Gordon Institute of Business Science
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Middle managers' perception of the internal environment and its relationship to entrepreneurial orientation in the South African coal mining industry

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Abstract

Corporate entrepreneurship a proponent of the innovation imperative is a process which enables constant corporate innovation, allowing firms to remain dynamic and competitive in the competing world markets (Kuratko, Hornsby, & Covin, 2014). The aim of this research was to do a quantitative assessment of middle managers in the South African coal mining industry through the lenses of two prominent constructs of the corporate entrepreneurship process. These are the internal environment for corporate entrepreneurship (Kuratko et al., 2014) and entrepreneurial orientation (Covin and Wales, 2012). To measure these constructs the Corporate Entrepreneurship Assessment Instrument (CEAI) and Entrepreneurial Orientation (EO) instruments were used respectively. Sequential multiple regression analysis was performed to analyse the relationship between the two constructs. The results confirmed that both the CEAI and EO instruments had a high degree of reliability and that the internal environment for corporate entrepreneurship contains three elements (management support, work discretion and rewards/reinforcement) which have a significant relationship with the entrepreneurial orientation composite measure. It was also found that middle managers in the South African coal mining industry do not perceive the internal environment for corporate entrepreneurship to be supportive even though they themselves have a high degree of entrepreneurial orientation. The research thus contributes to confirming the validity of existing measurement instruments and establishes a relationship between constructs to allow for strategic realignment.

Keywords

Internal environment, corporate entrepreneurship, entrepreneurial orientation, middle managers

Declaration

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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Chapter 1: Introduction to the research problem

1.1. Introduction

Kuratko, Hornsby and Covin (2014) propose through the innovation imperative that corporate entrepreneurship is a process which enables constant corporate innovation allowing firms to remain dynamic and competitive in the competing world markets. This statement is supported by Bierwerth, Schwens, Isidor and Kabst (2015) who in their meta-analysis on corporate entrepreneurship and performance found that a significant positive relationship exists. It has been argued though that unduly limited research has been done on the antecedents of corporate entrepreneurial processes and behaviours (Hornsby, Kuratko, Holt, & Wales, 2013; Fayolle, Basso, & Bouchard, 2010; Rauch, Wiklund, Lumpkin, & Frese, 2009). In line with this argument Kuratko and Audretsch (2013) conclude that in order for scholars to move the field forward the corporate entrepreneurial process needs to better understood.

When considering the South African context Scheepers, Hough and Bloom (2008) also conclude that limited research on the corporate entrepreneurial construct has been performed and propose multiple themes for future research. Despite the limited research a study by Urban and Oosthuizen (2009) found that their results supported the generalisation that the South African Mining industry is not supportive of entrepreneurial activities and this forms a key point of interest.

The aim of this research was to do a quantitative assessment of the South African coal mining industry through the lenses of two prominent constructs of the corporate entrepreneurship process. These are the internal environment for corporate entrepreneurship (Kuratko et al., 2014) and entrepreneurial orientation (Covin and Wales, 2012). Since middle managers play such a central role in the entrepreneurial process (Kuratko & Audretsch, 2013), the assessment was done at an individual level such that the relationship between the two proposed constructs could be explored. Essentially the core of the research can be summarised as evaluating the perception of being allowed to be entrepreneurial (internal environment) in relation to an inclination to be entrepreneurial (orientation) in the corporate context.

An understanding of the empirical evidence gained would confirm the validity of the existing instruments and add to the limited base of research in the South African context. Having established the value of corporate entrepreneurship the research is seen to contribute to a greater understanding of the entrepreneurial process and provides specific insights for firms to realign organisational strategy (Ireland, Covin, & Kuratko, 2009; Kuratko, Ireland, & Hornsby, 2001) and culture (Cameron & Quinn, 2011) so as to allow middle managers to display more innovative and entrepreneurial behaviours.

The document follows a research based approach (Suanders & Lewis, 2012) and consists of seven chapters which include, a literature review, research hypothesis, research methodology, results, discussion of results and lastly a conclusion.

Chapter 2: Literature review

2.1. The concept of Corporate Entrepreneurship (CE)

Kuratko (2010) proposes that corporate entrepreneurship is a concept which has seen significant evolution and the definitions thereof have had multiple variations over the past forty years. This proposal is supported by Morris and Kuratko (2002) who further explicate corporate entrepreneurship as a term which describes entrepreneurial behaviour within established organisations.

Entrepreneurial behaviour in itself is a very extensive concept. Morris, Lewis and Sexton (1994) performed a content analysis on seventy seven definitions of entrepreneurship from top journals and books in the entrepreneurial field. It was found that fifteen key words appeared at least five times in their sample and include terms such as: starting/founding/creating, new business/new venture, innovation/new products/new market, pursuit of opportunity and risk-taking/risk management/uncertainty. Since entrepreneurship in itself is so expansive, it is understandable that corporate entrepreneurship also has an array of varying definitions.

Guth and Ginsberg (1990) suggest that:

> The topic of corporate entrepreneurship encompasses two types of phenomena and the processes surrounding them: (1) the birth of new businesses within existing organisations, i.e. internal innovation or venturing; and (2) the transformation of organisations through renewal of the key ideas on which they are built, i.e. strategic renewal. (p. 5).

Zahra (1991) states:

> Corporate entrepreneurship may be formal or informal activities aimed at creating new businesses in established companies through product and process innovations and market developments. These activities may take place at the corporate, division (business), functional, or project levels, with the unifying objective of improving a company's competitive position and financial performance. (p. 262).

Sharma and Chrisman (1999, p. 18) proposed that corporate entrepreneurship "is the process whereby an individual or a group of individuals, in association with an existing organisation, create a new organisation or instigate renewal or innovation within that organisation." In more recent literature Kuratko and Audretsch (2013) differentiate corporate entrepreneurship into two predominant domains which are corporate venturing and strategic entrepreneurship. Kuratko and Audretsch (2013) explicate strategic entrepreneurship as:

> While corporate venturing involves company involvement in the creation of new businesses, strategic entrepreneurship corresponds to a broader array of entrepreneurial initiatives which do not necessarily involve new businesses being added to the firm. Strategic entrepreneurship involves simultaneous opportunity-seeking and advantage-seeking behaviors (Ireland, Hitt, & Sirmon, 2003). The innovations that are the focal points of strategic entrepreneurship initiatives represent the means through which opportunity is capitalised upon. These are innovations that can happen anywhere and everywhere in the company. By emphasising an opportunity-driven mindset, management seeks to achieve and maintain a competitively advantageous position for the firm. (p. 332).

Kuratko et al. (2014) propose the innovation imperative for competitiveness in the 21st century. In line with this proposition Kuratko et al. (2014) emphasise the importance of a supportive internal environment and its measurement. These are emphasised as they are considered to play a significant role in the attainment of a high degree of corporate entrepreneurship and innovation.

In line with the diversified base of definitions, Hornsby, Naffziger, Kuratko and Montagno (1993, p. 35) argue that "Intrapreneurship is multidimensional and relies on the successful interaction of several activities rather than events occurring in isolation". As such, Kuratko and Audretsch (2013) conclude that the various aspects and domains in the field of corporate entrepreneurship need to be understood as research continues. "Exploring these domains and gaining a sharper focus on the corporate entrepreneurship process may be a most important step for scholars interested in moving the field forward" (Kuratko & Audretsch, 2013, p. 333).

Hornsby et al. (1993) put forward one of the seminal works that attempted to describe the corporate entrepreneurial process. Their proposed model considered organisational and individual characteristics as antecedents to entrepreneurial behaviours. Lumkin and Dess (1996) further expanded the process by grouping individual characteristics as entrepreneurial orientation and by including environmental factors in addition to organisational factors. This gave rise to a multi dimensional model which had a bearing on a firm's performance as is shown in Figure 1.

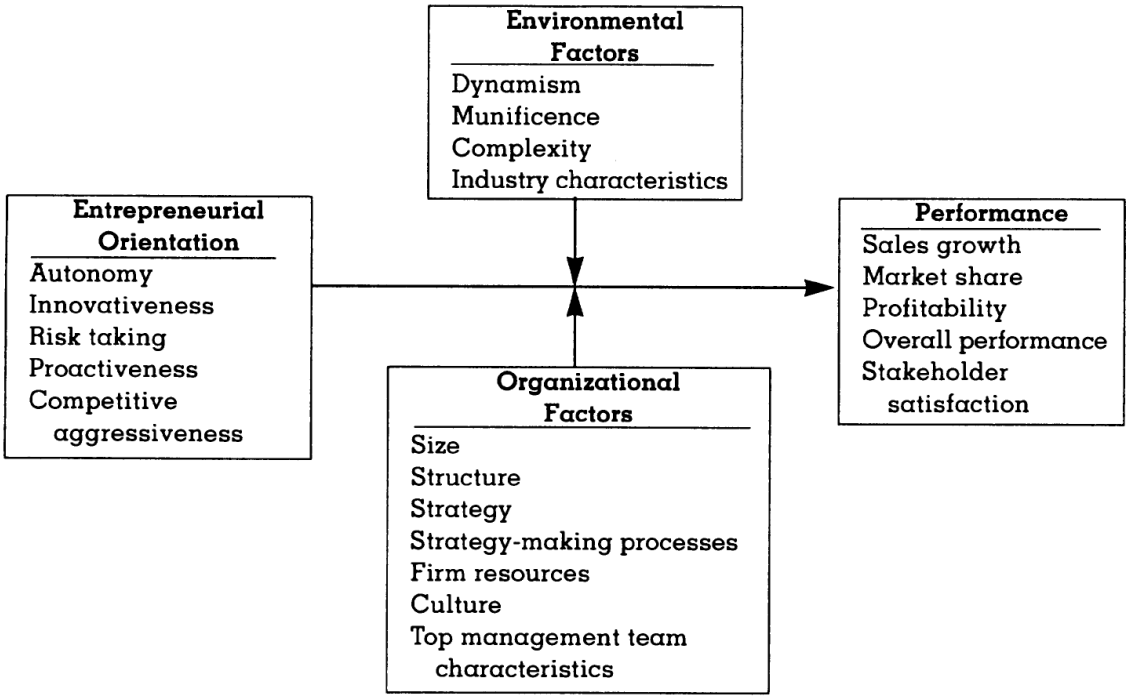

Figure 1 : Conceptual Framework of an Entrepreneurial Process (Lumpkin & Dess, 1996)

In a more recent article, Hornsby, Kuratko and Zahra (2002) propose that executive management set the entrepreneurial strategy. The strategy is seen to inform the presence and predominance of organisational characteristics which essentially create the internal corporate environment for entrepreneurial behaviour. This view is supported by Kuratko et al. (2014) who state "The managerial challenge becomes that of using workplace design elements to develop an innovation-friendly internal environment" (p. 39). An example of such a successful corporate entrepreneurship strategy was explored in a case study on Acordia Inc. by Kuratko et al. (2001). In the epilogue of the case study Kuratko et al. (2001) state:

> The corporate entrepreneurship strategy of Acordia, Inc. was a success, with entrepreneurial actions being used throughout the Acordia companies. Innovative processes helped to streamline company operations. The firm became more diversified in its products and markets, in that new products were introduced into multiple markets, while new markets with specific customer needs were regularly identified. The commitment to serve new, highly focused markets led to additional Acordia companies. Using its original competitive advantages, as well as innovation, a new advantage was formed in many of the individual companies. (p. 68).

Subsequent to the case study by Kuratko et al. (2001), a conceptualised model of corporate entrepreneurship strategy was created by Ireland et al. (2009). Ireland et al. (2009) used two of Mintzberg's (1987a, 1987b) "five dimensions of strategy" which included strategy as a perspective (incorporated as entrepreneurial strategic vision) and strategy as a pattern (incorporated as entrepreneurial processes and behaviour) to create a multidimensional integrative model.

Based on the extensive interdependence of concepts, it becomes clear that there is value in exploring the relationship between conceptual framework items to determine which are more prevalent. It is however first necessary to understand why it is of benefit for companies to partake in corporate entrepreneurial activities.

2.2. The benefits of corporate entrepreneurship

Bierwerth et al. (2015) performed a meta-analysis on literature relating to corporate entrepreneurship and performance and found that a significant and positive relationship exits. "Our results reveal that strategic renewal (Guth and Ginsberg, 1990), innovation (Zahra, 1991; Kuratko et al., 2014) and corporate venturing (Sharma & Chrisman, 1999) positively influence overall, subjective and objective firm performance" (Bierwerth et al., 2015, p. 1).

One of the key proponents of the positive relationship argument above is the article by Zahra and Covin (1995) in which a longitudinal impact analysis was performed on 108 firms. It was found that the performance index which consisted of both profitability and growth measures had a positive relationship with entrepreneurial behaviour (Zahra and

Covin, 1995; Ağca, Topal, & Kaya, 2012; Zahra, 1991). In a South African study performed by Goosen, Coning and van der Merwe Smit (2002), it was found that innovativeness, proactiveness and management's internal influence all deemed to be components of corporate entrepreneurship significantly contribute to financial performance. Despite the significant evidence for improved performance, Zahra and Covin (1995) state that corporate entrepreneurship may be risky and have an adverse effect on a firm's short term financial performance. Zahra and Covin (1995) also mention poor organisation, lack of strategic focus and dysfunctional organisational politics as factors which detract from the effectiveness of corporate entrepreneurial activities.

Covin (1999) proposes that corporate entrepreneurship is an antecedent to the promotion and sustainability of competitive advantage which plays a role in achieving improved firm performance. Covin (1999) states:

> Schollhammer (1982), Miller (1983), Khandwalla (1987), Guth and Ginsberg (1990), Naman and Slevin (1993), and Lumpkin and Dess (1996), for example, have all noted that corporate entrepreneurship can be used to improve competitive positioning and transform corporations, their markets, and industries as opportunities for value-creating innovation are developed and exploited. (p. 47).

This statement is further supported by Kuratko et al. (2014) who state "Corporate entrepreneurship a significant form of corporate innovation is envisioned to be a process that can facilitate firms' efforts to innovate constantly and cope effectively with the competitive realities companies encounter when competing in world markets" (p. 38).

These statements are significant in that they are supportive of the corporate entrepreneurial concept. More important than the realisation of increased firm performance is the understanding of the multiple facets of corporate entrepreneurship and how these interlink to achieve the subsequent result of increased performance. "It is only after understanding how and why corporate entrepreneurship produces superior firm performance that reservations regarding the possible spuriousness of this relationship can and should be discounted" (Covin, 1999, p.60). To this end, the concepts of an internal environment for corporate entrepreneurship (organisational

factors) and entrepreneurial orientation (a proxy of entrepreneurial behaviour) are explored in the sections that follow.

2.3. The internal environment for corporate entrepreneurship

Kuratko, Ireland, Covin and Hornsby (2005) propose that the factors related to a supportive internal corporate entrepreneurial environment serve as antecedents to promote entrepreneurial behaviours among middle managers. Such a reciprocal relationship view of organisational architecture and entrepreneurial behaviour is also supported by Ireland et al. (2009).

Over the last few decades researchers have sought to identify key internal organisational factors that have had a bearing on supporting corporate entrepreneurial activities. Although such internal factors are plentiful, the literature seems to converge on at least five dimensions (Hornsby et al. 2002). The five dimensions related to a firm's internal environment which are considered to be antecedents of entrepreneurial activity are explained by Hornsby et al. (2002, pp. 259-260) as follows:

Table 1 : Five dimensions of the internal environment for corporate entrepreneurship

Dimension	Quoted Description	Relevant Literature
Rewards	Theorists stress that an effective reward system that spurs entrepreneurial activity must consider goals, feedback, emphasis on individual responsibility, and results-based incentives. The use of appropriate rewards can also enhance middle managers' willingness to assume the risks associated with entrepreneurial activity.	(Scanlan, 1981; Souder, 1981; Kanter, 1985; Sathe, 1985; Fry, 1987; Block & Ornati, 1987; Sykes, 1992; Barringer & Milkovich, 1998)
Management Support	Indicates the willingness of managers to facilitate and promote	(Quinn, 1985; Hisrich & Peters, 1986; MacMillian,

	entrepreneurial activity in the firm. This support can take many forms, including championing innovative ideas, providing necessary resources or expertise, or institutionalising the entrepreneurial activity within the firm's system and processes.	Block, & Narashima, 1986; Sykes & Block, 1989; Sathe, 1989; Stevenson & Jarillo, 1990; Damanpour, 1991; Kuratko, 1993; Pearce, Kramer, & Robbins, 1997)
Resources (including time)	Employees must perceive the availability of resources for innovative activities. The availability of slack resources usually encourages experimentation and risk-taking behaviours.	(Von Hippel, 1977; Souder, 1981; Kanter, 1985; Sathe, 1985; Sykes, 1986; Sykes & Block, 1989; Hisrich & Peters, 1986; Katz & Gartner, 1988; Stopford & Baden-Fuller, 1994; Das & Teng, 1997; Slevin & Covin, 1997; Burgelman & Sayles, 1986)
Supportive Organisational Structure	The structure also provides the administrative mechanisms by which ideas are evaluated, chosen and implemented.	(Souder, 1981; Sathe, 1985; Hisrich & Peters, 1986; Sykes, 1986; Sykes & Block, 1989; Schuler, 1986; Bird, 1988; Guth & Ginsberg, 1990; Covin & Slevin, 1991; Zahra, 1991, 1993; Brazeal, 1993; Hornsby et al., 1993)
Risk Taking	Indicates the middle managers' willingness to take risks and show a tolerance for failure when it occurs.	(MacMillian et al., 1986; Sathe, 1985, 1989; Sykes, 1986; Sykes & Block, 1989; Burgelman, 1983a,b, 1984; Quinn, 1985; Kanter, 1985; Ellis & Taylor, 1988; Bird, 1988; Stopford & Baden-Fuller, 1994)

Hornsby et al. (2002) uses an adaptation of the five dimensions as described above to develop the Corporate Entrepreneurship Assessment Instrument (CEAI). The CEAI is a diagnostic tool which is used to measure managers' perceptions of the five internal environment dimensions which are conducive to the promotion of an internal entrepreneurial environment (Kuratko et al., 2014).

This was the first attempt at arriving at a stable set of five organisational factors for assessment using the CEAI instrument. The adapted five dimension set proposed by Hornsby et al. (2002) preserved management support, rewards/reinforcement and resources (including time) but replaced risk taking and supportive organisational structure with work discretion and organisational boundaries. In a more recent iteration of the CEAI instrument, Kuratko et al. (2014, p. 39) defines the five dimensions as follows:

Table 2 : Five elements of the CEAI (Kuratko et al., 2014)

Dimension	Quoted Description
Top Management Support	The extent to which one perceives that top managers support, facilitate, and promote entrepreneurial behavior, including the championing of innovative ideas and providing the resources people require to take entrepreneurial actions. Top management support has been found to have a direct positive relationship with an organisation's innovative outcomes. Also, research shows each level of management plays key roles in facilitating corporate entrepreneurship.
Work Discretion	The extent to which one perceives that the organisation tolerates failure, provides decision-making latitude and freedom from excessive oversight, and delegates authority and responsibility to lower-level managers and workers. Research suggests entrepreneurial opportunities are often best recognised by those with discretion over how to perform their work, as well as by those encouraged to engage in experimentation.
Rewards and Reinforcement	The extent to which one perceives the organisation uses systems that reward based on entrepreneurial activity and success. Reward systems that encourage risk taking and innovation have been shown to have a strong effect on individuals' tendencies to behave in entrepreneurial manners. Numerous studies have identified 'reward and resource availability' as a principal determinant of entrepreneurial behavior by middle- and first-level managers.

Time Availability	A perception that the workload schedules ensure extra time for individuals and groups to pursue innovations, with jobs structured in ways to support such efforts and achieve short- and long-term organisational goals. Research suggests time availability among managers is an important resource for generating entrepreneurial initiatives. For example, the availability of unstructured or free time can enable would-be corporate innovators to consider opportunities for innovation that may be precluded by their required work schedules.
Organisational Boundaries	The extent to which one perceives there are flexible organisational boundaries that are useful in promoting entrepreneurial activity because they enhance the flow of information between the external environment and the organisation, as well as between departments/divisions within the organisation. However, innovative outcomes emerge most predictably when innovation is treated as a structured and purposeful (vs. chaotic) process. Consistent with this point, organisation theorists have long recognised that productive outcomes are most readily accomplished in organisational systems when uncertainty is kept at manageable levels; this can be achieved through setting boundaries that induce, direct, and encourage coordinated innovative behavior across the organisation. In short, organisational boundaries can ensure the productive use of innovation enabling resources.

