

*Full Length Research Paper*

# An eight-factor solution for the Corporate Entrepreneurship Assessment Instrument

René van Wyk\* and Mandla Adonisi

Gordon Institute for Business Science, University of Pretoria, South Africa.

Accepted 17 January, 2011

**The USA developed Corporate Entrepreneurship Assessment Instrument (CEAI) (Hornsby, Kuratko and Zahra, 2002) is used to assess and implement a corporate entrepreneurial strategy. As psychometric instruments cannot necessarily be transferred between different cultures, the main objective of this study is to investigate the construct validity of CEAI, for a South African sample. An exploratory principal factor analysis with oblique rotation investigated the five-factor 48-item CEAI using a South African sample of 333 managers. Confirmatory factor analysis indicated an eight-factor 34-item solution (alphas in brackets): Work discretion (0.84), Management support and risk-taking (0.82), Rewards/reinforcement (0.75), Innovative initiatives (0.84), Financial support (0.73), Sufficient time (0.76), Organizational boundaries (0.81) and Inadequate time (0.67). The application of this eight-factor scale is a powerful tool that allows management to investigate and communicate entrepreneurial expectations and facilitate entrepreneurial actions effectively.**

**Key words:** Construct validity, Corporate Entrepreneurship Assessment Instrument (CEAI), portability, metric equivalence.

## INTRODUCTION

South African businesses are feeling the negative impact of the current collapse of the world economy. The additional high levels of unemployment that the country encounters, the lack of business skills experienced by many business owners as well as the implementation of black economic empowerment (BEE) policies make it necessary for South African businesses nurture corporate entrepreneurship to achieve a competitive advantage. These scenarios necessitate sensitivity in the identification of factors that could nurture an entrepreneurial environment ensuring organizations' growth and survival. Hence, the entrepreneurial climate should be assessed in businesses to implement and promote a proactive corporate entrepreneurial strategy that will ensure global competitiveness and economic growth. This is especially important to ensure sustainable economic development (Alam et al., 2010)

It is therefore important to evaluate the construct validity of the CEAI in the South African culture. Many measuring instruments applied in the South African

situation were originally developed in other cultures especially in the USA. Application of such instruments in the South African culture has shown a lack of construct validity, as psychometric instruments are not always portable to other cultures. The application of a valid measure of the CEAI in South Africa can serve as a powerful tool in businesses to gain a competitive edge by strategically applying entrepreneurial principles identified by the CEAI. This should empower management to investigate and communicate entrepreneurial expectations and facilitate entrepreneurial actions effectively to enhance organizations' entrepreneurial self-efficacy and global competitiveness. Through education, the necessary skilled workforce is provided to retain development in emerging economics (Alam, 2009a)

This paper presents an investigation into the construct validity of the five-factor 48-item CEAI (Hornsby et al.'s, 2002) in order to apply it constructively in the South African business culture. The underlying question of this research is: what would be an acceptable factor structure of Hornsby et al.'s (2002) 48-item CEAI when it is factor-analysed for a South African sample? To answer this question exploratory principal factor analysis is done with oblique rotation on the 48-item CEAI on a sample of South African managers. Secondly, it is questioned

\*Corresponding author. E-mail: [vanwyk.rene@gmail.com](mailto:vanwyk.rene@gmail.com). Tel: +27832578857. Fax: +270866239811.

whether the construct validity of the CEAI will be at an acceptable level when applied on a South African sample. Confirmatory factor analysis sheds light onto the construct validity of the instrument.

Verification of the construct validity of the CEAI will make it a constructive tool to enhance the corporate entrepreneurial activities and competitiveness of businesses in South Africa.

### **The importance of entrepreneurship and corporate entrepreneurial activities**

Entrepreneurship is the dynamic element that drives the success of businesses in a competitive and risky global environment (Drucker, 2007; Morris et al., 2008), a necessity for economic growth (Briggs, 2009), which in turn leads to sustainable development (Tsai et al., 2009). Entrepreneurship can be regarded as a valuable resource in creating jobs and developing economic independence (Awogbenle and Iwuamadi, 2010). The principles of entrepreneurship stay the same, whether it is practised in a large institution or in a small new venture (Drucker, 2007). Knowledge management and organisational learning facilitate a proactive advantage in risk-taking and the reduction of uncertainties by pursuing and grasping new opportunities in competitive markets (Alipour et al., 2010; Ribeiro-Soriano and Urbano, 2010). The entrepreneurial decisions that businesses make are grounded on the quality and quantity of knowledge management practices (Neto and Pinheiro, 2010).

Corporate entrepreneurship is an essential activity practised by organizations in order to survive in the long term (Chittipeddi and Walleit, 1991). Thus far, there is no generally accepted definition of corporate entrepreneurship. For this reason, synonyms such as intrapreneurship (Kuratko et al., 1990; Morris et al., 2008) and corporate venturing (Ellis and Taylor, 1987) are often used interchangeably for corporate entrepreneurship. These different terms for corporate entrepreneurship usually refer to the diversification and escalation of businesses (Kearney et al., 2007; Sharma and Chrisman, 1999), leading to the development of new businesses within existing companies to enhance competitiveness, productivity and profitability (Zahra, 1991).

Corporate entrepreneurship involves a constant reinvention of unique business projects which requires recognising and exploiting any opportunities that arise (Salvato et al., 2009). Corporate entrepreneurial activities serve as a catalyst in the fortification of a competitive advantage for organizational gain (Bhardwaj et al., 2006; Nayager and Van Vuuren, 2005; Schmelter et al., 2010; Sebora et al., 2010); and they promote international competitiveness (Ripollés-Meliá et al., 2007). Furthermore, engaging in such activities is seen as a strategy of reviving entrepreneurial actions and steering business resources in such a manner as to enhance a company's competitive advantage through and toward value creation

(Lumpkin and Dess, 1966; Marvel et al., 2007; McCrea and Betts, 2008) and optimal performance (Barrett and Weinstein, 1998). It enables organizations to proactively generate and establish competitive assets, processes and products in order to act competitively in developing markets (Bhardwaj et al., 2006; Sebora et al., 2010) through continuous innovation (Morris et al., 2008).

