, 2007; DeVellis, 2012; Krosnick and Presser, 2010). Three items were drafted for each attribute of the eight dimensions, comprising an initial list of 72 items for the proposed intrapreneurial competency scale. A five-point Likert scale, ranging from 1 = never to 5 = always, was proposed to assess the manner in which the respondent acts for each of the statements expressed in the items (Colton and Covert, 2007).

The second stage corresponded to the representativeness and adequacy of the data collection, consisting of three phases. The first consisted of refining the scale in a pilot test. To that end, the “cognitive interview” (CI) technique, one of the procedures that has been frequently used to adapt scales (Beatty and Willis, 2007), was used. The protocol designed by Smith-Castro and Molina (2011) was used to improve paper and pencil instruments. One of the main features of this process is the verbalization (“thinking aloud”) of ideas evoked by the item; meanwhile, the interviewer asks questions to investigate the cognitive processes that underlie the response process so that the obtained information adjusts the items to the corresponding construct. Six individuals who met the target profile of those who should respond to the instrument were interviewed: university professionals with a background in business administration or engineering who mainly worked in manufacturing or service companies at the time of the interview. The average duration of these interviews was 40 minutes per interviewee. A total of 24 items were assigned to three pairs of interviewees (from 1 to 24, 25 to 48, and 49 to 72) to obtain a more detailed item analysis.

The second phase consisted of completing the preparation of the questionnaire and adding three scales to measure convergent, divergent, and criterion-related validity. To that end, three steps were followed. The first was finding and translating a scale into Spanish that would measure attributes that are similar to intrapreneurial competencies. Champion's behavior scale was chosen; it identifies the behaviors of employees who make a decisive contribution to promoting the successful development of product innovation projects in the company (Howell *et al.*, 2005, p. 644). The "back-translation" technique suggested by Brislin (1986) and particularly the method followed by Beaton and Guillemin (2000) were used. This method proposes that two translators translate the scale from the original language into the target language; subsequently, the translations are synthesized, attempting to seek agreement on the translated items that show significant differences in wording or semantic content, given that it may be technical language. Then, a third translator performs the task of converting the items that were translated into the target language back into the original language ("back-translation"). Finally, the researchers meet with the last translator to identify possible semantic, idiomatic, conceptual, or cultural differences or equivalences between the original items and the target language. Here, they make the final adjustments to the translation in the language in which the tool is to be applied. As a result, the Champion behavior scale was composed of 15 items translated into Spanish, to be evaluated with the same type of Likert scale proposed for intrapreneurs. The pre-test was not performed due to time constraints; however, we sought to compensate for this by turning to translators with expertise in business management.

In the second step, a scale that would allow us to measure attributes that may be different from the intrapreneur was sought. The social desirability (SD) scale by Crowne and Marlowe (1960) was selected; it measures the trend by convening with social norms and more easily reports socially expected behavior than illicit and socially sanctioned behavior. This scale is used in studies as a control variable, particularly when the topics may be evocative of SD. We opted for a version that, composed of 13 items, had previously been adapted to the local context (Smith-Castro *et al.*, 2014). Its items were given the same values as the Likert scale scores proposed for the two previous scales. The third step consisted of designing a scale to measure interviewee performance aimed at proposing innovative initiatives for the organization, considering the four types of innovation suggested by the Oslo Manual (Eurostat and OCDE, 2006) and the creation of new businesses for the company. This step resulted in nine items to be assessed with the same type of Likert scale.

Once the questionnaire was prepared, the third phase began: selecting a non-probabilistic sample of professionals who mainly worked in private companies and who studied in undergraduate and master's programs at public and private universities to apply the questionnaire. Subject quotas were established according to the abovementioned academic degrees and by academic area (business administration and engineering majors). Furthermore, more state than private universities were included, with the purpose of ensuring a sample of professionals with sufficient variability regarding age, years of work experience, and the occupation of different positions or jobs in the company.

Regarding this point, Highhouse and Gillespie (2009) indicate that mechanical assessments, such as "convenience samples are bad", should be avoided (p. 261). These authors pose the following four questions to assess the quality of a sample: Did the research question contain a specific and well-defined population of interest? Is there a characteristic of the convenience sample that may interact with the variables of interest in the study? Is participant motivation relevant to this study? and If the researcher is testing a theory, does the theory apply to this sample? As is evident, the selected sample met all of these criteria.

Finally, the third stage, consisting of five phases, led to the measurement of the proposed scale's psychometric properties. Analysis of the dimensionality of the scales began with an exploratory factor analysis (EFA), reducing the proposed scale of intrapreneurial

competencies down to a smaller number of items in factors that were interpreted in the light of the support from the performed literature review; similarly, an analysis of internal consistency of the scale using Cronbach's α was performed, taking the assessment criteria proposed by DeVellis (2012) as a reference. Both procedures were performed using SPSS version 19.

In the third phase, a confirmatory factor analysis (CFA) was used to assess the general fit of the measurement model and to verify the multidimensional nature of intrapreneurial competencies (first-level analysis) and the establishment of a macro-construct of intrapreneurial competencies (second-level analysis); structural equation modeling was employed. The Mardia index (Álvarez *et al.*, 2006) was used to assess multivariate normality. On the other hand, robust versions of the three indices recommended by Hair *et al.* (2010) were used: a) $SB \chi^2$, b) CFI, and c) RMSEA. Power was calculated by taking the RMSEA as a basis according to the procedure of MacCallum *et al.* (1996); a type II error is defined as the possibility of detecting and rejecting a bad model. An exact fit was used (null hypothesis = 0.00; alternative hypothesis = 0.05) in accordance with Schumacker and Lomax (2010). Similarly, the online tool by Preacher and Coffman (2006) was employed for calculation. In a fourth phase, the global fit measure was calculated for three nested models (variations of those proposed by Byrne (2006) were used because there was only one method and various features), in search of evidence of convergent validity and discriminant validity with the use of parcels as a procedure (Williams *et al.*, 2009). This was done considering the advantages offered by the "pragmatic-liberal" approach (Little *et al.*, 2002), including i) higher reliability, ii) an improved relationship of the number of cases per parameter, iii) a lower possibility of violating the technique assumptions, iv) a better understanding of the relationship among constructs, and v) more stable solutions.