An eight factor solution for the CEAI has also been created by van Wyk and Adonisi (2011) to understand CEAI in the South African culture. Their instrument included innovative initiatives, financial support and inadequate time as the three additional factors. The advantages of using the CEAI instrument are shown in Table 3.

Table 3 : Advantages of the CEAI instrument

Advantage	Supporting Literature
1. Differentiation of managers and employees perceptions of the corporate entrepreneurial climate	(Marvel, Griffin, Hebda, & Vojak, 2007)
2. Diagnostic tool to identify limitations to corporate entrepreneurship and required training needs	(van Wyk & Adonisi, 2011)
3. Sensitisation tool to promotable corporate entrepreneurial facets	(Hornsby et al., 2002; Hornsby, Holt, & Kuratko, 2008)
4. Guide to enhance effective corporate entrepreneurial actions	(Gupta, MacMillan, & Surie, 2004)

The scores obtained from the CEAI instrument are relative and most effective when compared to either competitor scores or pre and post intervention scores (Kuratko et al., 2014).

2.4. Entrepreneurial Orientation (EO)

Morris and Sexton (1996) explain that there are three key dimensions which underlie corporate **entrepreneurial attitudes and behaviors** and these are: innovativeness, risk-taking, and proactiveness (Covin & Slevin, 1989; Ginsberg, 1985; Miles & Arnold, 1991; Miller, 1983; Morris & Paul, 1987).

Morris and Sexton (1996) further explicate the three dimensions as follows:

> **Innovativeness** refers to the seeking of creative, unusual, or novel solutions to problems and needs. **Risk-taking** involves the willingness to commit significant resources to opportunities having a reasonable chance of costly failure. These risks are typically calculated and manageable. **Proactiveness** is concerned with implementation-with doing whatever is necessary to bring an entrepreneurial concept to fruition. It usually involves considerable perseverance, adaptability, and a willingness to assume some responsibility for failure. To the extent that an undertaking demonstrates some amount of innovativeness, risk-taking, and proactiveness, it can be considered an entrepreneurial event, and the person behind it an entrepreneur. (p. 6).

These three dimensions when combined are an indication of the degree of entrepreneurship (how much). Another consideration that needs to be taken into account is the number of events of entrepreneurial activity which signifies the frequency of entrepreneurship (how often). When these two facets are combined, a conceptual entrepreneurial grid can be created as shown in Figure 2 and serves as an indication of a firm's **entrepreneurial intensity** (Morris & Sexton, 1996).

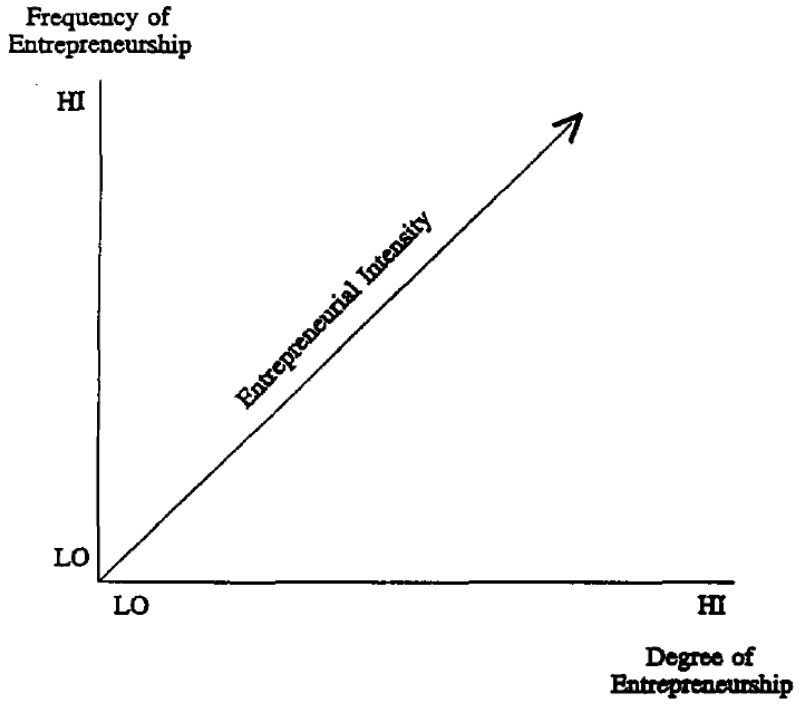

Figure 2 : The variable nature of entrepreneurship (Morris & Sexton, 1996)

In line with this thinking, Lumpkin and Dess (1996) proposed a five dimension model with two additional dimensions to the degree of entrepreneurship and they referred to this combination of factors as a firm's **entrepreneurial orientation.** Rauch et al. (2009) state "the primary function of an entrepreneurial orientation is to enhance financial outcomes rather than to advance other goals that organisations and their managers may pursue" (p. 780).

Lumpkin and Dess (1996) explain the additional two dimensions as:

> **Autonomy** refers to the independent action of an individual or a team in bringing forth an idea or a vision and carrying it through to completion. In general, it

> means the ability and will to be self-directed in the pursuit of opportunities. In an organisational context, it refers to action taken free of stifling organisational constraints. (p. 140).
>
> **Competitive aggressiveness** refers to a firm's propensity to directly and intensely challenge its competitors to achieve entry or improve position, that is, to outperform industry rivals in the marketplace. As suggested previously, competitive aggressiveness is characterised by responsiveness, which may take the form of head-to-head confrontation, for example, when a firm enters a market that another competitor has identified, or reactive, for example, when a firm lowers prices in response to a competitive challenge. Competitive aggressiveness also reflects a willingness to be unconventional rather than rely on traditional methods of competing. (pp. 148-149).

It is important to note however that since these dimensions act as a stimulant to corporate entrepreneurial behaviour (Dess & Lumpkin, 2005), they are often used as a proxy to facilitate the measurement of such behaviour. Since the inception of the entrepreneurial orientation concept, multiple models have been developed to be used as measurement instruments of the various proposed dimensions (Covin & Wales, 2012). When considering the five dimensions proposed by Lumpkin and Dess (1996), it is concluded by Covin and Wales (2012) that the entrepreneurial orientation measurement approach proposed by Hughes and Morgan (2007) is most suitably aligned to measure these.

The Hughes and Morgan (2007) measurement instrument however considers the entrepreneurial orientation measurement at an organisational level. Morris and Kuratko (2002) and De Jong, Parker, Wennekers and Wu (2011) argue that the degree and frequency of entrepreneurship measures at the organisational level are just as applicable at the individual level due to the construct of the individual in the seminal work upon which the entrepreneurial orientation concept is based. This view is further supported by Jaén and Liñán (2013). De Jong et al. (2011) state:

> The dimensions of a well-known firm-level concept can also be applied at the individual level. This is because the three dimensions are key elements in

> previous definitions of intrapreneurship (e.g. Pinchot, 1985; Stevenson & Jarillo, 1990; Antoncic & Hisrich, 2003) and similar constructs have been empirically related in the organisational behavior literature (e.g. Parker and Collins, 2010). (p. 18).

2.5. The role of middle management

Now that the context of internal entrepreneurial environment and entrepreneurial orientation is understood, it is important to consider the role that middle managers play with regards to corporate entrepreneurship. Verbs that have been used to describe the role of middle managers include championing, synthesising, facilitating, and implementing (Floyd & Lane, 2000). Middle managers' entrepreneurial behaviour has also been argued by Burgelman (1983b) to involve key activities which include coaching, strategic building, delineating, and negotiating. Similar characterisations of middle managers' entrepreneurial behaviours are found in the works of Kanter (1983) and Bartlett and Ghoshal (1994).

Kuratko et al. (2005) proposed that in studying the role of middle managers, focus should be placed on the objects of entrepreneurial behaviour rather than on the verbs which define such behaviour. Their description on the role of middle managers is most effectively captured by Kuratko et al. (2013) in the passage that follows:

> Middle-level managers' work as change agents and promoters of innovation is facilitated by their organisational centrality. Kuratko et al. (2005) proposed a model of middle- level managers' entrepreneurial behavior. They contend that middle-level managers **endorse, refine**, and **shepherd** entrepreneurial opportunities **and identify, acquire, and deploy** resources needed to pursue those opportunities. (p. 327).

"In short, it might be argued that the middle management level is where entrepreneurial opportunities are given the best chance to flourish based on the resources likely to be deployed in their pursuit" (Kuratko et al., 2013, p. 327). The notion that middle managers play a central role in the facilitation of corporate entrepreneurial efforts is also supported by Nonaka and Takeuchi (1995) as well as Zahra, Nielsen and Bogner (1999) and it is due to these reasons that middle managers form a significant point of interest.

2.6. Corporate entrepreneurship in the context of South African coal mining

An exploratory study by Urban and Oosthuizen (2009) proposes that the mining industry is a critical role player in the South African economy and that it is faced with major competitive and operational challenges. Some of these challenges were said to include labour and capital productivity as well as the volatility of the Rand. In their study Urban and Oosthuizen (2009) refer to the generalisation that mining companies are bureaucratic in nature which results in an inhospitable environment for creativity and innovation. Urban and Oosthuizen (2009) argue that in line with these challenges a more focused intrapreneurial orientation should be leveraged to maintain a competitive advantage especially within the global context.

In the study by Urban and Oosthuizen (2009), 13 dimensions of corporate entrepreneurship in the South African mining industry were measured using reliable measures from existing literature. Urban and Oosthuizen (2009) conclude that intrapreneurship is not well supported due to the non trivial scores obtained from several of the constructs measured thus making this study a proponent to the generalisation that the mining industry is not supportive of corporate entrepreneurial activities.

Dyduch (2008) conducted a similar study to determine the level of entrepreneurship in ten different Polish sectors which included the coal mining sector. Dyduch (2008) also measured 13 dimensions of corporate entrepreneurship based on existing literature using similar pre existing measurement tools to that of Urban and Oosthuizen (2009). Dyduch (2008) found that the coal mining industry had the lowest level of innovativeness and proactiveness and received the lowest overall score for level of entrepreneurship. Although the contextual differences between South Africa and Poland are apparent, the findings are still of interest as it seems to further support the proposition that the mining industry and in this specific case coal mining is not supportive of corporate entrepreneurial activities.

With regards to the exploration of entrepreneurial orientation, Urban (2008) conducted a study on 315 South African firms to explore the prevalence of entrepreneurial orientation in a developing country. Urban (2008) found significant correlations between

entrepreneurial orientation sub dimensions as well as cross correlations with firm success measures. In line with this finding, Urban (2008) states that “the principles of EO are alive and apply even in a multicultural developing country context” (p. 440). It is important to note however that the sampled population consisted mainly of industrial and commercial machinery (11.1%) as well as metal products (11.4%) and thus despite the study finding positive correlations for EO at the firm level it is not necessarily applicable to the coal mining industry.

Limited research has been conducted on the nature and management of corporate entrepreneurship in enterprises operating in South Africa (Scheepers & Hough 2004). Scheepers et al. (2008) therefore embarked on a study to “ determine whether the salient organisational factors, identified in international corporate entrepreneurship (CE) literature, that nurture CE capability are applicable in the South African context” (p. 50).

Scheepers et al. (2008) found that the dimensions of corporate entrepreneurship capability are most strongly influenced by strategic leadership and support for corporate entrepreneurship, autonomy of employees, and rewards for corporate entrepreneurship which is in support of international studies. Conversely to international corporate entrepreneurship studies, the organisational boundaries measure was not identified as a key internal factor. Based on the study by Scheepers et al. (2008), there seems to be merit for future research in the corporate entrepreneurship arena in the South African context. Scheepers et al. (2008) also propose multiple themes for corporate entrepreneurship studies in the South African context in the future.

2.7. Summary

Corporate Entrepreneurship, an evolutionary concept (Kuratko, 2010), is multi dimensional in nature and as such is best described as a process (Hornsby et al., 1993). The outcome of a successful corporate entrepreneurial process allows firms to be more dynamic (Jaén & Liñán, 2013) and has shown a positive relationship with performance (Bierwerth et al., 2015).

One component of the process is a supportive internal environment for corporate entrepreneurship which serves as an antecedent to a secondary process component, entrepreneurial behaviour (Kuratko et al., 2005). The five dimensions (Hornsby et al.,

2002) of a supportive environment are therefore of interest and can be measured by the CEAI instrument (Kuratko et al., 2014).

Entrepreneurial intensity is proposed to have three dimensions which underlie entrepreneurial behaviour (Morris & Sexton, 1996). Two additional dimensions are proposed to form a five dimension model to describe entrepreneurial orientation which is a measurable proxy of entrepreneurial behaviour (Lumpkin & Dess, 1996). The measurement approach proposed by Hughes and Morgan (2007) is most suitably aligned to measure the dimensions of entrepreneurial orientation (Covin & Wales, 2012). The primary function of entrepreneurial orientation is to enhance financial outcomes (Rauch et al., 2009) and the concept is applicable to both firm and individual levels (Morris & Kuratko, 2002; De Jong et al., 2011; Jaén & Liñán, 2013).

Since middle management plays a central role to entrepreneurial activities and is considered the level in which entrepreneurial opportunities are given the best chance to flourish, this level forms a significant point of interest (Kuratko et al., 2013).

It is proposed that the South African mining industry is not supportive of entrepreneurial activities (Urban & Oosthuizen, 2009). It is also proposed however, that significant correlations between entrepreneurial orientation sub dimensions exist in the South African emerging economy context (Urban, 2008). A study in the Polish coal mining industry, although in a different operational context, has come to similar conclusions (Dyduch, 2008). Studies by Hornsby et al. (2013) and Scheepers et al. (2008) have found that there are significant correlations between the constructs of the internal environment for corporate entrepreneurship and entrepreneurial orientation but warrant further investigation. Despite these findings limited research on the corporate entrepreneurial construct has been performed in South African firms and multiple themes for future research are proposed (Scheepers et al., 2008).

Chapter 3: Research hypothesis

The overarching research question which emerged from the literature was, to determine middle managers' perception of the internal environment for corporate entrepreneurship as well as to determine how this perception relates to their entrepreneurial orientation. Based on the findings of Urban and Oosthuizen (2009) which suggests that the South African mining industry is not supportive of entrepreneurial activities, the first two hypotheses were formed.

3.1. Hypothesis 1

The first hypothesis considers middle managers perception of the five dimensions of an internal environment for corporate entrepreneurship as described by Hornsby et al. (2002). Deducing from Urban and Oosthuizen (2009) these dimensions, when tested using the appropriate instrument, were expected to be non supportive of entrepreneurial behaviour.

H1. Middle managers in the coal mining industry perceive:

H1a: Management support to be non-supportive of entrepreneurial behaviour

H1b: Work Discretion to be non-supportive of entrepreneurial behaviour

H1c: Rewards/Reinforcement to be non-supportive of entrepreneurial behaviour

H1d: Time Availability to be non-supportive of entrepreneurial behaviour

H1e: Organisational Boundaries to be non-supportive of entrepreneurial behaviour

H1f: The Internal Environment for Corporate Entrepreneurship to be non-supportive of entrepreneurial behaviour

3.2. Hypothesis 2

The second hypothesis considers the entrepreneurial orientation of middle managers in the coal mining industry with reference to the five dimensions of entrepreneurial orientation as well as its composite measure (Lumpkin & Dess, 1996; Scheepers et al., 2008).

When the two articles from Urban and Oosthuizen (2009) and Urban (2008) were juxtaposed, it was expected that there would be some degree of entrepreneurial

orientation in the coal mining industry but due to the unsupportive generalisation it was not expected to be high.

H2. Middle managers in the coal mining industry have a low degree of:

H2a: Risk Taking
H2b: Innovativeness
H2c: Proactiveness
H2d: Competitive Aggressiveness
H2e: Autonomy
H2f: Entrepreneurial Orientation

3.3. Hypothesis 3

The last hypothesis considers the relationship between the internal environment for corporate entrepreneurship (Hornsby et al. 2002) and entrepreneurial orientation (Hornsby et al. 2002) at an individual level in the South African mining context. Studies by Hornsby et al. (2013) and Scheepers et al. (2008) have found that there are significant correlations between the two constructs, but warrant further investigation.

H3. Level of entrepreneurial orientation is related to:

H3a: Management Support
H3b: Work Discretion
H3c: Rewards/Reinforcement
H3d: Time Availability
H3e: Organisational Boundaries

Chapter 4: Research methodology and design

4.1. Introduction

This section details the methods that were used for conducting this research. The process diagram in **Appendix 1** shows the consistency flow of the research methodology.

4.2. Research philosophy

Research philosophy is defined as “the overall term that relates to the development of knowledge and the nature of that knowledge in relation to the research work" (Saunders & Lewis, 2012, p. 104). Saunders and Lewis (2012) further differentiate research philosophy into four categories which are: Positivism, Realism, Interpretivism and Pragmatism. **Interpretivism** is defined as "a research philosophy that advocates the necessity to understand differences between humans in their role as social actors" (Saunders and Lewis, 2012, p. 106). Since the study focused on the corporate entrepreneurial behaviours of middle managers and their perspectives on organisational factors, it is clear that Interpretivism was the dominant research philosophy of this study.

4.3. Research design

Induction and deduction are the two research **approaches** proposed by Saunders and Lewis (2012). **Induction** is defined by Saunders and Lewis (2012) as a “research approach which involves the development of theory as a result of analysing data already collected" (p. 109). **Deduction** on the other hand is defined by Saunders and Lewis (2012) as a “research approach that involves the testing of a theoretical proposition by using a research strategy specifically designed for the purpose of its testing" (p. 108).

Both an inductive and deductive approach was followed for different portions of the research. The deductive approach was applicable to the surveys as they are based on existing theory and tools as detailed in the research instrument section which follows. The inductive approach however came into play when the relationships between the outcomes of the two deductive surveys were explored. Saunders and Lewis (2012) explain that it is often a good idea to combine research approaches and that it is incorrect to think that a choice has to be made between the two.

Saunders and Lewis (2012) further explicate the main types of research as:

- **Exploratory -** "research that aims to seek new insights, ask new questions and to assess topics in a new light" (p. 110)
- **Explanatory -** "research that focuses on studying a situation or a problem in order to explain the relationships between variables" (p. 110)
- **Descriptive -** "research designed to produce an accurate representation of persons, events or situations" (p. 111)

In line with these definitions, the survey portions of the study could be classified as descriptive in nature. When the outcomes of the descriptive types were considered in relation to each other the study took on an explanatory dimension.

4.4. Research instruments

For this study a combination of two research instruments as well as an open ended questioning approach was used. Both instruments that were used are **quantitative** in nature and took the form of a standardised questionnaire which was administered through an online survey. Saunders and Lewis (2012) define a survey as “a research strategy which involves the structured collection of data from a sizeable population; data collection may take the form of questionnaires, structured observation and structured interviews” (p. 115). The section containing open ended questions also formed part of the survey but was **qualitative** in nature as it required respondents to type their own proposed answers to the questions which were posed.

4.4.1. Assessing the internal environment for corporate entrepreneurship

In researching the internal environment for corporate entrepreneurship component, the instrument employed was the Corporate Entrepreneurship Assessment Instrument (CEAI) (Kuratko et al., 2014). The CEAI instrument is an evolution of various instruments including the Intrapreneurial Assessment Instrument (IAI) developed by Kuratko et al. (1990) and later refined by Hornsby et al. (2002). It considers the five influential dimensions as explained by Hornsby et al. (2002) (rewards, management support,

resources, organisational structure and risk taking) to measure middle managers' perception of the internal entrepreneurial environment. The instrument is aimed at individuals and uses aggregation to determine organisational characteristics.

A study by Hornsby et al. (2013) used Hinkin's (1998) framework to assess the content as well as the structural and convergent validity of the CEAI instrument. In line with these validity checks and proposed refinements, the CEAI instrument as put forward by Kuratko et al. (2014) was developed. Since this is a copyright instrument, the necessary approval had to be obtained from the authors for its use in this research. Written permission to allow use of the instrument was granted by Dr. Kuratko via email correspondence.

4.4.2. Assessing entrepreneurial orientation

The instrument that was used for assessing individual middle managers' entrepreneurial orientation is an adaptation of the instrument proposed by Hughes and Morgan (2007). The instrument developed by Hughes and Morgan (2007) considers the five constructs of entrepreneurial orientation (innovativeness, risk taking, proactiveness, autonomy and competitive aggressiveness) as proposed by Lumpkin and Dess (1996). Covin and Wales (2012) also support this instrument to be a valid entrepreneurial orientation assessment instrument and conclude that it has a high degree of reliability.