In order to survive in a global economy, businesses continually have to develop new skills. They must be innovative in expanding or instituting new cycles of development, in preventing fossilization, and in proactively restructuring operations on a continuous basis (Bhardwaj et al., 2006; Kearney et al., 2007; Morris and Kuratko, 2002; Phambuka-Nsimbi, 2008; Shepherd et al., 2009; Zahra et al., 2009). Businesses need to apply entrepreneurial principles and be proactive, rather than merely reactive, in a volatile economic climate such as that which is currently experienced globally (Ngowi, 2010).

The dynamic development and maintenance of corporate entrepreneurial activities (also known as intrapreneurship) through knowledge management activities (Covin and Miles, 1999; Goosen et al., 2002; Hornsby et al., 2002; Hornsby et al., 2008; McCrea and Betts, 2008) and the development of entrepreneurial teams that enhance collective entrepreneurship (Ribeiro-Soriano and Urbano, 2010) can ensure the progression of venture development. A healthy intrapreneurial climate requires the evaluation of rewards, management support, time resources, macro-level organizational structures, and acceptance of risks (Marvel et al., 2007).

The economic sensitive period that South Africa is experiencing with the down turn of the world economy, with resultant high levels of unemployment, necessitates the application of corporate entrepreneurship strategies to enhance business growth (Van Wyk and Adonisi, 2008). Furthermore, it is sadly evident that some small business owners in South Africa lack the business skills they need to guarantee successful business operations (Van Scheers and Radipere, 2007). Many African countries regard entrepreneurial development as the pathway to economic development (Briggs, 2009). Entrepreneurial vigilance can be promoted by teaching entrepreneurship at a tertiary level to advance innovative entrepreneurial activities and foster entrepreneurial cultures, especially in the former colonies (Adejimola and Olufunmilayo, 2009). Education is inevitably regarded as the main device advancing the development of a country, especially in Africa (Oloruntegbe et al. 2010). The measurement of corporate entrepreneurship empowers individuals in businesses to act proactively by identifying and implementing suitable corporate entrepreneurial activities (Hornsby et al., 2008; Morris et al., 2008).

### **Why measure corporate entrepreneurship?**

The assessment of a corporate entrepreneurial environment is a prerequisite for the successful implementation

of an intrapreneurial strategy, identifying internal actions to be taken in order to support and enhance corporate entrepreneurship (Hornsby et al., 2008; Morris et al., 2008). Measuring their corporate entrepreneurship levels enables businesses to evaluate the intrapreneurial status quo and appropriately apply knowledge management practices to proactively implement and maintain a dynamic corporate entrepreneurial environment (Hornsby et al., 2008). First-hand knowledge of entrepreneurial behaviour empowers management to identify, effectively communicate and support critical factors that can enhance entrepreneurial actions. In this way quality education of entrepreneurial principles are communicated to ensure global competitiveness (Alam, 2009b)

By measuring the corporate entrepreneurial climate of a business, management gains the insight to develop appropriate strategies which can ensure sustainability by advancing an entrepreneurial work climate. For instance, corporate entrepreneurship is significantly positively associated with intrinsic and extrinsic job satisfaction (Van Wyk and Adonisi, 2008), as well the competence of employees (Ireland et al., 2009). By improving corporate entrepreneurial activities which lead to improved financial performance, general satisfaction and specific work perceptions are improved, resulting in a reciprocal relationship between improved performance and positive attitude and the eventual well-being of workers (Harter et al., 2010).

The measurement of corporate entrepreneurship enables management objectively to assess the culture and readiness of the organization to participate in corporate entrepreneurial activities (Hornsby et al., 2008) and to communicate effective corporate entrepreneurship actions (Gupta et al., 2004; Hornsby et al., 2002; Hornsby et al., 2008).

This should be done, firstly, by efficiently communicating an entrepreneurial vision; secondly, by supporting entrepreneurial initiatives with appropriate and adequate resources; and thirdly, by nurturing a culture of continuous idea-generation (Gupta et al., 2004). The objective measurement of corporate entrepreneurship enhances potential effective communication. It has been suggested that effective communication of entrepreneurial knowledge is essential for survival in a competitive global entrepreneurial environment (Adejimola, 2008), because skilled managers can facilitate the development of organizational factors that can provide structural support for entrepreneurial engagement (Hornsby et al., 2009).

### How to measure corporate entrepreneurship

The Corporate Entrepreneurship Assessment Instrument, also known as the CEAI (Hornsby et al., 2002), is an instrument that can facilitate the enhancement of the crucial role that employees should play in corporate entrepreneurship activities (Heinonen and Toivonen, 2008; Hornsby et al., 2008). This role is enhanced when

employees can become catalysts in corporate entrepreneurship activities, rather than mere silent followers. Using the CEAI could also help improve the entrepreneurial skills of individual employees, who are regarded as more important than other resources when entrepreneurial activities need to be pioneered (Montoro-Sánchez et al., 2009). It should be emphasized that young people need psychological maturity and self-efficacy in order to become successful entrepreneurs (Plattner et al., 2009) and that people who have the capacity to regulate their entrepreneurial performance by means of vigorous forms of self-efficacy tend to be more prepared to take on new entrepreneurial challenges (Shepherd et al., 2009).

An evaluation tool such as the CEAI (Hornsby et al., 2002; Hornsby et al., 2008) can serve as a diagnostic device to identify the level of corporate entrepreneurial actions that already exist in an organization and to diagnose which actions are needed to improve corporate entrepreneurial activities. Such a tool could, for instance, identify possible disparities between the perceptions of employees and those of management concerning the intrapreneurial climate of an organization, which is essential, according to Marvel et al. (2007). Furthermore, the CEAI provides a method to identify entrepreneurial limitations in organizations that could be destructive to the corporate entrepreneurial environment and demoralising to employees. It can also serve as tool to develop cultural elements and promote outcomes that could foster corporate entrepreneurship strategies for businesses (Ireland et al., 2009), which could in turn lead to higher levels of general satisfaction (Duygulu and Kurgun, 2009), as well as of intrinsic and extrinsic job satisfaction (Van Wyk and Adonisi, 2008).