In these two phases, EQS version 6.2 was used. Finally, an assessment of the degree of relationship between the scale of intrapreneurial competencies and the measure of action aimed at innovation for the company was performed to obtain evidence of external criterion-related validity, through a linear regression model, using SPSS version 19.0. In addition, the sensitivity and specificity analysis of the proposed instrument was conducted and was used as a cut-off for the scale scores equivalent to the first and fourth quartile that defined the groups of high and low levels of intrapreneurial competencies and, on the other hand, those of low and high innovative performance for the company. Furthermore, positive and negative value probabilities were considered, in addition to the calculation of sensitivity and specificity (Santisteban, 2009).

Results

Stage 1: theoretical importance and evidence of the construct to be measured

To build the model of intrapreneurial competencies, we proceeded to review each of the following dimensions cited in the literature: entrepreneurial orientation (Lumpkin and Dess, 1996); innovation (Hargadon and Sutton, 1999); strategic renewal (Floyd and Lane, 2000); entrepreneurship (Stevenson and Gumpert, 1985); the innovative champion (Jensen and Jorgensen, 2004); entrepreneurial intensity (Liao *et al.*, 2005); champions of new products (Howell *et al.*, 2005); the creation of new businesses (Baron, 2007); management (Kuratko *et al.*, 2005), and the MCI model of standards (2008).

Based on this review, attributes or characteristics relating to possible intrapreneurial competencies were identified. Subsequently, several grouping sessions of these attributes were performed, and the affinities between them were identified. A generic name was assigned to characterize them – a possible common factor, as proposed in the upper part of Figure 1. Using an iterative process of discussion among researchers, it was possible to agree upon seven possible dimensions that characterize intrapreneurial competencies (see Table I). It is important to note that each of the dimensions of the proposed theoretical

Possible dimension (FCIE-i) ^a	Conceptualization of core competency attributes of FCIE-i ^b	Associated attributes		
		ACg	AHb	AAc
1. Exploiter of opportunities	Knowledge to detect opportunities, acting to take advantage of opportunities, and adopting behaviors to take advantage of opportunities for the company	X	X	X
2. Pro-innovator	Knowledge to create new things, acting to put new things into practice and adopt behaviors, and willingness to create new things for the company		X	X
3. Idea stimulator	Knowledge to create new ideas, acting to put new ideas to the test, and adopting behaviors to promote and support new ideas for the company	X	X	X
4. Planner	Knowledge to plan initiatives, acting to implement a new initiative plan, and adopting behaviors for the new company initiative plan		X	X
5. Resource manager	Knowledge to detect and estimate resources, acting to mobilize resources, and adopting behaviors to commit resources to new initiatives for the company	X	X	X
6. Support network builder	Knowledge to build networks, acting to join forces with others, and adopting behaviors to attract others and negotiate with others to support new initiatives for the company		X	X
7. Builder of interactions with others	Knowledge to involve others, acting to put the knowledge and experiences of others into practice, and the ability to know how to encourage others to support new initiatives for the company		X	X

Table I.
Possible dimensions of core intrapreneurial competencies at a conceptual level

Notes: The symbols correspond to those proposed in Figure 1. ^aIn the first theoretical dimension, FCIE-i amounts to FCEI-1 and so on; ^beach dimension (FCIE-i) contains three competency attributes; thus, the seven dimensions of the theoretical model contain 21 attributes

model contains competency attributes, in particular, knowledge, skills, and attitudes. Thus, the dimensions of exploiter of entrepreneurial opportunities, idea stimulator, and resource manager contain the three intrapreneurial attributes; meanwhile, the other dimensions may be more focused on attributes of intrapreneurial skills and attitudes.

The experts were consulted as to how essential, useful, or non-essential they considered the 21 attributes of the seven dimensions proposed for employee innovative behavior in the organization. More than the half of the panelists indicated as essential the three attributes in the dimensions of exploiter of opportunities, pro-innovator, idea stimulator, network constructor, and constructor of interactions with others. In the dimensions of resource planner and manager, there was consensus that attitudinal competencies are essential. Indeed, this was the type of attribute that was most emphasized in their comments, given that cognitive competencies and skills can be learned; however, attitudes hold greater weight for the intrapreneur. Thus, they imply a work philosophy that allows tasks, mainly regarding innovation, to be performed in the organization.

Moreover, three of the panelists declared that the resource planning and management dimensions can be learned; nonetheless, it is not possible to separate them from others, for example, stimulating interactions with others. Most panelists agreed in noting that building networks and interactions with others are very interrelated dimensions, in addition to resource planner and manager.

In addition, four of the six panelists suggested an additional dimension, specifically, risk taking as a promoter of innovative actions in the company, which was included in the model. One aspect that is important to highlight was the agreement among the panelists in regard to the high level of interrelation between the dimensions, which suggests, as a hypothesis, the existence of a higher-level construct that represents intrapreneurship as a macro-competency.

As a result of the literature review, seven dimensions emerged that, in turn, were confirmed by the expert panel, who, moreover, suggested the incorporation of an additional dimension. Therefore, the model was expanded to eight dimensions and 24 attributes. Based on these results, we proceeded to draft three items per dimension for an initial scale of 72 items; this was done while considering the recommended practices for writing and each attribute's content facet.

Stage 2: representativeness and adequacy of data collection

The pre-test of the proposed 72-item scale revealed the need to make the following changes: (a) modifying several words in 24 items; (b) removing or replacing a word to improve the understanding of the item in 16 items; and (c) varying the position of four items. In Table II, we present three examples of modified items to compare them with the items that were finally used as a result of the CI.

Regarding the back-translation, in column 2 of Table III, some of the Champion behavior scale items once two translators agreed on the Spanish version are presented. Below, in the third column, the back-translation of the previous items that was agreed upon by a third translator is presented. Finally, the fourth column shows the final items that the third translator and the researchers agreed upon. Thus, the Spanish version used in this study was obtained. In addition to the two previously presented scales, the final questionnaire included scales of SD and innovative behavior, whereupon the instrument reached 109 items.

