ENTREPRENEURIAL ORIENTATION AND ITS IMPACT ON INNOVATION INTENSITY IN THE OMANI CORPORATE SECTOR

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ABSTRACT

Entrepreneurial Orientation (EO) is a widely researched construct of corporate entrepreneurship. Despite long-standing research on EO, past studies on this construct have been unable to resolve issues related to its measurement. Innovation Intensity (II) is also a dynamic construct of corporate entrepreneurship but has received relatively less empirical attention. Previous research has reported an absence of an empirically validated quantitative scale of innovation, particularly innovation intensity.

This research has addressed these gaps by proposing a refinement and validation of the Entrepreneurial Orientation scale and the development of an Innovation Intensity scale. The research proposes an Entrepreneurial Transformational Model (ETM) positing that EO impacts II.

A predominantly quantitative research strategy supported by qualitative inputs, is employed to obtain empirical data from 404 corporate firms in Oman, drawing from a list of corporate firms registered with the Oman Chamber of Commerce and Industry. A mix of questionnaire survey and semi-structured interviews was conducted with senior managers from firms representing various industries of the Omani corporate sector. Utilising exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and structural equation modelling (SEM), a two-stage data analysis approach was adopted. Measurement and structural models were developed for EO and II measures, while a complete SEM model was developed to test the causal relationship between EO and II.

The results indicate that EO is a second-order construct consisting of five first-order factors, namely ready to innovate, competitive aggressiveness, autonomy, risk taking and proactiveness, which are its reflective components. Similarly, II is a second-order construct consisting of two first-order factors, namely degree and frequency of incremental and radical innovation, which are its reflective components. The II scale developed through this study allows corporate firms to assess their innovation intensity on a two-dimensional four-celled grid with varying levels of degree and frequency of innovation. Finally, EO is found to influence II and the entire relationship is posited as Entrepreneurial Transformation Model. This study, by addressing the empirical irregularities, has brought clarity to the measurement of EO and II constructs and is an original contribution to the advancement of theoretical knowledge and improvement in professional practice.

DECLARATION

I declare that this thesis is my own unaided work. It is being submitted for the degree of PhD at the University of Bedfordshire.

It has not been submitted before for any degree or examination in any other University.

Name of candidate: Tahseen Anwer Arshi

Signature: Tahseen Anwer Arshi

Date: 14 November 2016

Research Publications by the Author Related to the Research

Tahseen Arshi, A. (2012) Entrepreneurial Intensity in the corporate sector in Oman: The Elusive Search Creativity and Innovation. International Business Research, 5(9), 171-193.

> This paper clarifies the entrepreneurship intensity construct, based on existing literature and links it to degree and frequency of innovation.

Tahseen Arshi, A. (2013) Can organizational culture influence innovation: An empirical study on organizational culture characteristics and innovation intensity. *Scottish Journal of Arts and Sciences*, 10(2), 3-17.

> This paper traces the effect of organizational culture and autonomy on incremental and radical innovation types.

Tahseen Arshi, A. (2013) Entrepreneurial leadership and innovation: An empirical study on organizational leadership characteristics and Entrepreneurial Innovation Intensity. *American Journal of Social Issues and Humanities*, 3(5), 234-243.

> This paper traces the effect of different forms of organizational leadership and how it aids autonomy that facilitates incremental and radical innovation types.

Tahseen Arshi, A. (2013) Strategizing for innovation: An empirical investigation on strategy types and innovation. *Business and Management Horizons*, 1(1), 138-152.

> This paper traces the effect of different forms of entrepreneurial strategies that are aimed at producing incremental and radical innovation.

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Dedication

"Life can only be understood backwards; but it must be lived forwards."

Søren Kierkegaard

In memory of my father Mohammad Ahsan, who motivated me in the past……

and

To my children Aayan and Aaira who inspire me for the future……

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List of Abbreviations

Constructs

EO	Entrepreneurial Orientation
II	Innovation Intensity

Factors

AUT	Autonomy
CA	Competitive Aggressiveness
EXTRSK	External Risk Taking
INCRD	Incremental Innovation degree
INCRF	Incremental Innovation Frequency
INTRSK	Internal Risk Taking
PRO	Proactiveness
RADDF	Radical Innovation Degree and Frequency
RTI	Ready to Innovate

Measures (survey items)

EORI	Ready to Innovate
EOC	Competitive Aggressiveness
EOA	Autonomy
EOR	Risk Taking
EOP	Proactiveness
III	Incremental Innovation degree
IIF	Incremental Innovation Frequency
IIR	Radical Innovation Degree
RIF	Radical innovation Frequency

Chapter 1: Introduction

1.1 Introduction

Corporate Entrepreneurship (CE) can be explained as entrepreneurial behaviour in large firms (Burns, 2016). Burns (2016) citing Morris and Kuratko (2002) pointed out that the objective of corporate entrepreneurship is to achieve 'superior organizational performance' by promoting innovation at all levels of the organization. Richard et al. (2009) explained that organizational performance can be largely determined through financial and market performance. Corporate entrepreneurship and Innovation, as its most prominent construct, promotes superior organizational performance, which also leads business growth, new venture creation, and the strategic revitalization of firms (Zahra, 1996; Holt et al., 2007). The role of corporate entrepreneurship and innovation in facilitating superior firm performance has been emphasised by corporate leaders, business press and academia (Hamel and Breen, 2007). Multiple researchers (Brizek, 2014; Kuratko et al., 2013; Antonic, 2006) have argued that firms that adopt corporate entrepreneurship are able to create value for different stakeholders.

Multiple models have been put forward in the corporate entrepreneurship literature that can potentially explain and measure corporate entrepreneurship. One such prominent model that emerged and received considerable empirical attention in this area of corporate entrepreneurship is Entrepreneurial Orientation (EO). The EO construct, which is considered an entrepreneurial process involving methods, decision-making styles and organizational practices that firms use to act entrepreneurially, has been found to be positively linked to superior organizational performance (Voss and Moorman, 2005). A similar construct called Innovation Intensity (II) has received some attention in the literature and has been linked to the innovation measures of a firm (Burns, 2013). Innovation Intensity, which consists of the degree and frequency of innovation, measures the strength of innovation (Burns, 2013). Although EO has received considerable empirical attention, innovation intensity is relatively less delineated in the literature. It branched out from the concept of Entrepreneurial Intensity, which was originally developed by Morris and

Kuratko (2002), as a measure of the ‘intensity’ of the originally proposed three dimensions of EO, namely innovation, risk taking and proactiveness.

1.2 Entrepreneurial Orientation

According to Wales et al. (2013) and Covin et al. (2006), entrepreneurial orientation has been one of the most prominent and widely accepted constructs in the extant literature on corporate entrepreneurship. Most of the definitions used to define EO treated it as a behavioural propensity and as an enabling framework that makes the firm entrepreneurial (Hosseini et al., 2012). Rauch et al. (2009, p. 766) defined EO as “*the entrepreneurial strategy- making processes that key decision makers use to enact their firm`s organizational purpose, sustain its vision and create competitive advantage(s).”* Covin et al. (2006) also noted that entrepreneurial orientation incorporates firm-level processes, practices and decision-making styles where entrepreneurial behavioural patterns are recurring. Rauch et al. (2009) also reported that EO is a dynamic and robust model that has been extensively researched as a construct of empirical interest in the extant literature.

The Entrepreneurial Orientation construct was initially developed by Miller (1983) with three factors, namely innovation, risk taking and proactiveness. It was further refined by Covin and Slevin (1989) who retained the ‘three-factor’ model. Lumpkin and Dess (1996) later added two more dimensions, namely competitive aggressiveness and autonomy. These dimensions comprehensively cover the area of EO and various research have been conducted using either three or five factors (Covin and Wales, 2012). Much research, including Covin et al. (2006) and Covin and Wales (2012), have treated EO as a universal construct and focused on finding relationships between EO and firm performance using these dimensions, which are briefly explained below.

Innovation is considered to be one of the most important dimensions among the five dimensions of EO (Parkman et al., 2012). Innovation refers to the proposal and generation of new ideas and commercial exploitation of its outcomes (Tonnessen, 2005). Lumpkin and Dess (1996) observed that without innovation, the other dimensions of EO have little or no value. Proactiveness would be of no value if the opportunity is not available through innovation, and risk taking without innovation would also be a futile strategy. Similarly, competitive aggressiveness posture would be difficult to adopt in the absence of innovation. Organizations which are innovative have the potential to produce new products, services and technologies, which is a key route to new entry.

Innovation is quite a broad concept and has been classified into different types such as product, process, market and technological innovation with different scales or degree ranging from incremental to radical innovation. Past studies have not clearly defined whether innovation within EO is an input or output factor (Baregheh et al., 2009). Researchers such as Vasconcellos and Marx (2011), Forsman (2011) and Sebora, and Theerapatvong (2010) have explained that innovation is not an isolated phenomenon and is a process comprising input and output factors. Wang and Ahmed (2004) argued on similar lines stating that certain innovations, like product and market innovation, focus on outcome based measures, while process and behavioural innovation highlights the underlying factors that facilitate product and market innovation, all of which provide a complete picture of innovation in a firm.

Competitive aggressiveness refers to the firm's way of intensely and directly engaging with competitors, in terms of pursuing their target markets, on various aspects such as price cuts, use of unconventional tactics and innovation (Grimm et al., 2006). The breadth, speed and frequency are usually associated with the competitive aggressiveness dimension. This dimension supports the existing dimensions of innovation, risk taking and proactiveness. However, the effectiveness of these three dimensions will to a large extent depend on the ability of firms to compete in the market. The importance of the competitive aggressiveness dimension lies in the influences it has on the firm's ability to perform better than rivals, through a strong offensive posture and aggressively and frequently entering markets identified or dominated by rivals and create substantial impact in the market. Blackford (2014) noted that aggressively promoting innovative products and services is a sign of competitive aggressiveness and hence this dimension is also closely related to innovation. It is argued that firms would find it hard to practise competitive aggressiveness in the absence of innovation.

Autonomy is quite different from other EO dimensions. It focuses inwards within the organization, while all other EO dimensions are focused on the firm's external factors. The Autonomy dimension was added to the EO construct to facilitate the achievement of other EO dimensions and the overall entrepreneurial orientation of the firm. Autonomy is about independent spirit, which is a key to unlocking entrepreneurial potential (Lumpkin and Dess, 1996). It specifically refers to the independent action of an individual or a team in bringing forward an idea or a vision and carrying it through to completion, without being held back by overly stringent organizational constraints (Burns, 2013). According to Lumpkin et al. (2009), the autonomy dimension improves the ability of firms towards decision-making, delegation and empowerment. In the absence of autonomy, firms would not be able to innovate, take risks, identify opportunities and compete aggressively in the market.

Risk taking is a dimension that has been traditionally associated with entrepreneurship and closely related to innovation (Hoonsopon and Ruenrom, 2012). Memili et al. (2010) argued risk taking is the driving force behind corporate entrepreneurship. Risk taking is the willingness of corporate managers to commit resources to risky propositions, which have the potential to fail (Eggers et al., 2013). Risk taking within the EO framework was initially explained as risky strategies that managers are willing to take as part of the new entry process and innovation (Miller and Friesen, 1982). Later, the development of the risk-taking dimension included the ability of firms to differentiate between calculated and random risks, internal and external risk opportunity, and risk assessments related to new entry.

Tang et al. (2014) observed that firms that take risks are known to achieve superior organizational performance. Risky propositions, either internal or external, involved venturing into new and unknown markets and drawing large borrowings to enhance returns (Baker and Sinkula, 2009). External risks mostly emerge by virtue of being innovative. Internal risk arises when organizations commit different resources to risky projects. Within the EO framework, risk taking is focused on venturing, risky strategies, calculated risks and resource commitments in uncertain environments.

The Proactiveness dimension is an important dimension of EO and is linked to competitive advantage, since it provides the first-mover advantage to firms in the market place (Wang et al., 2015). The proactiveness dimension describes the characteristic of entrepreneurial actions in pursuit of new opportunities for future growth, both in terms of products or technologies; in terms of existing and emerging markets; and consumer demand that is accompanied by innovation. Lumpkin and Dess (1996) observed that firms, by being proactive, create demand in the market. Firms beat competitors to be first to identify and capitalise on new and developing opportunities. Nieto et al. (2013) found the proactiveness dimension to be significantly associated with superior firm performance. Without proactiveness, organizations would not be able to effectively compete in the market and exploit innovation. Within the context of EO, proactiveness is conceptualized as forward-looking and opportunity-seeking behaviour that is accompanied by new entry and innovation (Ardichvili et al., 2003). Information search, alertness, social networking, anticipating demand and prior knowledge of products and markets are key variables associated with the proactiveness dimension (Lumpkin and Dess, 2001).

1.3 Entrepreneurial Orientation Measurement Scale

The EO scale, which measures the EO construct, has been extensively used in firm-level entrepreneurial research (Chadwick et al., 2008). The original EO scale, capturing all essential dimensions of the construct, was developed by Covin and Slevin (1988, 1989). It comprised 9 items of which 5 were adapted from the previous measures of EO developed by Khandwalla (1977) and Miller and Friesen (1982). The original scale contained a mix of input and output measures. Morris and Sexton (1996) modified the scale further, increasing the total number of items to 14. They are typically measured on Likert-type scales (i.e. 1–5 or 1–7), with a minimum of six items (i.e. two per each of the core concepts). This revised scale by Morris and Sexton (1996) was validated in a wide variety of research settings by Barringer and Bluedorn

(1999), Dickson and Weaver (1997), Green et al. (2008), Escribá-Esteve et al. (2008) and Parkman et al. (2012) and has been able to measure EO in particular research settings, with variations in the wording of questions and with other minor measurement variations (Miller, 2011).

1.4 Limitations of the EO Construct and its Measurement

After an extensive study of relevant literature (Lumpkin et al., 2009; Covin and Wales, 2012; Zang et al., 2014), it was observed that there are a number of limitations to the entrepreneurial orientation construct and its measurement. The EO measurement has been critiqued on the issue of dimensionality and aggregated measurement of the EO scores (Wales et al., 2013). The three- and five-factor models have been used inconsistently across various research settings without theoretical justification and empirical evidence. Original contributors to EO, such as Covin and Slevin (1986, 1989), argued that these EO dimensions, if measured correctly, would have the same score which will add up to show the entrepreneurial orientation of the firm. However, a few others argued that EO dimensions and their scores may vary independently and hence the scores cannot be aggregated (Kreiser et al., 2002; Covin et al., 2006; Schillo, 2011). Hence, there is no consistency in terms of approaches to measurement of EO in empirical studies (Chadwick et al., 2008).

The second limitation is related to the overlap of the dimensions itself. To quote an example, the innovation dimension was found to be overlapping with other dimensions (Lumpkin and Dess, 1997). Literature suggests that the items representing the dimensions spill over into each other and are not comprehensive enough to measure the dimensions. As a result, the EO scale has been continuously refined over the years by Green et al. (2008), Escribá-Esteve et al. (2008) and Parkman et al. (2012). Although these studies were helpful in refining the measures for individual dimensions, there is still further scope to refine the EO scale in terms of clarifying the nature of dimensions, developing an exhaustive list of items and testing them together, rather than for each individual dimension, which many studies have attempted in the past.

One more limitation concerns the conceptualization the innovation dimension, which is the dominant dimension of EO. It is observed that the EO construct represents only input measures of innovation. Despite an abundance of research suggesting that innovation capability contributes to firms' performance (Morris and Kuratko, 2011; Hamel and Breen, 2007), little is known regarding the extent to which innovation dimension within EO, may positively influence the firms' capability to innovate and generate innovation outputs (Wang et al., 2015). The EO scale also does not clarify the nature of the innovation dimension, which is mostly referred to 'innovativeness' of a firm, which implies ability or readiness state of a firm to innovate.

Based on the above limitations, there are two key themes that emerge and need empirical attention. First, there is a need to further refine the EO scale so that a comprehensive list of items could be added to the EO scale that captures the broad dimensions of EO. The idea is to conceptually and empirically delineate the dimensions and their measures addressing the overlap issues.

Second, there is also a need to take research on EO in a new direction that can add insights into the EO construct rather than heavily focusing on the relationship between EO and different parameters of organizational performance. Wiklund and Shepherd (2011, p. 52) reported that these studies are so one-directional that one is lead to ask: *"Are we at a point of saturation with little more to learn, or can future investigations of EO still make contributions to the strategy and/or entrepreneurship literature?"*. This provided the scope to contribute to the EO research. The measurement of 'intensity' of EO's prominent dimension – innovation – is an additional area of research that should be investigated as it has the potential to bring more clarity to EO dimensions, particularly measurement of innovation.

1.5 Summary of EO measures

The five-dimensional EO model measures and captures multiple entrepreneurial activities in a firm. The EO measurement scale has also drawn considerable empirical discussions. Numerous researchers have critiqued the EO scale on dimensionality and its focus. There exists an inherent research gap in the measurement of innovation within the EO framework. The strength or intensity of innovation dimension (output) is an associated area of research and is explained through the concept of Innovation Intensity.

1.6 Innovation Intensity

The word 'intensity' denotes something *"that is highly concentrated, has a high degree of force, energy or is strongly emphasized"* (Morris, 1998, p. 37). Morris and Sexton (1996) originally proposed the concept of entrepreneurial intensity which proposed to measure the intensity of three EO dimensions, namely innovation, risk taking and proactiveness. The measures proposed were the 'degree' and 'frequency' of these dimensions. The two-dimensional grid comprising of degree and frequency to measure innovation along with other EO dimensions was supported by Covin et al. (2006). Burns (2013), building on the idea, suggested that innovation intensity is similar to entrepreneurial intensity and can be measured through scale (degree) and number of entrepreneurial events (frequency). Burns (2013) proposed an innovation intensity grid, which allows firms to map themselves on any of the four quadrants represented through degree and frequency of innovation. These quadrants represent the variable nature of innovation intensity and were named as 'continuous incremental' (low degree and high frequency), 'discontinuous radical' (high degree and low frequency), 'periodic incremental' (low degree and low frequency) and 'continuous radical' (high degree and high frequency). Organizations with both high degree and frequency would be considered to have high innovation intensity, while organizations with low degree and low frequency should be considered to have low innovation intensity.

1.7 Measures of Innovation Intensity

Literature suggests that the measures of innovation intensity are not well developed. Considering that innovation is the most dominant dimension of EO, without which other dimensions have "*no value"* (Morris and Sexton, 1996, p. 47), the intensity of innovation dimension should provide critical information to firms in terms of innovation performance (Morris and Kuratko, 2002; Bessant and Tidd 2011, Burns, 2013). Burns (2013) argued that II should be ideally represented and measured through the degree and frequency of innovation. The degree of innovation can be explained further through radical and incremental innovation. The frequency is the occurrence of either type of innovation in a firm. Innovation may be of different types and at different stages, but the degree and frequency of innovation can be applied to all types of innovation.

1.7.1 Incremental Innovation

Incremental Innovation is a change usually involving improvement of existing products and services (Bessant, 2005; Goffin and Mitchell, 2010). It is *"a collection of activities that constitute a process intended to achieve performance improvement"* (Jha et al., 1996, p. 22). Incremental innovation does not require large investment, radical shifts and mind sets or substantial changes in competencies and capabilities (Garcia-Sabater et al., 2011). It is considered to be safe, less expensive with reasonably short time lines and hence is more frequent in occurrence. Incremental innovation is important for organizations since it keeps the organization entrepreneurial, improves the ability of firms to compete in the market and develops a stock of incremental innovation over a period of time that improves its innovative capability. Bessant and Tidd (2011) observed that incremental innovation provides competitive advantage to firms. The degree of impact in the market through incremental innovation may be low; although the number of times such incremental innovation is brought in the market may be high. High frequency of incremental innovation in firms is a common phenomenon, but firms with low frequency are considered to have low innovation performance.

1.7.2 Radical Innovation

Radical innovation is defined as *"A successfully exploited radical new product, process, or concept that significantly transforms the demand and needs of an existing market or industry, disrupts its former key players and creates whole new business practices or markets with significant societal impact"* (Assink, 2006, p. 217). It is an important dimension of innovation intensity, since it significantly represents the 'degree' aspect of innovation, which is more evidently observed due to the size of impact in the market. However, the frequency of radical innovations in the market is likely to be low and discontinuous. Firms can push the boundaries of performance by aiming to be radical and frequent, a phenomenon that is not commonly evident. Radical innovation requires substantial resource commitments, and radical improvements in capabilities and competencies. It plays an important role in the success of firms in the long run since it provides sustainable competitive advantage and changes the competitive rules of the industry (Goffin and Mitchell, 2010; Prahlad and Mashelkar, 2010). Bessant and Tidd (2011) contend that radical innovation is achieved by firms who work at the fringes of existing mainstream markets and thereby create new markets and focus on unmet customer needs. Firms that do not value radical innovation are not able to derive strategic advantages of high scale and have to remain content with smaller market shares (Nagji and Tuff, 2012). Frequency of radical innovation in firms is periodic, but firms that demonstrate high frequency are considered to be have high innovation performance.