Given that entrepreneurs are inclined to experience high levels of stress, the CEAI can also be implemented to identify the factors or weaknesses in a business that could increase stress levels (Ahmad and Salim, 2009). The CEAI can be applied as a diagnostic tool to sensitize individual employees to those elements that need improvement to advance entrepreneurship in the organization, and to promote an internal locus of control that will in turn enhance entrepreneurial self-efficacy, leading to psychological maturity and competent entrepreneurship.

### Assessment of the CEAI

In order to assess an organization's readiness and ability to implement an intrapreneurial strategy, it is important to evaluate the entrepreneurial intensity of a business (Hornsby et al., 2002; Hornsby et al., 2008). The original development of the CEAI indicated that five factors, namely Management support, Work discretion, Rewards/reinforcement, Time availability and Organizational boundaries, were relevant. However, a re-evaluation of the CEAI (Hornsby et al., 2008) yielded only four factors,

namely Work discretion, Time availability, Management support and Reward/reinforcement. This re-evaluation of the CEAI (Hornsby et al., 2008) did not replicate the Organizational boundaries factor. Hornsby et al. (2008) argue that, because of the relative newness of the CEAI scale, additional screening of the scale is needed before it can confidently be considered an effective measure of organizational culture and of an organization's preparedness or readiness to undertake corporate entrepreneurship endeavours.

### **Inter-cultural portability of psychometric instruments**

The portability of psychometric instruments developed in one culture and applied in another culture is often questioned, and a given instrument's validity may be limited in a culture other than the one in which it was originally developed (Dolnicar and Grün, 2007; Meiring et al., 2006; Van Eeden and Mantsha, 2007). Differences in metric equivalence with the application of psychometric instruments occur when a social reality is perceived through one's own subjective culture (Marsella et al., 2000; Prinsloo and Ebersöhn, 2002). It is even necessary to evaluate the invariance of factor structures when they are applied to different demographic groups (Ehrhart et al., 2008). Measuring the construct validity of psychometric instruments across cultures and countries is becoming increasingly important as globalisation increases and psychometric instruments are applied across cultures and countries (Cooper and Robertson, 1990; Campbell and Koutsoulis, 2004). Klein et al. (2005) argue that the replication of a psychometric instrument is vital in judging its robustness.

Although some South African studies have confirmed the construct validity of some instruments developed in other cultures when these instruments are applied in a South African context (De Bruin et al., 2004; Storm and Rothmann, 2003), other studies have questioned intercultural portability related to the construct validity of some psychometric instruments in some South African samples (Adonisi, 2003; De Klerk et al., 2009; Edwards and Riordan, 1994; Edwards and Leger, 1995; Van Wyk et al., 1999). Cross-cultural equivalence (Dolnicar and Grün, 2007) and inter-demographic equivalence (Ehrhart et al., 2008) have also been questioned. The differences in cross-cultural response styles could lead to potential misinterpretation of data (Dolnicar and Grün, 2007). Inadequate validation of psychometric questionnaires in different ethnic samples could also lead to biased interpretations and skewed conclusions (Hambrick et al., 2010). Measurement invariance across different cultures is therefore a prerequisite for valid interpretations of psychometric instruments, which cannot always be assumed across countries and languages (Nuevo et al., 2009). Consequently, researchers should be cautious when applying psychometric instruments across cultures (Meiring et al., 2006).

For this reason, the investigation into the construct validity of the measurement properties of the CEAI (Hornsby et al., 2002) is essential. It is particularly important to establish the usefulness of the test in South Africa as a developing country, with a sometimes fragile economy and high unemployment figures. The application of the CEAI allows the corporate climate of businesses to be evaluated and enables businesses to take continuous and proactive steps in pursuit of new business opportunities and to facilitate unique business ideas in developing a sustainable competitive advantage (Hornsby et al., 2008; Morris et al., 2008; Tidd et al., 1999).

### **Purpose of the study**

The purpose of the study is to investigate the construct validity of the CEAI (Hornsby et al., 2002) for a sample of 333 South African managers in the information technology, tertiary education, insurance and transport sectors. The main aim of the study is to investigate how the constructs of the CEAI (Hornsby et al., 2002) can be used in South African businesses to analyse corporate entrepreneurship actions in businesses which theoretically generate and support intrapreneurial actions. Two research questions are implicated. Firstly, it is questioned what an acceptable factor structure of Hornsby et al.'s (2002) 48-item CEAI is when it is factor-analysed for a South African sample? Secondly the construct validity of the newly formed factor structure of the CEAI should be at an acceptable level.

A validated CEAI for a South African sample should provide management with a tool to foster entrepreneurship in organizations, encouraging employees and managers to act in an entrepreneurial manner, in the sense in which Schumpeter (1934) originally described the functioning of an entrepreneur, namely as a person who disrupts the equilibrium of markets by forming new combinations of resources. Ideally, the outcome of using the CEAI in an organization will allow new organizations to be born within existing organizations. In order to achieve this, an environment should be created that facilitates a radical departure from traditional business structures so that key organizational areas that extend the domain of functioning and competence of a business can be reborn and renewed. A culture also needs to be established to capitalise on changes in the environment (Schumpeter, 1934). In this way, businesses can be revitalised and reinvigorated (Covin and Miles, 1999; Gupta et al., 2004; Hornsby et al., 2002; Hornsby et al., 2008; Hornsby et al., 2009).

### **METHODOLOGY**

In this study, a quantitative survey design was used (Kerlinger and Lee, 2000) to investigate the construct validity of the CEAI (Hornsby et al., 2002). A non-random quota convenience sample was drawn

from people identified in top and middle management in four different economic sectors. A hard copy of the CEAI questionnaire was sent to a convenience sample of managers in a life insurance company and at an information technology firm, to administrative and teaching staff at a university of technology, and to top managers in a parastatal in the transport sector. The questionnaire was accompanied by a covering letter assuring potential participants of the anonymity and confidentiality of the data, as well as a brief set of questions regarding biographical details.