Regarding the sample, it was composed of 543 professionals, of whom 71 percent worked in companies, particularly in the financial, telecommunications, and software sectors of large organizations. The remaining 29 percent of the participants worked in governmental organizations. According to job positions, 22.5 percent occupied positions of middle management, 20 percent supervision or leadership, and the remaining 57.5 percent administrative professional positions. The age range was between 19 and 53 years, with an average of 29.7 years and a standard deviation of 6.3 years. Below, the results from the statistical analyses are detailed.

Original item	Final item
I am interested in an in-depth understanding of the ins and outs of the business that this company conducts	I am interested in an in-depth understanding of the business operations that this company conducts
I use pilot prototypes, models, or programs within the company to assess and refine ideas	I use pilot models or programs in the company to assess and refine ideas
I ask questions that challenge the common knowledge of how things are done in the company	I ask questions that challenge how things are done in the company

Table II.
Examples of initial and final items as a result of the pre-test using the cognitive interview

Original item in English	Items with first collaborative translation from original into Spanish	Item with translation from Spanish into English Back-translation	Final item translated collaboratively into Spanish
Enthusiastically promotes the innovation's advantages	Promueve con entusiasmo las ventajas de la innovación	Promotes the advantages to innovation with enthusiasm	Promuevo las ventajas de la innovación con entusiasmo
Keeps pushing enthusiastically	Mantiene el impulso con entusiasmo	Maintains momentum with enthusiasm	Mantengo el impulso de la innovación con entusiasmo
Gets the right people involved	Hace participar a las personas adecuadas	Encourages the right people to participate	Hago participar a los tomadores de decisión clave

Table III.
Examples of items in the Champion behavior scale during the process of translation into Spanish using back-translation

Psychometric properties of the scale

Factorial structure. Regarding the EFA, the KMO = 0.927 indicated sample adequacy. Moreover, Bartlett’s test of sphericity rejected the null hypothesis that the correlation matrix corresponds to an identity matrix (Cea, 2002). We proceeded to perform an extraction using the principal axes and an Oblimin rotation because the experts reaffirmed the high degree of interrelation between the dimensions and it is recommended as the first alternative (Field, 2013). The results supported the oblique procedure, with correlations between factors higher than 0.33, exceeding the minimum criterion of 0.32 suggested by Tabachnick and Fidell (2013). Five factors met the Kaiser criterion of an eigenvalue higher than or equal to one (DeVellis, 2012); therefore, they were retained. This solution explained 63.14 percent of the variance and coincides with what was observed in the sedimentation diagram. Parallel analysis was not used to determine the number of factors because there is no consensus relating to its mode of calculation when an extraction is performed using principal axes (O’Connor, 2015).

Items with loadings ≥ 0.05 were retained because this value explains 25 percent of the item factor (Hair *et al.*, 2014). This value is higher than the minimum loading required for significance, given that, for a sample of 400, quantities of 0.23 ($p < 0.01$) are required (Stevens, 2009). It is important to remember that, in this case, the factors represent different competencies that resulted from the elaboration of the items according to the competency dimensions and attributes. In other words, the dimensionality revealed by the EFA is a first approximation to a model of intrapreneurial competencies.

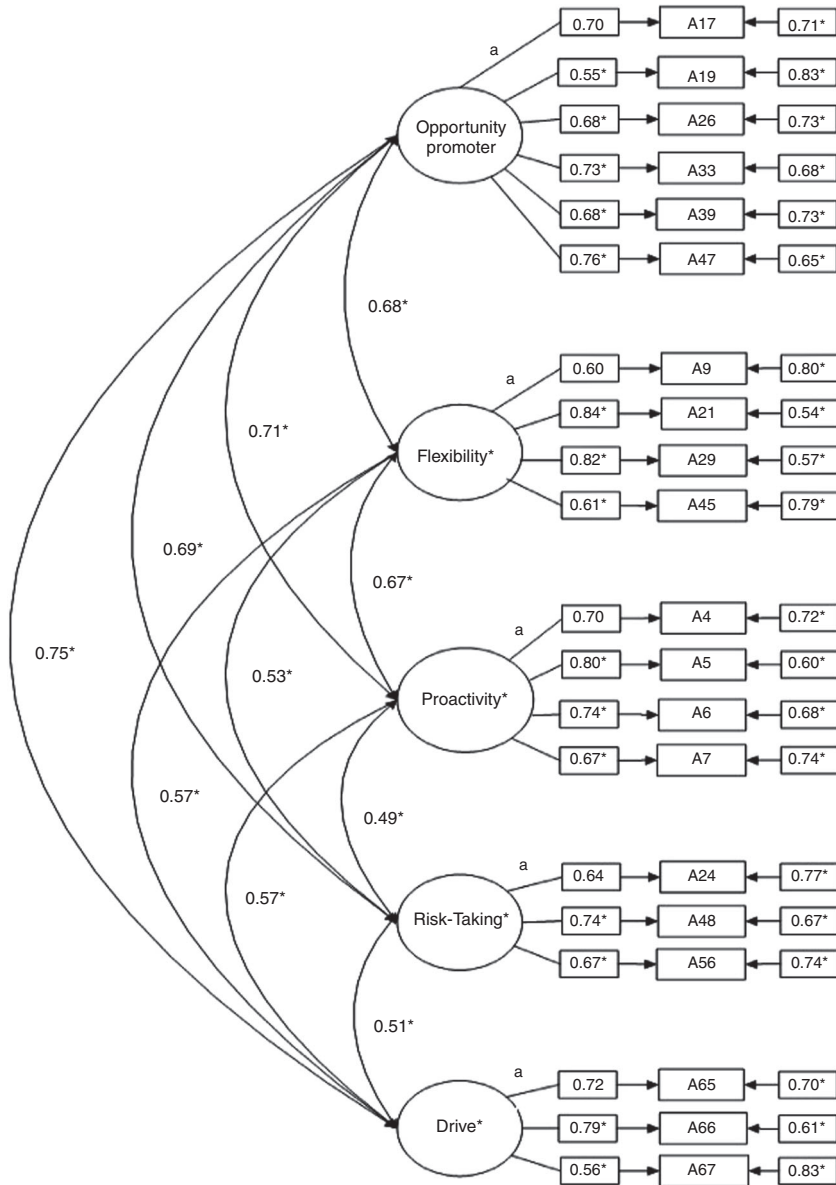
The first factor, known as “opportunity promoter”, is composed of six items related to behavior aimed at identifying, harnessing, convincing others, and being diligent in the face of opportunities for new initiatives in the company. The second factor, called “proactivity”, is composed of three items related to behavior aimed at supporting actions and triggering efforts for new initiatives. The third factor, called “flexibility”, consists of four items related to the flexibility and lack of attachment to schemas and rigid procedures. The fourth factor is called the “drive” competency and includes four items related to an individual’s capacity to become interested in the progress and support of new initiatives and to even perform actions to convince others. Finally, the fifth factor refers to the “risk taking” competency, which comprises three items that denote capabilities oriented toward taking risks on new initiatives for the company. In total, the scale was composed of 20 items, distributed as presented in Table IV.