1.8 Limitations of the Innovation Intensity Construct and its Measurement

After analysing the existing studies, it was observed that there are a number of limitations to the innovation intensity construct and its measurement. The II construct is posited to measure innovation as an output measure. However, within innovation, which is conceptually very broad, the measures for incremental and radical innovation are not properly developed. It is essential that these measures should be clearly conceptualized and empirically tested. Most of the research that attempts to measure innovation involves a one-dimensional scale comprising of degree of incremental and radical innovation, while the literature related to EI and II lays importance on both the 'degree' and 'frequency' of incremental and radical innovation. It is also observed that innovation stages such as inputs and outputs were not given due attention. Studies by Jong (2000) and Chen et al. (2008) provide important insights and indicate that input and output stages of innovation are critical indicators. There is no validated model currently available that incorporates and explains both input and output measures of innovation in an integrative model.

1.9 Summary of II Measures

Innovation intensity is a dynamic construct as it proposes to measure multiple facets of innovation on a two-dimensional grid. However, it has not received as much empirical attention and therefore its dimensions are not well delineated in the literature. Considering its usefulness in measuring intensity of innovation, it should be further developed and empirically tested. Since innovation is the dominant EO dimension, the intensity of innovation can be studied and tested through degree and frequency of innovation. An absence of an empirically validated scale for innovation makes a compelling case for research in this direction. Developing and testing measures for degree and frequency of innovation and developing a measurement scale for II would fill an important gap in the literature.

1.10 Research Gaps

Based on the above discussion, a few prominent gaps have been identified in both EO and II constructs. The table 1.1 explains these gaps and the associated aims.

Table 1.1: Research gaps and related aims/contributions

Constructs	Research gaps	Aims/Contributions
Entrepreneurial Orientation (EO)	The EO construct has been critiqued on the issue of dimensionality and aggregated measurement. The measures are not clearly deciphered, with reported overlaps in its various dimensions, particularly innovation measures.	This study addresses the issues related to dimensionality and measurement of the EO scale. It clearly deciphers the measures, particularly related to innovation and brings clarity to the nature of measures.
Innovation Intensity (II)	The II construct is not well developed in the literature. The measures for incremental and radical innovation are not well developed. There is no scale available to measure II using the two-dimensional scale of degree and frequency of innovation.	The measures for the II construct are developed and tested, which are specifically degree and frequency of innovation. A two-dimensional scale for II is developed.
Entrepreneurial Orientation and Innovation Intensity	The relationships between EO and II constructs have not been explored, particularly considering that EO factors seem to influence II.	The relationship between EO and II is explored, positing that EO influences II. An integrated model showing the relationship between EO and II is developed.

1.11 Importance of the Study

This research on EO and II not only consolidates the theoretical developments in the field, but also provides new insights into the measures of both entrepreneurial orientation and innovation intensity. It is able to fill key gaps in the literature by proving a better understanding of the EO dimensions and their measures. An exhaustive list of items representing each dimension within EO and II brings more clarity to both the constructs.

The contribution to the II construct is substantial. Firstly, the construct is clearly deciphered as it is important to clarify the innovation dimension within the context of II. The measures of innovation intensity, in this study, are developed as output measures. The II measures are converted into a two-dimensional measurement scale for measuring innovation intensity. Presently, there is no scale available to measure innovation intensity. By doing so, this study aims to bring clarity to the innovation dimension, which in this study, is presented as input measure at EO level and output measure at II level. Finally, the causal relationship between entrepreneurial orientation and innovation intensity is explored and tested and the possible causation between the two constructs is explained. This study aims to establish that each of the dimensions of EO, particularly innovation, which dominates the research on EO, influences entrepreneurial outputs and specifically innovative outputs, i.e. degree and frequency of innovation. An integrated model comprising EO and II measures is developed and tested to show the entire relationship through input and output measures. Therefore, the primary theoretical contribution of this study is to clarify these two prominent constructs of corporate entrepreneurship, so that researchers and academics can interpret and use the constructs and the measures appropriately to explain corporate entrepreneurship and innovation.

The refined EO scale and new II scale are applicable in the corporate sector in Oman. Valid measures for EO within the corporate sector in Oman will benefit corporate firms to align their efforts towards engaging in entrepreneurial activities. Corporate firms will be in position to evaluate their entrepreneurial orientation efforts as antecedents to entrepreneurial outputs which will be reflected through degree and frequency of innovation. The two-dimensional measurement scales for innovation will be of high value to practitioners as they will provide the firms the ability to map their positions on the degree and frequency grid. The II scale will provide managers with a checklist of items that need to be assessed before they decide their entrepreneurial and innovation focus.

1.12 Research Setting

This study is conducted within the corporate sector in Oman. Historically, Oman's economy has been characterised by a dominant government and public sector. However, the corporate sector has emerged from its shadows and has seen substantial growth and independence and now is a vibrant and important contributor to Oman's economic growth. This growth is the outcome of Oman's economic policy to actively pursue its development plan with focus on the corporate sector (*The Report Oman*, Oxford Business Group, 2015). As a result, the corporate sector's contribution to GDP is now at 55% and based on Oman's 5-year plan called Vision 2020, is expected to reach 70% (*Trade Policy Review*, WTO, 2014). The corporate sector operates largely in tourism, retail, banking, agriculture, construction, ports services and textile industries. There are total of 285,577 companies registered with the regulatory body, the Oman Chamber of Commerce and Industry (OCCI). Of the registered companies, 60.7% are in services, 37.2% in industry and 2.1% in agriculture. The OCCI categorises the corporate sector according to the capital structure of the firms. The study considers large firms having a capital structure in excess of Omani Rial 250,000 (GBP 428,775) and categorised as 'excellent' by OCCI. The total number of such firms is 5,853, as shown in figure 1.1.

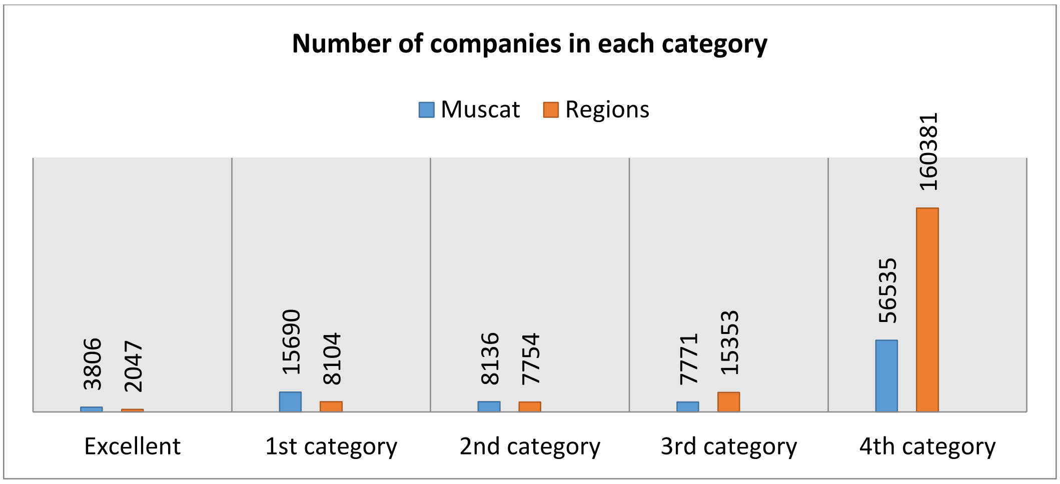


Figure 1.1: Number of companies registered with the Oman Chamber of Commerce and Industry as of 2014, (Source: OCCI, 2015)

The period between 2011 and 2014 has seen growth in the profitability of companies in most of the sectors. Highest growth was registered in the Industrial activities (19.9%), followed by Services activities which registered a growth of 11.6%. Agriculture and Fishing registered a growth of 6.11%. Oman's *Eighth Five-Year Development Pla*n (2011–2015) continues the policy of encouraging private sector investment into non-oil and non-gas industrial activities (Central Bank of Oman, 2014).

1.13 Rationale for the Research

With the advent of globalization, growth of the corporate sector and a greater exposure to Western economies and competition, the need for entrepreneurial orientation has been felt in the corporate sector in Oman. The burden of reducing oil dependence has fallen on the corporate sector, which has had to adopt an entrepreneurial approach so that growth opportunities are developed and harnessed. Currently, efforts are underway to liberalize investment opportunities in order to attract foreign capital (*Mid-Year Oman Economy Review Report*, Central Bank of Oman, 2014). The diversification plan has put pressure on the corporate sector as most of the diversification is set to come from this sector. Oman's corporate sector attracts more and more entrepreneurs and aims to increase foreign investment. The corporate sector aims to reduce unemployment levels, particularly among Omani youth. However, firms within the corporate sector in Oman find it challenging to promote an entrepreneurial approach considering the lack of such corporate culture and reliable measures. Ahmed and Shepherd (2010, p. 257) argued that measurement scales particularly for innovation are important because:

- They draw attention to those areas that needs improvement.
- They draw attention to areas of high performance and company strengths.
- They facilitate comparison to the company’s own performance in the past years and comparison with competition.
- They identify the causes of poor implementation of strategy.
- Achievement of objectives and performance gaps are identified.

The corporate sector in Oman has recorded growth in many areas and its contribution to the economy is growing. In order to reduce the dependence on oil, the corporate sector’s contribution has to grow further. This calls for the development of clear measures and an appropriate strategic focus for firms within the sector so that they can aid decision-making. However, there has been no empirical research on corporate innovation, on which managers can base their decisions. Entrepreneurial orientation and innovation intensity in the corporate sector in Oman has not been investigated except for the study conducted by this researcher (Tahseen, 2012). Most corporate sector organizations believe that corporate innovation is the key to growth and diversification. Innovative ideas and business models have been successful in the past and seem to be the future direction.

The danger of using scales that are not validated for a specific economy is that it may lead to incorrect interpretations. Researchers may make invalid inferences and recommend strategies to practitioners that are not appropriate for the context in which the practitioner functions (Terblanche and Boshoff, 2006).

1.14 Motivation for this Study

The motivation for research is an important condition for good research. The motivation for this study comes from two sources. Firstly, the researcher has been engaged in teaching entrepreneurship courses for the last ten years and has read and conducted research on various aspects of entrepreneurship in general and corporate entrepreneurship and innovation in particular. This motivated the researcher to investigate and develop measures for entrepreneurial orientation and innovation intensity which occupies a large part of the discussion on corporate entrepreneurship.

Secondly, the research is conducted in Oman, which is placing strategic importance on the development of corporate entrepreneurship. This is enumerated in the country's five-year plans which are named Vision 2020 and Vision 2040. The country aims to reduce its dependence on the oil economy by encouraging other sectors and believes that development of entrepreneurship among both individual and corporates should be the key strategic direction for future growth. The corporate sector is set to play a major role in this transformation. Conducting research in this area, that is applicable in the present research setting, would not only satisfy the requirements of the key stakeholders, such as the corporate firms, managers and the government, but also give satisfaction and a sense of contribution to the researcher. Moreover, the researcher has personally received requests, both from industry and academia, for further research in corporate entrepreneurship in general and innovation in particular.

1.15 Approach

Based on the epistemological positioning of the study, which is positivist and realist, the methodological approach in this research is dominantly quantitative. Since the objective of the research is refinement and development of measurement scales, a quantitative approach is felt to be an appropriate strategy. Reliability, validity, measurement and generalizability are key considerations in the research. However, a positivist-realist ideology is supported by an interpretivist philosophy and hence, qualitative inputs have been taken from key participants at the stage of questionnaire design and to address gaps in the findings during the data analysis. This is primarily a cross-sectional study, and data is collected from corporate sector organizations in Oman, representing different sectors of the economy. Both entrepreneurial orientation and innovation intensity have been studied as a firm-level construct and each organization within the corporate sector has been considered as a unit of analysis. Data is analysed using exploratory and confirmatory factor analysis and structural equation modelling, using measurement and structural modelling, which was helpful in testing the conceptual model and the hypotheses developed in this study.

1.16 Structure of the Thesis

Chapter 2 is the literature review, which looks at the extant literature on entrepreneurial orientation and entrepreneurial intensity. A thorough investigation into theories, models and scales in the entrepreneurship and innovation literature has been made. Although an attempt was made to include the most recent studies in the review, some of the earlier studies that were considered to be essential to the study are included due to their historical importance. Based on the review of the literature, the research gaps are explained and a conceptual framework is developed. The research aims and objectives and hypotheses are framed in this chapter.

Chapter 3 discusses the philosophical foundations of the research methodology, research design and methods of data collection. Research approaches that are employed in this research are outlined, rationalized, and justified in the context of research. The importance of quantitative methodologies and the complementary role of qualitative inputs for this research is discussed. Data collection tools are enumerated and also justified based on research objectives. Sampling strategy and sample size are justified in this chapter. Finally, data analytical tools that are used in this study are explained and justified in the context of the research. The pilot study phase is also explained in this chapter. The refinements to the scale, questionnaire design, and conceptual model after the pilot study are enumerated.

Chapter 4 describes the data and the characteristics of the sample used in the study. The findings of statistical tests such as homogeneity of variance, multi-collinearity and results of exploratory factor analysis are shown in this chapter. The results of the tests for reliability and validity of the measures are discussed in this chapter.

Chapter 5 presents the results of the data analysis, particularly confirmatory factor (CFA) analysis and structural equation modelling (SEM). The measurement and structural models related to EO and II are shown. The conceptual model is tested and model fit is analysed. The findings of the semi-structured interviews with managers of selected firms are also reported in this chapter.

Chapter 6 analyses the results of SEM and discusses the hypotheses and research objectives in the light of CFA and SEM results.

Chapter 7 explains the data with elaborate discussions and explanation. The findings from the literature are compared and contrasted with the quantitative and qualitative findings and the discussion analytically examines measurement of EO and II and their relationship. Based on the discussion, conclusions are made and future research directions are identified. The limitations of the study are also discussed in this chapter.

Chapter 8 elaborates this research's contribution to theoretical knowledge and professional practice. The refined entrepreneurial orientation scale, the newly developed innovation intensity scale and the Entrepreneurial Transformational Model are presented as major contributions of this study.

Chapter 9 presents a reflection of the researcher's thought processes and subsequent phases of knowledge acquisition and skill development through the entire period of study.

Chapter 2: Literature Review

2.1 Objectives of the Literature Review

Claims of ‘contribution to knowledge’ cannot be sustained without analysing current theories. Therefore, it was important for the researcher to review the literature so that a theoretical framework could be established, which guides the research. In this chapter, the researcher aims to convey to the reader the extent and depth of knowledge and ideas that have been established in the areas of entrepreneurial orientation and innovation intensity. The review of the literature facilitated investigation of the theories, frameworks and models on entrepreneurial orientation and innovation intensity which were analysed and critically evaluated. This allows the reader to be brought up to date regarding the state of research in this field and familiarize them with contrasting perspectives and viewpoints on the topic (Baker, 2014). The literature review helped to bring clarity and focus to the research hypotheses and helped in designing and improving the research methodology. In addition, it helped in understanding the basic terminologies and technical words used in the research. Most importantly, it has helped the researcher to identify the relevant factors and measures associated with the study. A thorough review of literature enabled the researcher to operationalize the constructs into measurable dimensions in an understandable manner (Fetahu, 2015).

Specifically, the review of literature was helpful for the following reasons:

- To appreciate the state of knowledge in the chosen field of study.
- To analyse what has and has not been investigated and identify research gaps.
- To identify and develop measures for the constructs investigated in this study.
- To identify potential relationships between constructs, and their measures in order to develop researchable hypotheses.
- To evaluate how others have defined and measured key constructs.
- To identify data sources used by other researchers.
- To develop a conceptual framework for this study.

Since the available knowledge on entrepreneurial orientation (EO) and innovation intensity (II) and their measurement are so fragmented, a comprehensive exploration could become a lifetime venture. Hence an analytical review scheme is required to evaluate the contribution of a given body of literature particularly of this size (Tranfield et al., 2003).

A thorough review of literature, which was utilised in this study, used an explicit algorithm as opposed to a heuristic, to perform a search and critical appraisal of the literature. Although it had its inherent challenges, particularly syntheses of data from various disciplines, it was important to use this methodology. The objective of an exhaustive literature review was to produce a clear picture of a fragmented field and find a common thread from various theoretical streams. The depth of literature, although fragmented, in the field of EO and innovation indicates the richness and availability of information and data. However, the literature on II and particularly measurement of innovation are in formative stages and the gap in the literature in terms of theoretical and scholastic works has been identified in the later part of the review.

The process of reviewing the literature involved two techniques, namely Dubin's methodology and the funnelling technique suggested by Fisher (2004). Employing Dubins' (1978) methodology, Gay and Weaver (2011) explained that theory building in quantitative research can be facilitated through conceptual models and testing of hypotheses. According to this technique, the main objective of the review of the literature review was to explain the main constructs (units) of the theory, which are EO and II.

Utilising the funnelling technique as suggested by Fisher (2004), the literature review started from a broader perspective by looking at entrepreneurial orientation and its relevance to firm performance and competitive dynamics. It narrowed down to study each of the entrepreneurial orientation dimensions. The literature was further narrowed down to study the role of innovation as an output measure influenced by EO. This led the researcher to analyse the construct of II and its dimensions, based on which the conceptual framework was developed. Although the literature review is not a linear process and constitutes multiple activities such as searching, retrieving, organizing, writing and presenting, a proper structure was developed for the review of literature and the findings are presented in the subsequent sections.

2.2 Background

A look at the extant literature reveals that research on CE appears to be fragmented, as researchers focused on different themes, some of which were represented through EO. According to Zahra (1996, p. 227), *"Corporate entrepreneurship is seen as the sum of a company's innovation, strategic renewal, and venturing efforts."* Innovation is considered as a central theme of CE (Antoncic, 2006). Yildiz (2014) citing Rutherford and Holt (2007) pointed out that both strategic renewal and business venturing is facilitated utilising innovation. Therefore, innovation is a key underlying factor or all forms of CE. Further, Ireland et al. (2006) argued that creating a work environment that supports employees to innovate on their jobs is a major pillar of CE. A critical evaluation of the different models and related scales that potentially explains and measures CE is shown through table 2.1.

Table 2.1: Critical evaluation of different Corporate Entrepreneurship scales

Scales that claim to measure CE	Dimensions and items	Authors	Strengths	Weakness
Entrepreneurial Orientation (EO)	Innovation, risk taking, proactiveness, competitive aggressiveness and autonomy	Covin and Slevin (1989); Lumpkin and Dess (1996); Covin and Wales (2012)	Widely researched, reliability and validity established in various research settings. Most studies consider EO as a behavioural propensity (input measures), which has shown positive results on firm performance (financial and market performance).	Inconsistent use of three and five factors to measure EO. Overlaps in measures reported and debate on its application and measurement has not been resolved. The literature posits EO as behavioural propensity but some of the past studies on EO used mix of input and output measures, particularly for innovation dimension.
Entrepreneurial Intensity (EI)	Innovation, risk taking, proactiveness	Morris and Sexton (1996); Morris (1998)	Measures intensity of innovation, risk taking, proactiveness on two-dimensional scale of degree and frequency.	Measurement of intensity of all the three dimensions together was empirically challenging and therefore no scales have been developed.
Innovation Intensity (II)	Degree and Frequency of Innovation	Morris and Kuratko (2002); Burns (2013)	Proposes to measure innovation intensity on a two-dimensional scale. Covers most types of innovation through degree and frequency of innovation.	The construct is proposed but no measures developed and empirically tested.
Entrepreneurial Management (EM)	Strategic orientation, resource orientation, reward philosophy, growth orientation, entrepreneurial culture	Steven (1998); Jarillo (1990); Brown et al. (2001)	Assesses firm-level entrepreneurship, particularly opportunity-seeking behaviour.	The measures have not been proven to influence firm performance. Only few studies have tested validity.

CE and Environmental Antecedents	Technological dynamism, Technological opportunities, Demand for new products	Scheepers et al. (2008)	Focused on technological innovation and develop the measures and the measures were developed in relation to the external environment.	Does not comprehensively covers all aspects of corporate entrepreneurship, particularly strategic renewal which are internally driven measures.
Organizational Climate scales (OC)	Management Practices, Organizational motivation, Resources, Outcomes	Amabile (1996, 1997); Isaksan et al. (2007a)	Captures internal factors comprehensively particular those related to organizational creativity.	The measures do not differentiate between measures for creativity and innovation. Product and market innovation are not considered.
Corporate Entrepreneurship Audit (CEA Audit)	Entrepreneurial culture, structure, strategies and leadership	Burns (2013)	Comprehensive list of items, measures capture the complexities of corporate entrepreneurship through an appropriate framework of entrepreneurial architecture.	Measures are not empirically tested and validated. Does not differentiate between input and output measures.