An adaptation to the instrument was however required due to the fact that its normal form requires respondents to provide answers at the organisational level. This was a problem as this study required entrepreneurial orientation to be measured at the individual manager level. It is argued (Jaén & Liñán, 2013; De Jong et al., 2011; Morris & Kuratko, 2002) that the entrepreneurial orientation measure at the organisational level is just as applicable at the individual level. This is due to the construct of the individual in the seminal work upon which the entrepreneurial orientation concept is based. In line with this precept, the question set as put forward by Hughes and Morgan (2007) was adapted such that questions were directed to the individual rather than to the organisation. This approach was adopted because unlike other individual entrepreneurship assessment instruments, this instrument was specific to corporate entrepreneurship. With this in mind, it was recognised that organisational characteristics

could still be determined through the aggregation of individual scores, as was the case with the CEAI instrument.

4.5. Exploratory qualitative questions

In addition to the instruments above, a section which contained open ended questions was included in the survey. This allowed respondents to express their views on their firm's internal environment as well as on their own entrepreneurial orientation. The information gleaned from the open ended questions was used to establish congruence to the research instruments as well as gain additional insights into possible relationships.

4.6. Unit of analysis

Since this study was aimed at the individuals within the organisation it was middle managers which formed the source of the data and hence formed the level of measurement. The responses which were gathered from individuals were then aggregated in order to perform statistical analysis at an organisational level which thus formed the level of analysis.

4.7. Population and sampling

Population is defined as "the complete set of group members" (Saunders & Lewis, 2012, p. 132). Since this study is concerned with coal mining in South Africa, the relevant population for this study was all middle managers in all disciplines in the South African coal mining industry.

An important assumption was made about the population so as to ensure a practical and representative sample could be obtained. The assumption was that South African Coal Mining companies are largely homogeneous in their modes of operation. This assumption was based primarily on the precept that all South African Coal Mining companies are legally required to comply with the *Mine Health and Safety Act and Regulations 1996* (SA) which has very rigid implications and requirements for management structures and operational practices. Other factors that support this assumption are the similarities in mining methods and equipment which are evident in the formation of collaborative associations such as the South African Colliery Managers Association (SACMA) and the South African Colliery Engineers Association (SACEA) of

which all major coal companies are members. The risk to this assumption was that cultural differences between companies were ignored which may have been a limitation to the research.

Based on this assumption, it was therefore decided that only middle managers from one of the major companies to which research access was available be selected as the sampling frame. Saunders and Lewis (2012, p. 133) defines a sampling frame as "the complete list of all the members of the total population. You select the sample from this list when using probability sampling". In the chosen company the constitution of middle management was clarified through the specific company's organisational level differentiating scale. This was very useful as the scale very clearly differentiates between senior, middle and lower management. To get access to the desired population it was necessary to obtain the required authorisation from the CEO of the relevant company.

Since a complete list of the sampling frame was available, it was decided that the survey would be sent to all the members within the sampling frame. This ensured a representative sample without the need for simple random sampling. Having followed this process to conduct the research it was seen that the sampling method was essentially purposive in nature and that it may have had an impact on the results obtained as described before.

4.8. Sample size

To determine the minimum sample size the equation proposed by Fidell and Tabachnick (2006) for a valid regression model was used:

$$n > 50 + 8m$$

Where

n = Minimum sample size

m = Number of independent variables

When considering the regression hypothesis (H3), it was seen that the five elements of the CEAI assessment constitute the independent variables and that EO as a composite

measure would form the dependent variable. As such a minimum sample of **90** respondents was required to perform a successful regression model.

4.9. Survey distribution (data gathering process)

The research questionnaire composition was informed by, the two previously discussed instruments, a set of open ended questions and a set of demographic questions. The questionnaire was created on the online survey distribution platform called Survey Monkey and the actual questionnaire used can be seen in **Appendix 2**. After a hyperlink had been created to grant access to the survey the hyperlink was distributed to the selected sampling frame. Since access had been granted to all the individuals in the sampling frame the hyperlink was distributed via an email.

A response period of three weeks was given to respondents and it was observed that the majority of the responses were received within the first five days. On the last week a reminder email was sent to all respondents which assisted to ensure that the required sample size could be met. An email was deemed to be a reliable delivery mechanism as it was the same mechanism though which all middle managers receive and distribute company communications on a daily basis.

4.10. Statistical analysis

The data from each of the instruments described above was subjected to a descriptive and inferential statistical analysis which was sufficient to obtain the results required from the instruments.

4.10.1. Sequential multiple regression

A sequential multiple regression analysis (Pallant, 2005) was performed to assess the relationship between the internal environment for corporate entrepreneurship and entrepreneurial orientation. A sequential multiple regression analysis was advantageous in that the sequence of regression could be determined based on preliminary findings from descriptive statistics (Fidell & Tabachnick, 2006).

The standard multiple regression equation (Salkind, 2012) is shown below:

$$Y = a + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_p X_p$$

Where:

- Y = Dependent variable
- a = Constant or intercept
- X = Independent variables
- β = Coefficient of independent variables

The β coefficient for an independent variable is the measure of how much the dependent variable will change in relation to the relevant independent variable. The description above is accurate provided that the relationships between variables are statistically significant. SPSS was used as a statistical tool to analyse the data collected such that the β coefficients could be determined and tested for significance.

4.10.2. Multiple regression assumptions

For the regression analysis to be valid, it was required that the sample data adhere to certain assumptions (Fidell & Tabachnick, 2006). The assumptions as well as their description and verification method are shown in Table 1.

Table 4 : Multiple regression assumptions (Pallant, 2005)

Assumption	Explanation	Requirement
Outliers and leverage	Standardised residual values above 3.3 or -3.3 standard deviations	-3.3 < SD < 3.3 Case wise diagnostics Cooks distance < 1 Leverage < 0.5
Normality	The residuals should be normally distributed about the predicted dependent variable scores	Normal distribution plot P- P Plot points lie close to line of best fit
Linearity	The residuals should have a straight-line relationship with	Standardised residuals against standardised

	predicted dependent variable scores	predicted values should be roughly square
Homoscedasticity	The variance of the residuals about predicted dependent variable scores should be the same for all predicted scores	Standardised residuals against standardised predicted values should be roughly square
Independence of residuals	Residuals are independent of each other	Durbin-Watson ≈ 2
Multicollinearity	Correlation of independent variables required to be low	Correlation smaller than 0.7 Tolerance larger than 0.1

Chapter 5: Results

5.1. Introduction

This chapter presents the results that have been obtained from the data collection and analysis process. The sections included are survey response rates, demographic results, descriptive statistics, reliability and consistency tests and lastly inferential statistics used for hypothesis testing.

5.2. Survey response rates

A sampling technique was used whereby surveys were sent out to the total designated sampling frame of 350 respondents. Only 148 of the distributed surveys were attempted and of these 35 were removed due to unsatisfactory completion. Therefore only 113 surveys were eligible to be used for further data analysis on the CEAI Assessment and of those only 108 could be used for data analysis on entrepreneurial orientation. The open ended question section was only completed by 76 respondents.

The determination of the amount of responses required was informed by the number of independent variables (Fidell & Tabachnick, 2006) to be used in the regression analysis. Since five independent variables were to be observed, a total survey sample of 90 respondents was required. As such the minimum response requirement was met and the data could be used for further analysis. Due to the online platform in which the data was collected it first had to be exported into MS Excel and then converted into a format that was compatible for data analysis.

5.3. Demographic results

5.3.1. Gender

Figure 3 displays the gender distribution of the respondents and it is observed that the majority of respondents (80%) were male. This result was expected due to the predominantly male occupied mining environment.

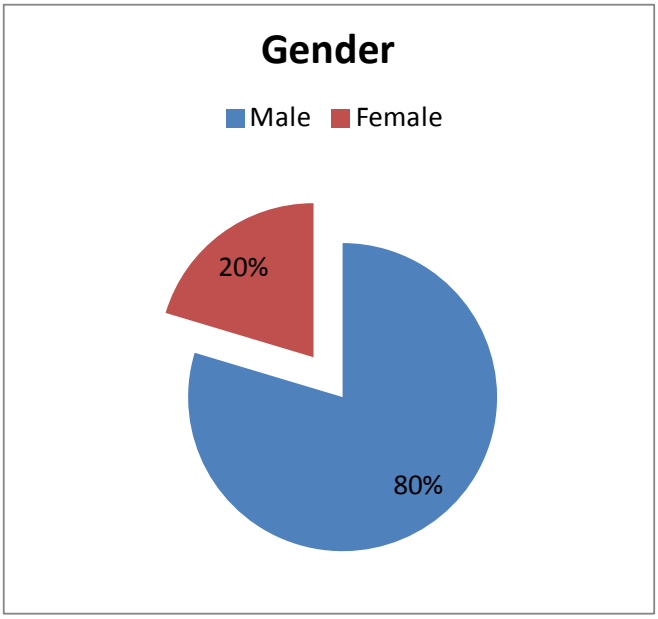

Figure 3 : Respondent gender distribution

5.3.2. Age

Figure 4 illustrates that the bulk of respondents fell into the 31 to 40 year old age category (34%). This group was followed by the 41 to 50 year old age group (24%) and the remainder of the respondents constituted the 51 to 60 (21%) and 24 to 30 (20%) year old age groups.

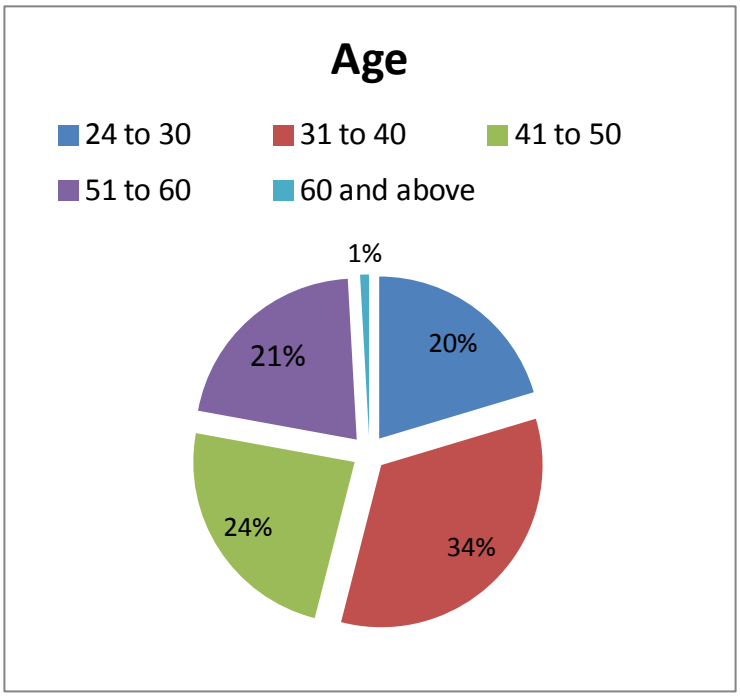

Figure 4 : Respondent age distribution

5.3.3. Ethnicity

Figure 5 illustrates that the majority of respondents were White (67%), with the second largest group being Black (29%) and only a small percentage of Indian (2%) and Coloured (2%) respondents.

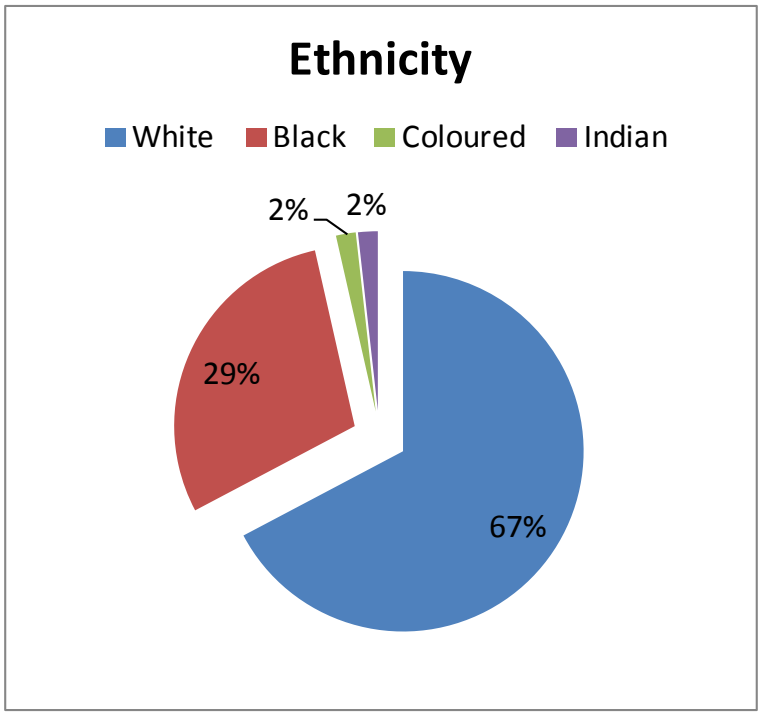

Figure 5: Respondent ethnic distribution

5.3.4. Highest qualification

Figure 6 illustrates that the majority of respondents had either an undergraduate degree (26%) or a diploma (26%). There were also a high percentage of respondents with post graduate degrees (22%).

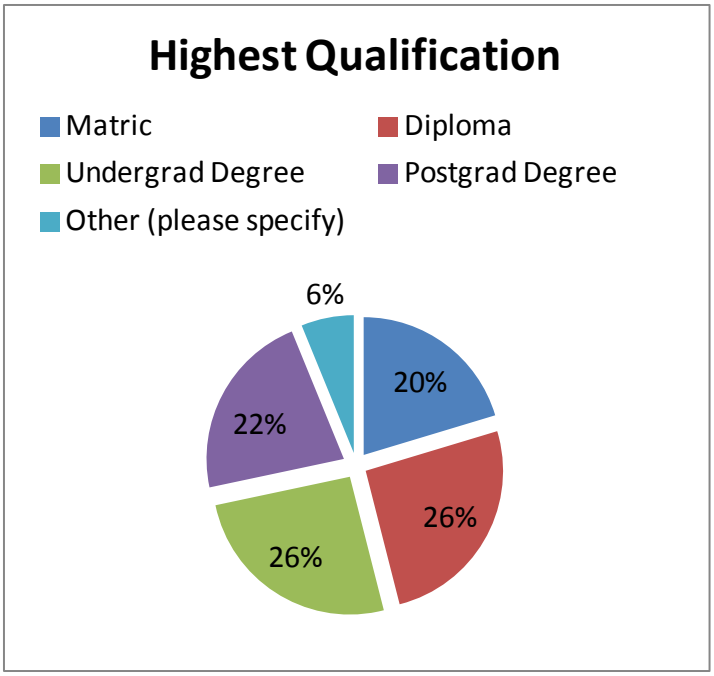

Figure 6 : Respondent qualification distribution

5.4. Internal consistency and reliability tests

To ensure the collected data was consistent and reliable, it was first subjected to a reliability test in which a Cronbach's alpha (α) of 0.7 (DeVellis, 2011) was required for the data to be considered for further analysis.

5.4.1. Corporate entrepreneurship assessment instrument (CEAI)

The Cronbach's alpha values for the CEAI assessment elements are detailed in Table 5. It was observed that management support (0.891) and rewards and reinforcement (0.739) both exceeded the requirement of 0.7. Work discretion had to have one question discarded to reach an acceptable value (0.823). Time availability only achieved a maximum reliability value of 0.69 which does not reach the 0.7 requirement but is only out by 0.01 which was accepted for the analysis. Organisational boundaries proved to be a concern with an initial reliability value of 0.332. This low value was believed to be due to the fact that the majority of negatively worded items formed part of this section. The result was consistent with arguments from van Wyk and Adonisi (2011) as well as Hornsby et al. (2013). The removal of one question however resulted in the significant increase of the reliability value to 0.669. This value also did not reach the 0.7

requirement but was accepted for the analysis due to very minor deviation. The details of all the reliability tests that were performed in SPSS are given in **Appendix 3**.

Table 5 : CEAI assessment reliability results

CEAI Element	Required α	Actual α	Modified α *
Management Support	0.7	0.891	-
Work Discretion	0.7	0.692	0.823 (WD1 Removed)
Rewards and Reinforcement	0.7	0.739	-
Time Availability	0.7	0.690	Cant remove any components for a better score
Organisational Boundaries	0.7	0.332	0.669 (OB 5 Removed)

***** Modified alpha was derived from the removal of a component from the analysis to yield an α which is approximately 0.7 or higher

5.4.2. Entrepreneurial orientation (EO) assessment

The Cronbach's alpha values for the EO assessment elements are detailed in Table 6. It was observed that all of the five elements significantly exceeded the requirement of 0.7. The details of all the reliability tests that were performed in SPSS are given in **Appendix 4**.

Table 6 : EO assessment reliability results

Orientation Element	Required α	Actual α	Modified α *
Risk Taking	0.7	0.940	-
Innovativeness	0.7	0.920	-
Proactiveness	0.7	0.908	-
Competitive Aggressiveness	0.7	0.894	-
Autonomy	0.7	0.877	-

***** Modified alpha was derived from the removal of a component from the analysis to yield an α which is approximately 0.7 or higher

5.5. Descriptive statistics

5.5.1. CEAI assessment scores

To determine the score achieved by each of the respondents the following process was followed. The scores assigned to each of the 46 questions (WD1 and OB5 removed) by respondents were added together to arrive at a total score. This total score per respondent would fall between a minimum of 46 and a maximum of 230 due to the use of a five point Likert scale. These individual total scores were then aggregated to yield the descriptive statistics as shown in Table 7.

Table 7 : CEAI assessment descriptive statistics

Descriptive	CEAI Assessment Score
Mean	133.8053
Std. Error of Mean	1.83522
Median	134.0000
Std. Deviation	19.50863
Skewness	.184
Range	109.00
Minimum	85.00
Maximum	194.00

Since a five point Likert scale was used for the sampling, the choice of “not sure” or 3 for a question signified a neutral answer. The neutral mean could therefore be calculated as the number of questions (46) multiplied by three, which yielded a neutral mean for the CEAI assessment of 138. Solely from looking at the descriptive statistics, it was observed that the mean achieved was lower than the neutral mean. This would suggest that middle managers perceive the internal environment as unsupportive of entrepreneurial activity. This finding was however statistically tested for in the inferential statistics section which follows. It was further observed in Figure 7 that the results achieved seem to be normally distributed and this was supported by a skewness value of 0.184 as shown in Table 8.