To corroborate these findings, we proceeded to perform several CFAs, as recommended in the literature (Worthington and Whittaker, 2006). Specifically, a first-level CFA was performed to corroborate the hypothesis of the existence of these five intrapreneurial competencies, i.e., that the selected items, through EFA, effectively load onto the five proposed dimensions. Furthermore, a second-level CFA was conducted to test the hypothesis that these five dimensions represent a macro-competency called intrapreneurship.

The first-level CFA (see Figure 2) showed a Mardia index of 72.19, indicating the absence of multivariate normality (Bentler, 2006). Thus, maximum likelihood with robust indicators

Table IV.
Item total for the scale of intrapreneurship according to dimension as a result of EFA

Dimension	Number of items
Opportunity promoter	6
Proactivity	3
Flexibility	4
Drive	4
Risk taking	3
Total scale items	20



Note: ^aParameters set in 1. Standardized coefficients; those with a statistical significance of $p < 0.005$ are presented with an asterisk

Figure 2. First-level AFC results

was used. The first model obtained a significant Satorra-Bentler χ^2 ($_{SB}\chi^2_{(160)} = 336.37$, $p < 0.001$); however, this statistic is very sensitive to sample size (Byrne, 2010). The robust CFI resulted in 0.943, with the acceptable minimum of 0.90 (Keith, 2015). The RMSEA was 0.046, with a 90 percent CI [0.039, 0.053], in which case, values greater than 0.08 were taken

as indicating a poor fit (Bentler, 2006; Schumacker and Lomax, 2010). Accordingly, it was concluded that the five-factor model obtained an acceptable global fit. The power of the RMSEA with an exact fit was 1, higher than the 0.80 suggested by Ellis (2010). The non-standard parameters freely estimated from the model were shown to be significant ($p < 0.05$). The standardized factor loadings were significant ($p < 0.05$) and higher than 0.50, meeting the established criteria of at least 25 percent s^2 item variance that is to be explained by the factor (Hair *et al.*, 2010). In addition, the correlations between the factors were significant ($p < 0.05$) and ranged between 0.49 and 0.75, indicating relationships between competencies without redundant factors.

The second-level or hierarchical model (see Figure 3) assumes the existence of a macro-competency called intrapreneurship that is formed by the five dimensions or competencies described in the EFA. This model obtained a Mardia index of 72.18; therefore, we continued to use robust statistics. The Satorra-Bentler χ^2 was significant ($_{SB}\chi^2_{(164)} = 333.99$, $p < 0.001$), although slightly less than the first-level model. The CFI was 0.945, and the RMSEA was 0.045, between 90 percent CI [0.038, 0.051]. This finding indicates a good model fit and is slightly higher than the first-level solution. The power of the RMSEA was 0.99.

In terms of the items, the factor loadings of the hierarchical solution were very similar to the first-level model in magnitude and significance. Moreover, the explained variance of each dimension was important, with a range between 0.49 and 0.88 and in all cases significant ($p < 0.001$). Both CFAs provide evidence of validity regarding the internal structure of the proposed scale, according to classical test theory (Martínez *et al.*, 2006; Santisteban, 2009).

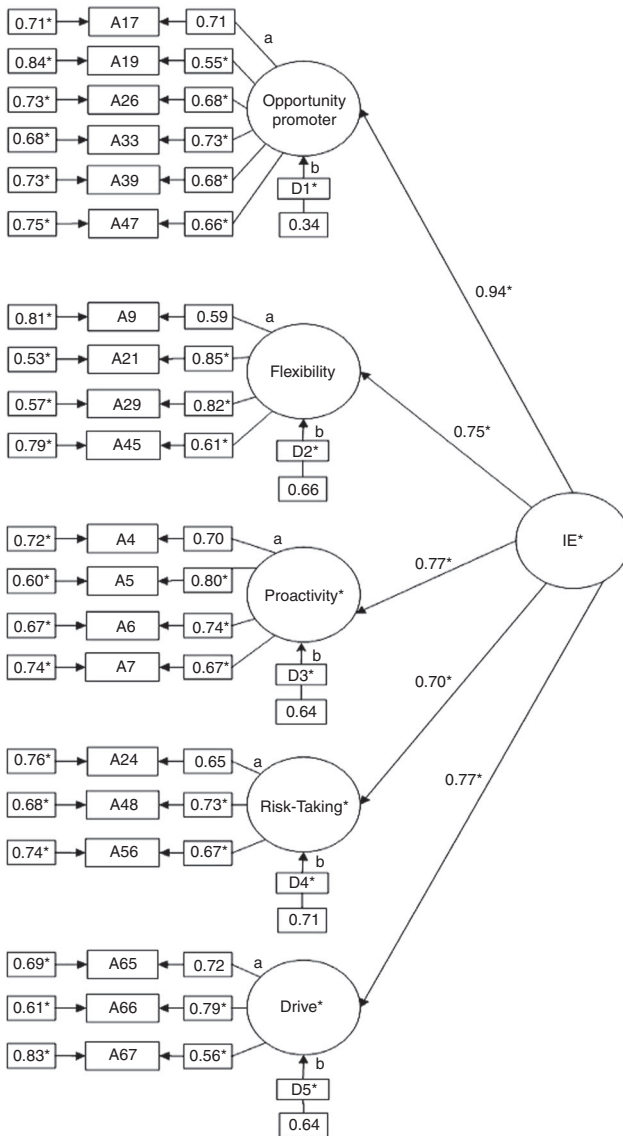
Cronbach's α coefficient was calculated for each dimension and for the total scale to assess the reliability of the developed instrument. As shown in Table V, all scales showed reliabilities between acceptable and very good in accordance with the valuation of DeVellis (2012), which is meritorious due to the small number of items.