Table 2.1 shows that different models have been proposed in the literature to explain and measure CE. However, an evaluation of the models and related scales show both strengths and weaknesses of these models. While, most of the scales like EO, EM, CEA and OC scales focus on input measures that facilitate or produce entrepreneurial outputs, only a few models such as EI, II and the environmental antecedents model attempt to measure entrepreneurial outputs, particularly innovation outputs, which is a critical entrepreneurial output. The models in table 2.1 showed certain weaknesses as either they are focused on only a particular type of innovation (environmental antecedent model) or proposed to measure a number of tangible and intangible outputs together (EI), which made their measurement impractical. Further, none of the models attempted to measure both input and output measures of innovation through a single model, considering innovation is a key underlying dimension of CE in general and EO in particular. As pointed out earlier, innovation is considered a dominant dimension of CE by many researchers (Thornhill and Amit, 2006; Stevenson and Jarillo, 1990; Ireland et al., 2006; Kuratko and Audretsch, 2007) and therefore appears to be a common theme across various models representing CE.

Among the models presented in table 2.1, two constructs have been chosen for this study, precisely for this reason. EO dimensions are input measures and they represent a range of corporate entrepreneurship objectives, which includes strategic renewal and new venture creation. Innovation intensity is an output measure that represents one of the most important pillars of corporate entrepreneurship, which is innovation. Together, both the constructs represent the entire range of corporate entrepreneurship behaviour and outcomes. This is one of the primary theses of this research. By deciphering the measures of these constructs in this study, the nature of the innovation dimension would be clarified and it also facilitate the measurement of innovation input (at EO level) and output measures (at II level).

The entrepreneurial orientation construct has also been selected for this study since it has been widely researched and tested for validity (Lumpkin and Dess, 1996; Anderson et al., 2009; Covin and Lumpkin, 2011). George and Marino (2011) reported that EO has been applied to more than 200 studies across various disciplines. Rauch et al. (2009) reported that EO is a dynamic and robust framework, which has been extensively researched as a construct of empirical interest in the extant literature. Dess and Lumpkin (2005) argued that that EO is an important construct of corporate entrepreneurship. They concluded that corporate entrepreneurship is about the content of entrepreneurship, while EO is about the 'processes of entrepreneurship'. Dess and Lumpkin's (2005) explanation indicates that EO is about the processes that promote entrepreneurship- representing itself as input measures that promotes entrepreneurship through it various dimensions. The explanation of EO by Covin et al. (2006) notes that entrepreneurial orientation represents firm-level processes, practices and decision-making styles, which reflects entrepreneurial behaviour of firms also points towards EO dimensions as input measures that facilitates entrepreneurship in organizations. However, despite the richness of research on EO dimensions, the issues related to their measurement have not been fully resolved. This study, therefore, aims to contribute towards the clarification of measurement of EO dimensions in a completely new research setting, where the measures have not been tested before.

II has been selected for this study as the output measure of innovation, which can be ideally an outcome of inputs at the EO level. Measurement of II can bring more clarity into the measurement of innovation, which has been a challenge to researchers. II focuses on measurement of innovation on a dynamic two-dimensional scale of degree and frequency (Burns, 2013). The proposed measures of II, which are incremental and radical innovation, have been studied widely, but its measures are not well developed and there are no widely accepted quantitative scales for either types of innovation. Therefore, the measures of II have not been empirically tested by earlier studies particularly in the present research setting. A critical evaluation of the of EO and II constructs, their dimensions and their measurement are discussed in the subsequent sections of the literature review.

2.3 Entrepreneurial Orientation

The Entrepreneurial Orientation construct has received considerable empirical attention in the entrepreneurship literature (Anderson et al., 2009; Parkman et al., 2012). Lumpkin and Dess (1996, p. 136-137) defined EO as *"involving the intentions* *and actions of key players functioning in a dynamic generative process aimed at new venture creation"*. Further, they defined EO as *"the organizational processes, methods and styles that firms use to act entrepreneurially"* (Lumpkin and Dess, 1996, p. 139). The definition by Lumpkin and Dess (1996) is adopted for this research. A closer look at both the definitions reveals that EO refers to behavioural propensity characterised as input measures that can impact organizational performance. Citing Covin and Wales (2012) and Morris et al. (2011), Hosseini et al. (2012) argued that EO is a behavioural propensity, which manifests itself as the willingness and tendency to engage in entrepreneurial activities. Covin et al. (2006) also noted that entrepreneurial orientation incorporates firm-level processes, practices and decision-making styles where entrepreneurial behavioural patterns are recurring. In other words, entrepreneurial orientation designs and facilitates organizational conditions that can make the organizational entrepreneurial or generate entrepreneurial outputs. These views were also earlier supported by Stevenson and Jarillo (1990) who stated that EO as a strategic choice is embedded in organizational philosophy that drives decision-making and behaviour towards creating new goods and services, new methods of production, and new markets. Since EO is mostly restricted to strategy making processes and as it is essentially a behavioural propensity, the dimensions of EO represent themselves as input factors. Rauch et al. (2009), through a meta-study, reported that 134 studies have considered EO factors as input factors that influence firm performance. Some studies looked at the moderating role of organizational factors between EO and firm performance. Miller (2011) also reported that 67 publications represented EO as input measure influencing firm's performance. Therefore, EO can facilitate outputs particularly related to innovation in creating new goods and services, new methods of production and new markets. Through further research, Dess and Lumpkin (2005) argued that the five factors, namely innovation, risk taking, proactiveness, competitive aggressiveness and autonomy, facilitate new entry.

Covin and Slevin (1986, 1989) initially proposed that EO consisted of three factors, which included innovation, risk taking and proactiveness. Covin and Slevin (1991, p. 21) argued that "*entrepreneurial orientation could best be measured by summing* *together the extent to which top managers are inclined to take business-related risks (the risk-taking dimension), to favour change and innovation in order to obtain a competitive advantage for their firm (the innovation dimension), and to compete aggressively with other firms (the proactiveness dimension)*".

It is clear from the above explanation that the proactive dimension was mixed up with competitive aggressiveness. Later, Lumpkin and Dess (1996, 2001) included two more dimensions, namely 'competitive aggressiveness' and a propensity to act 'autonomously', to the EO construct. Lumpkin and Dess (2001, p. 431) later refined the proactiveness dimension as *an "opportunity seeking, forward-looking perspective involving introducing new products or services ahead of the competition and acting in anticipation of future demand to create change and shape the environment"*. However, Dess and Lumpkin (2001) cautioned that although entrepreneurial orientation is central to understanding and explaining entrepreneurship, it may not be adequate to explain all forms of entrepreneurship. Each of the dimensions of EO is explained below.

2.3.1 Innovation

Innovation is the first and most important dimension of EO. Covin and Miles (1999) theorized that innovation was the single factor most critical in defining EO. Lumpkin and Dess (1996, p. 47) argued that after considering "*the various dimensions entrepreneurial orientation …. Innovation is the single common theme underlying all forms of CE."* They concluded that *"without innovation there is no EO regardless of the presence of other dimensions"* (ibid, p. 49). Innovation within the EO construct was interchangeably expressed as innovativeness and according to Lumpkin and Dess (1996), innovativeness within the EO construct meant the willingness of the firms to pursue new ideas and to explore and experiment with them with creativity. Parkman et al. (2012) found innovation to be the most extensively researched dimension relating to EO. Morris et al. (2011) emphasised the role of innovation as the most critical factor influencing firm performance. Ireland et al. (2006) argued that innovation is prevalent at all levels in entrepreneurial organizations.

A thorough literature search was conducted in order to understand innovation in its entirety, which revealed that the literature on innovation is not only quite fragmented but vast. An unrestricted search on innovation produces tens of thousands of articles and dozens of definitions. Lately, it has become quite common to use the word innovation for related activities, particularly creativity. However, one pattern that was evident in the literature was that innovation within the EO framework has not been clearly defined.

Yildiz (2014) citing Rutherford and Holt (2007) pointed out that innovation is an important force behind two of the most important functions of corporate entrepreneurship, which are strategic renewal and business venturing. Hence, innovation is considered as the critical dimension of entrepreneurial orientation. Proctor (2014, p. 288) defined innovation as *"practical application of new inventions into marketable products and services"*. Table 2.2 shows various definitions of innovation that are used in this study, which have been chosen to explain innovation in its various stages ranging from inputs to outputs. This was important, as in the latter part of the literature, the strength of these innovation measures are discussed through II. The different definitions of innovation are shown in table 2.2.

Table 2.2: Various definition on innovation and associated themes

Authors	Definition	Main Theme
Tonnessen (2005, p. 195)	"Innovation starts with the proposal and generation of new ideas and finishes with the use and commercial exploitation of the outcomes".	Shows that innovation is a process, start with ideas, and ends in the market place (outputs).
Wang and Ahmed (2004, p. 306)	"Organization's overall innovative capability is conceptualized as consisting of product, market, process, behavioural and strategic innovativeness".	Demonstrates that product and market innovativeness are externally focused, while process and behavioural innovation are internally focused to create conditions for innovation to occur and develop necessary behaviours and capabilities.
Advisory Committee on Measuring Innovation in the 21st Century Economy (2008, p. 3)	"The design, invention, development and/or implementation of new or altered products, services, processes, systems, organizational structures, or business models for the purpose of creating new value for customers and financial returns for the firm".	Illustrates that innovation involves a number of processes and has commercial value.
Freeman and Soete (1997, p. 6)	"Innovation is achieved with the first commercialized transaction involving the new product, process, system or device."	Focuses on innovative outputs in the market place and can form a good definition to develop measures for innovation.
Commission of European Communities (2003, p. 7)	"The successful production, assimilation and exploitation of novelty in economic and social spheres."	Acknowledges that innovation is a series of processes and the outputs of which are novel and practical.
The UK government white paper *Innovation Nation* (2007, p. 13)	"Successful exploitation of new ideas".	Acknowledges the importance of creative thinking and idea generation as part of innovation process.
Sebrae and Texeria (2010, p. 6)	"Innovation is not an isolated event but fruit of a process hence the concerns with assessing not just a simple result (number of innovations), but rather the maturity of the process."	Illustrates that innovation involves a number of processes, including inputs and output stages.
Wang et al. (2015, p. 65)	"Entrepreneurial orientation (EO) is seen as a significant driver of firms' innovation capability."	Argues that innovation within EO denotes innovation capabilities and hence readiness for innovation.

Table 2.2 shows that most of the definitions have at least two common themes. Firstly, these definitions indicate that innovation involves a series of processes ranging from input to output stages. Therefore organizational conditions have to be created for innovation to occur. Amabile et al. (1997) and Isaksen and Ekvall (2010) have argued at length as to how an organizational climate can be created that supports innovation. Isaksen (2007a) explained climate as recurring patterns, of behaviour, feeling and attitude that are part of an organization's life. Critical to this climate is the management support for innovation and seeking and promoting new ideas suited for new opportunities. It includes commitment of resources and employee rewards. Scheepers et al. (2008) found clear signals that appropriate organizational climate can facilitate innovation. According to Bessant (2005), innovation involves a series of linked activities such as searching for opportunities and ideas, selecting appropriate ideas, implementing these ideas with management support and learning.

Research done by Hayes and Clark (1985) at the Harvard Business School concluded that new technologies and applying technological models do not guarantee innovation. These findings were confirmed by Bessant (2005) who concluded that it also requires appropriate strategic focus, capabilities and mind sets. Shah et al. (2011) recommended the following mechanisms for promoting innovation, including:

- an incubation unit
- a technology validation unit
- an exploratory unit
- a venture capital arm and/or an emerging business development programme.

Dyer et al. (2011) have suggested that networking with external parties for capability and idea development can facilitate innovation. Innovation models also look at inputs, process and outcomes.

Secondly, all definitions show that the output of innovation must be brought to the market, and that has the potential to add value to the firms and its various stakeholders. Between these two themes, the discussion that a firm should be ready to innovate is missing in EO analysis. Measurement of innovation, therefore, must differentiate between these two themes and innovation must be studied within this context. Therefore, this study set its objectives to clearly differentiate the input and output measures of innovation.

Although innovation is considered as the dominant dimension of entrepreneurial orientation (Parkman et al., 2012; Gürbüz and Aykol, 2009; Preda, 2013; Wu et al., 2008), not many attempts have been made to clearly define innovation within the EO framework. Firms may have the desire to produce new products, services and technologies, but should be ready to do so and should ideally develop capabilities for innovation. It was observed that the discussion related to the ability and preparedness of firms to innovate before innovation is produced is not well argued in the literature. It can be logically argued that readiness for innovation is an input measure that produces innovation outputs. Many researchers, such as Vasconcellos and Marx (2011), Forsman (2011) and Sebrae and Texeria (2010), have explained that innovation is a process comprising of input and output factors. Therefore, EO may facilitate but does not necessarily ensure outputs particularly related to innovation in creating new goods and services, or new methods of production and new markets.

Therefore, within the EO framework the innovation dimension may not represent the measure of innovation itself as suggested by past studies in the literature. Further, the research on the innovation dimension of EO does not elaborate on the detailed aspects of innovation. It does not explicitly classify degrees of innovation such as incremental and radical innovation. It also does clarify the types of innovation such as product, process, administrative, or technical innovation (Damanpour, 2006; Garcia and Calantone, 2002; Subramaniam and Youndt, 2005; Wolter and Veloso, 2008).

Earlier attempts to bring clarity to innovation dimension within the EO framework were witnessed through the works of Walter et al. (2006). Innovation, within the EO context, according to Walter et al. (2006), is about a proclivity to support new ideas, novelty, experimentation and creative processes which challenges existing norms and practices and existing technologies that may result in new products and processes. The explanation of 'innovation factor' within the EO framework from Walter et al. (2006), implied that it aims to measure 'readiness for innovation' rather than innovative outputs or Schumpeterian innovation, which was conceptualized as 'creative destruction' through introduction of new products and services that changes the market dynamics (Schumpeter, 1934). The explanation from Walter et al. (2006) is similar to 'generation of ideas' from Tonnessen's (2005) definition and 'behaviour and processes' from Wang and Ahmed's (2004) definition. It suggested that such innovative inputs or climate for innovation (readiness to innovate) will lead to innovative outputs. Readiness to innovate is mainly related to organizational innovation, which involves developing overall innovative capability with strategic orientation towards innovative behaviours supported by organizational culture, structure and leadership (Bastic and Leskovar-Spacapan, 2006). The resource based view of developing innovation capacity and capability is also supported by Hurley and Hult (1998) and Atuahene-Gima (2005). A Deloitte research study (2004) found that there were plenty of gaps in organizational intention for innovation and their capabilities for innovation. This was also later confirmed by Nagji and Tuff (2012) who concluded that despite their intention, innovation in organizations is let down by their own capabilities. Tidd et al. (2005) elaborated that knowledge and learning are critical resource and source for innovation. The competencies that are acquired depend on how knowledge is acquired and managed. Merx-Chermin and Nijhof (2005) also argued that organizations must become truly learning organizations so that they can acquire new capabilities and knowledge. Knowledge sharing and trust can be created for learning to take pace. Engne and Hollen (2014) argued that employee-based activities such as idea collaboration are suitable for incremental innovations, while research and development based competence is important for firms focused on radical innovations.

Generally, EO is seen as driving a firm's innovation capability. Despite an abundance of research suggesting that innovation capability contributes to firms' performance, little is known regarding the extent to which the dimensions of EO may positively influence the firms' innovation outputs (Wang et al., 2015). On similar lines, Kanter (2010) and Christensen and Overdorf (2005) discussed the importance for developing necessary competencies for innovation. More evidence about the innovation dimension within EO being 'ready to innovate' came from Rauch et al. (2009) and

Dess and Lumpkin (2005) who argued that innovation within EO relates to willingness to engage with creativity, experimentation and innovative efforts. Damanpour (1996) Hurley and Hult (1998) and Walter et al. (2006) also argued that innovation involves developing capacity for introduction of new products and processes.

Prior research examined various factors that influence the EO-innovation relationship. Mbizi et al. (2013) suggested that innovativeness for individuals and employees is the ability to harness creative abilities and in spite of challenges, deciding to improve their processes, procedures, and products. Excessive bureaucracy mismanages the innovation process. It leads to learning deficiency, conservatism and lack of willingness to embrace innovation (Stringer, 2000). Therefore, the management of innovation requires managers to promote new idea generation and experimentation. Scheepers et al. (2008) also found a positive relationship between organizational climate and innovation. Snow (2007) pointed out that the research should seek more information on opportunity-seeking and advantage seeking through innovation.

The literature also indicated that the sources of innovation are not only internally driven but can also be found outside the organization that enhance the firm's capabilities to innovate. Prahalad (2006) found that venture units can produce innovation and help to introduce new products and services as they are relatively free from organizational constraints. Gaba and Meyer (2008) pointed out that entrepreneurial firms create private venture capital practices which are engaged in creating start-ups with a focus on innovation. These venture units help the firm to access a wide range of new technologies which can enable innovation. Gaba and Bhattacharya (2011) further pointed out that venture units in a firm help to externalise research and developments efforts through external collaboration.

2.3.2 Competitive Aggressiveness

Competitive aggressiveness is widely cited as an important dimension of entrepreneurial orientation. Lumpkin and Dess (1996) explained that competitive aggressiveness refers to a firm's propensity to directly and intensely challenge its competitors to achieve entry or to improve position to outperform rivals in the market place. This conceptualization by Lumpkin and Dess (1996) revolved around competitors' actions. It is related to reacting to competition, as Lumpkin and Dess (2001, p. 431) put it "*forceful response to competitors' actions*." Lumpkin and Dess (1996) also argued that intensely challenging the competitors would require unconventional strategies rather than conventional tactics. Two types of competitive actions are identified which involves being proactive or being reactive to competitors' moves (Stambaugh et al., 2011).

Competitive aggressiveness been associated with an ability to perform better than rivals, a strong offensive posture and aggressively entering markets identified or dominated by rivals (Lumpkin and Dess, 2001; Chen et al., 2006). Competitive aggressiveness is indicated by responsiveness which may be in the form of 'head to head competition' or being reactive, for example when a firm lowers its price in response to a competitor's price or vice versa. Porter (2008) also found cost and price as an important competitive force. Covin and Covin (1990) studied competitive aggressiveness in the context of being very aggressive with competitors in an attempt to eliminate them from the market by setting ambitious goals, or as suggested by Stambaugh et al. (2011), cutting costs sharply and sacrificing profits. The breadth, speed and frequency of new entry may also show the competitive aggressiveness posture of a firm. Ferrier et al. (2002) explained that competitive aggressiveness can be enhanced through speed and multiplicity of competitive attacks selecting a number of appropriate strategies. Harrison et al. (1991) and King et al. (2004) found that strategic alliances and mergers are useful to enhance competitive aggressiveness of firms, through which higher levels of synergy are achieved coupled by higher returns.

The evidence of overlaps between innovation and competitive aggressiveness dimensions is highlighted by Grimm et al. (2006) who noted that innovation and the development of such new products is an example of an aggressive competitive move, as well as a sign of disruptive competition, along with price cuts. Hence, they also related the competitive aggressiveness dimension to innovation dimension. Blackford (2014) also associated the competitive aggressiveness dimension with the innovation dimension arguing that different types of innovation in the market is a sign of competitive aggressiveness. He argued that the senior leaders in firms should adopt a strong competitive posture and promote innovation so that a firm positions itself aggressively. However, Stambaugh et al. (2011) attempted to clarify the differences between competitive aggressiveness and innovation. They argued that both operate from different logics. The objective of innovation may not be competitive aggressiveness, but a by-product of it. Chen et al. (2007) and Yu and Cannella (2007) argued that a firm's awareness, motivation and capabilities determines its level of competitive aggressiveness.

2.3.3 Autonomy

The Autonomy dimension has been linked to an ability to work independently, take actions, and make decisions, delegation, and empowerment (Lumpkin et al., 2009; Langfred, 2000; Tarabishy et al., 2005). Specifically, it refers to the freedom given to individuals and teams so that they can exercise their creativity and vision and promote conditions for entrepreneurship to occur. Monsen (2005) found positive relationship between autonomy and entrepreneurial firm performance. Jeroen and Hartog (2007) argued that when leaders give autonomy to middle and lower levels of managers, it leads to innovation. Similarly, Ireland et al. (2006) emphasised the role of middle managers in promoting entrepreneurship and innovation in firms, provided the autonomy is given. Dess and Lumpkin (2005), within the EO context, pointed out that since autonomy promotes independent spirit, it is a critical dimension representing entrepreneurial orientation. The organization does not stifle individual and team independence nor constrain creative freedom. Individuals and teams pursue new opportunities that may lead to new entry. Managers at different levels are able to take independent decisions to deal with problems and opportunities (Burns, 2013). Organizational members develop and generate ideas and pass them on to senior management.