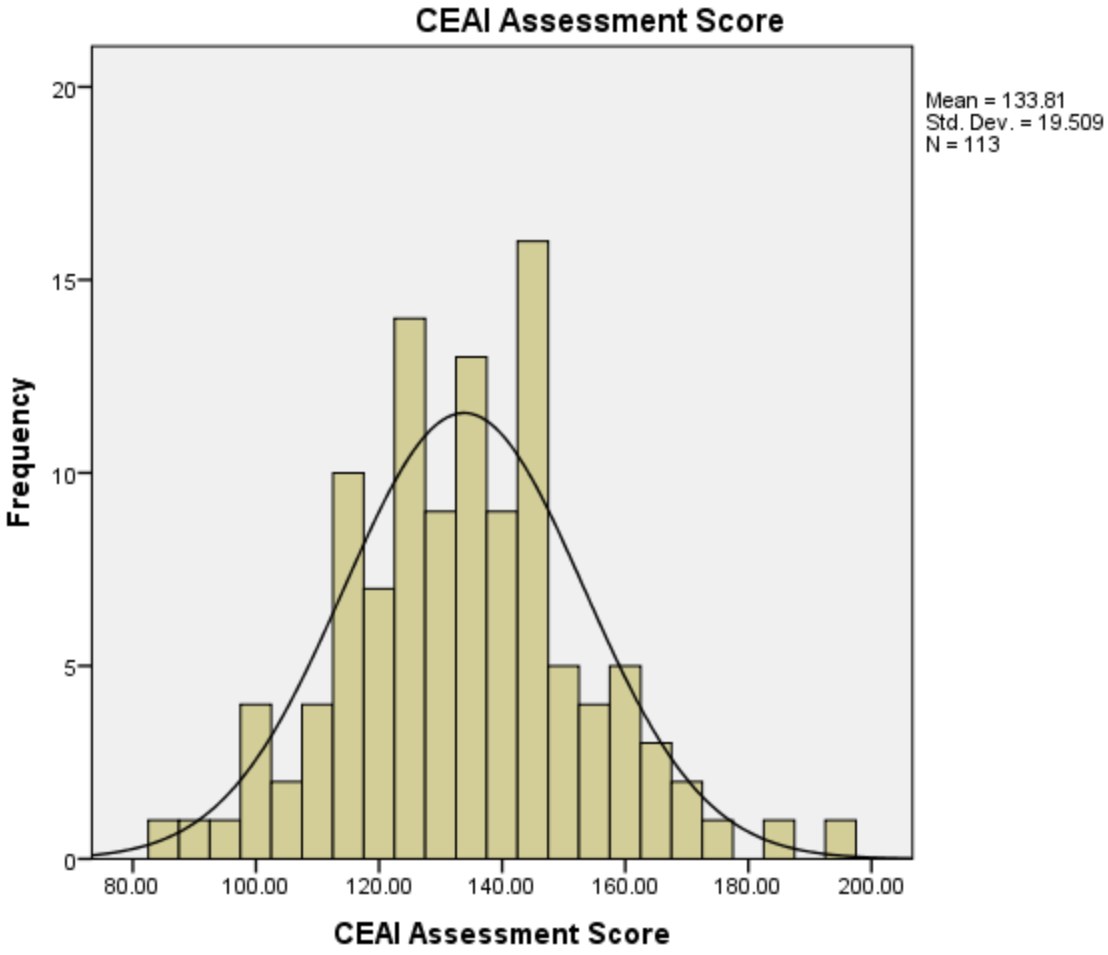

Figure 7 : CEAI assessment respondent score distribution

Table 8 : CEAI assessment skewness assessment

	Required	Actual	Comment
Check for Normality	-0.5<skewness<0.5	0.184	Adequately Normal

Since the CEAI assessment was comprised of five distinctive elements it was also possible to obtain a normalised score for each of the five elements. To arrive at the normalised score of each element the following process was pursued. The scores assigned by respondents to each of the questions in the specific element were added together to arrive at a total score for the element. The total score was then divided by the number of questions in that element to arrive at a normalised score. Management support for example had a total of 19 questions and hence the total score achieved for

each respondent was divided by 19 to achieve a normalised score. These scores were then averaged for all 113 respondents to arrive at an element specific normalised score. The normalised score (out of five) for each of the elements can be seen in Figure 8.

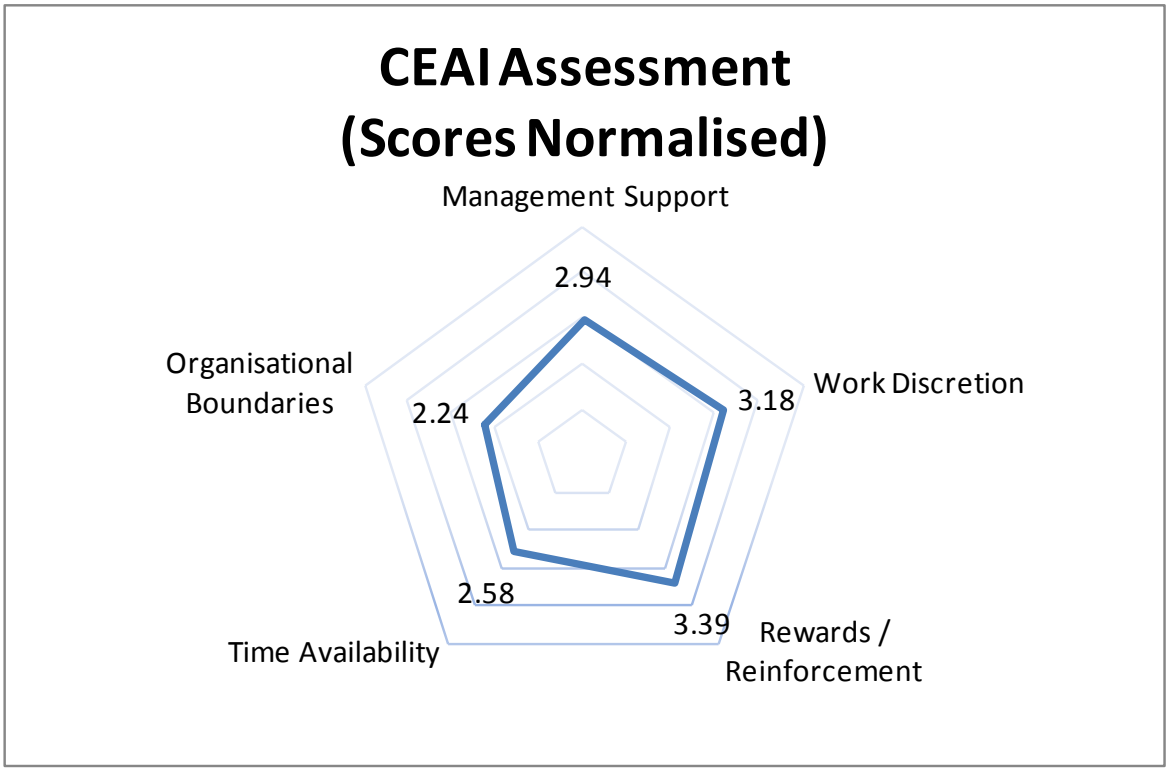

Figure 8 : Normalised CEAI assessment element scores

Since a score of three was a neutral answer, scores higher than three would suggest that the specific element was supportive of the internal environment for entrepreneurial activity and vice versa. Hence it was seen that management support (2.94), organisational boundaries (2.24) and time availability (2.58) were all lower than three suggesting an unsupportive environment. This was however statistically tested for in the inferential statistics section which follows.

5.5.2. Entrepreneurial orientation scores

To determine the score achieved by each of the respondents the following process was followed. The scores assigned to each of the 18 questions of the entrepreneurial orientation assessment by respondents were added together to arrive at a total score. This total score per respondent would fall between a minimum of 18 and a maximum of 90 due to the use of a five point Likert scale. These individual total scores when aggregated yielded the descriptive statistics as shown in Table 9.

Table 9: Entrepreneurial orientation descriptive statistics

Descriptive	EO Assessment Score
Mean	66.8796
Std. Error of Mean	.74486
Median	67.0000
Std. Deviation	7.74080
Skewness	.053
Range	46.00
Minimum	44.00
Maximum	90.00

As with the CEAI assessment, a five point Likert scale was used for the sampling and thus the choice of “not sure” or 3 for a question signified a neutral answer. The neutral mean could therefore be calculated as the number of questions (18) multiplied by three, which yielded a neutral mean for the EO assessment of 54. Solely from looking at the descriptive statistics it was observed that the mean achieved is significantly higher than the neutral mean which would suggest that middle managers have a high degree of entrepreneurial orientation. This was however statistically tested for in the inferential statistics section which follows. It was further observed in Figure 9 that the results achieved seem to be normally distributed and this was supported by a skewness value of 0.053 as shown in Table 10.

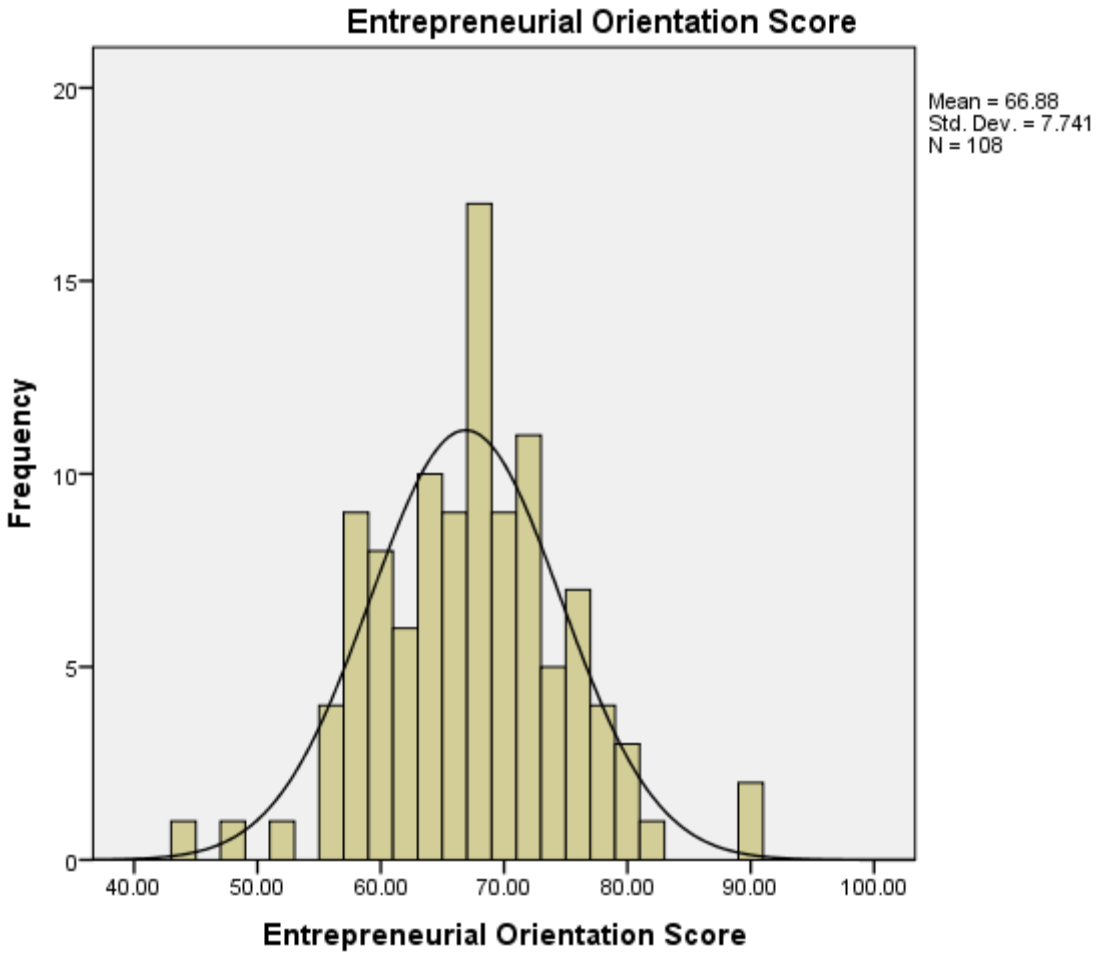

Figure 9 : Entrepreneurial orientation assessment respondent score distribution

Table 10 : Entrepreneurial orientation assessment skewness assessment

	Required	Actual	Comment
Check for Normality	-0.5<skewness<0.5	0.053	Adequately Normal

Since the Entrepreneurial Orientation assessment was comprised of five distinctive elements, it was also possible to obtain a normalised score for each of the five elements. To determine these scores the same process as described for the CEAI assessment was followed. The normalised score (out of five) for each of the elements can be seen in Figure 10.

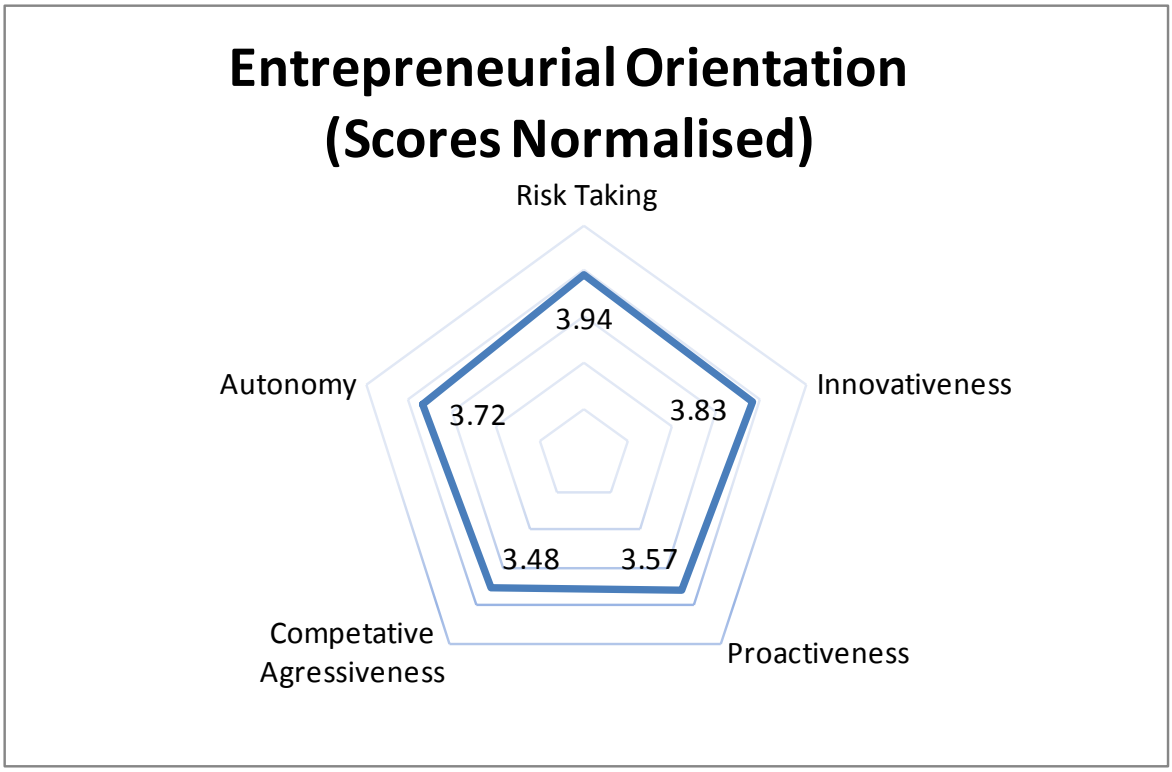

Figure 10: Normalised entrepreneurial orientation assessment element scores

Since a score of three was a neutral answer, scores higher than three would suggest that the specific element was supportive of middle managers with a high degree of entrepreneurial orientation. Hence it was seen that all the elements are significantly higher than three, which would suggest that middle managers have a high degree of entrepreneurial orientation. This was however statistically tested for in the inferential statistics section which follows.

5.6. Inferential statistics

5.6.1. CEAI assessment

To test the statistical significance of each of the five CEAI elements as well as the composite CEAI score, a five step hypothesis testing process (Wagner, 2013) was followed and is described below.

Step1: Formulate the null and alternative hypothesis

From the research hypotheses:

H1. Middle managers in the coal mining industry perceive:

H1a: Management Support to be non-supportive of entrepreneurial behaviour

H1b: Work Discretion to be non-supportive of entrepreneurial behaviour

H1c: Rewards/Reinforcement to be non-supportive of entrepreneurial behaviour

H1d: Time Availability to be non-supportive of entrepreneurial behaviour

H1e: Organisational Boundaries to be non-supportive of entrepreneurial behaviour

H1f: The Internal Environment for Corporate Entrepreneurship to be non-supportive of entrepreneurial behaviour

Since a five point Likert scale was used for the sampling the choice of "not sure" or 3 for a question signified a neutral answer. The neutral mean could therefore be calculated as the number of questions per element multiplied by three. A sample mean higher than this number would be supportive of the hypothesis and vice versa would be non supportive. In line with this argument Table 11 could be created.

Table 11 : CEAI neutral mean

CEAI Element	No of Questions	Neutral Mean
Management Support	19	57
Work Discretion	9*	27
Rewards/Reinforcement	6	18
Time Availability	6	18
Organisational Boundaries	6*	18
Composite Score	46*	138

* Indicates where questions were removed to improve reliability (WD1 and OB5) as per reliability analysis

With the neutral mean established for each element, the null and alternate hypothesis could then be defined as shown in Table 12 below:

Table 12 : Null and alternate hypotheses

CEAI Element	Null Hypothesis H_0	Alternative Hypothesis H_1
Management Support	**$\mu \geq 57$**	**$\mu < 57$**

Work Discretion	**μ ≥ 27**	**μ < 27**
Rewards/Reinforcement	**μ ≥ 18**	**μ < 18**
Time Availability	**μ ≥ 18**	**μ < 18**
Organisational Boundaries	**μ ≥ 18**	**μ < 18**
Composite Score	**μ ≥ 138**	**μ < 138**

Step 2: Identify the regions of rejection and non-rejection of H0 using α = 0,05 (95% confidence interval)

Due to the parameters shown in Table 12 the hypothesis test was classified as a one-sided lower-tailed test. With such a test the null hypothesis will be rejected in favour of H1 only when the sample mean evidence is significantly below the neutral mean. Since the sample frame members were known but the total population size was unknown, the t-test statistic was used for this analysis as shown in Figure 11.

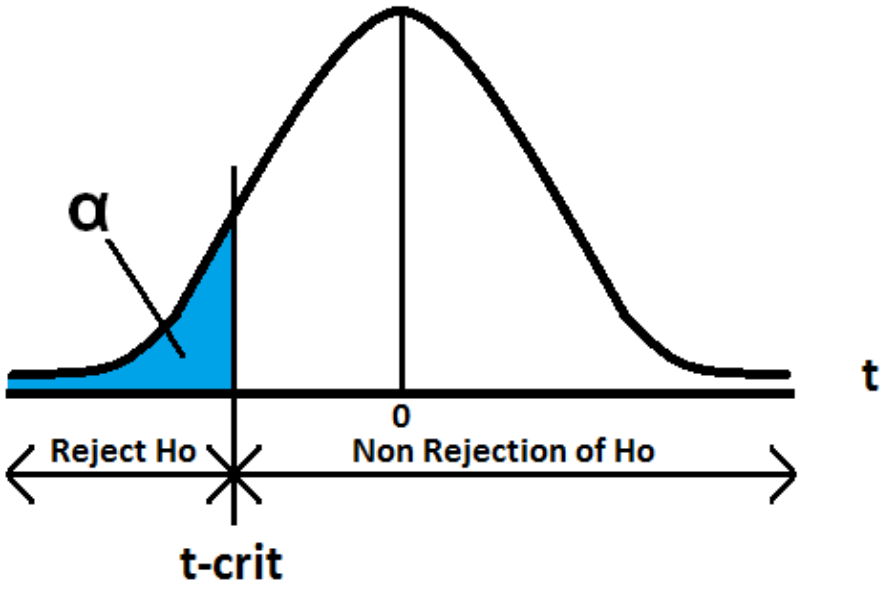

Figure 11 : Lower sided t-test

To determine t-crit the MS Excel built in software functionality (TINV) was used to arrive at a t-crit value which was the same for all the elements as can be seen in Table 13 below:

Table 13 : t statistic critical value

CEAI Element	n	α	t-crit
Management Support	113	0.05	-1.658
Work Discretion			
Rewards/Reinforcement			
Time Availability			
Organisational Boundaries			
Composite Score			

Step 3: Compute the sample test statistic t-stat

Next the test statistic (t-stat) was calculated for each element by using the formula as shown below:

$$t - stat = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$$

Where:

$\bar{x} = sample\ mean$

$s = sample\ standard\ deviation$

$n = sample\ size$

$\mu = single\ mean$

(Wagner, 2013, p. 200)

The results obtained are shown in Table 14 below:

Table 14 : Sample test statistic t-stat

CEAI Element	Mean	Std Dev	n	Std Err	t-stat
Management Support	55.867	11.400	113	1.072	-1.056
Work Discretion	28.664	6.250	113	0.588	2.830
Rewards/Reinforcement	20.354	4.177	113	0.393	5.991
Time Availability	15.460	4.112	113	0.387	-6.565

Organisational Boundaries	13.460	3.694	113	0.347	-13.065
Composite Score	133.805	19.509	113	1.835	-2.286

Step 4: Compare sample evidence (t-stat) to decision rule for H0 (t-crit)

With t-crit and t-stat computed, it was possible to determine if t-stat falls within the region of rejection or the region of non rejection and the results of this assessment are detailed in Table 15 below:

Table 15 : CEAI assessment sample evidence comparison

CEAI Element	t-crit	t-stat	Result	Decision
Management Support	-1.658	-1.056	t-crit < t-stat	Since t-stat falls in the region of non-rejection of H0, there was insufficient sample evidence at the 5% level of significance to reject H0 in favour of H1.
Work Discretion		2.830	t-crit < t-stat	
Rewards/Reinforcement		5.991	t-crit < t-stat	
Time Availability		- 6.565	t-crit > t-stat	Since t-stat falls in the region of rejection of H0, there was sufficient sample evidence at the 5% level of significance to reject H0 in favour of H1.
Organisational Boundaries		-13.065	t-crit > t-stat	
Composite Score		-2.286	t-crit > t-stat	

Step 5: Hypothesis conclusion

The results from the analysis are summarised as follows:

Table 16 : CEAI hypothesis test summary results

Hypothesis	Element	Bearing on Entrepreneurial Behaviour
H1a	Management Support	Supportive
H1b	Work Discretion	Supportive
H1c	Rewards/Reinforcement	Supportive

H1d	Time Availability	Non-supportive
H1e	Organisational Boundaries	Non-supportive
H1f	Composite Score	Non-supportive

It was seen that even though three of the elements were found to be supportive, the composite score was found to be non-supportive. This was due to the borderline score for management support and the significantly lower scores for the time availability and organisational boundaries elements.