Convergent and divergent validity analyses. Convergent validity seeks to measure the confluence between scores of different measures of similar constructs, whereas divergent validity measures the disparity between scores of measures of different constructs. This is the case regardless of the method used (Martínez *et al.*, 2006; Santisteban, 2009). In this study, only one method is used (participant self-report); therefore, the performed assessment is only based on construct content.

To obtain this type of validity evidence, it is common to impose progressive restrictions by setting a parameter simultaneously, i.e., using a nested model (Hoyle, 2012). Similarly, a positive correlation greater than 0.651 between two measures with conceptual correspondence, constituting evidence of convergent validity, was established. Conversely, an association lower than this value was considered to be between theoretically dissimilar constructs and was confirmation of discriminant validity (Mangin and Prado, 2006).

Figure 4 presents the first (base) model in which the three constructs correlate freely, i.e., without any restriction. The Mardia index resulted in 21.57; the Satorra-Bentler χ^2 was significant ($_{SB}\chi^2_{(41)} = 120.408$, $p < 0.001$); the CFI and RMSEA were between the expected values (0.964 and 0.062, respectively, the latter at 90 percent CI [0.049, 0.075]). The correlations between the two measures of intrapreneurship converge, with a significant ($p < 0.001$) correlation of 0.78. The correlations of these two measures with SD were much lower, with magnitudes of 0.36 and 0.41; both are significant ($p < 0.01$). Although these correlations are not negligible, it is important to note that in the case of the proposed scale, it decreases. Clearly, a lower level of correlation with SD is desirable; however, the obtained coefficients are satisfactory as evidence of divergent validity.

The estimated factor loadings were greater than 0.60 and significant ($p < 0.001$) in all parcels of the two measures of intrapreneurship, meaning that both constructs explain a



Notes: ^aParameters set in 1; ^bterm of disturbance for the endogenous latent variables. Standardized coefficients; those with a statistical significance of $p < 0.005$ are presented with an asterisk

Figure 3.
Second-level
AFC results

significant amount of the variance in each scale's sub-dimensions. In this sense, the loading magnitudes and the general fit of the model provide evidence of the convergent and discriminant validity of the scales.

In a second model, the covariances of intrapreneurship and of the Champion behavior scale with SD were set to 0 (see Figure 5). The implication is that the first two do not correlate with SD but that they correlate between themselves. Therefore, if the model fits, then it provides

evidence of convergent validity between intrapreneurship and the Champion behavior scale. In this case, a significant χ^2 was obtained ($_{SB}\chi^2_{(43)} = 185.864, p < 0.01$), with a CFI of 0.935, which is slightly less than the base model but meets the acceptable minimum. Regarding the RMSEA, it increased slightly to 0.081, with 90 percent CI [0.069, 0.093]. Accordingly, the model maintains an acceptable fit, providing evidence of convergent validity.

Table V.
Internal consistency
by competency for
the total scale

	Cronbach's α	Assessment ^a	Number of cases
Creating opportunities	0.838	Very good	537
Motivating	0.728	Acceptable	537
Flexible	0.803	Very good	539
Drive	0.815	Very good	537
Risk taking	0.723	Acceptable	537
Total scale	0.913	Very good ^b	520

Notes: ^aAccording to DeVellis; ^bthe scale could even be reduced

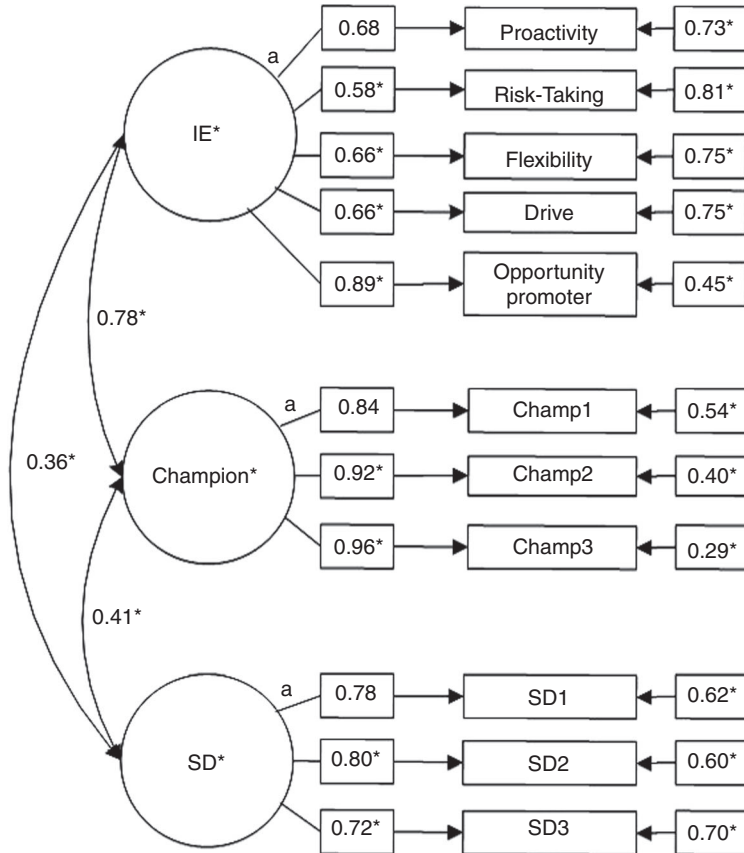
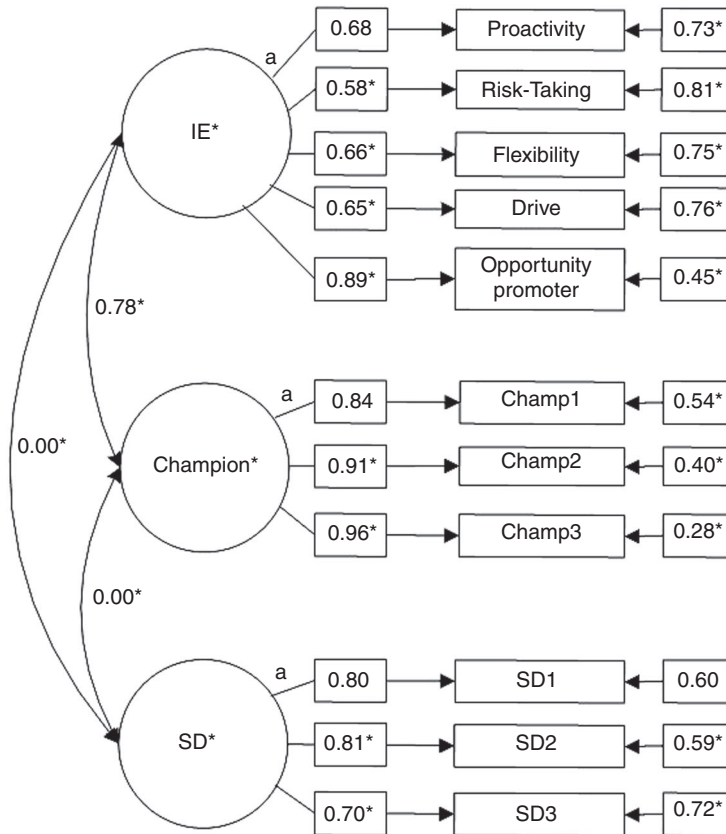