This is in line with the integrative framework developed by Hart (1992) a cursive model where the decision-making and emphasis on pursuing new opportunities occur at lower levels of the organization. Garvin and Levesque (2006) suggested creative organizational structures that have flat hierarchies and delegation of authority and decision-making to operating or independent units to promote corporate venturing. Burns (2013) concluded that firms that provide autonomy to their employees also facilitate innovation. Donald and Goldsby (2004) pointed out that when middle managers are given autonomy, they have to balance between clever resourcefulness and rule breaking. They suggested that firms should provide the right conditions for middle-level managers to balance between personal and organizational initiatives. Eder (2007) observed that autonomy promotes creativity and innovation in firms and linked it to employee attributes. Since autonomy provides personal freedom, it also leads to its abuse. Shimizu (2012) argued that autonomy does promote entrepreneurship in firms; however it sometimes leads to opportunistic behaviour by the employees. He also pointed out that the effect of autonomy, particularly in new idea generation is difficult to evaluate conclusively as the ideas are new in the market.

2.3.4 Risk Taking

Risk taking that results from self-employment decisions is an important factor used to explain entrepreneurship. Within the context of EO, risk taking refers to organizational risk as result of new entry and innovation. Miller and Friesen (1978, p. 923), who were one of the early architects of entrepreneurial orientation construct, defined organizational risk as *"the degree to which managers are willing to make large and risky resource commitments-i.e. those that have reasonable chance of costly failure."* According to Wiklund and Shepherd (2008, p. 701), "*Risk taking refers to acting in ways that are perceived as bold even in the face of uncertainty, such as a willingness to commit resources where the outcomes are unknown and the probability of failure is high*". The different streams of research on risk taking refer to risk in the context of new venturing, heavy borrowings and resource commitments. Organizations who are known to take risks generally take bold steps to enhance business returns. These bold steps involve venturing into new and unknown markets, investments in ventures that have uncertain outcomes and large borrowings from the market (Baker and Sinkula, 2009). Eggers et al. (2013) relate risk taking to strategies that involve commitment of high amounts of resources, both human and financial, to projects that have high probability of failure.

Early research on risk taking focused on safe versus risky strategies. Sitkin and Pablo (1992) and Miner and Raju (2004) distinguished between risk preferences, risk perceptions and risk propensity. Hughes and Morgan (2007) argued that firms that have high EO take risks in order to ensure superior organizational performance. McGrath (2001) pointed out that firms that follow conventional paths have lower returns, while firms taking risks have variable outcomes ranging from medium to high returns and have potential for long-term profitability. Dess et al. (2011) and Tang et al. (2014) also concluded that entrepreneurial risk taking positively influences organization performance and business growth. Hoonsopon and Ruenrom (2012) linked risk taking with innovation and argued that innovation receives a boost through risk taking. They particularly refer to product and services innovation. They concluded that risk taking and innovation have a positive impact on the competitive advantage of the firm. However, risk related to innovation may not be always positive. Radical innovation, for example, may be more risky than incremental innovation. As the definition by Miller and Friesen (1978) suggested, risk taking may lead to success and rewards or failure and negative outcomes. The risk-taking dimension, therefore, was considered to be negatively related to performance by Naldi et al. (2007).

Lumpkin and Dess (1996) highlighted that risk taking is influenced by past experiences, framing of risk propositions and ability to perform under risky conditions. Further, Dess and Lumpkin (2005) advocated safe and calculated risks rather than just gambling with little thought process going into risk calculation. Risk and opportunity assessment, risk-oriented culture and strategies related to new products / changes to existing products were considered to be key variables (Lumpkin and Dess, 2001). Nishimura (2015) and Borison and Hamm (2010) argued that firms that perceive opportunities as too risky miss out on important opportunities, which itself is a risk for these firms. Bekefi et al. (2008) pointed that if the unknown markets and competitors are considered to be too risky, then the firms may lose out on important opportunities and that itself may be a risk.

The extant literature does not indicate any consistent pattern in which risk taking was investigated. Broadly, the literature on risk taking can be categorised as internal risks and external risks. Internal risks refer to risks related to commitment of different resources to risky projects and creating a risk-oriented culture within the organization. Risk management involved researching a market, recruiting and employing skilled staff and creating structure and strategies for risk management. In such an organizational culture, employees are encouraged to come up with creative ideas, are not afraid of failure and experimenting. Awaad and Ali (2012), while investigating the role organizational climate on EO, found that risk taking was highly associated with autonomy. Blanco et al. (2014) called for developing a risk culture framework which has the right policies, strategies and structure to manage and mitigate risks.

External risks are related to venturing into new and unknown markets, adopting risky strategies to capitalise on opportunities and exposing firms to new competition. While some researchers used the existing EO scale to investigate risk taking, others refined and developed risk-taking measures. Similar to the innovation factor, the risk-taking factors and its measures are not well delineated in the literature. Most of the studies investigated individual risk taking, rather than risk taking at the organizational level. Earlier studies, investigating the risk-taking dimension, have reported the complexity of this dimension and related empirical evidences. Stewart and Roth (2001) reported that the research on risk taking had mostly yielded conflicting findings, which was an obstacle to theory development. They (ibid) found that entrepreneurial firms demonstrate higher risk-taking propensities than non-entrepreneurial firms. Stewart and Roth (2004) meta-analysed 14 studies and reported risk aversion among entrepreneurial organizations, which led Xu and Reuf (2004) to conclude that risk-taking propensity among entrepreneurs and entrepreneurial firms remains unresolved. Lumpkin and Dess (1996) therefore called for further research on operationalizing of measures for organizational risk taking.

2.3.5 Proactiveness

Entrepreneurship has been traditionally associated with taking initiatives, finding opportunities and pursuing those opportunities. Within the context of EO, Proactiveness is conceptualized as forward-looking and opportunity-seeking behaviour that is accompanied by new entry and innovation (Ardichvili et al., 2003). Miller and Friesen (1978, p. 92) conceptualized proactiveness as firm’s ability to shape the environment proactively rather than merely reacting to the changes in the market. Miller (1983, p. 923) also explained it as "proactive innovations". They (ibid) argued that proactiveness is aimed at anticipating future needs and a proactive firm is usually a leader rather than a follower in the market as it has the foresight and vision to see the opportunities in the market. Information search, alertness, social networking, anticipating demand and prior knowledge of products and markets are key measures associated with the proactiveness dimension (Lumpkin and Dess, 2001). Applegate (2008) categorised opportunity-seeking behaviour into four categories, shown in figure 2.1.

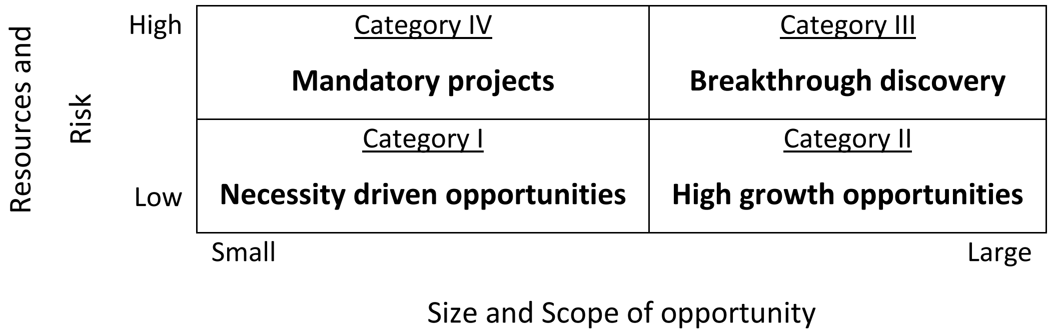


Figure 2.1: Applegate's (2008) categories of opportunities and resources

According to Applegate (2008), categories two and three pursue large opportunities by virtue of being in high-growth business or through innovation. Eggers et al. (2013) explained that the proactiveness dimension is about the propensity of the firm to anticipate, understand and act upon customer needs that have potential in the marketplace, thus challenging the competition and establishing a favourable first-mover benefit among competitors. Covin and Lumpkin (2011) argued that the proactive dimension ensures that new opportunities and related initiatives are identified and implemented and there is tolerance for failure. Through proactiveness, the importance of first-mover advantage to capitalise on market opportunities is emphasised. Sandberg (2002) found proactiveness useful for launching disruptive innovations as it has the potential to change market conditions. Proactiveness, therefore, was also studied in the context of first-mover advantage – whether firms are the first to introduce new products and services (Wang et al., 2015). Wang et al. (2015) and Tang and Hull (2012) viewed the proactiveness dimension as a facilitator of first-mover advantage. Proactive firms take advantage of opportunities in emerging markets and this is the key essence of proactiveness. Baker and Sinkula (2009) found the proactiveness dimension to be significantly associated with superior firm performance. These views are shared by Rhee and Mehra (2013) who pointed out that adopting proactiveness in manufacturing, process and new product development leads to superior business performance and competitive advantage in the market place. Lau (2015) suggested that joint ventures can enable firms to expand internationally and capture new opportunities. It is easier for proactive firms to target premium markets and enjoy advantages associated with first-entrant advantages like skimming the market much ahead of their competitors (Tang and Hull, 2012; Lumpkin and Dess, 2001). Bekefi et al. (2008), and therefore argued that firms must constantly generate information about new opportunities through environmental scanning.

The fact that the literature on EO has often mixed up the proactiveness dimension with competitive aggressiveness, has been reported by Lumpkin and Dess (1996). They (ibid) pointed out that although they are closely related, there is important distinction between the two dimensions. Proactiveness is about market opportunities facilitating the process of new entry. Proactive firms act opportunistically and shape and even create trends and demand. Competitive aggressiveness on the other hand, relates to competitors and how firms react to trends and demands that exist in the market. Therefore, the former is more inclined towards creating and meeting demand, while the latter is more focused on competing for the demand.

Lumpkin and Dess (1996) further argued that proactiveness can be seen on a continuum where a firm may be highly proactive on one end and reactive on the other end. Chen and Hambrick (1995) argued that a firm should be proactive and responsive to innovation, technology and customers. Covin et al. (2006) related proactiveness to leading in development of new processes, technologies and introduction of new product and services. Therefore, the overlap in the proactive dimension is not only with competitive aggressiveness and dimensions but also with innovation dimension. Wang et al. (2015) supported this view and argued that proactiveness and innovation go together and innovation is dependent upon a proactive approach. It is manifested in the processes of prototyping, testing, researching and discovery. Nieto et al. (2013) concluded that firms that introduce innovations need to change their ways of operating since they operate in new markets and launch new products and services. These are examples of both innovation and proactiveness. According to Nieto et al. (2013), both innovation and proactiveness have a critical impact in improving the total firm performance.

2.4 The Effect of Entrepreneurial Orientation on Firms' Outputs

Since EO is posited as a behavioural propensity and an enabling framework, it should ideally lead to desired outcomes and therefore a number of studies have linked EO to firm performance. EO was mostly studied as a firm-level variable and linked to organizational performance (Kuratko et al., 2015; Scheepers et al., 2008; Hughes and Morgan, 2007; Keh et al., 2007). Voss and Moorman (2005) cited much research that empirically made attempts to link these EO behaviours to firm performance and a range of firm-level outcomes. Kollmann and Stockmann (2014) studied the mediating role of exploratory and exploitative innovations, while Wang (2008) studied the mediating role of learning orientation and strategy, while measuring the effect of EO on firm performance. On similar lines, Campos et al. (2012) investigated the mediating role of dominant logic (existing strategies and capabilities) entrepreneurial orientation and firm performance. The role of entrepreneurial orientation in contributing to different levels of entrepreneurial activities was also found to be true by Kreiser and Davis (2010), Hughes and Morgan (2007) and Rauch et al. (2009). Matsuno et al. (2002) and Merlo and Auh (2009) identified that firms that are market-oriented have usually strong entrepreneurial orientation. This argument is particularly linked to the innovation factor. Preda (2013) looked into the effect of entrepreneurial orientation on the firms' strategic capability to innovate and found a positive relationship between EO and organizational learning and innovation capabilities. However, no study attempted to find the effect of entrepreneurial orientation on innovative outputs, particularly innovation intensity, which this study has attempted.

2.5 Entrepreneurial Orientation Scale

The EO scale was originally developed by Covin and Slevin (1986, 1989), which has dominated research on EO (Rauch et al., 2009). Wales et al.'s (2013) study observed that 80% of prior studies used the Miller / Covin and Slevin (1989) conceptualization. The original scale developed by Covin and Slevin (1988, 1989) comprised 9 items of which 5 were adapted from the previous measures of EO developed by Khandwalla (1977) and Miller and Friesen (1982) and the remaining four items were created as part of the Covin and Slevin (1986) study. Morris and Sexton (1996) modified the scale further, increasing the total number of items to 14. Initial conceptualization of the innovation factor within the scale was not clear as both input and output factors were included as measures. Schillo (2011) pointed out that the measures of innovation within the EO framework, in past research, focused on technological leadership and new product lines. Past research also included research and development efforts as a measure of innovation, which was an input factor. Several refined versions of EO scale were developed and validated by researchers in a wide variety of research settings. These included Barringer and Bluedorn (1999), Becherer and Maurer (1997), Dickson and Weaver (1997), Green et al. (2008) and Escribá-Esteve et al. (2008) and Parkman et al. (2012). However, none were able to clearly delineate the innovation dimension within the EO scale and 'innovation' or 'innovativeness' remained an issue to resolve in the last forty years of research on EO (Vora and Polley, 2012). While the output measures of innovation remained largely underdeveloped, the research on innovativeness focused on preparing the organization to produce innovation.

The EO scale has also been questioned on dimensionality and hence there is a call for refinement and development of the EO scale, particularly in different research settings. Wiklund and Shepherd (2011) questioned the scale arguing that the items try to capture both current attitudes and past behaviours.

Initial conceptualization by Covin and Slevin (1986, 1989) proposed aggregated measurement of EO scores. Covin and Slevin (1989) and Miller (1983) concluded that the dimensions of EO co-varied to the extent that they could be aggregated to determine a firm's overall level of EO. Kreiser et al. (2002) assessed the psychometric properties of the EO scale in cross-cultural settings across six countries. One of the important conclusions of their research was the three dimensions varied independently of one another in many situations. Covin et al. (2006) also reported that the dimensions of EO may occur in different combinations and hence the scores cannot be aggregated. Muller and Thompson (2001) argued that EO scales must be validated in their research settings so that the firms are aware of the contribution of different dimensions. If different dimensions of EO can make overall contributions to firms' entrepreneurial activities then the aggregated measure can be justified in the light of empirical evidence. Van der Valk (1998) argued that in order to derive meaningful measurement of EO, the effort should be firstly to solve the problem of measuring innovation, before one can investigate how to improve it. This research, therefore, not only advances the research on EO and the nature of innovation within the EO framework, but also aims to develop measures for innovation.

2.6 Innovation Intensity

The concept of innovation intensity emerged as researchers continued to make efforts to bring greater clarity to the measurement of innovation. II, although under-researched, is a critical construct that can explain measures of innovation. II was conceptualized to address the limitations of measurement of innovation. Early conceptualization of II was done by Jong (2000, p. 14) who defined it as a linear *"input, process and output"* construct. According to Jong (2000), intensity signified the 'strength on innovation'. Jong (2000) critiqued earlier attempts to measure innovation intensity by Van der Valk (1998) and Nagel (1992), on the grounds that these studies used a single dimension of innovation and the measures lacked clarity and comprehensiveness. The attempt to measure innovation intensity by Nagel (1992) consisted of six 'input' items such as organizational strategy and five 'process' items related to organizational conditions and no output measures. In his measurement scale, Nagel did not cover the entire process, especially output measures. Nagel's measurement scale was further critiqued on the grounds that the items did not represent the construct clearly and there were overlaps. Similarly, the study by Van der Valk (1998) lacked clarity. He employed a number of innovative indicators, which were specific to only industrial companies. The merit of the scale was that the entire spectrum of innovation – input, process and output – was included. However, the biggest limitation of the measurement scale by Van der Valk (1998) was that different measures can be used for different sectors and hence the items are not applicable to all sectors. He himself recommended that the scale for innovation intensity should be such that it could be universally applicable.

Earlier attempts to measure II was alternatively termed as direct and indirect methods. Gosselink (1996) attempted to measure innovation intensity through both input and outputs measures, which he called direct and indirect methods, respectively. Input or direct methods included resources such as financial means, staff and strategies. The direct method allowed the firms to judge their financial position. The indirect methods consisted of output-oriented innovative measures, which were clearly visible through innovative results, such as the number of new products, number of patents requested and number of new markets. The study by Gosselink (1996) gave important directions to research on innovation intensity as output measures were considered to be the primary measures of innovation. Additionally, Gosselink's study also indicates that the time frame is a factor to consider and gave early indications that the frequency dimension also needs to be considered when innovative outputs are studied.

The studies by Gosselink (1996) and Jong (2000) concluded that the input and process factors impact innovation intensity (output). Chen et al. (2008) studied innovation intensity as a single dimension linking incremental and radical innovation to internal venturing and social relationship capabilities. They argued that different capabilities are required for each type of innovation. The conceptualization of innovation intensity by Chen et al. (2008) is also not complete as it was conceptualized on only a single dimension of innovation, namely degree of innovation. The findings of his study indicated that different capabilities are required for incremental and radical innovation.

The concept of innovation intensity further emerged from the concept of entrepreneurial intensity (EI), which was proposed as a measure of both degree and frequency of entrepreneurship and aimed to measure innovation, risk taking and proactiveness (Morris and Kuratko, 2002; Kuratko et al., 2013; Scheepers et al., 2008). However, since the concept of EI was initially proposed by Morris and Sexton (1996), Morris (1998) and Morris and Kuratko (2002), little research has been done to develop or clarify the EI construct. Building on these studies by Morris and Sexton (1996) and Morris and Kuratko (2002), Burns (2013) explained that II is similar to EI. According to this concept of II, degree and frequency of innovation can explain the innovation intensity of the firm and both can provide competitive advantage. The degree of innovation can be measured by measuring the size (degree) of 'innovative activity' and number of times (frequency) an 'innovative activity' occurs in the organization. To assess the overall measure of innovation in a firm, the concept of degree and frequency should be considered together. This author (Tahseen, 2012) studied innovation intensity within the corporate sector in Oman, and found that a number of organizational factors developed by Burns (2013), such as leadership, culture, structure and strategies (entrepreneurial architecture), facilitates innovation intensity. The innovation intensity construct, as conceptualized by Burns (2013) based on studies by Morris and Sexton (1996) and Morris and Kuratko (2002) is shown through figure 2.2.

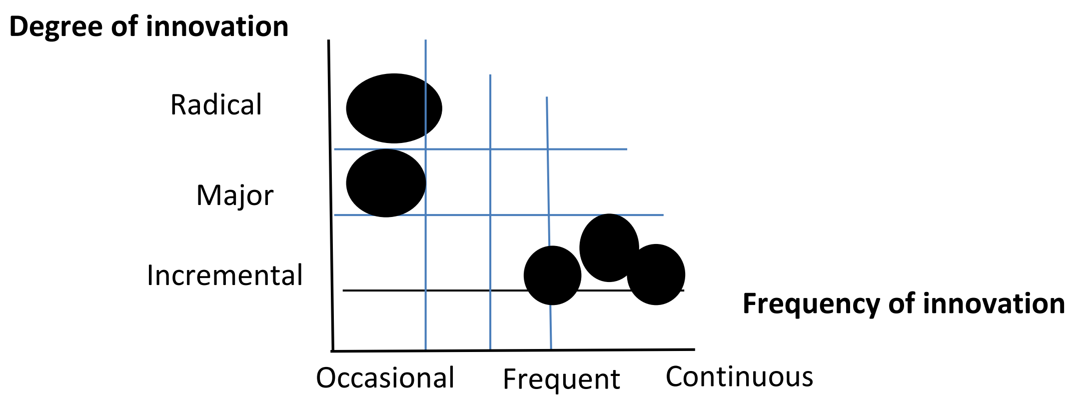


Figure 2.2: The two-dimensional Innovation Intensity construct (Source: Burns, 2013, p. 385)

The degree of innovation can be represented through incremental and radical innovation (Burns, 2013). Wong (2014) had supported the view that innovation, particularly product innovation, can be divided into incremental innovation and radical innovation. Conventionally, innovations are classified as radical or incremental, depending upon the degree of novelty in their applications (Nieto et al., 2013) and hence these are ideal measures to study intensity of innovation. The size of the blobs in the figure (top left-hand corner) increases as the radicality of innovation increases. The size of the blobs in the bottom right-hand corner is smaller representing their incremental nature but there are a number of blobs indicating a high frequency of incremental innovation. Corporate firms can be placed on this grid, based on the four possible strategic postures. These are low degree and low frequency, high degree and high frequency, high degree and low frequency, and low degree and high frequency. Burns (2013) explained that firms try to push the envelope, attempting to move towards the top right of the quadrant characterised by high degree and high frequency of innovation.