Should it have been chosen to remove the organisational boundaries element from the composite CEAI score due to its marginal reliability acceptance, the following would have been found:

Table 17 : CEAI assessment sample evidence comparison (organisational boundaries element removed)

CEAI Element	t-crit	t-stat	Result	Decision
Composite Score	-1.658	0.173	t-crit < t-stat	Since t-stat falls in the region of non-rejection of H0, there was insufficient sample evidence at the 5% level of significance to reject H0 in favour of H1.

Table 18 : CEAI hypothesis test summary results (organisational boundaries element removed)

Hypothesis	Element	Bearing on Entrepreneurial Behaviour
H1f	CEAI Composite Score	Supportive

5.6.2. Test assumption of homogeneity

Since the study was conducted on several participative coal mines, it was desirable to establish if there was any significant variance in the mean composite CEAI scores obtained for each mine. A result with significant variance would suggest that the initial homogeneity assumption as per section 4.7 does not hold true and would be a factor

that needs to be considered in future research. To statistically test this assumption an ANOVA analysis was conducted.

The null and alternate hypotheses were defined as:

	Null Hypothesis H_0	**Alternative Hypothesis H_1**
Test for Homogeneity	$\mu_1 = \mu_2 = \mu_{3.....}\mu_{10}$ (All means are equal)	At least one μ_i differs

The data from the participating mines was analysed in MS Excel using a single factor ANOVA analysis the output of which can be seen in **Appendix 6**. Since F-stat (= 0.593) < F-crit (= 1.972) and p (= 0.8) >> α (=0.05), there was sufficient sample evidence at the 5% level of significance to accept H0 in favour of H1. Essentially this then statistically confirmed that the initial assumption of homogeneity held true. It must however be mentioned that all participating mines formed part of the same company and that although each is unique all have the same overarching corporate structure and culture. It is therefore suggested that future research be conducted over a wider audience of companies as the results from this research regarding homogeneity are not necessarily applicable to all other coal mining companies.

5.6.3. Entrepreneurial orientation assessment

To test the statistical significance of each of the five entrepreneurial orientation elements as well as the composite EO score, a five step hypothesis testing process (Wagner, 2013) was followed in the same manner as was done for the CEAI assessment.

Step1: Formulate the null and alternative hypothesis

From the research hypotheses:
H2. Middle managers in the coal mining industry have a low degree of:

H2a: Risk Taking
H2b: Innovativeness
H2c: Proactiveness

H2d: Competitive Aggressiveness

H2e: Autonomy

H2f: Entrepreneurial Orientation

Since a five point Likert scale was used for the sampling the choice of “not sure” or 3 for a question signified a neutral answer. The neutral mean could therefore be calculated as the number of questions per element multiplied by three. A sample mean higher than this number would be supportive of the hypothesis and vice versa would be non supportive.

Table 19 : Entrepreneurial orientation neutral mean

Entrepreneurial Orientation Element	No of Questions	Neutral Mean
Risk Taking	3	9
Innovativeness	3	9
Proactiveness	3	9
Competitive Aggressiveness	3	9
Autonomy	6	18
Composite Score	18	54

With the neutral mean established for each element the null and alternate hypothesis could then be defined as shown in Table 20 below:

Table 20 : Null and alternate hypotheses

Entrepreneurial Orientation Element	Null Hypothesis H_0	Alternative Hypothesis H_1
Risk Taking	**$\mu \geq 9$**	**$\mu < 9$**
Innovativeness	**$\mu \geq 9$**	**$\mu < 9$**
Proactiveness	**$\mu \geq 9$**	**$\mu < 9$**
Competitive Aggressiveness	**$\mu \geq 9$**	**$\mu < 9$**
Autonomy	**$\mu \geq 18$**	**$\mu < 18$**
Composite Score	**$\mu \geq 54$**	**$\mu < 54$**

Step 2: Identify the regions of rejection and non-rejection of H0 using α = 0,05 (95% confidence interval)

Due to the parameters shown in Table 20, the hypothesis test was classified as a one-sided lower-tailed test. With such a test the null hypothesis will be rejected in favour of H1 only when the sample mean evidence is significantly below the neutral mean. Since the sample frame members were known but the total population size was unknown, the t-test statistic was used for this analysis as shown in Figure 12.

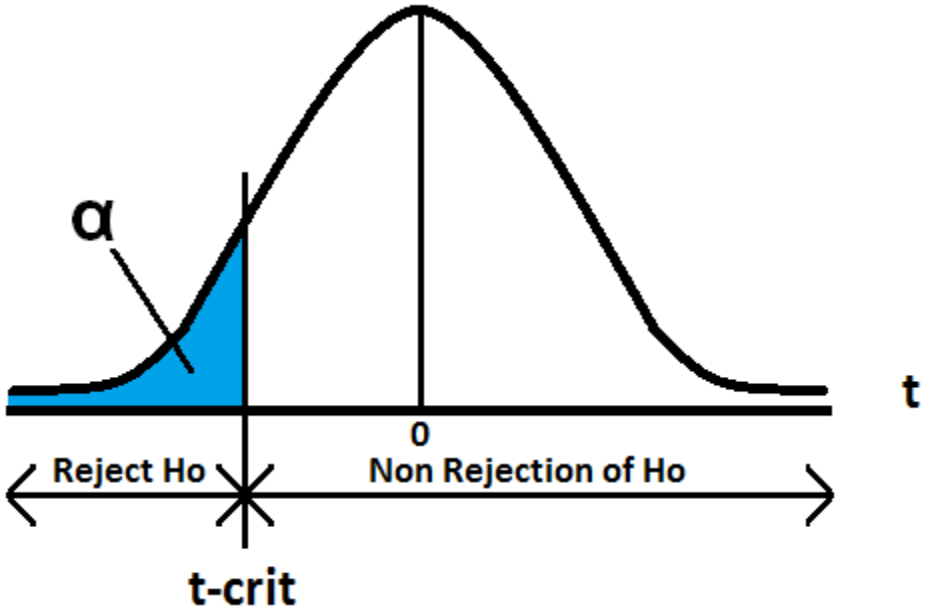

Figure 12 : Lower sided t-test

To determine t-crit the MS Excel built in software functionality (TINV) was used to arrive at a t-crit value which was the same for all the elements as can be seen in Table 21 below:

Table 21 : t statistic critical value

Entrepreneurial Orientation Element	n	α	t-crit
Risk Taking	108	0.05	-1.659
Innovativeness			
Proactiveness			
Competitive Aggressiveness			

Autonomy			
Composite Score			

Step 3: Compute the sample test statistic t-stat

Next the test statistic (t-stat) was calculated for each element by using the same formula as before:

$$t - stat = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$$

The results obtained are shown in Table 22 below:

Table 22 : Sample test statistic t-stat

Entrepreneurial Orientation Element	Mean	Std Dev	n	Std Err	t-stat
Risk Taking	12.000	1.948	108	0.187	16.005
Innovativeness	11.824	1.599	108	0.154	18.352
Proactiveness	11.491	1.649	108	0.159	15.696
Competitive Aggressiveness	10.704	2.424	108	0.233	7.305
Autonomy	20.861	3.753	108	0.361	7.923
Composite Score	66.880	7.741	108	0.745	17.291

Step 4: Compare sample evidence (t-stat) to decision rule for H0 (t-crit)

With t-crit and t-stat computed, it was possible to determine if t-stat falls within the region of rejection or the region of non rejection and the results of the analysis are detailed in Table 23 below:

Table 23: Entrepreneurial orientation assessment sample evidence comparison

Entrepreneurial Orientation Element	t-crit	t-stat	Result	Decision
Risk Taking	-1.659	16.005	t-crit < t-stat	Since t-stat falls in the region of non-rejection of H0, there

Innovativeness		18.352	t-crit < t-stat	is insufficient sample evidence at the 5% level of significance to reject H0 in favour of H1.
Proactiveness		15.696	t-crit < t-stat	
Competitive Aggressiveness		7.305	t-crit < t-stat	
Autonomy		7.923	t-crit < t-stat	
Composite Score		17.291	t-crit < t-stat	

Step 5: Hypothesis conclusion

Hypothesis	Element	Bearing on Entrepreneurial Behaviour
H2a	Risk Taking	Supportive
H2b	Innovativeness	Supportive
H2c	Proactiveness	Supportive
H2d	Competitive Aggressiveness	Supportive
H2e	Autonomy	Supportive
21f	Composite Score	Supportive

5.6.4. Sequential multiple regression relationship analysis

Bivariate correlation analysis

Before the sequential regression analysis was performed, a bivariate correlation analysis as was performed by Hornsby et al. (2013) was conducted. The analysis was done to determine if there were any striking similarities or differences between the results from this study and the study by Hornsby et al. (2013). Table 24 below indicates the results that were obtained from this study as well as the study by Hornsby et al. (2013).

Table 24 : Correlations among the CEAI elements and the EO elements

	Management Support	Work Discretion	Rewards	Time Availability	Organisational Boundaries	CEAI Composite Score
Risk Taking	.104 *.41***	.204* *.14***	.028 *.10***	.083 *.11***	-.093	.133 *.28***
Innovativeness	.230* *.32***	.264** *.14***	.144 *.09**	.109 *.05*	-.176	.240* *.21***
Proactiveness	.199* *.31***	.208* *.11***	.003 *.22***	.143 *.11***	-.061	.203* *.28***
Competitive Aggressiveness	.270**	.199*	.060	.175	-.038	.264**
Autonomy	.495**	.517**	.347**	.180	-.347**	.504**
EO Composite Score	.441** *.45***	.463** *.17***	.224* *.15***	.216* *.13***	-.253**	.453** *.32***

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

(Hornsby et al., 2013, p.951, Table 5)

Drawing on the convention used by Hornsby et al. (2013), the correlations in the table above which are statistically significant can be interpreted as follows:

Table 25 : Correlation convention

Correlation Range	Correlation Interpretation
r < .20	Small
.20 < r < .45	Moderate
.45 < r	Large

Based on this convention the following observations were made. The correlations for the CEAI and EO composite scores were large (.453) compared to the moderate (.32) obtained by Hornsby et al. (2013). The correlation between EO and management support was large (.441) and was consistent with the large (.45) from Hornsby et al. (2013). The correlation between the EO composite score and work discretion was also large (.463) but was not consistent with the small (.17) from Hornsby et al. (2013). Another correlation that should be noted is that of risk talking and management support

which is small (.104) whereas for Hornsby et al. (2013) it was large (.41). When looking at the elements that were not included in the analysis by Hornsby et al. (2013), it was found that management support (.495), work discretion (.517) and the CEAI composite score (.504) were all found to have large correlations with autonomy.

Based on the results of the analysis, it was expected that the sequential multiple regression analysis would find a relationship between the EO composite measure, management support and work discretion. As such the sequential multiple regression analysis was conducted such that management support and work discretion formed the initial iteration in the regression sequence. This ability demonstrated the advantage of having used this approach through allowing for the observation of the contribution effect of each of the different elements.

Regression analysis

The regression relationship analysis was performed to test the hypotheses as detailed below:

H3. Level of entrepreneurial orientation is related to:

- ***H3a:*** Management Support
- ***H3b:*** Work Discretion
- ***H3c:*** Rewards/Reinforcement
- ***H3d:*** Time Availability
- ***H3e:*** Organisational Boundaries

As seen from the hypotheses above, the five elements of the CEAI Assessment were used as predictor or independent variables and the composite EO score was designated as the dependent variable. The data from the survey was entered into SPSS where a sequential multiple regression was performed.

Before the results could be investigated, it was first necessary to test the validity of the regression assumptions (Pallant, 2005). This test was required to ensure the reliability of the regression model and the requirements as well as outcomes can be seen in Table 26.

Table 26 : Multiple regression assumptions (Pallant, 2005)

Assumption	Explanation	Requirement	Result
Outliers and leverage	Standardised residual values above 3.3 or -3.3 standard deviations	-3.3 < SD < 3.3 Case Wise Diagnostics Cooks distance < 1 Leverage < 0.5	One case (61) was found to be an outlier but due to the maximum value of cooks distance of 0.2<<1 it is concluded that it does not have a significant impact on the model. **(As seen in Appendix 5.1)** Leverage values = 0.197 << 0.5 Cooks distance = 0.2 << 1 **(As seen in Appendix 5.2)**
Normality	The residuals should be normally distributed about the predicted dependent variable scores	Normal distribution plot P- P Plot points lie close to line of best fit	Histogram with superimposed normal curve seen to be roughly normal, P-P plot points are seen to lie very close to the best fit line **(As seen in Appendix 5.3)**
Linearity	The residuals should have a straight-line relationship with predicted dependent variable scores	Standardised Residuals against Standardised Predicted Values should be roughly square	Actual plot used standardised residuals against standardised predicted values and was found to be roughly square **(As seen in Appendix 5.4)**
Homoscedasticity	The variance of the	Standardised	Actual plot used

	residuals about predicted dependent variable scores should be the same for all predicted scores	Residuals against Standardised Predicted Values should be roughly square	standardised residuals against standardised predicted values and was found to be roughly square. Further supported by the residual mean of (-.01827) which is very close to zero **(As seen in Appendix 5.4)**
Independence of residuals	Residuals are independent of each other	Durbin-Watson ≈ 2	Durbin-Watson = 2.343 **(As seen in Appendix 5.5)**
Multicollinearity	Correlation of independent variables	Correlation smaller than 0.7 Tolerance larger than 0.1	All Correlation < 0.7 All Tolerance > 0.1 **(As seen in Appendix 5.6)**

With all the assumptions met, it was then possible to draw inferential results from the regression analysis and these can be seen in Table 27 below:

Table 27 : Sequential multiple regression results

Explanatory Variables	Dependent Variable – Entrepreneurial Orientation	
	Model 1 (MS + WD) β Coefficient	Model 2 (ALL) β Coefficient
Management Support	.242 **	.280 **
Work Discretion	.307 ***	.361 ***
Rewards/Reinforcement		-.215 *
Time Availability		.032
Organisational Boundaries		-.095
R^2	.248	.273

Adjusted R^2	.234	.238
Levels of significance:	* indicates p < 0.1 ** indicates p < 0.05 *** indicates p < 0.01 **** indicates p < 0.001	

Model 1 tested the regression relationship with only management support and work discretion as predictor variables and entrepreneurial orientation as the dependent variable. Both predictor variables were found to have a statistically significant relationship as was the case with the correlation analysis before.

Model 2 tested all the CEAI elements as predictors with entrepreneurial orientation as the dependent variable. It was again found that a significant positive statistical relationship exists for management support and work discretion. Rewards and reinforcement was found to have a somewhat significant statistical relationship. The remaining two elements did not however have a statistical relationship with EO.

Having done the sequential multiple regression, it is seen that the increase in the coefficient of determination (R^2) is a mere 0.025 when all the predictor variables are included in the analysis.

Summary of results for hypothesis 3

Table 28 : Summary of regression results

Hypothesis	Result	Conclusion
H3a: Management Support is related to level of entrepreneurial orientation	Significant (p < 0.05), H3a is supported	Management support **is related** to level of entrepreneurial orientation
H3b: Work Discretion is related to level of entrepreneurial orientation	Significant (p < 0.01), H3b is supported	Work Discretion **is related** to level of entrepreneurial orientation
H3c: Rewards/Reinforcement is related to level of entrepreneurial orientation	Significant (p < 0.1), H3c is supported	Rewards/Reinforcement **is related** to level of entrepreneurial orientation

H3d: Time Availability is related to level of entrepreneurial orientation	Not Significant, H3d is not supported	Time Availability **is not related** to level of entrepreneurial orientation
H3e: Organisational Boundaries is related to level of entrepreneurial orientation	Not Significant, H3e is not supported	Organisational Boundaries **is not related** to level of entrepreneurial orientation

5.6.5. Exploratory analysis

Three open ended questions were asked as part of the exploratory component of the research and are shown below:

1. *What do you think your firm needs to do so that you can behave in a corporate entrepreneurial manner?*
2. *What behaviours do you think are required for a person to be a corporate entrepreneur?*
3. *What would cause you to start/continue acting in a corporate entrepreneurial manner?*

Each of the answers given by respondents in the survey was categorised into the existing CEAI or EO elements and where new elements could be recorded due to high frequency occurrences this was done. The supplementary elements that had been suggested for both the CEAI and EO instruments are indicated in Table 29 below:

Table 29 : Supplementary elements suggested by respondents

Question 1 (Suggested Supplementary CEAI Elements)	Question 2 (Suggested Supplementary EO Elements)	Question 3 (Any other Suggested Supplementary Elements)
• Communication • Individual Development • Organisational Culture	• Positive Attitude Behaviour • Opportunistic Behaviour • Inquisitive Behaviour • Collaborative Behaviour	No new elements were recorded as all of the answers could be categorised into one of the elements that had already existed or had been recorded as an additional

	• Persevering Behaviour • Persuasive Behaviour	element above.

By counting the amount of times each element was cited as a relevant aspect in the survey, it was possible to construct a histogram for each question and these are illustrated in the graphs that follow:

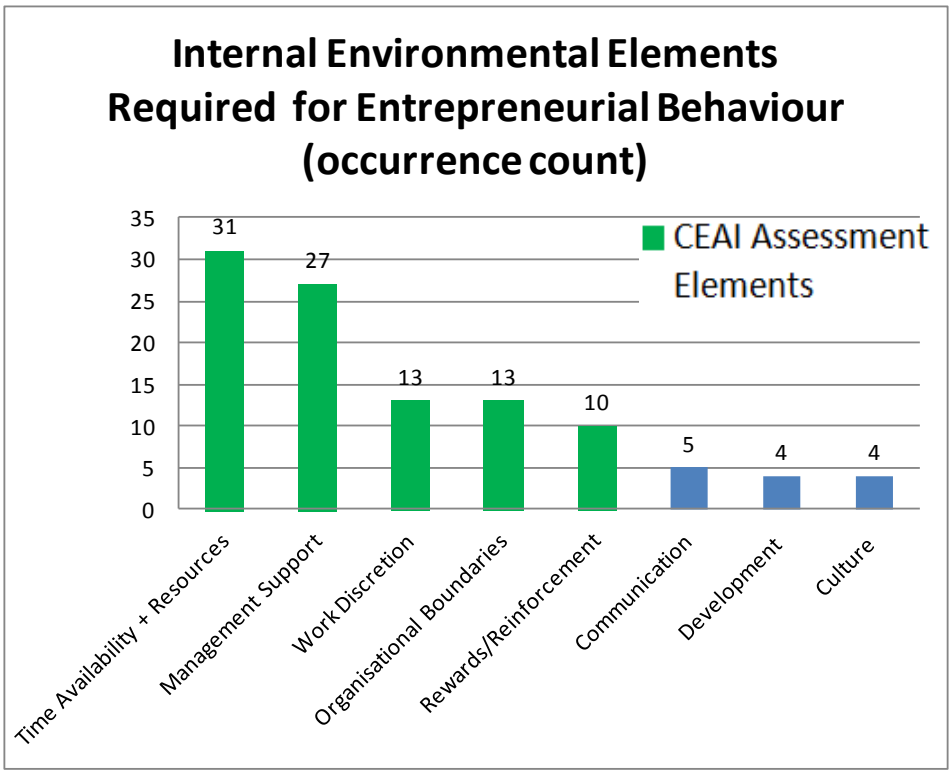

Figure 13 : Question 1 response frequency plot

Figure 13 illustrates that the five elements of the CEAI assessment occurred the most often. Time availability which includes resources (31) and management support (27) were recorded with the highest frequencies.