The final non-random convenience sample of managers consisted of 333 managers from four different economic sectors: life insurance (N=266), information technology (N = 33), a university of technology (N = 26) and a transport parastatal (N = 8). Of the original 396 responses received, only 333 were usable, because some of the respondents failed to complete all the items in the CEAI. The sample consisted of 144 men and 187 women. Two respondents did not indicate their gender. The respondents' ages ranged between 21 and 70 years, with a mean of 36.66 years and a standard deviation of 9.26 years. A large proportion of the sample (202 respondents) indicated that English was their home language. Of the 333 respondents, 86 were Afrikaans-speaking and 45 spoke other African languages at home. Most of the 333 respondents had a post-school certificate/diploma (105 respondents); and 38 had advanced to a Bachelor's degree; 33 held an Honours degree and 17 had a Master's degree. However, 87 respondents had only a Grade 12, while 46 had a secondary school qualification, but had not matriculated. Seven participants did not indicate their educational qualification.

The CEAI that was originally designed by Hornsby et al. (2002) was used to measure the corporate entrepreneurship construct. The instrument consists of 48 items in a questionnaire using a five-point Likert scale. Respondents were asked to rate the 48 statements, choosing from a scale ranging between 1 ("strongly disagree") and 5 ("strongly agree"). In order to overcome response set bias, Hornsby et al. (2002) included 11 negatively worded items. Hornsby et al. (2002) reported that the original instrument measured five factors (the corresponding Cronbach alpha coefficients are given in brackets): Management support (0.89), Work discretion (0.80), Rewards/reinforcement (0.65), Time availability (0.92) and Organizational boundaries (0.58). The re-test reliabilities of the instrument were reported as follows: Management support (0.89), Work discretion (0.87), Rewards/reinforcement (0.75), Time availability (0.77) and Organizational boundaries (0.64).

A further exploratory and confirmatory factor analysis, using the principal axis method in the evaluation of the psychometric properties of the CEAI, indicated a four-factor solution (Hornsby et al., 2008). The four factors were identified as (the Cronbach alpha coefficients are given in brackets): Work discretion (0.89), Time availability (0.75), Management support (0.67) and Reward/reinforcement (0.79). The factor Organizational boundaries did not load appropriately and was therefore omitted from the subsequent analysis. The four factors explained 57.1% of the observed variance. Confirmatory factor analysis showed a comparative fit index of 0.98, an incremental fit index of 0.98 and a root-mean-square error of 0.081.

In the current study, the BMDP 4M SAS program was used to execute exploratory factor analysis to identify the possible viable factors of the CEAI (Hornsby et al., 2002). The sample size of 333 was adequate for factor analytical purposes in terms of the criteria set out by Hair et al. (1998). Principal factor analysis (oblique rotation) was done, with Direct Quartimin Rotation of the axis, resulting in the investigation of a possible four-, five-, six-, seven-, and eight-factor structure. Principal component analysis is regarded as "the most important type of analysis performed by the FACTOR procedure" (SAS Institute, 1990:777).

The procedure followed in the exploratory factor analysis used the principal axis method (oblique rotation) in combination with confirmatory factor analysis, as suggested by Conway and Huffcutt

(2003). Principal factor analysis was done by identifying Eigen values larger than 1.00 and using "clear breaks" in the Scree test between Eigen values larger than 1.00 as a guideline for the differentiation of possible factors. The identified factors were then subjected to exploratory factor analysis using the principal axis method, as indicated by both the Scree test and the Eigen values. Items were eliminated if the item loading was less than 0.25 on any factor, or the difference between the loadings on the factors was less than 0.25. In the rotation that followed, these items were removed and the results were re-analysed on the same terms. Exploratory factor analysis was done until "clean" structures with values lower than 0.25 on any factor and between loadings were formed. Finally, a confirmatory factor analysis was done on the aggregated items on each of the factors. Aggregation was only done on factors containing more than four items.

The current study has certain limitations. The study was done on a sample that consisted mainly of managers from a life insurance company (N=266), and a small number of managers in information technology (N = 33), a tertiary institution (N = 26) and a transport parastatal (N = 8). A larger sample from managers from different business sectors should be investigated to establish the portability of the CEAI. The findings of the current study are only applicable to the South African representative sample and the findings are not generalizable to other countries and industries. Future research should include samples from other countries and different ethnic groups to ensure portability to different cultures.

## RESULTS

To investigate the number of factors measured by the CEAI (Hornsby et al., 2002), an exploratory factor analysis was done. The Scree test identified 11 Eigen values above 1.00. There were clear "breaks" between the fourth and fifth, fifth and sixth, sixth and seventh, seventh and eighth, and eighth and ninth Eigen values. With the aim of maximising the possible measurement using the CEAI (Hornsby et al., 2002), principal factor analysis was done on eight factors using the principal axis method (oblique rotation). The results for the eight-factor structure are reported in Table 1.

The eight factors were identified as: (1), Work discretion (2) Management support, (3) Rewards/ reinforcement, (4) Innovative Initiatives, (5) Financial support, (6) Sufficient time, (7) Organizational boundaries and (8) Inadequate time. The Cronbach alpha coefficients were: 0.84 (Factor 1), 0.82 (Factor 2), 0.75 (Factor 3), 0.84 (Factor 4), 0.73 (Factor 5), 0.76 (Factor 6), 0.81 (Factor 7) and 0.67 (Factor 8). All the factors presented above the acceptable level of 0.60. Table 2 indicates the intercorrelations between the eight factors.

The explained total variance for the eight factors was 2.55% (Factor 1), 4.52% (Factor 2), 1.99% (Factor 3), 1.86% (Factor 4), 1.13% (Factor 5), 0.99% (Factor 6), 0.68% (Factor 7) and 0.73% (Factor 8); with common variances of 9.82% (Factor 1), 17.32% (Factor 2), 7.64% (Factor 3), 7.17% (Factor 4), 4.36% (Factor 5), 3.79% (Factor 6), 2.63% (Factor 7) and 2.82% (Factor 8).