Banu and Grant (2011) explained that the 'degree of innovation, degree of change, degree of impact and degree of newness', vary depending on incremental and radical innovation. They argued that depending on the degree of newness of the product, incremental and radical innovation may be classified. Bessant and Tidd (2011) explained that innovations vary on the degree of their novelty and may range from minor improvements termed as incremental innovation to radical changes termed as radical innovation. Incremental innovation is usually continuous and may occur more frequently in a firm. Radical innovation, on the other hand, is occasional, may occur at low frequency, but has a higher impact. Incremental innovation is explained by Engne and Holen (2014) as learning by doing and an employee-based activity. Radical innovation is defined by Conway (2009) as a major advance in a particular field. Zheng et al. (2005) argued that EO facilitates incremental and radical innovation breakthroughs. Citing Marshall et al. (2009) and Chen and Bau-Guang (2012) pointed out that continual innovation or the frequency of innovation is key to innovation development, without which firms would become stagnant.

Innovation is a common dimension in both EO and II constructs. While the former is a measure of EO and manifests itself as input measure the latter is a measure of II and manifests itself as output measure. Therefore, it can be argued that EO could possibly be an antecedent to II and influence II.

Generally, the measures of innovation were quite wide, ranging from product, process, service and technological innovation. However, each of these outputs could be incremental with slight impact or radical with high impact. Innovation may be of different types, but the degree and frequency of innovation can be applied to all types of innovation. Therefore, it was important to study the degree and frequency of innovation in order to understand the innovation intensity in its totality and bring more clarity to the innovation intensity construct. Garcia and Calantone (2002) pointed out that the definitions of incremental and radical innovations are used ubiquitously to identify innovations. Based on a thorough literature review, they concluded that consistent definitions for these innovation types have not emerged. At this point, it is important to clarify that various authors have labelled innovations incremental and radical through different terminologies. The different terminologies used to denote incremental and radical innovation in the innovation literature are used interchangeably and to avoid any confusion the terminologies are shown in table 2.3.

Table 2.3: Various terminologies representing incremental and radical innovations used in this research (Source: Garcia and Calantone, 2002, p. 110)

Radical innovation	• disruptive innovation • discontinuous innovation • breakthrough innovation
Incremental innovation	• continuous innovation • frequent innovation

2.7 Measurement of Innovation

The literature has shown that various attempts to measure innovation have not yielded successful results and there is no universally acceptable quantifiable scale for innovation. Baregheh et al. (2009, p. 1324) reported that *"there is no clear authoritative definition of innovation"* and conceptualizations have varied over the last 40 years of research on innovation. These views are supported by Edison et al. (2013) who have drawn attention towards the lack of definitive measures for innovation. Baregheh et al. (2009) pointed out that innovation can be classified into various categories, such as nature of innovation, type of innovation and stages of innovation, and therefore measures are difficult to develop.

The research on innovation models portrayed innovation on a single dimension, which led Dougherty (2007) to opine that most of the innovation models and their measures are trapped in twentieth-century mind sets. Ahmed and Shepherd (2010) explained that innovation as a concept has been misinterpreted at times. They also argue that innovation is both an input process and an outcome. However, both may not be mutually exclusive as value added processes may lead to innovative outputs. Many of the measures identified in the literature are qualitative measures, such as the innovation radar developed by Sawhney et al. (2006), while some of the innovation models used financial performance as a measure of innovation. Oke (2007) called for differentiation between innovation and business performance. Non-financial measures, according to him, were measures of innovation performance, while financial performance indicated business performance. Innovation performance was measured using dimensions such as better time to market and being first to market.

The measures for innovation focused on different types of innovation (Bastic and Leskovar-Spacapan, 2006). Some studied product and market innovation, while others investigated technological innovation. Product and market innovation focused on product design, market research, advertising and promotion. Technological innovation branched into developing innovative production and manufacturing process and deployment of new technologies. Technological innovation focused on product and process development, engineering, research and development and technical expertise. Product and market innovation was mainly measured through number of new product and service introductions and frequency of changes in services and product lines. According to Bastic and Leskovar-Spacapan (2006) and Goffin and Mitchell (2010), different facets of innovation make innovation difficult to measure. Table 2.4 shows the diverse range of innovation types and associated complexities.

Table 2.4: Different forms of innovation, (Source: Bastic and Leskovar-Spacapan, 2006)

Different facets of innovation	Description
Product	Newness, novelty, originality, uniqueness in product or service either from customers' or firms' point of view.
Process	New production methods, new management process or technological improvements in production or management processes.
Technological	Research and development, invention.
Market	New forms of advertising, promotion, distribution and creation of new markets.

The dominance of technological model paradigms in the innovation literature is evident as plenty of industries have shown progress and innovation based on technological progress and development. Therefore, the last few decades saw technological innovation and related measures dominating research and development efforts. However, Moore (2004) reported that there has been an increased shift from technological and product development models of innovation to include a more holistic perspective of innovation. Product innovation refers to any newness in the product or services either from the customer or firm point of view. Process innovation may be achieved through new production methods, new management processes or technological improvements in production or management processes (Bastic and Leskovar-Spacapan, 2006). Overall, market related innovativeness is also closely associated with product and service innovation and includes areas of advertising, promotion, distribution and identification and entry into new markets. Burns (2013) explained that product innovation, both incremental and radical, can be understood within the context of the markets in which they operate. As firms move across the continuum from incremental product innovations to radical product innovation, they find incrementally new markets to radically new markets, respectively.

Figure 2.3 explains that product innovation may create new markets. Continuous incremental innovation may shift the market incrementally, which is traditionally called diversification. Radical innovation brings incremental changes in the market, while market paradigm shift brings incremental changes to the product. When the degree of changes in product and market assumes radical propositions, it creates new–to-the-world industries.

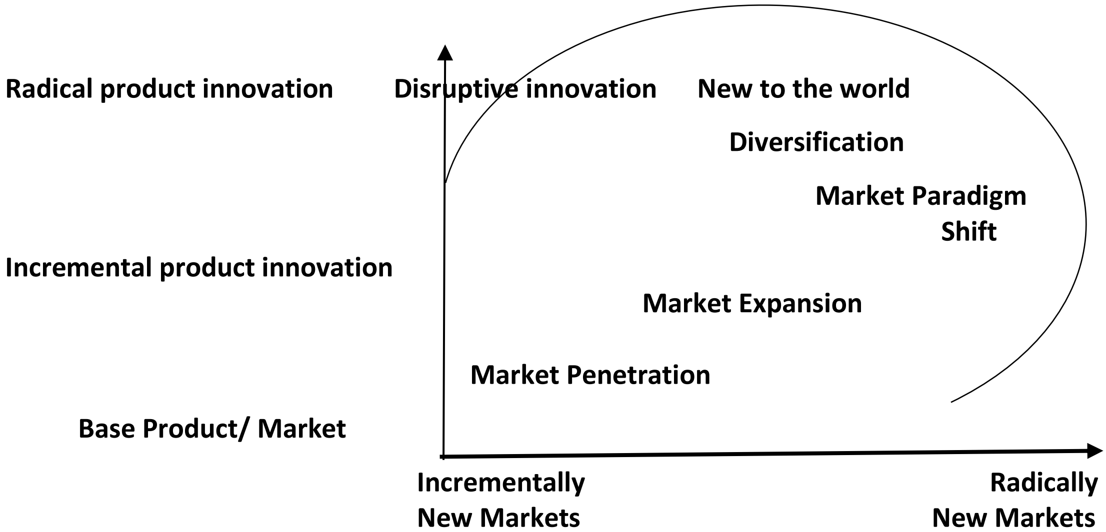


Figure 2.3: Product innovation and markets, (Source: Burns, 2013, p. 402)

Based on Bastic and Leskovar-Spacapan's (2006) and Burns' (2013) explanation of innovation, this study has applied innovation intensity measures for product, service, process and market innovation. This is in agreement with the measurement of the innovation intensity construct which focuses on measurement of innovation outputs. Tonnessen (2005), Madsen and Leiblein (2007) and Van de Ven et al. (2008) have also pointed out that innovation is mostly measured through commercialization of new ideas and tangible outputs such as product, process and market innovation (Kropp et al., 2008). Therefore, measurement of innovation has become quite challenging and this study aims to bring more clarity on measurement of innovation through the two-dimensional scale as envisioned through innovation intensity.

The measurement of innovation becomes more complex as intensity comes into the picture because not only does the degree of these types of innovation have to be measured, but it has to be measured alongside frequency. The frequency is explained as how frequently an activity such as innovation (Burns, 2013) or entrepreneurship (Kuratko et al., 2013) takes place. The frequency of product, process and market innovation is measured alongside the degree dimensions in this study. Although the literature falls short on identifying specific measures for each dimension, there is enough debate on utility and practices of incremental and radical innovations, which can be applied to all these innovation types discussed above.

2.7.1 Summary of Different Innovation Measures

The literature on measurement of innovation is dominated by issues such as the need for a measurement scale, the hindrances that come in the way of developing such a measurement scale, and what should be the right criteria to measure innovation. Most of the scales were based on qualitative measures, which were inadequate to quantitatively measure innovation. An exhaustive search of literature showed no comprehensive, quantitative and widely acceptable scale is put forward by researchers.

The discussions were bifurcated on mainly two lines of argument. The traditional measures were primarily focused on financial measures while more modern techniques encompassed qualitative dimensions. Some of the measures focused on product and market innovation, while some focused on technological innovation. The critical question related to this research gap is: should there be separate measures for innovative outputs and the environment that produces them? Although there is plenty of discussion in the literature on why and how firms can focus on different stages of innovation, this question largely remains unanswered. None of the existing measures fill the gap in the literature, which calls for a precise quantitative measurement scale for innovation particularly measuring intensity represented through incremental and radical innovation (degree) and frequency of these measures. Each of these innovation types is discussed in the relevant part of the literature review.

2.8 Radical Innovation

Radical innovation is defined as "*a successfully exploited product, service or business model that significantly transforms the demand and needs of an existing market and disrupts its former key players"* (Lettice and Thomond, 2002, p. 4). Damanpour (1996, p. 695*)* defined radical innovation as *"those that produce fundamental changes in the activities of an organization and represent a large departure from existing practices."* Brown (2003) viewed radical innovation as a change agent impacting social practices, and the entire way of life. Radical innovation has been termed differently in various literatures. Some researchers have related radical innovation to breakthrough inventions (Ahuja and Lampert, 2001; Mote et al., 2007), disruptive innovations (Christensen, 1997) and discontinuous innovations (Michel et al., 2008). Leifer (2001) was of the opinion that the development and implementation of radical innovation is not well understood. Dunlop-Hinkler et al. (2010) was of the similar opinion that radical or breakthrough innovations are difficult to create but provide long-term competitive advantage.

Different researchers have explained and illustrated radical innovation in different ways. These have provided some insights into the measures of radical innovation. Coulson-Thomas (2001) and Wind and Crook (2005) characterised radical innovation with different metaphors such as seeing the world differently, challenging pre-assumptions and spotting of 'white spaces'. Through these illustrations, these researchers tried to explain that radical innovation involves identification of unmet customer needs, challenging targets, thinking the unthinkable and defying accepted mental models. But perhaps the most comprehensive definition of radical innovation, which is most suited for this study, came from Assink (2006, p. 217) who defined radical innovation as *"a successfully exploited radical new product, process, or concept that significantly transforms the demand and needs of an existing market or industry, disrupts its former key players and creates whole new business practices or markets with significant societal impact"*. This definition is adopted by this study, since it suggests specifically the degree of innovative output and its impact. Sood and Tellis (2005, p. 153) also argued that terms such as "discontinuous" and "disruptive" innovations "define an innovation in terms of its outputs".

Radical innovation as a measure of innovation was considered appropriate and valid by researchers such as Tellis et al. (2009) and Chandrasekaran et al. (2007). According to Oke (2007), new and radically innovative products and services is a key measure of radical innovation, which was also confirmed by this study. Bright et al. (2006) explained radical innovation increases mutual benefit to both business and society, with the potential to create a deep shift in the values, assumptions, and behaviours of people, organizations, industry and the global society. Gharajedaghi (2006) suggested the use of systems approach and use of metaphors to explain radical innovation. This was taken forward by Prasad and Nori (2008), who argued that radical innovation has deep impact organizational cultural values and hence must be treated holistically involving spirit (mission, vision, values and communication and governance), mind (knowledge systems and resources) and body (structure and infrastructure). Researchers such as Pratali (2003) contended that radical innovation brings long-term benefits to the firm and are engines for long-term growth (Leifer et al., 2001). Freel and Robson (2004), however, argued that strategies that promote radical innovation may even have negative impacts on a firm's performance in the short run as the real benefits of radical innovation in evident only in the long run.

The literature on radical innovation also pointed towards market based measures. Researchers such as Michel et al. (2008) argued that radical innovation changes the firm's value creation, while Mosey (2005) argued that firms that are focused on radical innovation bring out product and services that are "new to the market". Tidd et al. (2005) found that radical innovation may emerge based on following changing conditions. These include:

- New unpredicted markets emerging
- Establishment of new business models
- Emergence of new technologies
- New political rules developing and deregulations in certain markets
- Markets being exhausted with current products and services
- Unexpected events.

The discussion in the literature on different aspects of radical innovation mentioned above not only provides indicators of its different measures, but also indicates that these measures are output measures. Skarzynsky and Rufat-Latre (2011) associated radical innovation with customer requirements. They (ibid) pointed out that disruptive innovations are suitable at a time when customers need to re-assess their cost and value assumptions. Disruptive innovation does not take place based on a single shifting trend, but rather a number of changing trends and when looked holistically provides a new opportunity in the market. They also pointed out that disruptive innovation is more likely to happen in low growth, high unemployment markets.

The literature on radical innovation also cautioned against excessive focus on incremental innovation as incremental innovation is easy to initiate and implement and faces less resistance. According to the *Innovators' Toolkit* (2009), 90% of the corporate firms are engaged in incremental innovation due to its easy accessibility. The tool kit, however, cautions that firms should avoid just adding features to products and services, in the name of incremental innovation, especially ones that customers do not value. At the same time it provides caveats that firms should not put all their efforts into incremental innovation and should strive for radical innovation. Tushman and O'Reilly (2002) were of the opinion that radical innovation calls for proactive change without which it is not possible. They (ibid) found scattered instances of firms who could manage both evolutionary and revolutionary change through punctured equilibrium. Punctured equilibrium is an alternation between long periods when stable infrastructures permit only incremental adoptions, and brief periods of revolutionary upheaval. Christensen and Overdorf (2005), highlighted the challenges of disruptive innovations arguing that such innovations are not routine, so there are no routine processes to handle them. In addition to that, Christensen and Overdorf (2005) pointed out that disruptive innovations promise lower profit margins per unit sold, hence are not very attractive to established firms.

Radical innovation can be seen as changing the shape of existing business models. Skarzynsky and Gibson (2008) pointed out that 'business model' innovation creates either radical or incremental innovation. When the firm makes attempts to completely re-invent its business model, it leads to radical innovation. On the other hand, when the firm makes attempts to continuously evolve its business model, it leads to incremental innovation. Product and service innovation is just the end process of that innovation. Skarzynsky and Gibson (2008) argued that business model requires innovation due to changes and discontinuities in the market. They (ibid) recommended that discontinuities in the external market must be studied in depth, so that new opportunities are recognized. The core competencies and strategic assets of the organization must be evaluated in the light of these discontinuities so that these discontinuities can be leveraged.

Researchers also highlighted the fact that higher research and development budgets associated with radical innovation is a challenge. Huston and Sakkab (2006) argued that many firms suffer from flattening R&D productivity and enhanced innovation budgets. Huston and Sakkab (2006) recommended that firms that are focused on radical innovation must connect and develop with external sources: universities, government labs, web-based talent markets, suppliers and even competitors. These external sources can provide firms with important information on market and customer needs, knowledge developments and new opportunities. Propis (2002) and Knott (2012) also reinforced the need for inter-firm collaboration and argued that even without formal research and development firms can collaborate to come up with radical innovation. On similar lines, Narayana (2005) also emphasised the role of knowledge networks and communities to produce radical innovation. Radical innovation requires highly complex knowledge transfers and strong ties with all stakeholders (Hildreth and Kimble, 2002). Propis (2002) also found positive relationship between radical innovation and inter-firm collaboration especially in regional clusters where the buyers and suppliers have more opportunities to interact. Further, Dunlop-Hinkler et al. (2010) hypothesized that innovations emerging from strategic alliances and joint ventures would be breakthrough rather than incremental.

Chen et al. (2013) further contended that there are contradictory views on the focus of the innovative efforts. They pointed out that given the knowledge of different categories of innovation, firms have to decide on their innovation focus. The trade-offs may be between the breadth and focus of innovation. Companies who focus on all categories of innovation may spread their innovation efforts too thinly on all categories and may be lost between them.

The literature on innovation does not give priority to either forms of innovation but makes a case for clear goals and ambitions related to innovation. Nagji and Tuff (2012) pointed out that firms must manage radical innovation strategically. They should clearly articulate their innovation ambitions. They recommended an innovation ambition matrix to reconcile between the aspirations of radical and incremental innovation. This model represented the measures of radical and incremental innovation in the market. Figure 2.4 represents the innovation ambition matrix.

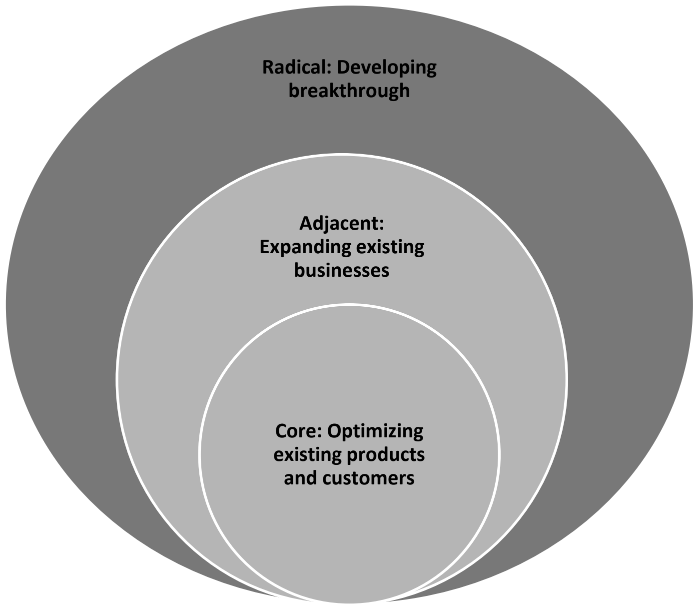


Figure 2.4: Innovation Ambition Matrix, (Source: Nagji and Tuff, 2012, p. 49)

According to figure 2.4, organizations should look at managing their total innovation portfolio. Nagji and Tuff (2012) explained that a series of ad hoc efforts do not lead to any strategy. Figure 2.4 brings into consideration three major aspects which are products, markets and assets. Radical innovations are disruptive, change industry dynamics and create new markets and needs. They require new resources and capabilities. Adjacent innovation allow companies to draw on existing capabilities and get fresh perspectives on customers' needs, demand trends, market structure, competitive dynamics, technology trends and other market variables. Nagji and Tuff (2012) explained that core innovation draws maximum resources; it is the radical innovation that gives maximum financial returns. However, Kirby (2010) does not agree with his view and concluded that stock markets do not respond positively to radical innovation and seem to be more comfortable with incremental innovation.

Radical innovation strategies include time-based considerations such as faster, more efficient time to the market and developmental strategies such as quality enhancement, customer focus, integration with stakeholders and flexibility and responsiveness (Rothwell, 1994). Radical innovations frequently leverage advanced technology or a combination of known technologies as a basis for advantage (Kelley, 2005).

The fact that radical innovation requires specific competencies and is challenging to implement was a recurring theme in the literature. Lawrence (2009) pointed out that some of the necessary expertise for a radical innovation project is not likely to be handled in-house, so that help from external stakeholders may be beneficial. The main sources of difficulty have been ownership of intellectual property and confidentiality. From a practical perspective, if radical innovation becomes successful they offer improvements in known performance features of five times or greater, an entirely new set of performance features or a 30% or more reduction in costs (Leifer et al., 2000). According to a report in *BusinessWeek*, Mandel (2009) reported that radical innovations are also hard to sustain because they take a long time to commercialize, losses to imitation and lack of patent protection. Skarzynsky and Rufat-Latre (2011) recommended three strategies for radical innovators:

- Focusing on new business models, find and act on market discontinuities and satisfy unmet customer needs.
- A single shared aspiration should link both incremental and radical innovation efforts. Incremental and game changing ideas are not easily discernible in the early stages, so should not be taken apart.
- Strategic direction with a mind-set that promotes finding new market discontinuities. Disruptive innovation strategies then informs strategy making. Radical innovation stretches the boundaries of innovation.