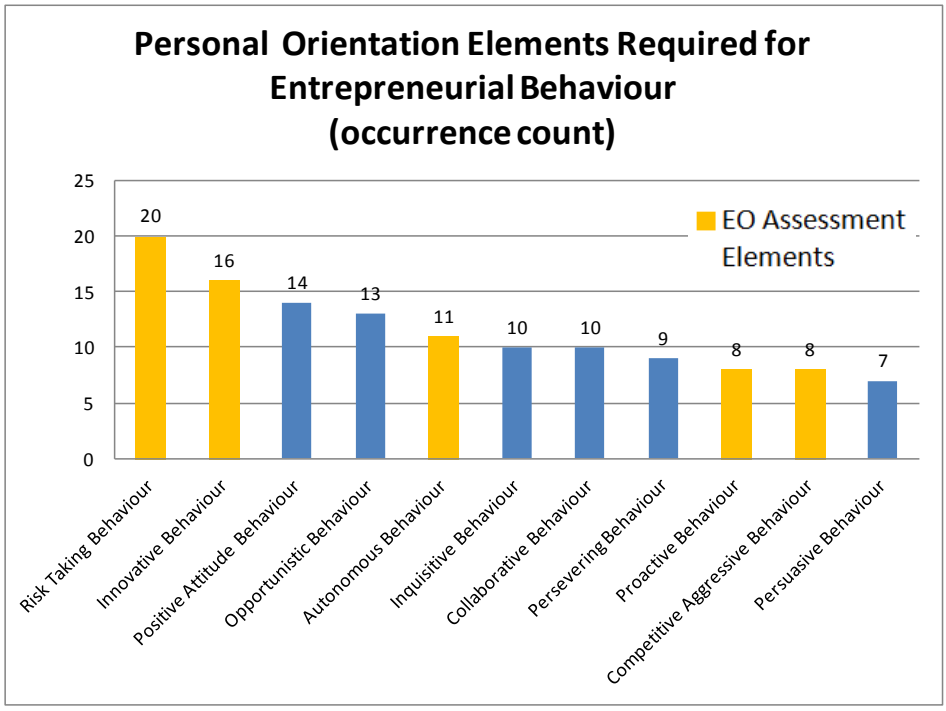

Figure 14 : Question 2 response frequency plot

Figure 14 illustrates that two of the EO elements which are risk taking (20) and innovativeness (16) had the highest occurrence count. They were followed closely by two other elements which were positive attitude (14) and opportunism (13). It is also important to note that the range of occurrence counts for the other identified elements is small. This suggests limited differentiation by respondents of the perceived importance of these elements.

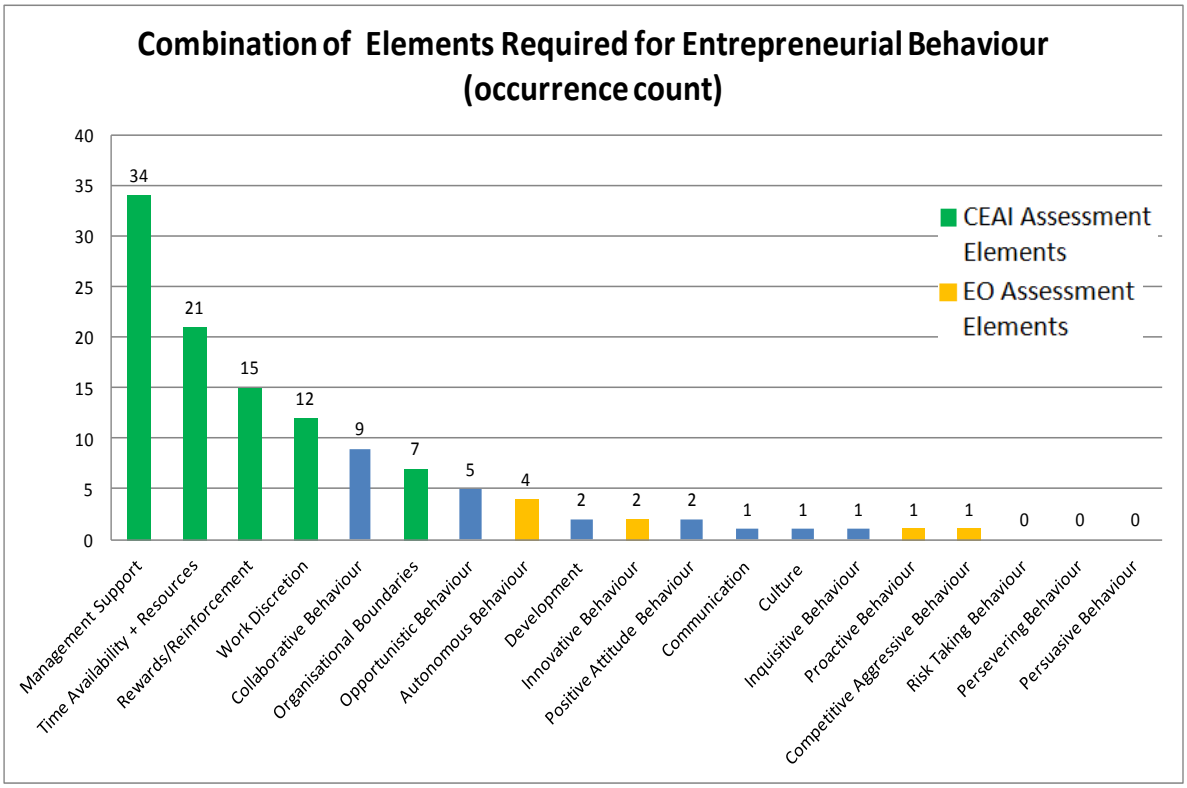

Figure 15 : Question 3 response frequency plot

Lastly Figure 15 illustrates that the five CEAI elements are in the top 6 occurrence counts and that four of the EO elements are mentioned but do not nearly have the same amount of occurrence counts.

The exploratory information above therefore confirmed that all the elements used for analysis in the quantitative section of the survey were also recommended by respondents as relevant elements. It was however also observed that the elements related to the firm's internal environment are considered to be of much greater perceived importance than the entrepreneurial orientation behaviour elements. These results therefore further advocated the significance of the elements contained within the CEAI and EO constructs.

Chapter 6: Discussion of results

6.1. Introduction

This chapter analytically discusses the results that were obtained in chapter five. The outcomes of the three hypothesis tests as well as the exploratory data are discussed. Analysis of the results was done with relation to the relevant literature in chapters two and three.

6.2. Descriptive statistics

6.2.1. Survey responses

The survey response rate calculated as valid responses (113) divided by total surveys distributed (350) was found to be 32.3%. According to the meta-analysis study on response rates by Shih and Fan (2008), web surveys received response rates ranging from a minimum of 7% to a maximum of 88%. In addition it was found that the surveys studied had a mean response rate of 34% and a standard deviation of 22%. Based on these results it was seen that the response rate achieved for this research (32.3%), denoted a successful data collection process.

It is also of importance to note that the non responses grew on each of the subsequent survey sections but still yielded data that was satisfactory for analysis. It was found that the sequential decline in section responses was due to the length of the survey and that respondents aborted due to fatigue or exceedance of personal allotted time allocation.

6.2.2. Demographic results

Based on the demographic results achieved the majority of respondents were white (67%), males (80%), between the ages of 31 and 40 (34%) and had either a diploma (26%) or undergraduate degree (26%). No further inferences were made from the demographic data as it was not used for any of the variables in the hypothesis testing section.

6.2.3. Internal consistency and reliability tests

CEAI assessment

Based on research by Hornsby et al. (2013) in which four of the five CEAI elements were tested for internal consistency, it was found that each of the elements received a moderate to high Cronbach's alpha (α) rating and can be seen in Table 30. To ensure the data reliability for this thesis, an alpha (α) of 0.7 (DeVellis, 2011) was required for the data to be considered for further analysis. The alpha values from a comparative study done on the South African industry (Scheepers et al., 2008) were also used to ensure the results obtained were consistent. Table 30 displays the required alpha (α) as well as the comparative alpha (α) and finally the actual obtained alpha (α).

Table 30 : CEAI internal consistency and reliability

CEAI Element	Hornsby et al. (2013) α	Scheepers et al. (2008) South African Firms α	Required α	Actual α
Management Support	0.63	0.92	0.7	0.891
Work Discretion	0.89	0.85	0.7	0.823
Rewards and Reinforcement	0.79	0.88	0.7	0.739
Time Availability	0.75	-	0.7	0.690
Organisational Boundaries	-	0.68	0.7	0.669

It was observed that the alpha values from the research survey were comparable to either one or both of the comparative studies described. The only major deviation in alpha (α) value was that of management support but since it was higher it did not impact the data reliability. Based on the results obtained it was therefore concluded that the CEAI assessment proved to be a reliable instrument to gather data for the required dimensions.

EO assessment

As described in chapter four the EO instrument used by Hughes and Morgan (2007) was adapted to measure individual entrepreneurial orientations for the purposes of this

research. Hughes and Morgan (2007) in their article only refer to item - total scale correlations for reliability assurances of the EO instrument. These correlations are shown in Table 31. As was the case with the CEAI instrument, it was desirable to achieve an alpha (α) of 0.7 (DeVellis, 2011) for the data to be considered for further analysis. The assessment results from the comparative study by Scheepers et al. (2008) are also included and were found to be significantly lower than the actual results obtained. Table 31 displays the required alpha (α) and the actual obtained alpha (α) as well as the alpha value from the Scheepers et al. (2008) study.

Table 31 : EO internal consistency and reliability

Orientation Element	Hughes and Morgan (2007) Item-Total Scale Correlations	Obtained Item-Total Scale Correlations	Required α	Obtained α	Scheepers et al. (2008) South African Firms α
Risk Taking	0.820	0.878	0.7	0.940	0.68
Innovativeness	0.853	0.839	0.7	0.920	0.69
Proactiveness	0.820	0.817	0.7	0.908	0.77
Competitive Aggressiveness	0.817	0.792	0.7	0.894	-
Autonomy	0.767	0.686	0.7	0.877	-

When comparing the item-total scale correlations it was seen that the only items which had a significant deviation (more than 5%) were risk taking (5.8% increase) and autonomy (8.1% decrease). The other items are remarkably similar which seems to suggest that when considering EO from either an organisational or individual view, significant results can be obtained. This is further supported by the obtained alpha (α) values which were all higher than 0.87, far in excess of the required 0.7.

The choice to adapt the EO assessment questions proved to have negligible impact on the reliability of the data and it was concluded that the EO assessment proved to be a reliable instrument to gather data for the required dimensions.

6.3. Hypothesis 1

When considering the literature explored in chapters two and three, it was anticipated to find that middle managers in the coal mining industry perceive the internal corporate environment to be non-supportive of entrepreneurial behaviour (Urban & Oosthuizen, 2009). Since the internal corporate environment in itself is complex in nature, it was required to break it down into five quantifiable elements (Kuratko et al., 2014) which could be measured to enable further analysis.

To test the hypothesis that each individual element as well as their composite measure was non-supportive of entrepreneurial behaviour, a five step statistical hypothesis testing approach (Wagner, 2013) was employed. The results obtained were by no means unanimous with two elements (time availability and organisational boundaries) quite strongly supporting the notion that the internal environment is non supportive of entrepreneurial behaviour. The other three elements (management support, work discretion and rewards/reinforcement) on the other hand were found to be contradictory to the proposed notion even though only slightly.

When all the elements were tested together, it was found that the composite result ultimately advocates the notion that the internal corporate environment in the coal mining industry is not supportive of entrepreneurial behaviour. The result obtained from using the CEAI instrument therefore supports the findings of Urban and Oosthuizen (2009) who proposed that intrapreneurship is not well supported in the mining industry. It was however observed that if the organisational boundaries element is removed from the composite score (due to marginal reliability acceptance) that the converse of the finding above is realised. Since the organisational boundaries element had such a profound impact on the outcome, it is suggested that the reliability of the element be improved for future studies rather than the removal of the element from the instrument.

Another study performed by Scheepers et al. (2008) used a preceding version of the CEAI instrument to assess a total of 315 South African organisations. When a similar statistical analysis was performed on the journal article results of Scheepers et al. (2008), it was found that management support, work discretion, rewards\reinforcement and organisational boundaries were all supportive of entrepreneurial behaviour. The

variation in outcomes therefore suggests that the internal environment for corporate entrepreneurship is perceived to be different in coal mining as compared to other industries.

The result from this assessment when used as a comparative measure, suggests that there is an opportunity for coal mining firms to realign their corporate entrepreneurship strategy (Kuratko, Ireland, & Hornsby, 2001; Ireland, Covin, & Kuratko, 2009). The realignment of strategy will be the first step towards altering the perceptions that middle managers have of the internal environment for corporate entrepreneurship. Based on the advantages of using the CEAI instrument as was displayed in Table 3, it was realised that the borderline scored management support element would be a suggested starting point.

6.4. Hypothesis 2

The second hypothesis was researched to test the assumption that if an organisation is found to be unsupportive of entrepreneurial activities, then the individuals within such an organisation will lack a personal affinity towards entrepreneurial behaviour. In order to test this hypothesis, it was necessary to find an instrument that would be able to provide a quantifiable measure that could be used for analysis at an individual level.

The entrepreneurial orientation instrument as proposed by Hughes and Morgan (2007) was used and measured five of the elements that an individual requires in order to have an affinity towards personal entrepreneurial behaviour. As such, EO was used as a proxy in order to determine if respondents had a high or low degree of EO which would suggest a high or low degree of entrepreneurial behaviour. The instrument that was used to measure EO had originally been intended to measure organisational EO but after adaptation was found to be just as effective at measuring EO at an individual level.

To test the hypothesis, a five step statistical hypothesis testing approach (Wagner, 2013) was employed as was done with the CEAI instrument. The results of the five step analysis revealed an outcome that was in complete statistically significant contradiction to the proposed hypothesis. It was found that middle managers in the coal mining industry perceived themselves to have a high degree of entrepreneurial orientation which was echoed across all five of the EO elements that were measured.

This unexpected result proved that the initial assumption as described above had been incorrect and that individuals could have a high degree of entrepreneurial orientation even when they do not perceive the internal environment for corporate entrepreneurship to be supportive. This did not however mean that there is no significant statistical relationship between the two constructs but merely shows that there are a multitude of other factors that also play a role as per the conceptual framework of Lumpkin and Dess (1996).

One limitation to the EO construct is that it does not measure frequency of entrepreneurial actions as is the case with the EI instrument proposed by Morris and Sexton (1996). The consequence of this is that the EO scores obtained may suggest that individuals have a high inclination towards entrepreneurial activities but due to the lack of frequency measure it is not possible to gauge how often they engage in entrepreneurial activities.

The only consolidation in not having introduced the frequency measure is that one of the questions in the EO instrument asks weather individuals actively introduce improvements and innovations in their business. It was found with statistical significance for this specific question ($p < 0.001$) that individuals do perceive themselves to actively introduce improvements and innovations.

6.5. Hypothesis 3

A sequential multiple regression analysis was performed to test the hypothesis whether any of the five elements of the CEAI assessment had a significant relationship with the composite EO measurement. The five CEAI elements were therefore treated as independent variables and the EO measure treated as the dependent variable. The analysis was performed in SPSS and it was paramount to test that all the assumptions of regression as described by Pallant (2005), were complied with to ensure model validity. The results obtained in **Table 18** confirmed that all the assumptions of regression had been met and that the results produced were relevant.

Having done the complete statistical analysis it was found that a significant positive statistical relationship exists for management support ($p<0.05$), work discretion ($p<0.01$)

and rewards/reinforcement ($p<0.1$). The remaining two elements (time availability and organisational boundaries were found to not have a significant relationship with EO. These results were consistent with the findings of Scheepers et al. (2008) who through a Structured Equation Modeling (SEM) approach also arrived at similar results. Scheepers et al. (2008) in their study on South African firms found that management support, autonomy (work discretion) and rewards had a significant relationship to three of the EO elements including innovativeness, proactiveness and risk taking.

The coefficient of determination (R^2) for the model was found to be 27.3% and thus shows that 72.7% of the variation in the dependent variable entrepreneurial orientation is not explained by the factors as described in the CEAI instrument.

Also of interest was the finding that the bivariate correlations, as was shown in Table 24, were in the majority of cases found to be higher than those obtained by Hornsby et al. (2013). In particular the autonomy element which was introduced as an additional element to the EO instrument used by Hornsby et al. (2013), was found to have strong correlations with all elements except the time availability element. The organisational boundaries element was found to have a negative correlation with all of the EO elements although only autonomy and the composite entrepreneurial orientation score were significant.

6.6. Qualitative questions

Finally a set of qualitative questions were asked in an attempt to supplement the results obtained from the survey. These questions were asked to determine if there were categorical elements which respondents had identified that were supplementary to the elements contained in the CEAI and EO assessments. Question one aimed to explore additional elements relating to the perception of middle managers of the firm's internal environment. Similarly question two was meant to explore additional elements with relation to entrepreneurial orientation. Finally question three was meant to explore a combination of additional elements that relate to corporate entrepreneurial behaviour.

The chart constructed from the results obtained from question one confirmed that the five CEAI elements were also viewed as significantly relevant by respondents. What was

of interest to note was that time availability which for the analysis included resources, had the highest frequency of occurrences (31). It was suspected that this had to do with the extremely low coal price which is an external environmental aspect and seems to have had an impact on the internal environment. This is further discussed in the chapter which follows.

The chart that was constructed to identify additional EO elements showed that the five EO elements as proposed by Lumpkin and Dess (1996) were also viewed as relevant by respondents. Their perceived importance was however more diversified and not all of the Lumpkin and Dess (1996) elements were in the top five occurrence counts.

Lastly the chart, in which respondents could list any reason to be more entrepreneurial, showed that the five CEAI elements were identified significantly more times than the five EO elements. This suggests that middle managers perceive the internal environment for corporate entrepreneurship to have a greater impact on corporate entrepreneurship as opposed to an individual's entrepreneurial orientation. This finding therefore suggests that middle managers have a biased focus towards the internal environment for corporate entrepreneurship which assists to explain why so many new EO elements were suggested in the previous paragraph.

Chapter 7: Conclusion

7.1. Introduction

This chapter concludes the principal findings of the research as well as discusses implications for management, limitations of the research and suggestions for future research.

7.2. Principal findings

An understanding of the empirical evidence gained, confirmed the validity of the existing instruments and adds to the limited base of research in the South African context. Both the CEAI and EO assessment instruments were found to be reliable measures of the internal environment for corporate entrepreneurship and entrepreneurial orientation respectively.

Some concern was however raised around the relatively low reliability of the organisational boundaries element in the CEAI instrument (van Wyk & Adonisi, 2011; Hornsby et al., 2013). The reliability deviation of the organisational boundaries element in this research had only been marginal (0.031) and was thus included in the analyses. Exclusion of this element, when tested, was found to have a significant effect on the composite CEAI measure. As such it is advocated that the reliability of the element is improved rather than the omission of the element from the CEAI instrument as it might place a limitation on research.

With this in mind, there was significant support found for the first hypothesis formulated in chapter three. The first hypothesis concluded that middle managers in the South African coal mining industry perceive their internal environment for corporate entrepreneurship to be unsupportive of entrepreneurial activities. It must also be noted that this result was a consequence of the low scores in the time availability and organisational boundaries elements and the marginally positive scores for the management support, work discretion as well as rewards and reinforcement elements.

The results obtained from testing the second hypothesis concluded that middle managers in the South African coal mining industry perceive themselves to have a high degree of entrepreneurial orientation. This result was in contradiction to the proposed

hypothesis and confirms that there are other significant factors which also have an effect on EO. A similar empirical approach could be followed in future research to explore the influence which other proposed concepts have on EO. One shortcoming of the EO instrument employed was that it did not measure the frequency of entrepreneurial activities as is the case with the entrepreneurial intensity instrument Morris and Sexton (1996). The only consolidation was that there is one EO question which was significantly found to have measured frequency to some degree but was by no means a comprehensive indicator of frequency.

The third and last hypothesis as put forward in chapter three was found to have significant support in some of the dimensions which were proposed. The third hypothesis found that a regression analysis could be applied to determine that management support, work discretion and rewards/reinforcement all had significant relationships with the composite EO measure. It was further observed that many of the inter-element correlations between the CEAI and EO constructs were consistent with the results obtained by Hornsby et al. (2013).

7.3. Implications for management

Based on the main findings which have been discussed in the previous section there were some managerial implications.