Figure 4.
Model 1: the
three constructs
correlate freely

Notes: ^aParameters set in 1. Standardized coefficients; those with a statistical significance of $p < 0.005$ are presented with an asterisk

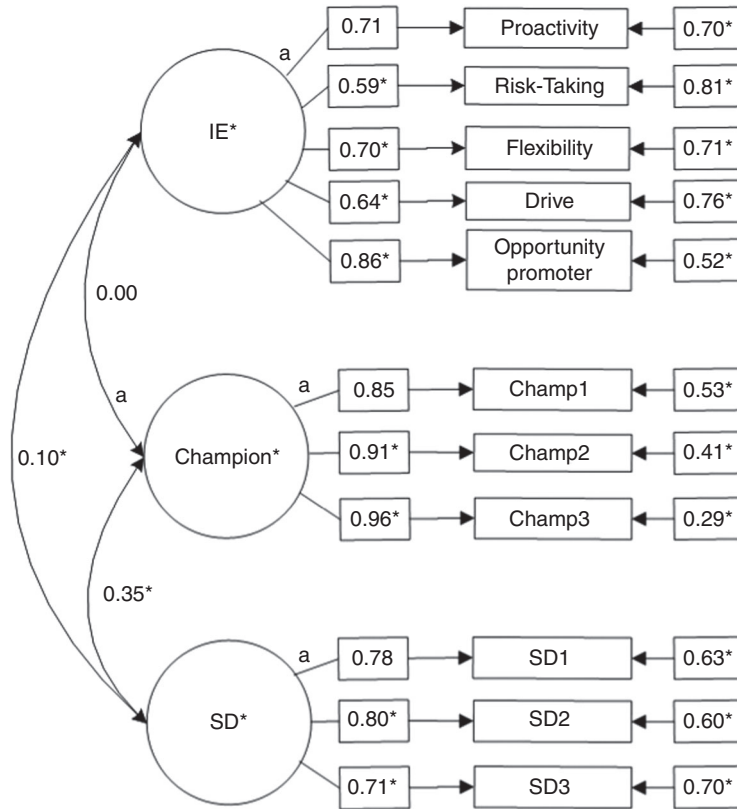


Notes: ^aParameters set in 1. Standardized coefficients; those with a statistical significance of $p < 0.005$ are presented with an asterisk

Figure 5.
Model 2: the two measures of IE do not correlate with SD

The third model set the correlation between the two measures of intrapreneurship to 0 (see Figure 6) and allowed them to correlate freely with SD. In this case, it is assumed that, given the divergence between intrapreneurship and the Champion behavior scale with SD, the model should not fit. This has been used in the field of business management by authors such as Tellis *et al.* (2009, p. 11). Indeed, the χ^2 rose markedly ($_{SB}\chi^2_{(42)} = 441.428, p < 0.01$), the CFI was below the acceptable minimum (0.817), and the RMSEA was outside of the range (0.138 at 90 percent CI [0.126, 0.149]). The difference between the robust Satorra-Bentler χ^2 of the base model and third model ($\Delta_{SB}\chi^2_{(2)} = 143.58$) was significant ($p < 0.01$). The findings above indicate a poor model fit; in this sense, they provides evidence of the discriminant validity of the proposed scale.

To determine the possible SD bias, the procedure suggested by Podsakoff *et al.* (2003) was used. Both Model 4, which does not control SD, as well as Model 5, which does, fit (see Table VI and Figures 7 and 8). In the case of the scale of intrapreneurship, the factor loadings controlling SD varied very little. In fact, this last factor obtained significant saturations, although they were very low. This finding indicates that although there is a SD bias, it is very small. In the case of the Champion behavior scale, the loadings varied to a



Notes: ^aParameters set in 1. Standardized coefficients; those with a statistical significance of $p < 0.005$ are presented with an asterisk

Figure 6.
Model 3: the two measures of IE do not correlate

Models Indices	Model 4	Model 5
SB χ^2	64.64* (28) ^a	87.83* (19) ^a
Robust CFI	0.97	0.97
Robust RMSEA	0.068 (0.050, 0.087) ^b	0.055 (0.041, 0.069) ^b

Notes: ^aDegrees of freedom; ^b90 percent confidence intervals. *Statistically significant at the $p < 0.001$

wider extent (see Table VII). SD obtained significant and moderately high saturations, indicating that it is more susceptible to this type of bias than the proposed tool.