2.8.1 Measures of Radical Innovation

The earlier discussion on radical innovation indicated that the radical innovation can be evident through new products and services, new processes, new technologies, and its substantial impact on markets, customers and competition. In relation to markets and competition, Prahlad and Mashelkar (2010), pointed out that radical innovations are very often disruptive, as it changes the industry and competitive dynamics and provides a substantial level of competitive advantage. Nagji and Tuff

(2012) explained that organizations are compelled to undertake radical innovation because the incremental innovations do not bring strategic advantages to the scale they desire. Organizations involved in incremental innovation have limited market share as it gets divided between others and the market does not get bigger. Radical innovation can create new target markets. Hamel (2002) pointed out that without radical innovation firms will find it hard to compete in the market and firms will be at danger of decline. According to Constantinos and Geroski (2005), radical innovation often results in product or value propositions which undermine the competences and complementary assets on which existing competitors have built their success and disturb prevailing consumer habits and behaviours in a major way (Constantinos and Geroski, 2005). Nijssen et al. (2005) developed a three items measure of radical innovation through:

- Introduction of radically new products
- Use of radically new technologies
- Focus on future markets and future customers.

Radicality in product and service innovation was highlighted by Katila (2000) who argued that radicalness can be evident at organizational level, market level, industry level, customer level and technological level. Researchers such as Nieto (2004) and Vaughan (2013) associated technological innovation with radical innovation. They argued that technology is the primary focus of radical innovation and firms may either pursue the development and commercialization of new technologies or exploit radically new technologies to apply to new products and services. Le Bas et al. (2015) argued that technological innovation encompasses product and service innovation. Oke (2007) measured radical product innovations through:

- Introduction of a new product to an existing market; and
- Introduction of a new product or service to a new market.

Although the literature provided insights into the measures of radical innovation, the challenges to practice and promote radical innovation in organizations was not restricted to capabilities and scale of innovation. Some sectors, particularly service sector have their own challenges. Oke (2007) argued that radical innovations are characterised by uncertainty, knowledge intensity and boundary crossing. He argued that service sectors do not see a lot of radical innovations because of its characteristics and many of the service features cannot be patented. Service innovations are, therefore, characterised by 'process innovation' with variations in service delivery, processes or add-on services that aim to enhance customer experience with the service. Terziovski (2002) linked radical innovation in service sector to 'Business Process Re-engineering'. Hammer (2004) pointed out that operational innovation should not be confused with operational improvements, which is quite incremental in nature. Operational innovation involves coming up with new ways in all aspects of operational processes such as filling orders, product development, and customer service and processes that lead to the development of organizational outputs. Hammer (2004) further recommended that since process and operational innovation is disruptive and brings deep change, it must be concentrated on those activities that have the biggest impact on a firm's strategic goals. The above discussion points out that that in services process and operational innovation may witness radical innovation and hence qualify as measures of radical innovation.

The literature further reinforced that measures of radical innovation can be evident through markets and products. Brown and Anthony (2011) argued that disruptive innovations represent new-to-world opportunities as the company enters new markets with new opportunities. Jansen et al. (2006) reported that radical innovation involves findings new markets and future customers. Kristina and Behrens (2005) contended that new and novel products characterise radical innovation. They argued that radical innovation should be novel but the novelty should be widely accepted. Tellis et al. (2009) and Chandrashekran et al. (2007) also emphasised that the value of radical innovation lies in its adoption rather than its commercialization. Norman and Verganti (2014) argued that radical innovation also exploit new technologies in bring new and novel products in the market. These result from research and development and design research. Bessant and Tidd (2011) contended that radical innovation is achieved by firms and individuals who work at the fringes of existing mainstream markets. These make them come across customer needs that do not exist. These requirements of the fringe markets begin to attract mainstream markets and radical innovations make it relevant for mainstream markets by increasing its applicability and reducing the cost (Christensen et al., 2007).

Radical innovation can also provide cost advantage to firms and these are evident at the lower end of the market. Cromer et al. (2011) hypothesized that radical innovation may have plenty of patents but that does not have a significant impact on a firm's profitability and market valuations. The firm's profitability and market valuations also do not depend on patent citations and time to develop new patents. The findings supported their hypothesis that radical innovation had positive impact on return on investment but not on market valuation and venture profitability. Cromer et al. (2011) did not specifically find any relationship between market valuation and number of patents held. They concluded that radical innovation provides robust returns while incremental innovation provides limited returns. Therefore, patents do not prove to be a reliable measure of radical innovation. A number of radical innovations do not get patented due to high costs or lack of robust processes in different part of the world and therefore, patents do not reflect a true measure.

Further, Bessant and Tidd (2011) pointed out those low end disruptions cause major players in the industry to re-think their strategies. These low end disruptions bring products and services into the market at low cost that are 'good enough for use' and change the rules for competition in that industry. These insights resonate with the ideas of Prahalad (2006) who pointed out that entrepreneurial firms meet the challenges of radical innovation by creating business units who behave as free agents and challenge the existing rules, thought processes and conventional approaches. Chen et al. (2013) not only recommended 'innovation focused innovators' but also found positive relationships between focused innovators and superior business performance. Dugan and Gabriel (2013, p. 68) argued that decisions for radical innovation should not be made by committees as they point out that *"breakthroughs do not lend themselves to consensuses"*. They called for 'special forces' style research groups and temporary project teams that can break existing knowledge barriers.

Radical innovation is, therefore, more programmed, is a result of deliberate research, and has formalized research development efforts (Propris, 2002).

Customer inputs into design are critical in developing products and services which are customized either for mainstream or fringe markets. User involvement in this type of innovation is critical to their success. Since Harrington (1995) suggested radical innovation is associated with top down strategy, evidence from research indicates that user involvement is more associated with incremental innovation rather than radical innovation. Since radical innovation disrupts the market, it also brings changes in customer behaviour. Verganti (2009) argued that radical innovation is not about staying close to the customers and their needs, it is actually the opposite. The customers are unable to comprehend how radical innovation will change their needs and habits. Focusing on customer needs also leads to identification of unmet customer needs. Customers on many occasions do not know what they really want. Radical innovation focuses on these unidentified and unmet customer needs and by bringing such products and services into the market changes the nature of customer demand (Trot, 2005). Paap and Katz (2004) also agreed with this view and concluded that radical innovation is often hampered because these insights are not recognized as opportunities.

2.9 Incremental Innovation

Jha et al. (1996, p. 22) defined continuous incremental improvement as *"a collection of activities that constitute a process intended to achieve performance improvement".* Incremental innovation is mostly associated with doing things better and improving. While radical innovation has competency destroying properties, incremental innovation has competency enhancing properties. Pratali (2003) contended that incremental innovation has an effect on the competitive positioning of the firms. Many times incremental innovations take place around radical innovations (Propris, 2002). Madanmohan (2005) explained that incremental innovation can be classified as material, operations and product innovations. Customer orientation and formalization was associated with scale innovation, while R&D intensity and technology planning was associated with product innovation. He associated process innovation with, formalization, annual demand of the product, customer orientation and inter-organizational coordination.

The literature differentiated the impact of incremental innovation on customers, markets and competition, although most agreed that incremental innovation provides value to the firms. Bessant (2005) contended that although incremental innovation is evolutionary and its impact may be debatable, it certainly has a significant impact on competitive advantage of a firm. He elaborated that firms benefit from incremental innovation leveraging from its creative potential and launch a number of improvements in the later stages of the product life cycle. Nemet (2009) argued that product innovation life cycle, towards its end, stimulates incremental innovation rather than radical innovation. Therefore, when firms cannot deliver radical innovation, their focus should be on incremental innovation, because it also counts towards delivering customer satisfaction. It is therefore, understood, that at the later stages of the product life cycle, the frequency of innovations is more critical than the degree of innovation. Bessant (2005) argued that as the scale and frequency increases the competitive advantage is enhanced. The risks associated in both types of innovation are also perceptual. A firm engaged in incremental innovation may believe that the risks are low. However, the risks associated with missing out on the opportunities may be enormous and firms may become an imitator rather than innovator. Wolf and Pett (2006) argued that internalization and innovator position has crucial impact on new product improvement processes. Previous studies on firm size and innovation posited that large firms are more focused on product innovation rather than process or service innovation. Simon et al. (2002) further hypothesized that smaller firms tend to come up with more radical innovation rather than incremental innovation.

The fact that incremental innovation provides substantial value to the firm was also highlighted by Anonymous (2013). Firms who focus on the next big innovation miss the opportunity for incremental innovation. Incremental innovation calls for extending the mandate of innovation to all facets of the organization and not restricting it to research and development. Tidd et al. (2005) pointed out that innovation is a ‘process’ and requires evolutionary integration of organization, technology and external market forces.

Incremental innovation does not have the largess or the glamour associated with radical innovation and the resistance to this kind of innovation is of a different order. Herrmann (1999) explained that this is the case because incremental innovation comes out of day-to-day activities. Interestingly, Herrmann (1999) pointed out that incremental innovation may also result from a design or process deficiency. Since these deficiencies are not easily acceptable or acknowledged, incremental innovation becomes difficult to manage. Citing Tidd and Bodley (2002), Vermeulen et al. (2007) argued that firms struggle with this type of innovation because they are expected to implement incremental innovation within their existing organizational arrangements and frameworks.

2.9.1 Measures of Incremental Innovation

The measures of incremental innovation was found to be similar to radical innovation as it revolved around customers, competition and markets but varied from radical innovation in terms of degree and frequency as the following discussion would explain. Incremental innovation, according to Christensen and Overdorf (2005), is mostly launched by established firms in the industry. Their years’ of experience in the industry and customer interactions and feedback make them respond to their changing needs. At the same time, the investments required in sustaining technologies and incremental innovations fit the values of established firms as they aim for higher margins from leading edge customers. Elsbach (2002) argued that intra-organizational factors have an impact on incremental innovation. The literature on new product development and incremental innovation revealed that working with and listening to lead users can help to find areas for incremental innovation. Drucker (2002) argued that most of the innovations are a result of methodological analysis of opportunities in the market rather than flashes of inspiration.

The importance of frequency of incremental innovation was highlighted by Bessant and Tidd (2011) who pointed out the fact that incremental innovation is continuous and frequent. Bessant and Tidd (2011) explained that the benefit of incremental innovation lies in the fact that improvements and changes in type of innovation are on the lines of a well-known path. Familiarity means less risk and more acceptances from different stakeholders. The effects of such incremental improvements are seen in its cumulative results over a period of time because it is continuous and frequent. Bessant and Tidd (2011) observed distinct patterns emerging of what they called 'punctured equilibrium' which involved exploiting, elaborating and refining on a theme within the existing technical and regulatory markets. However, there are times when this equilibrium is punctured and a new trajectory emerges and the cycle resets itself. Thus, Bessant and Tidd (2011) concluded that most of the time, firms are engaged in making incremental improvements, searching and adjusting the equilibrium. By this pattern, incremental innovation is the dominant form of innovation practised in most organizations. As evident from multiple views on incremental innovation, this type of innovation is more associated with what is called 'nuts and bolts' innovation.

The discussion on incremental innovation was also witnessed in operations management literature. These featured mainly around product and process improvements and process improvements. Khim (2001) was of the opinion that incremental innovation is deeply embedded into operational philosophies of Just-in-Time (JIT) and Total Quality Management (TQM). JIT brings continuous improvement by reducing lot sizes and inventory and the TQM philosophy of continuous improvement is through reduction of waste and improvement of quality and ownership. The observations made by Khim (2001) are mainly applicable for production and process innovation. His main considerations were related to elimination of non-value added activities through these improvement techniques. Bessant and Tidd (2011) also linked incremental innovations to TQM and JIT. Terziovski (2002) linked incremental innovation to the concept of Kaizen. Improvement can be broken down between continuous improvement and innovation. *Kaizen* signifies small improvements made in the status quo as a result of on-going efforts. Incremental innovation involves a step-change improvement in the status quo as a result of a large investment in new technology and/or equipment.

The literature clearly differentiated the fact that radical innovation was focused on ‘newness’ and ‘radicalness’ of products, services and processes, while the incremental innovation was focused on improvements and modifications of products, services and processes. Oke (2007), measured incremental product innovations through:

- Minor improvements or adaptations to existing products; and
- Major improvements or adaptations to existing products.

The modularity in incremental innovation was highlighted by many researchers. Zhang and Gao (2010) argued that modularity provides space for incremental innovation and leads to higher innovation advantage. Researchers such as Avermaeteet al. (2003), Salavou (2002), Oke (2007), Norman and Verganti (2014) and Dong (2015) supported the view that incremental innovation was primarily associated with improvement of products and services. They argued that incremental innovation is a critical driving force behind improvement efforts. Avermaete et al. (2003) and Salavou (2002) attempted to measure incremental innovation on the basis of the number of improvements in products, process, systems, markets, suppliers and packages that the firm had adopted in the last five years. Simon et al. (2002) argued that smaller firms are in a better position to adjust, change and be flexible with the requirements of organizational change. Incremental innovation usually exploits the existing technologies, know-how processes to serve existing customers and markets. Puga and Trefler (2007) argued that incremental innovation is more evident when new products are launched and fixing the bugs takes place through incremental innovations. Nahmias (2005), therefore, pointed out that incremental innovation and steep learning occurs in the initial stages of production.

The differences between measures of radical and incremental innovation in relation to markets were also evident in the literature. While the former focused on finding new markets, the latter is focused on serving existing markets and customers. According to Pratali (2003), firms engaged in incremental innovation study and serve existing markets, which has a positive influence on sales. Since, incremental innovation focuses on existing customer and markets, it should allow firms to penetrate existing markets (Farris et al., 2010). Arnold et al. (2011) argued that customer retention and relationship can be improved through incremental innovation and it shows the effectiveness of a firm's innovation performance. Although Pratali (2003), agreed that incremental innovations provide short-term profits prospects, day-to-day improvements associated with incremental innovations become the backbone of organizational performance and improvement efforts. Martin (2011) argued that incremental innovation, particularly in product innovation, comes from close interaction with customers. The 'front line' staff bring in important clues and insights for managers across the organization to modify or improve products as customers expect them. This led Govindrajan and Trimble (2010) argued that firms do not need to re-invent the wheel and just by reorganizing the work flow and collaboration between various functional teams incremental innovations can be achieved.

Researchers critiqued incremental innovation in terms of making superficial improvements and therefore not providing real value to the customers. Goldenberg et al. (2003) argued that many incremental innovations; particularly involving new products are impractical and uninspiring. They argued that many a time firms are engrossed listening to their customers and innovative teams focus on fulfilling the needs of the customers. Goldenberg et al. (2003) recommended that, apart from listening to the customers, firms should also listen to the product. By listening to the product generic innovation pattern can be worked upon. These patterns emerge from focusing on 'subtraction' (or reduction – making the product less complicated), 'multiplication' (quantitative and qualitative increase in features of the product) and 'division' (customization of modular components), 'task unification' (multiple uses of the product) and 'attribute dependency change' (the relationship of product attributes with dependencies such as age or gender).

The literature highlighted the fact that the research on incremental innovation requires new direction and the measures need to be identified and tested. Sorescu et al. (2003) pointed out that academic literature focuses more on radical innovation and incremental innovation is left out of the analysis. Boer and Gertsen (2003) concluded that the literature on incremental innovation is underdeveloped. They (ibid) argued that the literature on incremental innovation is just emerging and pointed out that various bodies of knowledge from other fields can be combined to study incremental innovation. Most of the concepts of incremental innovation literature therefore come from new product development, change management and operations literature (Petersen et al., 2004; Leifer et al., 2000). Cromer et al. (2011) pointed out that corporate entrepreneurial initiatives in the form of either incremental or radical innovation and their impact on venture performance are theoretical and empirical questions that needs to be resolved. These theoretical gaps are explained in more detail in section 2.12.

2.10 Balancing Incremental and Radical Innovation

The literature on innovation emphasises that firms benefit from both incremental and radical innovation. However, the literature also suggests that it is not an 'either or' strategy that works. Firms should balance both incremental and radical innovation. Bessant and Tidd (2011) have enumerated the benefits of both types of innovation in delivering competitive advantage. Applegate (2008) also supported this view by arguing that innovation life cycle in firms start with incremental innovations, through which firms exploit growth opportunities, while at a later stage of the life cycle, firms achieve traction and momentum and use radical innovation to transform their businesses. Their findings were also supported by Alvarez and Barney (2007) and Raisch and Birkinshaw (2008), Dunlop-Hinkler et al. (2010) who reinforced the usefulness of combining explorative and exploitative forms of innovation.

The benefit of balancing incremental innovation with radical innovation is also highlighted by Christensen (2005) who explained that incremental innovation is sustaining, while radical innovation is disruptive. He, however, argued that some sustaining technologies can also be disruptive. Both types of innovation can be useful to balance the risk portfolio of an organization. Incremental innovations are considered to be safe, less expensive and have reasonably short time lines as compared to radical innovations, which are expensive, risky, and have uncertain and long wait times for any tangible results (*The Innovators' Toolkit*, 2009). Engen and Holen (2014) considered incremental and radical innovation at two extremes, particularly in the context of novelty. Burns (2013) showed that incremental product innovation is associated with internal corporate venturing, while radical product innovation leads to external corporate venturing and associated risks. Radical and incremental product innovation can be targeted at different markets and can be facilitated through corporate venturing as shown in figure 2.5.

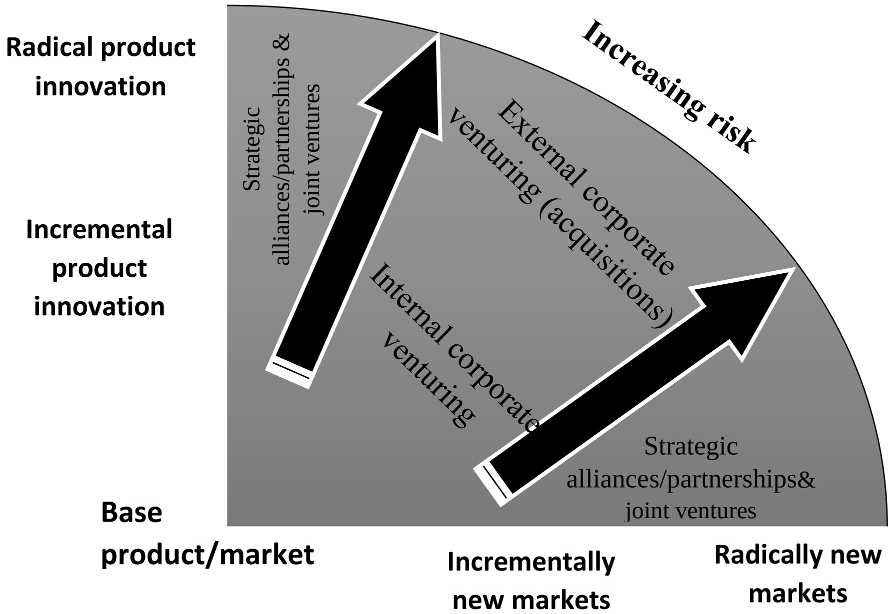


Figure 2.5: Corporate venturing and forms of corporate renewal and risk, (Source: Burns, (2013, p. 406)

Burns (2013) explained that strategic alliances and corporate venturing have higher risks when associated with radically new markets and radical products. The primary purpose of strategic alliances is to enhance the potential for innovation. Herrmann et al. (2007) added that transformational capabilities, risk propensity and customer orientation are essential for the development of radical innovation. Generally, researchers have found that the development of radical innovations demands the disruption of existing capabilities or the creation of new capabilities while incremental innovation development requires enhancements of existing capabilities (Ellonen et al., 2011; Ellonen et al., 2016; Forsman and Ranatanen, 2010).

Kanter (2010) argued that organizations must have capabilities for incremental innovation before they can acquire new capabilities for radical innovation. Bragg and Bragg (2005) emphasised the role of incremental innovation and along with Christensen and Overdorf (2005) cautioned organizations on relying only on incremental innovation. They (ibid) argued that such organizations fail to handle revolutionary changes and hence their ability to meet the challenges of disruptive innovation becomes restricted. Narula (2002) also argued that firms who invest time and money in incremental innovations are 'locked out' from radical innovation opportunities. He also argued that firms that rely on past knowledge and experiences also fall prey to a familiarity trap and cannot achieve breakthrough innovations. They argued that, both type of innovations follow different paths as shown in figure 2.6.