The **first implication** was that both instruments that were used had performed as a diagnostic tool to identify strengths and weaknesses, in two of the key constructs of corporate entrepreneurship. The knowledge gleaned from the assessments can be used in a variety of ways and include the following:

- Perception alignment between management and employees (Marvel, Griffin, Hebda, & Vojak, 2007)
- A training needs analysis to determine which aspects should be addressed through training (van Wyk & Adonisi, 2011)
- A guide to inform aspects of the corporate entrepreneurship strategy and enhance corporate entrepreneurial actions (Gupta, MacMillan, & Surie, 2004)
- A sensitisation and continuous measurement tool to promote corporate entrepreneurial facets and behaviours (Hornsby et al., 2002; Hornsby, Holt, & Kuratko, 2008)

Essentially the instruments serve to gain a better understanding of the firms' entrepreneurial process and provides some insight for realignment of strategy (Kuratko, Ireland, & Hornsby, 2001; Ireland, Covin, & Kuratko, 2009) and culture (Cameron & Quinn, 2011) so as to allow middle managers to display more innovative and entrepreneurial behaviours. Strategic leadership and management support play an instrumental role in developing the internal environment for corporate entrepreneurship and are crucial when a breakaway is needed from a traditional organisational system Scheepers et al. (2008). In addition to the points above, when combining individual intention with the internal environment for corporate entrepreneurship as a positive promoter of the three antecedents of the theory of planned behaviour (Ajzen, 1991) it is expected that entrepreneurial behaviour will follow.

The **second implication** was that there was a significant relationship between three of the elements of the internal environment for corporate entrepreneurship and entrepreneurial orientation. It was seen that a slightly negative perception of the internal environment for corporate entrepreneurship still resulted in a relatively high degree of entrepreneurial orientation. Based on this finding, coal mining firms could realign strategy to place more focus on the elements which have a relationship to EO in order to promote entrepreneurial activity.

The three applicable elements are **management support** which has a direct positive relationship with organisational innovation outcomes, **work discretion** which allows for the recognition of entrepreneurial activities and lastly **rewards systems** which encourage risk taking and innovation (Kuratko et al., 2014).

Ideally through the successful integration of corporate entrepreneurial constructs into a firm's strategy and culture, it will allow a firm to become more innovative and adaptive so as to create a competitive advantage. This statement is best captured by Kuratko et al. (2014) who state "Corporate entrepreneurship a significant form of corporate innovation is envisioned to be a process that can facilitate firms' efforts to innovate constantly and cope effectively with the competitive realities companies encounter when competing in world markets" (p. 38).

The **third implication** has a bearing on employee satisfaction, retention and recruitment. It has been proposed by Pearce et al. (1997) that increased supervisor entrepreneurial behaviour leads to increased subordinates' satisfaction with supervision. Increased levels of satisfaction are expected to suppress abscondment intentions and thus result in lower employee turnover.

Complimentary to this argument Niehoff, Enz and Grover (1990) propose that:

> Employee commitment to the organisation is strongly influenced by the degree to which employees perceive top management as inspiring a shared vision and modeling that vision. Commitment is also enhanced by allowing employees influence in decision making and supporting them as they progress toward higher levels of performance. Finally, as top managers encourage employees to take risks in order to discover new ways of approaching problems, commitment will be gained from the employees, and the innovation process will be greatly facilitated. Similarly these actions also enhance employee job satisfaction and reduce role ambiguity. (p.350)

When comparing the elements discussed in the passage above to the elements of the internal environment for corporate entrepreneurship, some striking similarities are realised. By inference therefore it can be concluded that a negative perception of the internal environment for corporate entrepreneurship may have a negative impact on employee retention.

Further to this point, when considering the person-organisation (PO) construct as explored by Kristof-Brown, Zimmerman and Johnson (1999), it was found that a misalignment in PO fit implies that an employee will eventually leave the company. When considering the low CEAI score against the high EO scores which have been attained, it would imply that there is a degree of misalignment within the PO construct. It would therefore be expected to find that employees with a high EO would have a tendency of leaving companies that do not have a significant corporate entrepreneurial environment.

The argument is most accurately captured in the results of the study by Lee, Wong, Foo and Leung (2011). Lee et al. (2011) found that employees with a higher innovative orientation have increased negative effects on job satisfaction due to a restrictive

innovative climate and poor technical excellence incentives. In addition Lee et al. (2011) also found that “the effects of a misfit between individual orientation and organisational conditions are indirectly linked to entrepreneurial intentions through low job satisfaction” (p. 135). Lastly Lee et al. (2011) found that when a mismatch between individual orientation and organisational environment exists, individuals with a high degree of self-efficacy have an increased likelihood to want to start their own businesses.

Contrary to this argument, should a firm place considerable emphasis on corporate entrepreneurship, the PO construct could be used as a powerful tool during recruitment. This is because the elements of the CEAI and EO instruments could be leveraged to identify individuals who have a high degree of alignment with the organisation (Gupta et al., 2004).

7.4. Limitations of the research

It is necessary to discuss the aspects that may have had an impact on the data collected which could have had a significant impact on the results obtained. The first of these aspects is the assumption that had been made that South African coal mines are homogeneous. This assumption ignored the paradigm of organisational culture and as explained by Barney (1986), “a firm's culture can be a source of sustainable competitive advantage if that culture is valuable, rare, and imperfectly imitable” (p.663). Therefore even though the operational rules and practices may be similar, it is highly likely that coal mining companies leverage organisational cultures in order to provide competitive advantages.

This is further supported by the resource-based view (RBV) which according to Scheepers et al. (2008) “suggests that variation in competitive markets stems from differences in the characteristics of competitors’ resources and capabilities” (p.51). The results from the ANOVA analysis conducted in section 5.6.2 indicated that the assumption held true for the population that was sampled. It must be noted however that this may not be the same case for the population that was not sampled and therefore future research should take this into consideration.

The second of these aspects was one which is related to the external environment as explained in the conceptual framework of Lumpkin and Dess (1996). It was specific to

industry characteristics of the external environment and is explained by the desperately low coal price which has been steadily declining over the last five years.

To remain price competitive in the prevailing economic climate, it was necessary for coal mining companies to focus on cost reduction initiatives. Cost reduction initiatives especially when prolonged, can have a dampening effect on employee's morale and motivation. As such, respondent's perceptions of the internal corporate entrepreneurial environment may have been adversely skewed.

Cascio (1993) points out that:

> "Study after study shows that following a downsizing, surviving employees become narrow-minded, self-absorbed, and risk averse. Morale sinks, productivity drops, and survivors distrust management. In fact, this constellation of symptoms is so common that it has taken on a name of its own: survivors' syndrome". (p. 100).

Based on the results received from the qualitative questions section above in which time availability and resources received the highest counts, it is suggestive that the external environment has had an impact on respondent's perception of the internal environment for corporate entrepreneurship.

A third aspect was the limitation of the EO instrument which does not have a measure of frequency of entrepreneurial activities. As such an individual may achieve a very high score for degree of entrepreneurial orientation but due to the possibility that they do not actively engage in entrepreneurial activities, result in a misrepresentation. It is also important to note that complications arise when using a frequency measure. Examples of this include an individual actively introducing many new innovations which are of little value or conversely an individual who introduces only a few very valuable innovations.

7.5. Suggestions for future research

In line with the limitations discussed in the previous section, the following recommendations are made:

Future research regarding the CEAI and EO instruments when used to assess an industry should not make a homogeneous assumption and should sample a broader

audience of firms. It is also advisable to increase the sample size such that significant conclusions can be drawn for each participating firm.

A more comprehensive construct for measuring entrepreneurial orientation is recommended such that the effects of frequency of entrepreneurial activities can be included. A possible amalgamation between the entrepreneurial orientation and entrepreneurial intensity instruments may be a valid starting point.

Since the organisational boundaries element of the CEAI instrument had such a profound impact on the outcome, it is suggested that the reliability of the element be improved for future studies rather than the removal of the element from the instrument.

Future research should explore a comparative study considering the CEAI assessment in which one firm has a poor external environment and the other has a prosperous external environment.

Lastly it is recommended that future research further venture to explore the relationships in the corporate entrepreneurship process. More specifically focus should be given to the constructs which have the most significant effect on entrepreneurial orientation. A similar empirical approach to this research is suggested as it would allow for consistent use of instruments employed. Such exploratory studies will assist to validate existing constructs as well as identify those which are more profound.

7.6. Conclusion summary

Based on the research performed, significant findings were ascertained and new insights gleaned. Both the CEAI (Kuratko et al., 2014) and EO (Hughes & Morgan, 2007) instruments were found to be useful diagnostic tools. Such instruments serve to allow firms to gain a better understanding of their entrepreneurial processes (Gupta et al., 2004). Having administered these instruments to middle managers (Kuratko et al., 2013) in the South African coal mining industry, three significant results were established.

The first was that the observed population perceived their internal environment for corporate entrepreneurship to be unsupportive of corporate entrepreneurial behaviours. This result was consistent with that of Urban and Oosthuizen (2009) in the South African

mining context. The finding suggests that opportunity exists for the realignment of organisational strategy (Kuratko, Ireland, & Hornsby, 2001; Ireland, Covin, & Kuratko, 2009) and culture (Cameron & Quinn, 2011) so as to enable a more conducive internal environment.

The second result found that middle managers perceived themselves to have a high degree of entrepreneurial orientation. This finding was contradictory to the proposed hypothesis (H2) but consistent with the results of Scheepers et al. (2008) with regards to the broader South African industry. When the person-organisation (PO) construct (Kristof-Brown, Zimmerman, & Johnson, 1999) was explored it was observed that there was a degree of misalignment between middle managers perception of the internal environment and their individual EO scores. Such misalignment is proposed to have a negative effect on employee retention (Lee et al., 2011), should the misalignment endure. Conversely the PO construct may be leveraged during recruitment to identify employees with an entrepreneurial orientation which best aligns with the requirements of the organisation (Gupta et al., 2004).

The third result established that a relationship exists between three of the CEAI elements (management support, work discretion and rewards/reinforcement) and the composite entrepreneurial orientation measure. These results were consistent with the findings of Scheepers et al. (2008) and further advocate the notion of corporate entrepreneurship as a process (Lumkin & Dess, 1996). Additionally, the established relationships provide direction as to which elements could be focused on more prudently during realignment to ensure the most effective results are achieved.

To this end, the results discussed have contributed towards further understanding two of the prominent constructs of corporate entrepreneurship in the South African coal mining context. Limited research however exists in this field (Scheepers et al., 2008) and suggestions for future research have been proposed.

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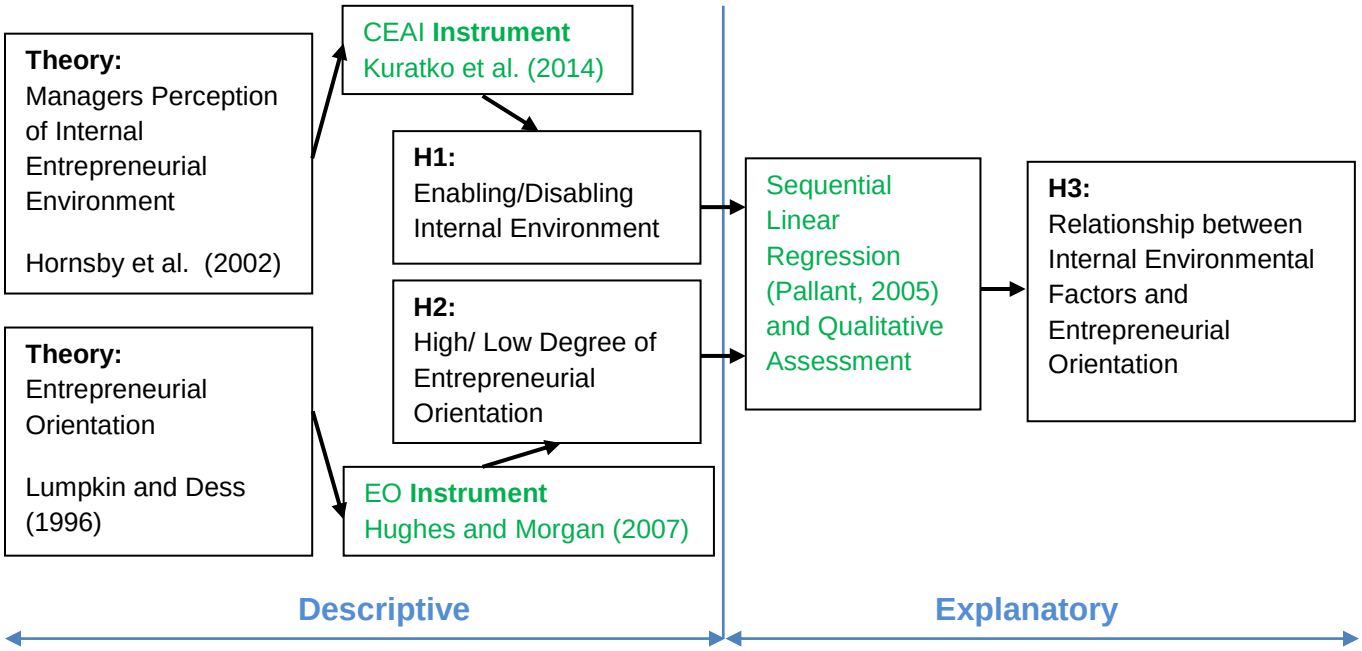
Appendix 1: Research flow consistency diagram



Appendix 2: Survey questionnaire

Instructions and Disclosure

Thank you for participating in this survey :)

The survey consists of four sections and should take no more than 15 minutes of your time.

Using the scale which follows please indicate how much you agree or disagree with each of the statements. If you strongly agree, write ''5.'' If you strongly disagree write ''1.''

There are no right or wrong answers to these questions so please be as honest and thoughtful as possible in your responses.

Your participation is voluntary and you can withdraw at any time without penalty. All data will be kept confidential. By completing the survey, you indicate that you voluntarily participate in this research.

Thank you for your cooperation!

Demographic Information

1. What is your gender?

- ○ Female
- ○ Male

2. What is your age?

- ○ 23 and below
- ○ 24 to 30
- ○ 31 to 40
- ○ 41 to 50
- ○ 51 to 60
- ○ 60 and above

3. Ethnicity

- ○ Black
- ○ Coloured
- ○ Indian
- ○ White
- ○ Other (please specify)

4. Highest Level of Education

- ○ Matric
- ○ Diploma
- ○ Undergrad Degree
- ○ Postgrad Degree
- ○ Other (please specify)

5. Work Experience at Present Company (years)

- ○ Less than 3
- ○ 3 to 5
- ○ 6 to 10
- ○ 11 to 15
- ○ More than 15

CEAI Assessment

* 6. Environment

	Strongly Disagree (1)	Disagree (2)	Not Sure (3)	Agree (4)	Strongly Agree (5)
1. My organization is quick to use improved work methods.	○	○	○	○	○
2. My organization is quick to use improved work methods that are developed by workers.	○	○	○	○	○
3. In my organization, developing one's own ideas is encouraged for the improvement of the corporation.	○	○	○	○	○
4. Upper management is aware and very receptive to my ideas and suggestions.	○	○	○	○	○
5. A promotion usually follows from the development of new and innovative ideas.	○	○	○	○	○
6. Those employees who come up with innovative ideas on their own often receive management encouragement for their activities.	○	○	○	○	○
7. The "doers on projects" are allowed to make decisions without going through elaborate justification and approval procedures.	○	○	○	○	○
8. Senior managers encourage innovators to bend rules and rigid procedures in order to keep promising ideas on track.	○	○	○	○	○
9. Many top managers have been known for their experience with the innovation process.	○	○	○	○	○
10. Money is often available to get new project ideas off the ground.	○	○	○	○	○

11. Individuals with successful innovative projects receive additional rewards and compensation beyond the standard reward system for their ideas and efforts.	○	○	○	○	○
12. There are several options within the organization for individuals to get financial support for their innovative projects and ideas.	○	○	○	○	○
13. People are often encouraged to take calculated risks with ideas around here.	○	○	○	○	○
14. Individual risk takers are often recognized for their willingness to champion new projects, whether eventually successful or not.	○	○	○	○	○
15. The term "opportunity risk taker" is considered a positive attribute for people in my work area.	○	○	○	○	○
16. This organization supports many small and experimental projects, realizing that some will undoubtedly fail.	○	○	○	○	○
17. An employee with a good idea is often given free time to develop that idea.	○	○	○	○	○
18. There is considerable desire among people in the organization for generating new ideas without regard for crossing departmental or functional boundaries.	○	○	○	○	○
19. People are encouraged to talk to employees in other departments of this organization about ideas for new projects.	○	○	○	○	○
20. I feel that I am my own boss and do not have to double check all of my decisions with someone else.	○	○	○	○	○
21. Harsh criticism and punishment result from mistakes made on the job.	○	○	○	○	○
22. This organization provides the chance to be creative and try my own methods of doing the job.	○	○	○	○	○

23. This organization provides the freedom to use my own judgement.	○	○	○	○	○
24. This organization provides the chance to do something that makes use of my abilities.	○	○	○	○	○
25. I have the freedom to decide what I do on my job.	○	○	○	○	○
26. It is basically my own responsibility to decide how my job gets done.	○	○	○	○	○
27. I almost always get to decide what I do on my job.	○	○	○	○	○
28. I have much autonomy on my job and am left on my own to do my own work.	○	○	○	○	○
29. I seldom have to follow the same work methods or steps for doing my major tasks from day to day.	○	○	○	○	○
30. My manager helps me get my work done by removing obstacles and roadblocks.	○	○	○	○	○
31. The rewards I receive are dependent upon my innovation on the job.	○	○	○	○	○
32. My supervisor will increase my job responsibilities if I am performing well in my job.	○	○	○	○	○
33. My supervisor will give me special recognition if my work performance is especially good.	○	○	○	○	○
34. My manager would tell his/her boss if my work was outstanding.	○	○	○	○	○
35. There is a lot of challenge in my job.	○	○	○	○	○

	Strongly Disagree (1)	Disagree (2)	Not Sure (3)	Agree (4)	Strongly Agree (5)
36. During the past three months, my workload kept me from spending time on developing new ideas.	○	○	○	○	○
37. I always seem to have plenty of time to get everything done.	○	○	○	○	○
38. I have just the right amount of time and workload to do everything well.	○	○	○	○	○
39. My job is structured so that I have very little time to think about wider organizational problems.	○	○	○	○	○
40. I feel that I am always working with time constraints on my job.	○	○	○	○	○
41. My co-workers and I always find time for long-term problem solving.	○	○	○	○	○
42. In the past three months, I have always followed standard operating procedures or practices to do my major tasks.	○	○	○	○	○
43. There are many written rules and procedures that exist for doing my major tasks.	○	○	○	○	○
44. On my job I have no doubt of what is expected of me.	○	○	○	○	○
45. There is little uncertainty in my job.	○	○	○	○	○
46. During the past year, my immediate supervisor discussed my work performance with me frequently.	○	○	○	○	○
47. My job description clearly specifies the standards of performance on which my job is evaluated.	○	○	○	○	○
48. I clearly know what level of work performance is expected from me in terms of amount, quality, and timelines of output.	○	○	○	○	○

Entrepreneurial Intensity

* 7. Orientation

	Strongly Disagree (1)	Disagree (2)	Not Sure (3)	Agree (4)	Strongly Agree (5)
1. I consider 'risk taker' a positive attribute for people in our business (NB! not in a safety sense but in a opportunity sense)	○	○	○	○	○
2. I encourage people to take calculated risks with new ideas (NB! not in a safety sense but in a opportunity sense)	○	○	○	○	○
3. I emphasize both exploration and experimentation for opportunities	○	○	○	○	○
4. I actively introduce improvements and innovations in our business	○	○	○	○	○
5. I am creative in my methods of operation	○	○	○	○	○
6. I seek out new ways to do things	○	○	○	○	○
7. I always try to take the initiative in every situation (e.g.,against competitors, in projects and when working with others)	○	○	○	○	○
8. I excel at identifying opportunities	○	○	○	○	○
9. I initiate actions to which other employees respond	○	○	○	○	○
10. I am intensely competitive	○	○	○	○	○
11. In general, I take a bold or aggressive approach when competing	○	○	○	○	○
12. I try to undo and out-maneuver the competition as best as I can	○	○	○	○	○
13. I act and think without interference	○	○	○	○	○
14. I perform jobs that allow me to make and instigate changes in the way I perform my work tasks	○	○	○	○	○
15. I decide on my own how to go about doing my work	○	○	○	○	○
16. I communicate without interference	○	○	○	○	○
17. I act alone if I think it to be in the best interests of the business	○	○	○	○	○
18. I have access to all vital information to perform my job and to explore opportunities	○	○	○	○	○