Criterion validity analysis. The linear regression model used the sum of the scores from the 20 items in the proposed scale to assess intrapreneurship as an independent variable. As a dependent variable, the sum of the scores of the nine items from the employee innovative behavior scale was employed. These items measure employee participation in the development of product, process, organizational, and marketing innovations in the company (Eurostat and OCDE, 2006) and in the creation of new businesses for the company.

The results showed a relationship between the scores on the intrapreneurship and employee innovative behavior scale, $F(1, 505) = 329.9, p < 0.01$, with a reasonable level of explained variance, $R^2 = 0.394$. Moreover, graphically, the estimate assumptions were verified according to the ordinary least squares method: the normality assumption (histograms of residuals and normal probability plot; and the independence of errors (constant variance and 0 mean, with the use of the residuals vs predicted values plot). All of these results offer evidence of the criterion-related validity of the developed scale.

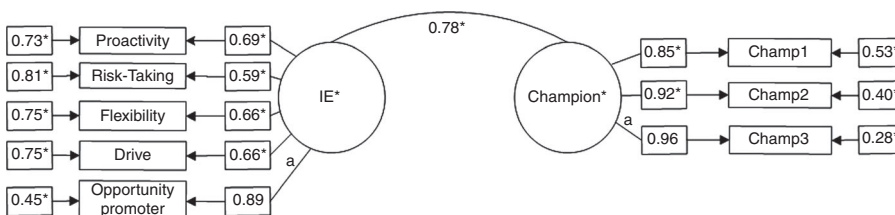
In addition, as shown in Table VI, a sensitivity and specificity analysis was performed. Regarding the former, it can be observed that out of every 100 intrapreneurs in the sample, the instrument detects 90.3 percent. Furthermore, regarding the latter type of analysis, 89.9 percent of the non-intrapreneurial individuals in the sample are identified with the scale. We add to this fact that the probabilities that an intrapreneur will actually correspond to a case of success and that a non-intrapreneur will correspond to a case of success are 91.1 and 89 percent, respectively. As can be observed, these values are very high and balanced, providing evidence of not only the criterion-related validity of the scale but also its usefulness as a diagnostic instrument for the development of competencies (Table VIII).

Conclusions

This study provides evidence of five sub-dimensions of employee attributes that constitute a higher-level construct called intrapreneurial competencies. These sub-dimensions are consistent with what has been indicated in the literature. The first of these contains characteristics relating to the ability to ask questions about the organization’s endeavors because doing so may be an input to detect opportunities that, coupled with the ability to turn them into manageable initiatives, contribute to creating opportunities for the company. Attributes such as diligence are added to the above to take advantage of these opportunities and to promote enthusiasm in their execution. This addition is based on the models by Stevenson and Gumpert (1985) and Baron (2007). It is worth noting that from their conceptualization of the intrapreneur, authors such as Kierulff (1979) and Felicio *et al.* (2012) have highlighted the ability to recognize opportunities. Similarly, Stevenson and Jarillo (1990) emphasize individuals who pursue opportunities, and Pinchot and Pellman (1999) highlight those who make them a reality.

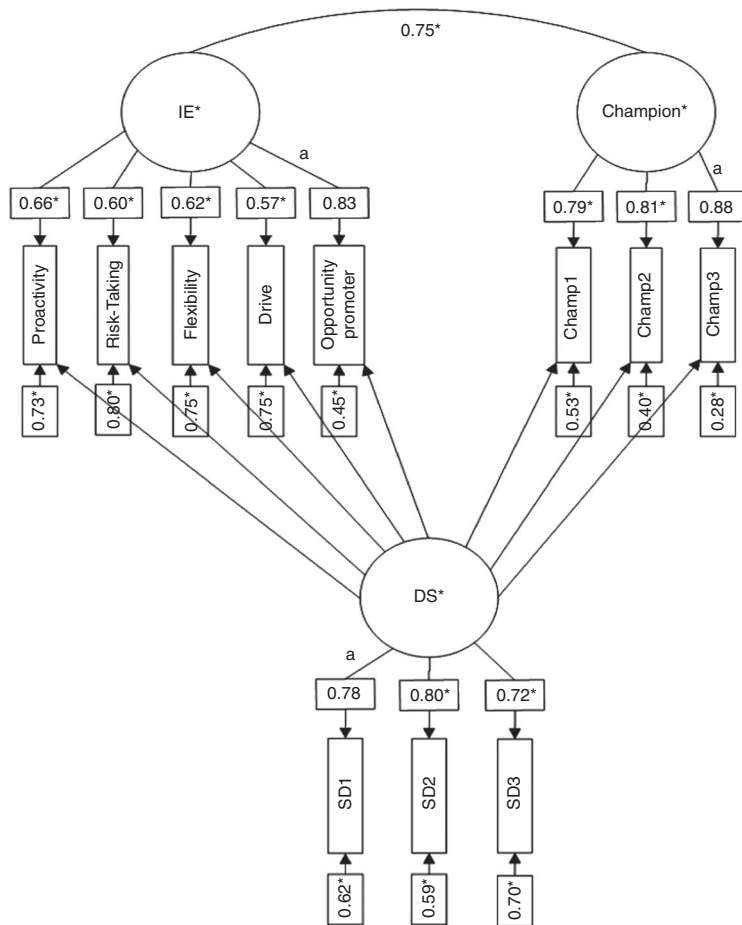
A second element is the proactivity reflected in actions such as the willingness to assess a new initiative with others and to support new ideas, regardless of who suggests them, and the ability to unite efforts to implement innovations for the company. In the literature, authors such as Lumpkin and Dess (1996) have noted proactivity as a component of the entrepreneurial orientation of organizations, and Becherer and Maure (1999) have presented evidence of the relationship between the proactive personality and entrepreneurial behavior.