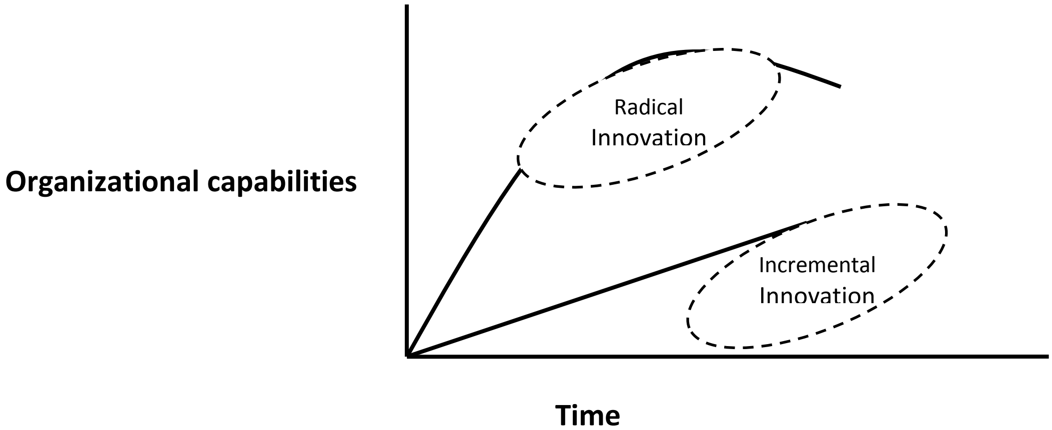


Figure 2.6: Radical and incremental innovation paths, (Source: Narula, 2002)

An alternative view was presented by Propris (2002) and Dunlop-Hinkler et al. (2010), who hypothesized that a firm should have a stock of incremental innovation which can be used to kick-start radical innovation. Further, as the higher stock of breakthrough innovation increases, it is likely that its future innovations will be breakthrough and vice versa.

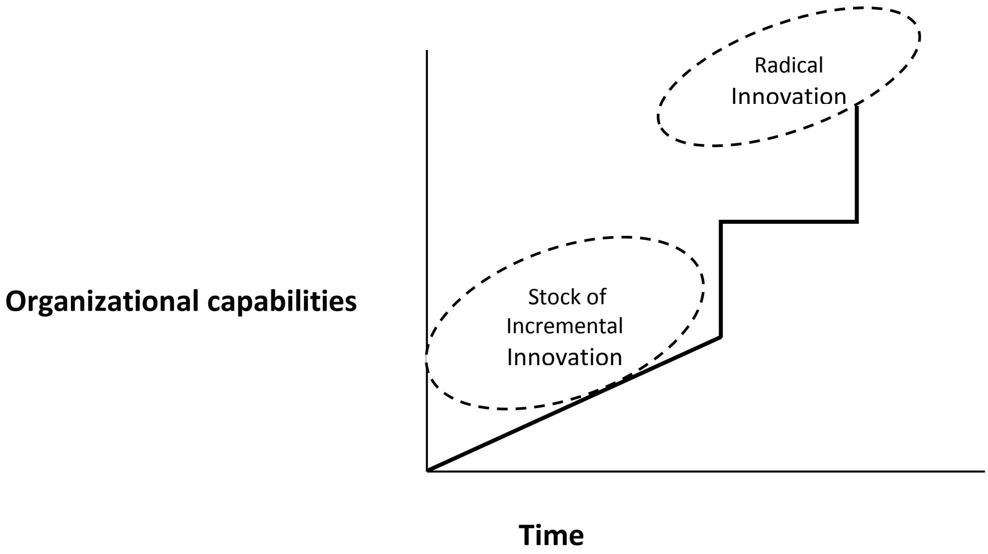


Figure 2.7: Radical innovation can be built on a stock of incremental innovations,

(Source: Dunlop-Hinkler et al., 2010)

Radical and incremental innovation requires different strategies as the objectives of each may vary. Bessant and Tidd (2011) explained that incremental innovation can be viewed as doing something better, while radical innovation can be viewed as doing something different. While the former involves strategies to exploit and explore, the later involves reframing and re-designing. Bessant and Tidd (2011, p.263) explained different degrees of innovation, as shown in table 2.5.

Table 2.5: Innovation types and challenges and opportunities, adapted from Bessant and Tidd (2011, p. 263)

Innovation Type	Challenges and Opportunities
Incremental- Alternate business model	Reframing – introduce new elements, open-ended search, corporate venturing.
Radical – New to the world, path independent, no clear rules and high tolerance for ambiguity	Emergence – co-evolve with stake holders, high risks but higher returns. Fluidity, flexibility can lead to radically different outputs.

Tidd et al. (2005) explained that based on the degree of the innovation novelty, two patterns of change can be defined and these result in either incremental innovation or radical innovation. Researchers such as Raisch and Birkinshaw (2008) have called for balancing of both exploration (radical) and exploitation (incremental) innovation within a firm. Junarsin (2009) also called for maintaining incremental innovation for survival and promoting radical innovation for changing the company and the environment. Various researchers have proposed establishing dedicated unit(s) within large firms in order to successfully incubate and develop radical innovation projects (Chesbrough, 2003; Christensen and Raynor, 2003; Leifer et al., 2000; Shah et al., 2011). Sethi et al. (2001) have also supported the fact that cross-functional integration between teams impacts the level of innovation especially in new product development. Leifer et al. (2000) made a comparison between incremental innovation and radical innovation so that each can be balanced against the other. The major differences are shown through table 2.6.

Table 2.6: Major differences between incremental and radical Innovation, (Source: Leifer et al., 2000)

Area	Incremental Innovation	Radical Innovation
Technology and Market Concept Prototyping	Exploitation of existing technology Ironing out wrinkles near the end of the design phasedesign phase	Exploration of new technology Teaching the market about the new technology and Learning application of that technology

Finally, the literature supported the view that both incremental and radical innovation are essential and one substitutes the other. Kanter (2010) was of the opinion that radical and bold innovation is good, but that does not decry the need for incremental innovation. He criticized the view that most of the time radical and incremental innovations are seen as polar opposites, which is not true. He argued that before radical innovation takes place incremental innovation provides the foundation for such innovations. He proposed a pyramid of innovation (see figure 2.8) as against the polar view of radical and incremental innovations.

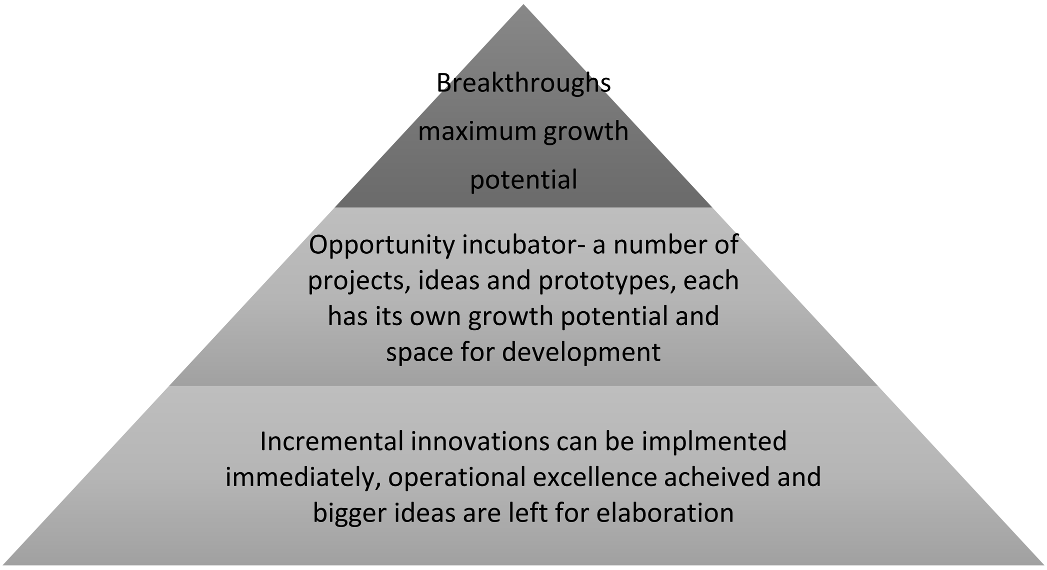


Figure 2.8: Innovation pyramid showcasing both incremental and radical innovation, (Source: Kanter, 2010)

Kanter (2010) argued that incremental and radical innovation goes together and firms need all parts of the pyramid. He finally concluded that radical innovation cannot be achieved without the bottom base of the pyramid and hence called it 'block-by-blockbuster' innovation. Hamel and Breen (2007) argued that firms that aim for evolutionary advantage get the benefits of careful exploitation of new opportunities. They (ibid) concluded that these innovations were evolutionary in nature and allowed the firms to build on each innovation – either in product, service or business model.

2.11 Summary of the Literature

2.11.1 Entrepreneurial Orientation

The literature was helpful in identifying and evaluating the measures associated with EO dimensions. The literature posited EO as behavioural propensity, pointing EO measures towards being input measures. Since, most researchers considered EO as input measures, they study EO's impact on a number of business performance indicators. However, the development of these measures was not reported to be consistent. The innovation dimension within the EO framework was studied generally and not with the objective of conceptually deciphering the nature of innovation. Most of the discussions on innovation within the EO context, in past studies, implied organizational innovation. The discussion on innovation revolved around two themes. These were ‘input factors’ or organizational climate and capabilities that generate innovative outcomes. Organizational innovation focuses on developing competencies, strategies, resources, and an organizational climate that is conducive for innovation to take place. The second theme is about ‘outputs factors’ or the measures of innovation itself. The latter was rarely associated with EO, while some research indicated that such innovative outputs are the objectives of being innovative within the context of EO. The output measures of innovation is clearly distinguished in this study and discussed separately through the concept of innovation intensity. The innovation strategies within the context of inputs emphasised the role of capabilities and resources that promote innovation. Since most of the focus of these studies were on input measures, rather than outputs, this study, termed the innovation dimension within the EO framework as ‘ready to innovate’ dimension, rather than calling it just ‘innovation’.

The discussion on competitive aggressiveness revolves around the need for entrepreneurial firms to compete in the market by being more proactive. It advocates that entrepreneurial firms should perform better than rivals based on the competitive posture they adopt. Entrepreneurial firms should adopt strong offensive posture, develop capabilities to compete and use of a number of strategies to outperform their rivals.

Autonomy within the context of EO is about empowering employees at all levels so that other dimensions, particularly innovation, risk taking and proactiveness are facilitated. The senior management allocate resources and make everyone believe in their vision of change and innovation. Autonomy allows employees in the organization to be creative and generate new and creative ideas that can generate innovative outputs.

The discussions on risk revolved around two major themes. The first is about perceptions, values and strategies related to risk taking. It is about risk-taking behaviour and implementation of such strategies. Second theme is about the scope of the risks. The literature showed that risks can be classified as internal and external risks. Internal risk is related to commitment of resources for risky ventures, while external risk involves actionable risky strategies in the market.

The discussion on the proactiveness dimension has been explained as being first to act in the market in pursuit of new opportunities. It advocates that firms need to be proactive in anticipating needs and demands in the market. Entrepreneurial firms should constantly monitor the environment for information and develop networks that can allow themselves to achieve competitive advantage. However, the proactive dimension is also not well delineated in the literature as it overlaps with competitive aggressiveness and innovation dimensions have been reported.

Finally, the EO construct was found to be positively influencing organizational performance factors. The effect of EO on a number of organizational performance parameters have been studied, but EO has not been studied within the context of innovative outputs, primarily because innovation was part of the of EO framework itself. The literature informed this study that innovation within the EO framework is primarily about inputs and hence needs to be studied further within the context of innovative outputs, which is studied as innovation intensity. Further, the literature was helpful in informing this study about the measures of EO, based on which a comprehensive list of items were drawn.

2.11.2 Innovation Intensity

The literature showed that that development of measures of innovation is quite challenging because of the nature and scope of innovation. Most of the measures found in the literature were either qualitative in nature or measured innovation in a single dimension.

Innovation Intensity was explained as degree and frequency measures of innovation. Through the concept of II, the role of frequency, along with degree was highlighted and therefore a two-dimensional matrix was proposed. The innovation intensity of a firm can be measured by mapping it on a two-dimensional matrix, where a firm may have varying degrees of degree and frequency. The degree of innovation is traditionally represented through incremental and radical innovation, while the frequency of innovation is rarely measured. Therefore, the attempt in this study to measure II through incremental and radical innovation is justified, as the measures for either types of innovation on a two-dimensional matrix of degree and frequency has not been well developed.

Incremental innovation can allow firms to penetrate existing markets and increase their market share. Incremental innovation also involves focusing on improvements in product, service and process design and removing deficiencies in products services and processes based on customer needs and demands. As far as customer solutions are concerned, incremental innovation focuses on listening to customer and solving customer problems. In order to achieve this, regular customer and supplier feedback is sought so that existing customers can be retained. Incremental innovation can occur under existing organizational frameworks and does not require major modifications to their operations and processes. The frequency of these incremental innovations is higher and is often continuous, because of lower risks, less research and development intensity and fewer changes in organizational design and orientation.

Radical innovation, on the other hand, requires a major shift in operations and processes and mind sets. It also requires greater commitment to resources and development of new capabilities. Measures of radical innovation revolve around discovering and developing new target markets through new products, services and processes. Changes at this radical scale require firms to alter their business models. Radical innovation is possible through significantly altering operational processes, product design and features, and operating in new markets. New products and services are radically different from the existing products and services in the market and have the potential to alter competitive dynamics in favour of the firm launching the radically innovative products and services. Further, radical innovation also even threatens its existing products and services. Therefore, radical innovation is not continuous and frequent compared to incremental innovation. Radical innovation has the potential to alter and modify customer behaviour is such a way that it creates new demand for the radically innovative products and services.

A stream of literature suggested that both incremental and radical innovation should be looked at holistically. Firms that have experience and stock of incremental innovation can build and develop radical innovations. Researchers suggested that firms should strike a balance between incremental and radical innovation, both of which are required in different conditions. Finally, it was concluded that both incremental and radical innovation has the potential to deliver competitive advantage. The importance for both types of innovation has implications for this study. The literature informed this study about the possible measures of II and an exhaustive lest of items were drawn from the literature. The measures of both incremental and radical innovation were included as measures of innovation intensity. Finally, the literature was helpful in identifying research gaps related to the measurement of both EO and II, which are discussed below.

2.12 Research Gaps

The observation from the literature led to the identification of key research gaps (RG) which are shown through figure 2.9.

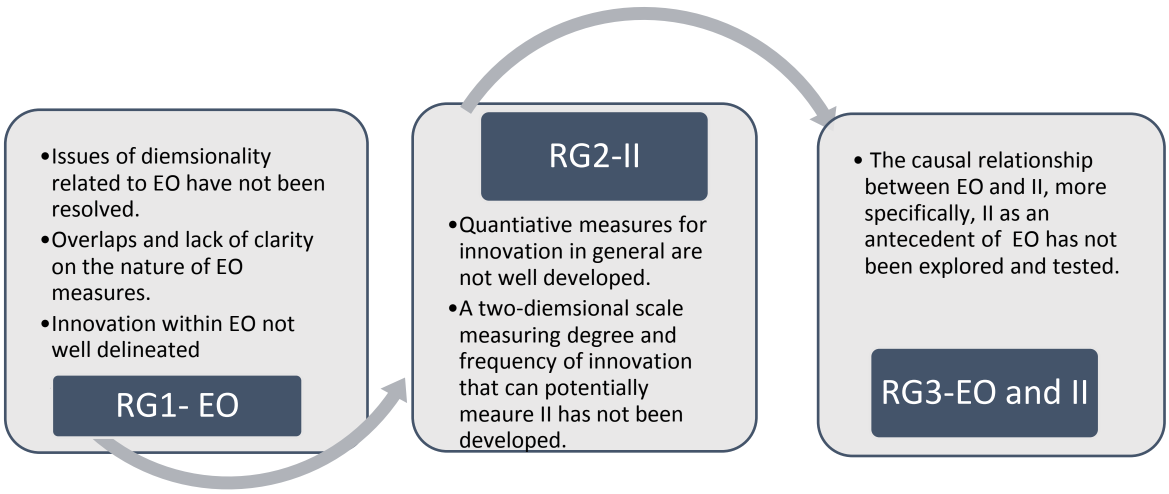


Figure 2.9: Research gaps (RGs)

The research gaps and potential relationships between EO and II are shown in figure 2.9 and are explained in the following paragraphs.

2.12.1 RG-1 Entrepreneurial Orientation

Entrepreneurial orientation is one of the most widely cited constructs in the entrepreneurship literature. However, there are research gaps that are identified need an investigation. A widely debated issue on EO is its dimensionality. Vora and Polley (2012) pointed out that many studies on EO have focused on only three of the five factors, namely innovation, risk taking and proactiveness and hence, only a partial view of EO is analysed. Further, Chadwick et al. (2008) also reported inconsistent results in the development of EO scale.

The EO scale has also been questioned on its psychometric properties (Wales et al., 2013). Researchers debated whether the EO scores can be aggregated to reflect the degree of EO in a firm. Studies done by Covin and Slevin (1989), and Miller (1983) have aggregated the EO scores. However, critics such as Kreiser et al. (2002), Muller and Thompson (2001) and Covin et al. (2006) opposed the aggregation of scores on the ground that there might be varying levels of contributions from EO dimensions. However, this argument does not reflect correctly on the measurement of EO as the dimensions measure the same underlying construct. Further, there is no empirically validated and acceptable criteria to measure the EO scores resulting from the existing EO scales and this is an open empirical issue.

Another area that needs attention is the conceptualization of EO factors and overlaps in measures that can be addressed through the refinement and validation of the EO scale. Different versions of the EO scale with either 3 or 5 factors are available. However, Zahra (1993) and Knight (1997) concluded that these scales explore important aspects of firm-level entrepreneurship but may not be comprehensive enough to measure the broad concept of EO. Since EO is posited as behavioural propensity in the literature, the measure should consist of input measures, but some of the studies in the past have used a mix of input and output measures, which in not in line with conceptualization of EO and its dimensions. Shane and Venkataraman (2000) particularly question the measure on proactiveness and certain aspects of innovation. Innovation is major dimension that lacks clarity as it is not clear whether its conceptualization refers to measures that produce innovation or the measures of innovation itself. The conceptualization of innovation dimension is therefore also referred to as ‘innovativeness’ in many studies. The majority of the evidence in the literature suggested that the innovation dimension within the EO framework refers to input measures and the measures relate to ‘readiness to innovate’ and this assumption is tested in this study. The discussion that capacity and readiness for innovation should present in a firm, before innovation can take place, is missing in the EO analysis. Considering the above, Covin and Wales (2012) and Covin and Lumpkin (2011) called for further research on the EO construct and refinement and validation of the scale. Based on the research gap, the following research objective is framed:

Research Objective 1: To refine and validate the EO scale

2.12.2 RG-3 Entrepreneurial Orientation and Innovation Intensity

There is no literature available integrating the two broad concepts of EO and II and viewing it from an innovation perspective. Kuratko et al. (2015) argued that entrepreneurship studies should now attempt to integrate theoretical frameworks so that entrepreneurship can be better explained. They call for new directions in entrepreneurship studies as the present studies have reached saturation with few or no new insights. Innovation, a principal dimension, figures in EO literature as input measures and in II literature as output measures; hence a combined view of innovation through this integrated framework of EO and II will shed light on these key constructs. The relationship between EO and II will cover the entire spectrum of innovation measurement and clarify scale development related to EO and II and provide new insights into the measurement of innovation. Based on the research gap, the following research objective is framed:

Research objective 2: To explore the causal relationship between EO and II

2.12.3 RG-2 Innovation Intensity

Generally, there is no empirically validated and universally accepted quantitative scale for innovation, particularly on a two-dimensional scale of degree and frequency of innovation. A meta-analysis of 32 studies by Szymanski et al. (2007) found that researchers are yet to agree on the mechanisms that foster radical innovation in corporate environments. The report by advisory committee on measuring innovation (2008) called for research on innovation to move beyond measuring inputs of innovation. Further, the report (ibid) called for measurement of innovation outputs.

II is a dynamic concept that proposes to measure innovation on a two-dimensional scale. A review of the literature related to II shows a gap in terms of conceptualization of its dimensions. Incremental and radical innovation degree and frequency are proposed as measures of intensity of innovation. However, these measures are not adequately developed and there is no empirically developed scale that measures innovation on a two-dimensional scale of degree and frequency. Based on the research gap, the following research objectives are framed:

Research Objective 3: To empirically test the conceptual idea that degree and frequency of innovation are the critical measures of II.

Research Objective 4: To develop a two-dimensional II scale that is applicable in the corporate sector in Oman.

Overall Aim of the Study: To refine and develop EO and II scales and analyse the causal relationship between EO and II.

2.13 Conceptual Framework

Based on the review of literature, and objectives and overall aims of the study, the following conceptual framework and hypotheses have been developed shown in figure 2.10.