Confirmatory factor analyses were done on the eight-factor solutions. The indices obtained are indicated in Table 3.

The goodness-of-fit index is generally seen as the

**Table 1.** Eight-factor solution for the CEAI (N=333).

Factor 1		Factor 2		Factor 3		Factor 4		Factor 5		Factor 6		Factor 7		Factor 8	
Work discretion		Management support and risk acceptance		Rewards/reinforcement		Innovative initiatives		Financial support		Sufficient time		Organizational boundaries		Inadequate time	
Item	Load	Item	Load	Item	Load	Item	Load	Item	Load	Item	Load	Item	Load	Item	Load
Q25	0.702	Q14	0.754	Q30	0.472	Q1	1.020	Q10	0.478	Q37	0.759	Q47	0.789	Q36	0.601
Q26	0.753	Q15	0.770	Q32	0.586	Q2	0.662	Q11	0.555	Q38	0.803	Q48	0.774	Q39	0.640
Q27	0.831	Q16	0.627	Q33	0.812			Q12	0.900					Q40	0.556
Q28	0.746	Q17	0.557	Q34	0.581										
Q29	0.447	Q18	0.461												

most common data index fit (Hair et al., 1998; Hoyle, 1995). Fit indices varying between 1.0 and 0.90 are commonly seen as acceptable indices; and ones varying between 0.85 and 0.89 are seen as reasonable (Hair et al., 1998). The indices in Table 3 therefore indicate a reasonable (0.89) to good fit (0.92) with the data.

Taking into account the performance of the indices in the confirmatory factor analysis, the eight-factor structure's indices were at an acceptable level, with the additional advantage of identifying more factors than suggested by the original CEAI as developed by Hornsby et al. (2002). It had the advantage of dividing the Time availability factor into two factors discriminating between Sufficient time and Inadequate time availability. Furthermore, it measured two additional factors, namely financial risk-taking and Innovative initiatives. This would make the application of the eight-factor structure in the South African sample beneficial, as it closely measures the constructs important to corporate entrepreneurship, as suggested by both Hornsby et al. (2002) and Marvel et al. (2007).

## DISCUSSION

The investigation in the current study into the factor structure of the CEAI is a response to Hornsby et al.'s (2008) plea for additional vetting of the scale, due to its relative newness. The first research question is addressed by the principal factor analysis, which shows that the eight-factor structure displays the best fit with the data. The increase of factors applied in a culture different from that for which the scale was originally validated was surprising, as other cross-cultural validations of instruments to South African samples usually render fewer factors than those developed in the original instruments (Adonisi, 2003; De Klerk et al., 2009; Edwards and Riordan, 1994; Edwards and Leger, 1995; Van Wyk et al., 1999). The variety of the eight-factor structure creates vast potential for application in industry.

The results from the study suggest that the application of the CEAI in its eight-factor form is metrically acceptable as applied in this South African sample. In response to the second research question, the high factor loadings and

acceptable Cronbach alpha coefficients in the principal factor analysis, as well as the acceptable indices of the confirmatory factor analysis, indicate that the construct validity of the eight-factor structure of the CEAI for the South African sample is acceptable.

## Conclusion and recommendation

The differences found in the factor structure of the CEAI in the current study should serve as a warning that management should not apply psychometric instruments blindly in a culture different to that for which the instrument in question was originally developed. The higher number of measured factors in the current study should serve as an encouragement to improve the measurement of the instrument across cultures by developing additional items to measure the different constructs. This will necessitate a re-evaluation of the construct validity of the advanced development of such an instrument. The discrimination between sufficient and

**Table 2.** Factor intercorrelations for the eight-factor solution of the CEAI.

Factor	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
Factor 1	1.000							
Factor 2	0.334	1.000						
Factor 3	0.401	0.261	1.000					
Factor 4	0.166	0.355	0.317	1.000				
Factor 5	0.176	0.542	0.253	0.276	1.000			
Factor 6	0.025	0.123	0.052	0.117	0.097	1.000		
Factor 7	0.236	0.160	0.294	0.259	0.072	0.130	1.000	
Factor 8	-0.081	-0.065	-0.019	-0.023	-0.073	-0.313	-0.149	1.000

**Table 3.** Results of confirmatory factor analysis on the four-, five-, six-, seven-, and eight-factor models for the CEAI (aggregated items) (N = 333).

Indices	Eight factor structure
Goodness of Fit Index (GFI)	0.8975
Root Mean Square Residual (RMR)	0.0490
Chi <sup>2</sup> (df = , p > Chi <sup>2</sup> )	512.703 (271;0.0001)
RMSEA Estimate (90% limits)	0.0518 (0.0449-0.0587)
Bentler's Comparative Fit Index	0.9234
Bentler and Bonett's (1980) Non-normed Index	0.9081
Bollen (1988) non-normed Index Delta2	0.9247

inadequate time is a useful diagnostic tool in businesses

The main advantage of applying the eight-factor structure of the CEAI as an analytical tool in businesses is that it measures a wide variety of corporate entrepreneurship factors, closely resembling the measurement of the most important constructs that need to be taken into account, as identified previously by Hornsby et al. (2002) and Marvel et al. (2007). The measures of Work discretion, Management support and Risk acceptance, Rewards/reinforcement, Innovative initiatives, Financial support, Sufficient time, Organizational boundaries and Inadequate time should enable businesses to achieve a reasonable assessment of the state of the corporate entrepreneurship climate of these businesses. This knowledge should enable management to promote effective communication of entrepreneurial knowledge and make appropriate entrepreneurial decisions, seen as a necessity for fundamental entrepreneurial development, as well as global competitiveness (Adejimola, 2008; Bhardwaj et al., 2006; Hornsby et al., 2002; Hornsby et al., 2008; Hornsby et al., 2009; Marvel et al. 2007; McCrea and Betts, 2008; Montoro-Sánchez et al., 2009; Morris et al., 2008; Neto and Pinheiro, 2010; Seborá et al., 2010; Van Scheers and Radipere, 2007). Such a tool could help to enhance the entrepreneurial psychological maturity and self-efficacy of individuals.