A third component proposes the absence of structured or methodological schemes (Jensen and Jorgensen, 2004) in different types of knowledge related to the recognition of



Notes: ^aParameters set in 1. Standardized coefficients; those with a statistical significance of $p < 0.005$ are presented with an asterisk

Figure 7.
Model 4: measurement model of the intrapreneurial and champions scales, without controlling the social desirability bias



Notes: ^aParameters set in 1. Standardized coefficients; those with a statistical significance of $p < 0.005$ are presented with an asterisk

Figure 8.
Model 5: measurement model of the intrapreneurial and champions scales by controlling the social desirability bias

opportunities regarding financial resources, specifically, identifying resources, obtaining resources, and assessing the initiative's cost and benefits. This last attribute is consistent with what is proposed by Pinchot and Pellman (1999) in the sense that innovation may lead to a chaotic process. Therefore, innovators must have the courage to do what must be done, even if it means challenging the rules. These authors clearly warn that attempting to bend the rules requires the employee to have the company and its clients' best interests in mind.

The fourth component highlights the importance of attributes such as perseverance, stimulating projects, and being interested in the progress of initiatives for the company and the capacity to identify resources for new initiatives. This is consistent with what is indicated by Hargadon and Sutton (1999), Kuratko *et al.* (2005), and Lumpkin and Dess (1996). In addition, Garud and Van de Ven (1992) emphasize the relevance of employees who endeavor to gain access to the necessary resources and provide advice and guidance for innovative projects.

Finally, a fifth component contains characteristics relating to taking risks on new initiatives for the company, which is in line with Kuratko *et al.* (1990), Lumpkin and Dess (1996), and Stull (2005). It is worth highlighting the contribution by Desouza (2011) in the sense that intrapreneurs are individuals who take calculated risks as a result of their quick learning and from experiencing numerous iterations of learning by trial and error. This allows them to take risks that have the potential for a yield for the organization.

On the other hand, the study has shown that the measurement scale of the intrapreneurial competency construct is related to the employee's disposition to contribute to the development of innovations and to the creation of new businesses for the company. This potential predictive capacity of an instrument of this nature would be useful for the business sector, particularly as a diagnostic instrument to strengthen processes of staff development in areas that promote the development of innovation and the creation of new businesses for the company.

Despite the exploratory nature of this study, the model offers a first firm step to continue studies that aim at developing a robust model of intrapreneurial competencies. It is clear that the proposed scale requires further research. The need to access employees working in companies, through advanced academic programs (undergraduate and master's) in universities, limits the ability to infer the results. According to this deficiency, we propose the development of future studies to replicate the results in different samples. Such studies would help to refine the proposed competency model, verifying the item behavior and including new items to explore other possible dimensions of intrapreneurship. This improvement in the scale would help build performance criteria with respect to the

Models	IE Model 4 ^a	IE Model 5 ^b	CH Model 4 ^c	CH Model 5 ^d	SD Model 5 ^e
Implementer	0.69	0.66			0.19
Risk	0.59	0.60			0.08*
Flexibility	0.66	0.62			0.24
Change	0.66	0.57			0.34
Opportunity	0.89	0.83			0.33
Parcel 1			0.85	0.79	0.31
Parcel 2			0.92	0.81	0.43
Parcel 3			0.96	0.88	0.38
Factor correlation	0.78	0.75	0.78	0.75	

Notes: ^aFactor loadings of the scale of intrapreneurship in the model without bias control; ^bfactor loadings of the scale of intrapreneurship in the model with bias control; ^cfactor loadings of the Champion behavior scale in the model without bias control; ^dfactor loadings of the Champion behavior scale in the model with bias control; ^efactor loadings of the social desirability scale in the model with bias control. *ns ($p > 0.05$)

Table VII.
Model saturations without and with controlling for social desirability

Scale cut-off criterion	Innovative behavior cut-off point		Total
	> 28 points	< 20 points	
> 78 points IE scale	102	10	112
< 65 points IE scale	11	89	100
Total	113	99	212
Sensitivity	102/103 = 0.903		
Specificity	89/99 = 0.899		
Positive prob. value	102/112 = 0.911		
Negative Prob. Value	89/100 = 0.890		

Table VIII.
Sensitivity and specificity analysis of the measuring instrument

market (e.g. percentiles), offering much more objective criteria for assessing the degree of development of intrapreneurial competencies and supporting the practical use of the tool.

In the future, it would be useful to complement these findings with the study of intrapreneurial competencies in governmental organizations. The reason is that professionals working in private companies predominated in this study sample.

It is important to note that basing the development of a tool on 10 models of entrepreneurial orientation that were developed in contexts different from Costa Rica constitutes a limitation. Thus, it is necessary to extend the exploration of intrapreneurial attributes in the ecosystem of companies because the models studied in the literature have been developed in cultural and economic contexts that are very different from the local context. We attempted to mitigate this limitation with expert judgment. However, for future studies, we propose accompanying the intrapreneurial competency analysis with other inputs provided by employees situated at a higher or intermediate level of the organizations, using techniques such as the frequency concept of disposition proposed by Buss and Craik (1980).

The academic environment of the study addresses the weakness or gap indicated by Slavec and Drnovsek (2012) regarding the little emphasis that valid measure development has been given in the field of entrepreneurship. Specifically, this study is a first effort toward defining a competency model and its respective measurement scale for intrapreneurship in the Costa Rican business context.

Moreover, the possibility of performing studies with the tools of classical test theory in the field of intrapreneurship is demonstrated. Having done so allows other researchers not only to emulate the effort but also to improve it. The advancement of a scientific discipline is not feasible without good measures (Bearden *et al.*, 2011). Furthermore, in the social sciences, instrument validity is linked to the context in which the instrument is used. In accordance with the above, the scale aims to make a contribution to the community of researchers in the field to create a tool that possesses validity evidence in the Costa Rican context. Clearly, as with any measuring instrument in the field, the scale requires further studies not only to corroborate its validity and reliability but also aimed at obtaining more robust versions. Appropriate measuring instruments clearly reduce measuring error. Thus, researchers can better manage the development of causal models in which intrapreneurship constitutes an important factor.

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