Responder Opinion

8. What do you think your firm needs to do so that you can behave in an entrepreneurial manner (i.e. I capitalise on opportunities and innovate new or improved processes)

9. What behaviours do you think are required for a person to be a corporate entrepreneur (i.e. someone who can capitalise on opportunities and innovate new or improved processes)

10. What would cause you to start/continue acting in a corporate entrepreneurial manner. (i.e. To capitalise on opportunities and innovate new or improved processes)

Appendix 3: CEAI reliability analysis data

3.1. Management support

Reliability Statistics

Cronbach's Alpha	N of Items
.891	19

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
MS1	52.4956	116.056	.586	.884
MS2	52.7788	115.656	.591	.883
MS3	52.2832	117.741	.518	.886
MS4	52.4867	119.038	.479	.887
MS5	53.2832	117.848	.483	.887
MS6	52.4513	118.428	.475	.887
MS7	53.2743	116.254	.568	.884
MS8	53.4248	119.497	.395	.890
MS9	52.6460	117.284	.558	.885
MS10	53.3451	116.657	.531	.885
MS11	53.1416	115.855	.562	.884
MS12	52.9735	116.651	.545	.885
MS13	53.1150	118.263	.469	.887
MS14	52.8938	118.310	.492	.887
MS15	53.0885	116.135	.542	.885
MS16	53.0177	117.196	.501	.886
MS17	53.4602	114.036	.674	.881
MS18	52.9204	120.003	.373	.890
MS19	52.5310	118.573	.495	.886

3.2. Work discretion

Reliability Statistics

Cronbach's Alpha	N of Items
.692	10

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
WD1	28.6637	39.064	-.582	**.823**
WD2	28.6814	34.469	-.304	.775
WD3	28.8850	25.121	.529	.638
WD4	28.6283	24.450	.616	.623
WD5	28.5929	24.119	.614	.621
WD6	28.9735	22.455	.700	.596
WD7	28.6372	23.358	.690	.605
WD8	28.8761	23.199	.701	.602
WD9	28.5752	23.586	.676	.609
WD10	28.7699	26.018	.439	.654

3.3. Rewards and reinforcement

Reliability Statistics

Cronbach's Alpha	N of Items
.739	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
RR1	17.1858	11.706	.550	.680
RR2	17.5752	12.068	.552	.680
RR3	16.8850	13.906	.314	.746
RR4	16.9204	10.860	.749	.617
RR5	16.9735	11.437	.663	.646
RR6	16.2301	16.500	.036	.796

3.4. Time availability

Reliability Statistics

Cronbach's Alpha	N of Items
.690	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
TA1	12.9204	12.610	.394	.658
TA2	13.2655	12.536	.471	.635
TA3	12.8230	11.754	.475	.630
TA4	12.6814	13.058	.319	.683
TA5	12.9646	12.481	.402	.656
TA6	12.6460	12.391	.470	.634

3.5. Organisational boundaries

Reliability Statistics

Cronbach's Alpha	N of Items
.332	7

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
OB1	15.0265	8.133	.382	.183
OB2	14.8761	8.020	.274	.219
OB3	14.8850	7.192	.439	.108
OB4	14.2655	7.965	.184	.270
OB5	13.4602	13.643	-.505	**.669**
OB6	14.5575	7.231	.394	.130
OB7	14.8761	8.181	.277	.222

Appendix 4: EO reliability analysis data

4.1. Risk taking

Reliability Statistics

Cronbach's Alpha	N of Items
.940	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
OR1	7.6903	4.234	.846	.940
OR2	7.5929	4.458	.922	.876
OR3	7.6549	4.728	.865	.921

4.2. Innovativeness

Reliability Statistics

Cronbach's Alpha	N of Items
.920	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
IN1	7.6637	3.797	.821	.900
IN2	7.5575	3.892	.882	.851
IN3	7.3805	3.970	.815	.904

4.3. Proactiveness

Reliability Statistics

Cronbach's Alpha	N of Items
.908	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PR1	7.3363	3.725	.827	.859
PR2	7.3363	3.725	.827	.859
PR3	7.2920	4.030	.797	.885

4.4. Competitive aggressiveness

Reliability Statistics

Cronbach's Alpha	N of Items
.894	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
CA1	6.6018	4.849	.809	.834
CA2	6.8673	4.920	.808	.835
CA3	6.9912	4.973	.759	.878

4.5. Autonomy

Reliability Statistics

Cronbach's Alpha	N of Items
.877	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
AU1	16.7080	23.173	.629	.865
AU2	16.3805	23.416	.729	.850
AU3	16.5221	22.395	.727	.849
AU4	16.6637	22.832	.708	.852
AU5	16.8850	22.013	.691	.855
AU6	16.5310	22.876	.629	.866

Appendix 5: Regression assumptions test results

5.1. Test for significant outliers or influential points

Casewise Diagnostics[a]

Case Number	Std. Residual	Entrepreneurial Orientation Score	Predicted Value	Residual
61	-3.178	44.00	65.4727	-21.47270

a. Dependent Variable: Entrepreneurial Orientation Score

Only one case was found with a residual value greater than -3 but smaller than -3.3. It was then required to check if case 61 had a significant impact on the regression model by inspecting cooks distance.

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	57.2215	79.4188	66.8796	4.04813	113
Std. Predicted Value	-2.386	3.098	.000	1.000	113
Standard Error of Predicted Value	.848	3.072	1.532	.440	113
Adjusted Predicted Value	54.2973	77.8356	66.8180	4.06488	108
Residual	-21.47270	19.08734	-.01827	6.58817	108
Std. Residual	-3.178	2.825	-.003	.975	108
Stud. Residual	-3.211	2.968	.003	1.005	108
Deleted Residual	-21.93441	21.07879	.06163	7.01111	108
Stud. Deleted Residual	-3.371	3.090	.004	1.020	108
Mahal. Distance	.696	21.117	4.956	3.617	113
Cook's Distance	.000	**.200**	.011	.026	108
Centered Leverage Value	.007	.197	.046	.034	113

a. Dependent Variable: Entrepreneurial Orientation Score

Since the maximum Cook's distance is 0.2<<1 it indicates that the individual case did not have a significant impact on the ability to predict the outcome and as such there were no significant outliers or influential points.

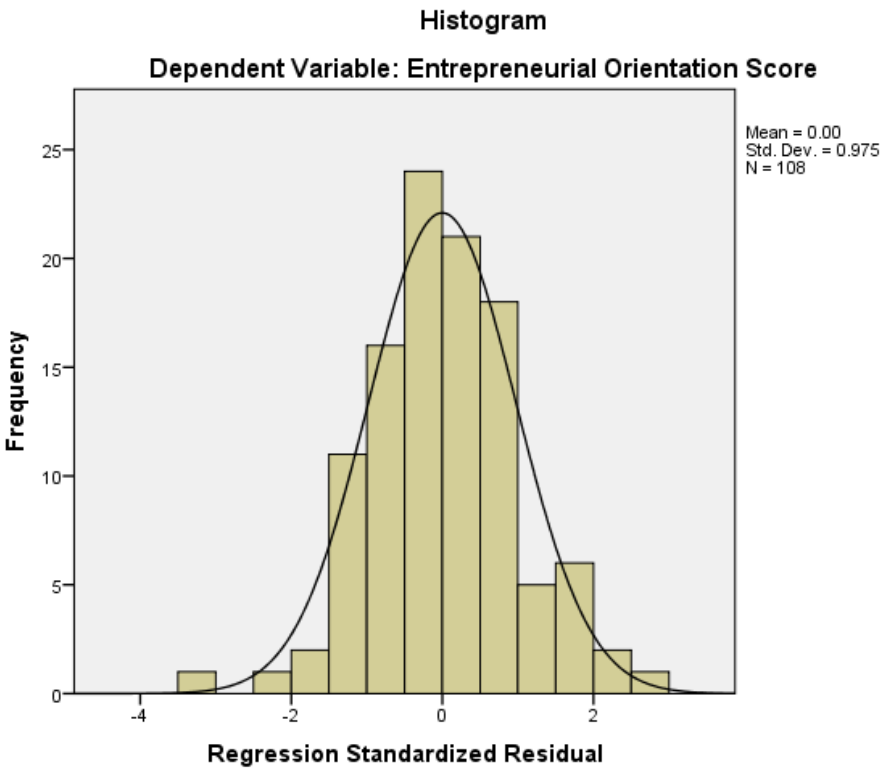
5.2. Test for leverage or influential points

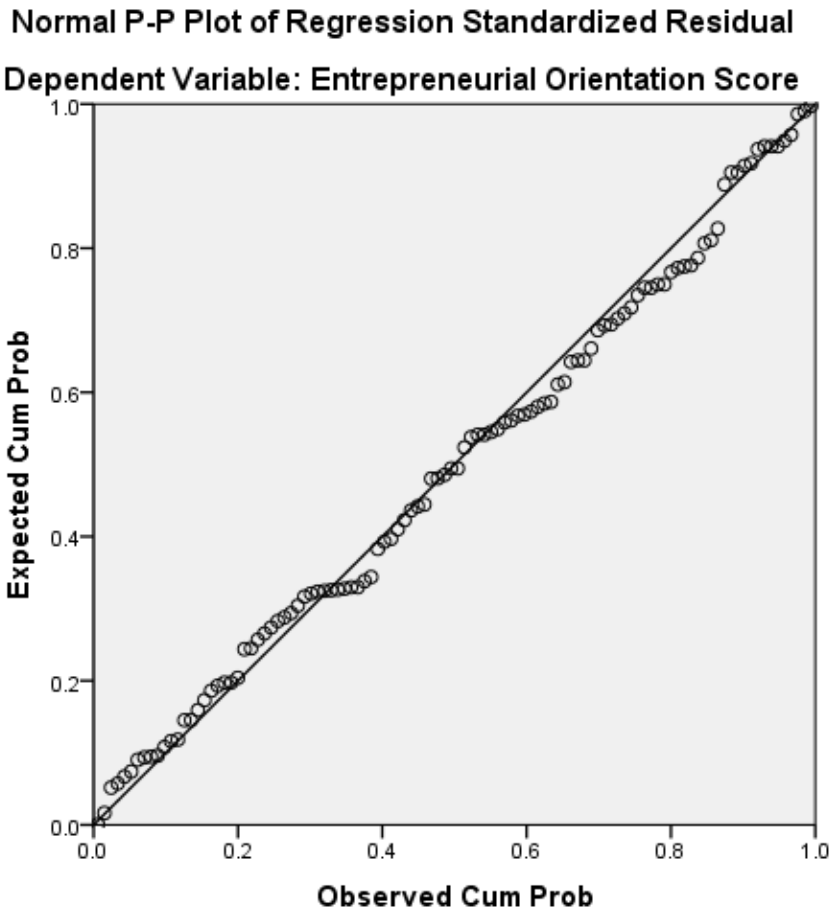
Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	57.2215	79.4188	66.8796	4.04813	113
Std. Predicted Value	-2.386	3.098	.000	1.000	113
Standard Error of Predicted Value	.848	3.072	1.532	.440	113
Adjusted Predicted Value	54.2973	77.8356	66.8180	4.06488	108
Residual	-21.47270	19.08734	-.01827	6.58817	108
Std. Residual	-3.178	2.825	-.003	.975	108
Stud. Residual	-3.211	2.968	.003	1.005	108
Deleted Residual	-21.93441	21.07879	.06163	7.01111	108
Stud. Deleted Residual	-3.371	3.090	.004	1.020	108
Mahal. Distance	.696	21.117	4.956	3.617	113
Cook's Distance	.000	**.200**	.011	.026	108
Centered Leverage Value	.007	**.197**	.046	.034	113

a. Dependent Variable: Entrepreneurial Orientation Score

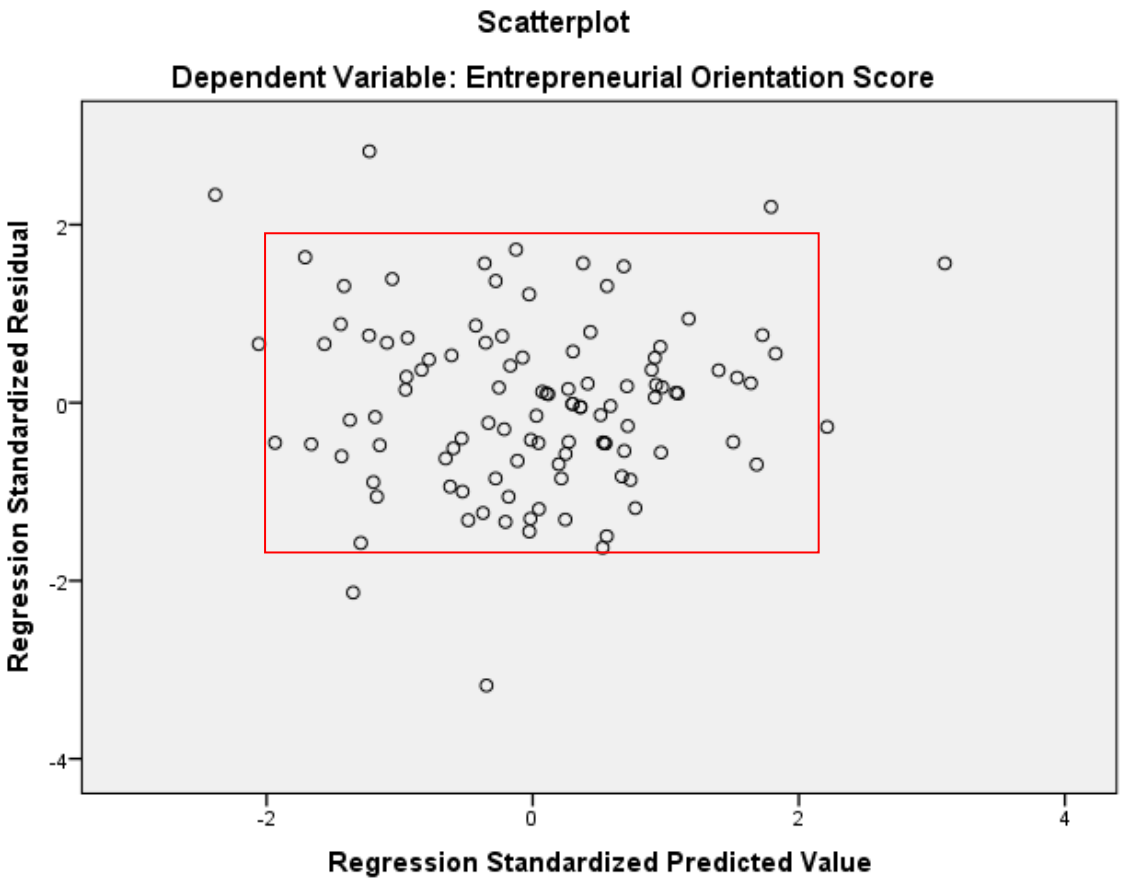
5.3. Test for normality





Since the points lie very close to the line of best fit and the histogram has a normal distribution, the data can be assumed to be normally distributed.

5.4. Linearity and homoscedasticity



Since distribution is roughly rectangular with most scores clustered in the center, the assumption of linearity is met. With the exception of a few outliers, it is seen that the data points are homoscedastic due to the variance of the error term which remains roughly constant. This is further supported by the residual mean of (-.01827) which is very close to zero as seen in the table below:

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	57.2215	79.4188	66.8796	4.04813	113
Std. Predicted Value	-2.386	3.098	.000	1.000	113
Standard Error of Predicted Value	.848	3.072	1.532	.440	113
Adjusted Predicted Value	54.2973	77.8356	66.8180	4.06488	108
Residual	-21.47270	19.08734	**-.01827**	6.58817	108
Std. Residual	-3.178	2.825	-.003	.975	108

Stud. Residual	-3.211	2.968	.003	1.005	108
Deleted Residual	-21.93441	21.07879	.06163	7.01111	108
Stud. Deleted Residual	-3.371	3.090	.004	1.020	108
Mahal. Distance	.696	21.117	4.956	3.617	113
Cook's Distance	.000	.200	.011	.026	108
Centered Leverage Value	.007	.197	.046	.034	113

a. Dependent Variable: Entrepreneurial Orientation Score

5.5. Independence of residuals (errors)

1	Work Discretion, Management Support[b]	.	Enter
2	Time Availability, Organisational Boundaries, Rewards[b]	.	Enter

a. Dependent Variable: Entrepreneurial Orientation Score

b. All requested variables entered.

Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					**Durbin-Watson**
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.498[a]	.248	.234	6.77412	.248	17.359	2	105	.000	
2	.523[b]	.273	.238	6.75770	.025	1.170	3	102	.325	**2.342**

a. Predictors: (Constant), Work Discretion, Management Support

b. Predictors: (Constant), Work Discretion, Management Support, Time Availability, Organisational Boundaries, Rewards

c. Dependent Variable: Entrepreneurial Orientation Score

5.6. Multicollinearity

Correlations

		Entrepreneurial Orientation Score	Management Support	Work Discretion	Rewards	Time Availability	Organisational Boundaries
Pearson Correlation	Entrepreneurial Orientation Score	1.000	.441	.463	.224	.216	-.253
	Management Support	**.441**	1.000	.649	.606	.372	-.471

	Work Discretion	**.463**	.649	1.000	.580	.344	-.358
	Rewards	.224	.606	.580	1.000	.329	-.521
	Time Availability	.216	.372	.344	.329	1.000	-.279
	Organisational Boundaries	-.253	-.471	-.358	-.521	-.279	1.000

First it was required to check if predictors had some correlation to the predicted variable i.e. the correlation is higher than 0.35. It was seen that management support and work discretion complied with this requirement and the other three variables did not. A sequential regression with management support and work discretion as the first regression and the others elements as the subsequent regression, was therefore performed.

It was also required that the correlations between the predictor variables were not larger than 0.7 such that there was not a high level of multi co linearity. It was seen that the highest correlation was 0.649 and thus the multicollinearity assumption was met. The multicollinearity assumption was further assessed with the tolerance and Variance Inflation Factors (VIF) in the table below:

Coefficients[a]

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	**Tolerance**	**VIF**
1	(Constant)	46.831	3.491		13.413	.000	39.908	53.753					
	Management Support	.164	.075	.242	2.174	.032	.014	.314	.441	.208	.184	**.579**	**1.727**
	Work Discretion	.380	.138	.307	2.757	.007	.107	.653	.463	.260	.233	**.579**	**1.727**
2	(Constant)	53.282	6.580		8.098	.000	40.231	66.333					

	Management Support	.190	.084	.280	2.265	.026	.024	.356	.441	.219	.191	**.467**	**2.143**
	Work Discretion	.448	.145	.361	3.080	.003	.159	.736	.463	.292	.260	**.517**	**1.933**
	Rewards	-.399	.219	-.215	-1.817	.072	-.834	.036	.224	-.177	-.153	**.509**	**1.966**
	Time Availability	.061	.175	.032	.349	.728	-.285	.407	.216	.034	.029	**.828**	**1.207**
	Organisational Boundaries	-.199	.214	-.095	-.930	.355	-.623	.225	-.253	-.092	-.078	**.685**	**1.460**

a. Dependent Variable: Entrepreneurial Orientation Score

If tolerance is very small i.e. less than 0.10 it suggests that there are multiple correlations that are high suggesting that there is a high level of multicollinearity. In the data obtained, none of the predictor tolerances were small and hence this again affirmed that the multicollinearity assumption was met. Similarly the Variance Inflation Factors (VIF) need to be less than ten and was seen to be the case with all five elements.

Appendix 6: Test for homogeneity

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Mine 1	34	4583	134.7941	279.7442
Mine 2	9	1199	133.2222	300.9444
Mine 3	4	509	127.25	634.9167
Mine 4	14	1789	127.7857	330.489
Mine 5	6	822	137	336.8
Mine 6	9	1124	124.8889	227.1111
Mine 7	5	697	139.4	349.3
Mine 8	8	1091	136.375	865.9821
Mine 9	17	2331	137.1176	601.4853
Mine 10	7	975	139.2857	350.5714

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F - Stat*	*P-value*	*F - crit*
Between Groups	2098.338	9	233.1487	0.592545	0.800577	1.972014
Within Groups	40527.38	103	393.4697			
Total	42625.72	112				