This eight-factor scale could also be applied to differentiate between differences of perceptions between employees' perceptions of the intrapreneurial climate of an organization as opposed to management's perception,

important in intrapreneurial facilitation, as suggested by Marvel et al. (2007). Furthermore, the application of the eight-factor scale could serve as diagnostic tool to identify corporate entrepreneurship limitations in organizations, as the development of a corporate entrepreneurship culture should ideally be optimized in an organization in order to advance value creation and establishing a competitive advantage (Lumpkin and Dess, 1966; Marvel et al., 2007), making businesses more competitive and optimizing performance (Barrett and Weinstein, 1998; Bhardwaj et al., 2006; Hornsby et al., 2002; Hornsby et al., 2008; Hornsby et al., 2009; Morris et al., 2008; Seborá et al., 2010). The eight-factor structure provides businesses with quality and quantity information to make appropriate entrepreneurial decisions and take the necessary actions to support and reinvigorate corporate entrepreneurial activities as suggested by Neto and Pinheiro (2010).

Application of the CEAI could also sensitize businesses to the facets of entrepreneurship that should be promoted (Hornsby et al., 2002; Hornsby et al., 2008; Hornsby et al., 2009; Morris et al., 2008), resulting in the development of employees that are self-confident catalysts of entrepreneurial behaviour and have an internal locus of control, display self-efficacy and psychological maturity, which are all essential characteristics in the development of entrepreneurship (Heinonen and Toivonen, 2008; Plattner et al., 2009). This will prepare employees to take on new entrepreneurial challenges (Shepherd et al., 2009) and provide management with knowledge to

facilitate the organizational factors which support entrepreneurial engagement (Hornsby et al., 2008; Hornsby et al., 2009).

The application of the CEAI (Hornsby et al., 2002) could serve as a guide to enhance effective corporate entrepreneurship actions, as suggested by Gupta et al. (2004), by enabling management to communicate an entrepreneurial vision effectively, supported by appropriate resources, and to encourage continuous novel idea generation. Accordingly, businesses will be able to behave proactively rather than reactively, which is imperative in a volatile economic climate (Ngowi, 2010). Businesses can then also improve entrepreneurial vigilance (Adejimola and Olufunmilayo, 2009) and make the most of new opportunities that arise in competitive markets (Alipour et al., 2010; Ribeiro-Soriano and Urbano, 2010). The identification of problematic areas by means of the CEAI scale could reduce the risk of elevated stress levels among entrepreneurs, which is regarded as a possible handicap for entrepreneurs (Ahmad and Salim, 2009). In this way, management would be enabled to strategically revive entrepreneurial activities (Lumpkin and Dess, 1966; Marvel et al., 2007), and to ensure the establishment of competitive assets, processes and products in competitive markets (Bhardwaj et al., 2006).

The identification of the eight-factor structure of the CEAI has vast potential for future research and application in businesses. Improvements of the instrument should be considered, such as developing additional items on the factors with lower alpha coefficients to improve the inter-cultural portability of the instrument to benefit organizations. The application of the eight-factor structure of the CEAI as identified in the current study should serve as a useful diagnostic tool to identify possible shortcomings in the intrapreneurial culture of businesses. Further investigation into the factor structure of the CEAI across cultures is encouraged to ensure metric equivalence.

By using the eight-factor structure as an analytical tool in organizations, managers can diagnose shortcomings, as well as sustain and facilitate the continuous development of intrapreneurship in organizations at all levels. The structure could also give insight into possible disparities that exist between the perceptions of employees and those of managers concerning the state of corporate entrepreneurship in businesses. This eight-factor structure of the CEAI enables management to gain a deeper understanding of the corporate entrepreneurial needs of an organization, as well as to develop proactive corporate entrepreneurial strategies. In this way management can focus on strategies and practices that enhance entrepreneurial growth.

## REFERENCES

Adonisi M (2003). The relationship between Corporate

- Entrepreneurship, Market Orientation, Organisational Flexibility and Job Satisfaction. Doc. Diss. Pretoria: Univ. Pretoria.
- Adejimola AS (2008). Language, communication and information flow in entrepreneurship. *Afr. J. Bus. Manage.* 2(10): 201-208.
- Adejimola AS, Olufunmilayo TO (2009). Spinning off an entrepreneurship culture among Nigerian University Students: Prospects and challenges. *Afr. J. Bus. Manage.* 3(3): 80-88.
- Ahmad SZ, Salim FAA (2009). Sources of stress and the coping mechanism for Malaysian entrepreneurs. *Afr. J. Bus. Manage.*, 3(6): 311-316.
- Alam GM (2009a) Can governance and regulatory control ensure private higher education as business or public goods in Bangladesh? *Afr. J. Bus. Manage.*, 3(12): 890-906.
- Alam GM (2009b). The role of science and technology education at network age population for sustainable development of Bangladesh through human resource advancement, *Sci. Res. Essays*, 4(11): 1260-1270.
- Alam GM, Hoque KE, Oloruntegbe, KO (2010) Quest for a better operation system in Education: Privatization, Teacher Educationalization or Voucherization: glimpsing from consumer and product perspectives, *Afr. J. Bus. Manage.*, 4(6):1202-1214.
- Alipour H, Davabi K, Mehrabi Z, Moshtaghi M (2010). The role of knowledge management in the achievement of competitive advantage: A case study of Iran Alborze Insurance Company in Western Mazandaran. *Afr. J. Bus. Manage.*, 4(7): 1346-1350.
- Awogbenle AC, Iwuamadi KC (2010). Youth unemployment: Entrepreneurship development programme as an intervention mechanism. *Afr. J. Bus. Manage.*, 4(6): 831-835.
- Barrett H, Weinstein A (1998). The effect of market orientation and organisational flexibility on corporate entrepreneurship. *Ent. Theo. Prac.*, 23(1): 57-67.
- Bhardwaj BR, Sushil S, Momaya K (2006). Corporate entrepreneurship model: A source of competitiveness. *Indian Inst. Manage. Bangalore Manage. Rev.*, 131-145.
- Briggs BR (2009). Issues affecting Ugandan indigenous entrepreneurship in trade. *Afr. J. Bus. Manage.*, 3(11): 788-797.
- Campbell JR, Koutsoulis M (2004). Cross-cultural instrumentation: Overriding frameworks. In JR Campbell K, TP Ruohotie WH (Eds). *Cross-Cultural Research: Basic Issues, Dilemmas and Strategies* (pages 15-26). Hämeenlinna: Research Centre for Vocational Education, University of Tampere.
- Chittipeddi K, Walleit TA (1991). Entrepreneurship and competitive strategy for the 1990's. *J. Small Bus. Manage.*, 29(1): 94-98.
- Conway JM, Huffcutt AI (2003). Evaluation of exploratory factor analysis practices in organizational research. *Org. Res. Meth.*, 6:147-168.
- Cooper CL, Robertson LT (Eds). (1990). *Cross-cultural issues in organisational psychology: Emergent trends and directions for research in the 1990s*. *Int. Rev. Ind. Organ. Psych.*, 5: 59-99.
- Covin JG, Miles MP (1999). Corporate entrepreneurship and the pursuit of competitive advantage. *Ent. Theo. Prac.*, 23(3): 47-64.
- De Bruin GP, Swartz L, Tomlinson M, Cooper PJ, Molteno C (2004). The factor structure of the Edinburgh Postnatal Depression scale in a South African periurban settlement. *South Afr. J. Psyc.*, 34(1): 113-121.
- De Klerk M, Boshoff A, Van Wyk R (2009). Measuring meaning in life in South Africa: Validation of an instrument developed in the USA. *South Afr. J. Psyc.*, 39(3): 314-325.
- Dolnicar S, Grün B (2007). Cross-cultural differences in survey response patterns. *Int. Mark. Rev.*, 24(2): 127-143.
- Drucker PF (2007). *Innovation and entrepreneurship*. (2<sup>nd</sup> ed). Burlington: Butterworth-Heinemann.
- Duygulu E, Kurgun OA (2009). The effect of managerial entrepreneurship behaviour on employee satisfaction: Hospitality managers' dilemma. *Afr. J. Bus. Manage.*, 3(11): 715-726.
- Edwards D, Leger P (1995). Psychometric properties of the Right Wing Authoritarianism Scale in black and white South African students. *Int. J. Psyc.*, 30(1): 47-68.
- Edwards D, Riordan S (1994). Learned resourcefulness in black and white South African university students. *J. Soc. Psyc.*, 134(5): 665-675.
- Ehrhart KH, Roesch SC, Ehrhart MG, Killian B (2008). A test of the factor structure equivalence of the 50-item IPIP five-factor model



- measure across gender and ethnic groups. *J. Pers. Assoc.*, 90(5): 507-516.
- Ellis RJ, Taylor N (1987). "Specifying Entrepreneurship", *Frontiers of Entrepreneurship Research*. Wesley, MA: Babson College.
- Goosen CJ, De Coning TJ, Smit E VdM (2002). The development of a factor based instrument to measure corporate entrepreneurship: A South African perspective. *South Afr. J. Bus. Manage.*, 33(3): 39-51.
- Gupta V, MacMillan IC, Surie G (2004). Entrepreneurial leadership: developing and measuring a cross cultural construct. *J. Bus. Vent.*, 19(2): 241-260.
- Hair JR Jr, Anderson RE, Tatham RL, Black WC (1998). *Multivariate data analysis*. New York: Macmillan.
- Hambrick JP, Rodebaugh TL, Balsis S, Woods CM, Mendez JL, Heimberg RG (2010). Cross-ethnic measurement equivalence of measures of depression, social anxiety and worry. *Assess.*, 17(2):155-171.
- Harter HK, Schmidt FL, Asplund JW, Killham EA, Agrawal S (2010). Causal impact of employee work perceptions on the bottom line of organizations. *Persp. Psyc. Sci.*, 5(4): 378-389.
- Heinonen J, Toivonen J (2008). Corporate entrepreneurs or silent followers? *Leader. Org. Dev. J.*, 29(7): 583-599.
- Hornsby JS, Holt DT, Kuratko DF (2008). The dynamic nature of corporate entrepreneurship: Assessing the CEAI. *Acad. Manage. Proc.*, 1-6.
- Hornsby JS, Kuratko DF, Shepherd DA, Bott JP (2009). Managers' corporate entrepreneurial actions: Examining perception and position. *J. Bus. Vent.*, 24(3): 236-247.
- Hornsby S, Kuratko F, Zahra A (2002). Middle managers' perception of the internal environment for corporate entrepreneurship: assessing a measurement scale. *J. Bus. Vent.*, 17: 253-273.
- Hoyle RH (1995). *Structural equation modelling: Concepts, issues, and applications*. Thousand Oaks, CA: Sage.
- Ireland RD, Covin JG, Kuratko DF (2009). Conceptualizing corporate entrepreneurship strategy. *Ent. Theo. Pract.*, 31(1): 19-46.
- Kearney C, Hisrich R, Roche F (2007). Facilitating public sector corporate entrepreneurship process: A conceptual model. *J. Enterp. Cult.*, 15(3): 275-299.
- Kerlinger FN, Lee HB (2000). *Foundations of behavioural research*. (4<sup>th</sup> ed). Sydney: Harcourt College Publishers.
- Klein SB, Astrachan JH, Smyrnios KX (2005). The F-PEC scale of family influence: Construction, validation, and further implication for theory. *Ent. Theo. Pract.*, 25: 321-339.
- Kearney C, Hisrich R, Roche F (2007). Facilitating public sector corporate entrepreneurship process: a conceptual model. *J. Enterp. Cult.*, 15(3): 275-299.
- Kerlinger FN, Lee HB (2000). *Foundations of behavioural research*. (4<sup>th</sup> ed). Sydney: Harcourt College Publishers.
- Kuratko DF, Montagno RV, Hornsby JS (1990). Developing an intrapreneurial assessment instrument for an effective corporate entrepreneurial environment. *Strateg. Manage. J.*, 11: 49-58.
- Lumpkin GT, Dess GG (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Acad. Manage. Rev.*, 21(1): 135-172.
- Marsella AJ, Dubanoski J, Hamada WC, Morse H (2000). The measurement of personality across cultures. *Am. Behav. Sci.*, 44:41-63.
- Marvel MR, Griffin A, Hebda J, Vojak B (2007). Examining the technical corporate entrepreneurs' motivation: voices from the field. *Ent. Theor. Pract.*, 31(5): 753-768.
- McCrea E, Betts SC (2008). Failing to learn from failure: An exploratory study of corporate entrepreneurship outcomes. *Acad. Strat. Manage. J.*, 7: 111-132.
- Meiring D, Van de Vijver FJR, Rothmann S (2006). Bias in an adapted version of the 15FQ+ in South Africa. *South Afr. J. Psychol.*, 36(2): 340-356.
- Montoro-Sánchez A, Ortiz-de-Urbina-Criado M, Romero-Martínez AM (2009). The decision to use alliances as corporate entrepreneurship: The role of resources and skills. *Group Dec. Neg.*, 18(5): 431-448.
- Morris MH, Kuratko DF (2002). *Corporate entrepreneurship*. New York: Harcourt College Publishers.
- Morris MH, Kuratko DF, Covin JG (2008). *Corporate entrepreneurship and innovation*. (2<sup>nd</sup> ed). Mason, OH: Thomson.
- Nayager T, Van Vuuren JJ (2005). An analysis of an organisational strategy, structure and culture that supports corporate entrepreneurship in established organisations. *South Afr. J. Econ. Manage. Sci.*, 8(1): 29-38.
- Neto MDC, Pinheiro AC (2010). The contribution of a Portuguese Angolan wiki for development promotion. *Afr. J. Bus. Manage.*, 4(6): 836-841.
- Ngowi HP (2010). The current global economic crisis and its impacts in Tanzania. *Afr. J. Bus. Manage.*, 4(8): 1468-1474.
- Nuevo T, Dunn G, Dowrick C, Vázquez-Barquero JL, Casey P, Dalgard OS, Lehtinen V, Ayuso-Mateos JL (2009). Cross-cultural equivalence of the Beck Depression Inventory: A five-country analysis from the ODIN study. *J. Aff. Dis.*, 114(1-3): 156-162.
- Oloruntegbe OK, Akinsete AM, Ayeni EO., Oduyoyiand, MO, Alam GM (2010). Rethinking development and sustainability of African economy: The roles of science education. *Afr. J. Bus. Manage.*, 4(6): 811 – 819.
- Phambuka-Nsimbi C (2008). Creating competitive advantage in developing countries through business clusters: A literature review. *Afr. J. Bus. Manage.*, 2(7): 125-130.
- Plattner IE, Lechaena M, Mmolawa W, Mzingwane B (2009). Are university students psychologically ready for entrepreneurship? A Botswana study. *Afr. J. Bus. Manage.*, 3(7): 305-310.
- Prinsloo CH, Ebersöhn I (2002). Fair usage of the 16PF in personality assessment in South Africa: A response to Abrahams and Mauer with special reference to issues of research methodology. *South Afr. J. Psyc.*, 32: 48-57.
- Ribeiro-Soriano D, Urbano D (2010). Employee-organization relationship in collective entrepreneurship: An overview. *J. Organ. Change Manage.*, 23(4): 349-359.
- Ripollés-Meliá M, Menguzzato-Boulard M, Sánchez-Peinado L (2007). Entrepreneurial orientation and international commitment. *J. Int. Ent.* 5: 65-83.
- Salvato C, Sciascia S, Alberti FG (2009). The microfoundations of corporate entrepreneurship as an organizational capability. *Int. J. Ent. Inov.*, 10(4): 279-289.
- SAS Institute (1990). *SAS/STAT user's guide (Version 6, 4<sup>th</sup> ed. Vol 1)*. Cary, NC: SAS.
- Schmelter R, Mauer R, Börsch C, Brettel M (2010). Boosting corporate entrepreneurship through HRM practices: Evidence from German SMEs. *Hum. Res. Manage.*, 49(4): 715-741.
- Schumpeter JA (1934). *The theory of economic development*. Cambridge, MA: Harvard University Press.
- Sebora TC, Theerapatvong T, Lee SM (2010). Corporate entrepreneurship in the face of changing competition. A case analysis of six Thai manufacturing firms. *J. Org. Change Manage.*, 23(4): 453-470.
- Sharma P, Chrisman JJ (1999). Toward a reconciliation of the definitional issues in the field of corporate entrepreneurship. *Ent. Theor. Pract.*, 23(3): 11-27.
- Shepherd DA, Covin JG, Kuratko DF (2009). Project failure from corporate entrepreneurship: Managing the grief process. *J. Bus. Vent.*, 24(6): 588-600.
- Storm K, Rothmann S (2003). A psychometric analysis of the Maslach Burnout Inventory-General Survey in the South African police service. *South Afr. J. Psyc.* 33(4): 219-226.
- Tidd J, Bessant J, Pavitt K (1999). *Managing innovation: Integrating technological, market and organisational change*. New York: John Wiley and Sons.
- Tsai HT, Tzeng SY, Fu H-H, Wu JCT (2009). Managing multinational sustainable development in European Union based on the DPSIR framework. *Afr. J. Bus. Manage.*, 3(11): 727-735.
- Van Eeden R, Mantsha TR (2007). Theoretical and methodological considerations in the translation of the 16PF5 into an African language. *South Afr. J. Psyc.*, 37(1): 62-81.
- Van Scheers L, Radipere S. (2007). Why are so many managers not "managing?" *Afr. J. Bus. Manage.*, 1(7): 85-91.
- Van Wyk R, Adonisi M (2008). The role that entrepreneurial characteristics play in predicting job satisfaction. *South Afr. J. Econ. Manage. Sci.*, 11(4): 391-407.