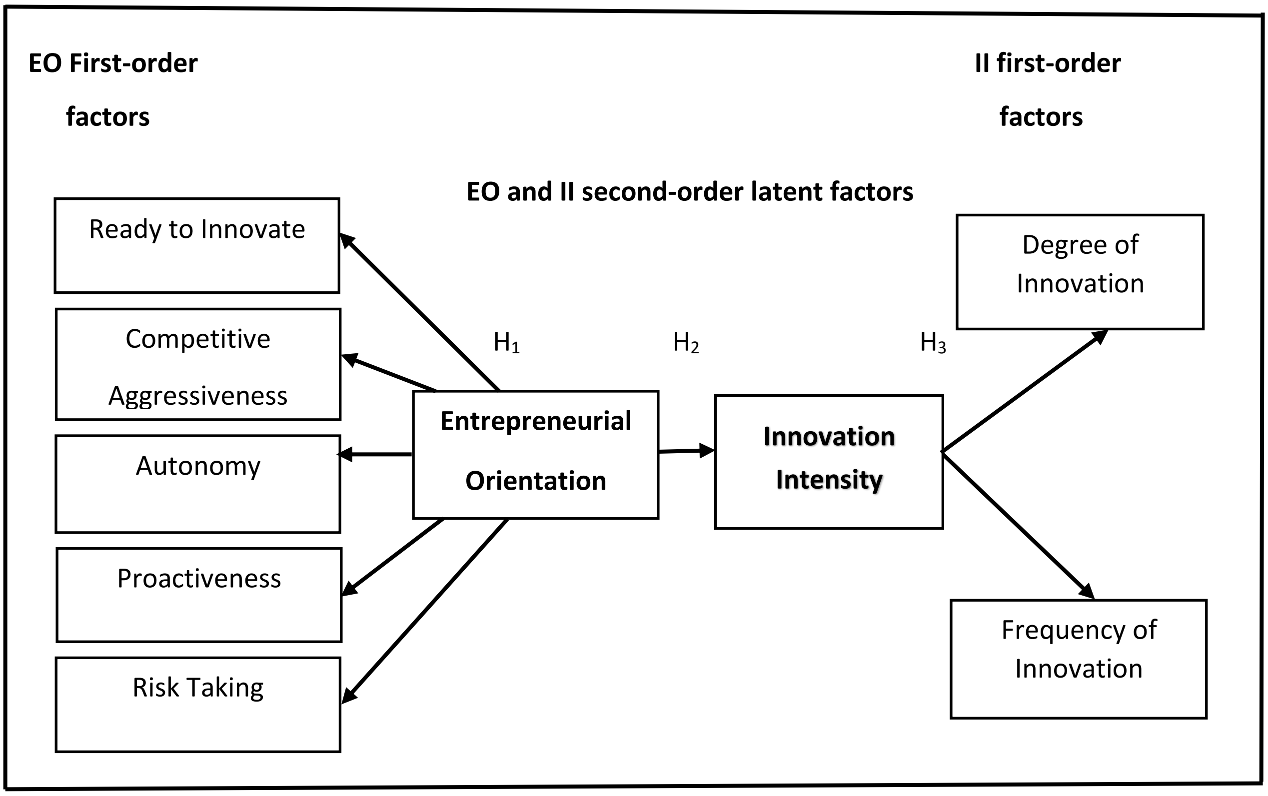


Figure 2.10: Conceptual Framework

Hypotheses *H_1**:** The five factors, namely ready to innovate, competitive aggressiveness, autonomy, risk taking and proactiveness are appropriate and significant measures of EO***.**

$H_{2:}$ EO positively and significantly influences II.

H_3: Degree and frequency of incremental and radical innovation are appropriate and significant measure of II.

2.14 Explaining the Conceptual Framework

The conceptual model shows the nature and direction of relationship between second-order latent constructs and first-order constructs and their measures. Constructs are usually viewed as producing behaviour that is captured by their measures, meaning that variation in a construct leads to variation in its measures (Hardin et al., 2008) and therefore measures are reflections of the construct. Diamantopoulos and Siguaw (2006) advised that it should be clear whether a construct is measured formatively or reflectively. Howell et al. (2007b) have been critical of Bagozzi's (2007) suggestion to use formative measures and strongly recommended the use of reflective measures. This is because formative measures' weights are dependent on particular outcome variables used to estimate them. As a result, the meaning of formatively measured construct can vary from one study to another which can be threat to external validity. Howell et al. (2007a) considers this a hindrance to scientific progress and "flaw in theory testing" (Howell et al., 2007a, p. 245).

Therefore, the relationships shown in the conceptual model in this study (figure 2.10) are specified as reflective measures of EO. Schillo (2011) also considered the five dimensions as reflection of a company's EO. The conceptual framework shows that EO is a second-order construct consisting of five first-order factors, namely ready to innovate, competitive aggressiveness, autonomy, risk taking, and proactiveness, which will be subsequently tested. These five factors, which are reflective components of EO manifests itself as input measures that can potentially influence II. Similarly, II is a second-order construct consisting of two first- order factors, namely degree and frequency of innovation. Degree and frequency of incremental and radical innovation are reflective components of II, which manifests itself as output measures of innovation. Studying both input and output organizational factors within this conceptual framework would represent a more comprehensive view of innovation and will provide practitioners a broad framework to design and apply strategies related to innovation inputs and measure innovative outputs. The output measures through degree and frequency of innovation can be used to develop a comprehensive scale to measure II.

To empirically test the conceptual framework and proposed hypotheses, an appropriate methodology is essential and in line with research methodology, research tools that fit the purpose were identified and applied. The next chapter on research methodology sheds light on the methods and tools used and statistical tests applied to test the conceptual model.

Chapter 3: Methodology

In the previous chapter, the literature review was helpful in identifying three major gaps pertaining to measurement of entrepreneurial orientation and innovation intensity constructs and their relationship. Accordingly, the hypotheses, research objectives were framed and the conceptual framework was developed, which are further discussed in this chapter. In order to justify the methods used in this research, the philosophical foundation influencing this research forms the backdrop against which the research methods and research tools have been adopted.

This is an empirical research as it uses empirical evidence to test the hypotheses and the conceptual framework. It is important here to make the distinction between empirical research and empiricism. Hjorland (2005) considers empiricism as the important method to gain knowledge. This essentially implies that justification of methods used and knowledge developed will be predominantly empirical and result from experience, observation and evidence (Peter, 2012).

3.1 Epistemological Foundations

Epistemological positioning in research concerns with the nature of knowledge and the way to investigate, know and acquire it. Epistemologists are primarily pre-occupied with establishing the truth in empirical knowledge, as compared to what is generally believed and finding valid methods to justify the truth (Bengson and Moffett, 2011). The researcher's claim to new knowledge is embedded into the 'belief' that the proposed EO and II scales can be developed if it is adequately validated, justified and tested as most of epistemological theorizing emerges from this 'belief' (Easterby-Smith et al., 1991). The research acknowledges the role of the regress problem with this argument, which states that there has to be an infinite series of justifications for the truth to be established. But, as argued by Haack (1999), there cannot be an infinite regress of (potential) justifications as logicians argue that if arguments are circular in nature, they are inherently invalid.

However, for the sake of epistemological justification it was ensured that measures are derived through reliable methods and justifications because 'beliefs' can be infallible (Haack, 1999). The researcher believes in an 'internalist approach' (Wedgwood, 2002) for justification, whereby it is assumed that our senses and cognitive states are not infallible and our claims to knowledge may not be certainly true. Therefore, this researcher has approached this process of acquisition of knowledge with methodological doubt, which incrementally took shape as the research progressed.

Understanding the relationship between philosophy and methodologies helped in selection of appropriate methods because the foundation upon which that choice was predicated was clearly understood. The researcher's view of reality (ontology) and the true meaning the researcher ascribed to knowledge (epistemology) and its creation was fundamental to articulating and validating the research design for this study (Darlaston-Jones, 2007).

What is considered knowledge and how it is accessed and known, precedes knowledge generation, which meant that a method for knowledge generation has to be appropriately justified based on research philosophies (Saunders, 2010). An integrated positivist and realist philosophies were the dominant research philosophies in this study and were supported by a limited use of an interpretivist philosophy.

3.1.1 An Integrated Positivist-Realist Dominance on this Research

As suggested by Weber (2004), research approaches in this study were chosen that best fitted the objectives of the research. Development of a measurement scale calls for an empirical research which has strong commitments to positivist philosophy (Curwin and Slater, 2010). Empiricism, although not an exclusive domain of positivists and realists, is the dominant epistemological pendant of this research. Thus the ideals of quantification and measurement have found substantial representations in this research. The objective of the study was to ensure that reliability, validity and generalisability of the measures are established and a positivist philosophy aided such objectives. In order to quantify the variables in this study and develop measurable characteristics, the analytical tools used were mainly statistical in nature. Although, Bryman and Bell (2015) argued that most positivists consider empiricism as an exclusive domain of positivism, this study does not. It is argued in the following sections that empiricism in this research is delineated through both positivist and realist philosophies and supported by interpretivist philosophy.

Realist ideology is the middle ground between positivist and interpretivist philosophies (Fisher, 2004) and hence was also suited to this research. As Fisher (2004) pointed out, adopting a realist ideology allows testing of hypothesis and analysis of relationships through the selected data. Therefore, adopting a realist research approach allowed the researcher to use the hypothetical-deductive method (Fisher, 2004).

While positivism allowed objective measurement and quantification, a realist ideology showed implications and consequences of significance so that relationship patterns could be understood in the light of the theory. These patterns of relationships would not have been otherwise observed until investigated (Bhaskar, 1989). Since acquiring objective knowledge allowed the research to give good indications of what should be done, the realist ideology provided the link between knowledge and action (Bhaskar and Callinicos, 2003). The aspirations that knowledge must be subjected to the rigours of testing before it can be considered as knowledge was retained by both positivist and realist philosophies (Boyd, 2010; Devitt, 2011). Table 3.1 shows how an integration of positivist and realist philosophies aided this research.

Table 3.1 Integration of Positivist and Realist philosophies

Positivist Philosophy	Realist Philosophy
Ideals of quantification and objective measurement were essential. Quantitative testing with statistical confidence (significance) was required. Conceptual framework and hypotheses were tested. The objectives of reliability, validity and generalisability were met.	Observed variables were analysed and identified from the literature using a deductive approach. Implications and consequences of these statistical significances were understood and analysed. Conceptual framework and testable hypothesis were developed. Attempts were made to understand the patterns of relationships.

Although positivist and realist philosophies were appropriate positioning of the research, it was not able to completely satisfy the requirements of this study. A realist philosophy which accommodated positivist ideology also allowed room for interpretivist aspirations (Denzin and Lincoln, 2005a) and it seemed to fit well the requirements of this study.

3.1.2 Interpretivist Influences on this Research

Epistemological positioning in this research began with positivist and realist commitments, but soon it was realized that such one-dimensional view of reality would be inadequate to explain the complexities of intricate and loosely defined constructs of EO and II in this study. The orthodox view of positivism and a very structured approach of realist research seemed inadequate to fully achieve the research objectives. This view is also shared by Hatch (1996) who has advised researchers not to rely on a single philosophical positioning. Myers (2013) recommends use of triangulation combining different methods in order to improve the research rigour. Through an interpretivist ideology, the research aspired to establish that the measures are well understood and correctly interpreted in the Omani context so that their application can be enhanced. An interpretivist research philosophy, although remained limited, was used strategically to achieve this objective. Adopting an interpretivist research philosophy helped to get an insight into participants' perspectives, and their interpretations in actual situations (Maxwell, 2012).

3.1.3 Integrating Positivist-Realist and Interpretivist Research Philosophies

Positivist and interpretivist philosophies are considered to be opposite to each other and irreconcilable. However, according to Lee (1991) and Myers (2013), methodological pluralism should be used to strengthen empirical research. The goals of achieving 'objective' measurement through positivism was complemented by 'subjectivity' through an interpretivist ideology. Interpretivist ideology was utilised at different stages of research. At the initial stage, an interpretivist philosophy was useful to establish face validity of measures. The measures were validated by subjects who were able to socially construct the shared meaning behind the measures (Goldkuhl, 2012). At this stage the measures needed to be understood by all respondents and an interpretivist approach ensured that the respondents interpreted the measures well. The participants provided insights into how the social realities and processes were lived, experienced and what meanings can be probably attached to the measures that were to be tested.

Once the face validity was established the next stage was to collect the quantitative data as per the ideals of positivist philosophy. After the quantitative data was collected the interpretivist ideology was again utilized which allowed causal inferences to be made between the primary constructs and helped to explain the measures (further elaborated in figure 3.2). At the same time, the measures and scores needed right perspective as to how these are derived, practised and socially constructed and therefore an interpretivist ideology was quite useful.

Therefore, integrating the positivist- realist philosophy with an interpretivist ideology improved the empirical confidence in research. Positivist-realist approach helped to establish the reliability, validity, objectivity and generalisability of measures, while the interpretivist approach complemented it by drawing inferences, contextualization and understanding and interpreting measures and understand causal relationships (Pawson, 2006).

However, this research does not claim that adopting such a philosophical stance would grant this research any epistemologically privileged status. It however, provided empirical validity and justification of the research approaches used.

The research objectives called for adoption of positivist-realist approaches and hence quantification and measurement are expected to be key outcomes. However, the research objectives also allowed some room for judgement, interpretation and subjectivity and hence interpretivist ideology was used. Table 3.2 is an elaboration.

Table 3.2: Research objectives and philosophical positioning leading to adoption of research approaches

Research Objective 1: To refine and validate the EO scale. **Research objective 2:** To explore the causal relationship between EO and II. **Research Objective 3:** To empirically test the conceptual idea that degree and frequency of innovation are the critical measures of II. **Research Objective 4:** To develop a two-dimensional II scale that is applicable in the corporate sector in Oman.	A combined positivist- realist approaches are more suited as development of measures, testing of measures, ensuring reliability, validity generalizability and understanding patterns of relationships were the key features. Therefore, a dominantly quantitative research was adopted. However, a more in-depth investigation (interpretivist approach) was required to clarify the nature of construct and to explain the possible weak or strong relationships. The quantitative data was supported by qualitative data to achieve the research objectives and enhance the validity of the findings.

Table 3.2 shows that the quantitative strategy was the dominant research approach, although allowing room for qualitative investigation. The EO and II factors and their measures were identified through deductive scrutiny and needed to be tested in the research setting. The fact that a measurement scale should have the potential to be generalized to a larger population calls for a positivist approach as suggested by Bryman and Bell (2015) and a realist approach as suggested by Fisher (2004) and hence a quantitative strategy was adopted. This attempt to quantify, generalize and to find association between these variables could not be completely 'objective' in nature (Denscombe, 2010). There are certainly alternative explanations that are used in this research and a realist approach is advised by Johnson and Duberley (2000) and an interpretivist approach as suggested by Pawson (2006) is adopted. Although the exploration of causal relationship between EO and II can be facilitated through a realist and objectivist approach, the nature of relationships and their interpretation allow room for adopting an interpretivist approach and hence quantitative strategy was supported by qualitative strategy.

3.2 Ontological Influences on this Research

In line with the epistemological philosophies in this research, ontological positioning had to be aligned. The ontological question as to what constitutes reality is widely debated in the literature. In line with positivist and realist philosophies, this research adopts an ontologically objectivist position. Therefore, this research, based on the augments of Bryman and Bell (2015), assumes that social phenomena and their meaning may not have been shaped by the social actors. However, researchers such as Saunders at al. (2010) argued that reality can be multiple and socially constructed. However, given the epistemological positioning, this research could not afford a value-laden socially constructed view of the reality (Ashworth, 2003) and therefore there was a limited influence of constructionist ontology. This research accepts the propositions of researchers such as Carson et al. (2001) who argued that there is a 'single external reality' for most research questions. Adopting the objectivist ontology allowed the researcher to seek an emotionally neutral, participant-detached view of reality that is objective, rationale and logical (Curwin and Slater, 2010). Specifically, measurement of construct and scale development require such an approach. Gergen (2001b) argued that if the research seeks to measure a construct that demands exploration and discovery, objectively, an objectivist ontology, supported by empiricist epistemology is the appropriate positioning of the research and methods of data collection and analysis should stem from this perspective.

Constructivists' ontologisms give value to lived experiences and do not favour abstraction and statistical data (Jewkes, 2011), although this study argues that it supports statistical data and provide meaning by the participants of the research. However, this research does not aim to satisfy either of the arguments, but is only true to its mission, i.e. its objectives. As Denscombe (2010) pointed out, research designs should be coherent and fit for purpose. The gap in the literature that 'lack of comprehensive measurement scales' and 'weak links between EO and II', is an empiricist and positivist gap and warrants limited insight into socially constructed view of the world. Therefore, there was a limited influence of constructivist ontology in this study. Nonetheless, both epistemological and ontological positioning had to address these gaps and hence influenced methodological considerations and the research design.

3.3 Research Design

The research design is primarily non-experimental co-relational research with cross-sectional data. Specifically, a cross-sectional regression model was used in order to analyse the existence and magnitude of causal effects as suggested by Andrews (2005). Although, correlation does not mean causation – it has been adequately debated in epistemological discussions (Wooldridge, 2009) – this research follows Tufte (2006) who argued that just ignoring correlation in the context of causation may not be representative of the hypothesized relationships. Tufte (2006) made a wise comment by saying that empirically observed co-variation is a necessary but not sufficient condition for causality. Since causality is a significant product of quantitative approaches, it is further discussed in the following sections. A quantitative research design was considered to be more suited for this study considering the nature of this research and the philosophical foundations. Houlette et al. (2004) argued that quantitative methodology is suited for research that adopts positivist and realist positioning and is ontologically objectivist. Giddings (2006) argued that the dominance of positivism continues in social sciences and recommends adoption of a mixed approach. Considering the importance of interpretivist epistemology and constructionist ontology, this research included it as part of research design in the initial and last stages of research, a practice endorsed by researchers such as Seekaran (2009) and Leech and Onwuegbuzie (2010).

3.4 Research Approaches

The literature on research methods shows differences of opinion over the appropriateness and use of qualitative and quantitative approaches （Fernández-Cano and Fernández-Guerrero, 2011). However, this research does not derive much value from the quantitative and qualitative divide. Researchers such as Alvesson and Skoldberg (1999) and Deetz (1996) argued that researchers have much deeper epistemological and ontological concerns to address than focusing on quantitative and qualitative distinctions. Leech and Onwuegbuzie (2010) argued that such debates do not work in favour of advancement of knowledge. They (ibid) highlighted the commonalities between the two research approaches. Gail (2013) also argued that the researchers should look beyond the qualitative and quantitative divide.

Therefore, this research is focused on the ‘process’ and the ‘outcome’ to represent social reality. In doing so, it finds solace from the insights of Morrow (1994, p. 207) who writes,

> “The predominant distinction between quantitative and qualitative methods in social sciences serves primarily to conceal and confuse theoretical positions”.

At the heart of the debate on the quantitative and qualitative divide is the subjectivity-objectivity debate. Researchers such as Westmarland (2001) have argued that quantitative research is in fact more subjective, which reduces the claim of subjective research to obscurity. Many versions of objective research were actually more vulnerable to critique for being more subjective than much qualitative research. While widely misunderstood from the start, the primary critics of positivism found the natural science model to be too ‘subjective’, not too ‘objective’ (Drapeau, 2002). In so-called objective research, concepts and methods are held a priori, they are unknown projections of researchers’ own ways of encountering the world, they constitute the world as observed without ownership or critical reflection and are not subject to the objection of the ‘outside’ towards possible alternatively constituted worlds, including the understandings of others (Deetz, 1996).

Quantitative research has been criticized by Chambers (2007) on grounds of quantification of social phenomenon. However, Chambers (2007, p. 42) acknowledged the importance of quantitative research by stating that the “criticisms on quantitative research does question the power, relevance, and utility of science, measurements, and mathematics in many domains”.

Quantitative research has been also criticized on the grounds that it treats language as a transparent medium that is competent enough to present objective reality (Alvesson and Deetz, 2007). Critics argued that the fixed nature of constructs in quantitative research is actually a social construction and may not be a true representation of reality (Huberman and Miles, 1994). The assumption behind this critique is that constructs may have different representations (Edwards and Bagozzi, 2000), which need subjective interpretation of reality, especially from the point of the view of those being researched. In this research, constructs such as EO and II may be questioned on their representative ability by qualitative researchers.

However, quantitative research has found methods, namely validity and reliability, to address this deficiency associated with quantitative methods. Reliability addressed the issue of internal consistency between variables and their ability to represent a social construct, while validity focused on robustness and appropriateness of the variables in measuring the social constructs in this research. Reliability and validity are discussed in the following sections.

3.4.1 Quantitative Strategy in this Research

Based on epistemological influences and ontological positioning, a quantitative research approach was adopted. As the research is largely posited in positivist and objectivist philosophies, the dominant research approach was quantitative with limited use of qualitative approach. This was due to restricted influence of interpretivist and constructionist ideologies. In quantitative research, a deductive approach is required that can explain the relationship between research and theory. This calls for an objectivist view of social reality. Quantitative approach allowed testing and measurement of relationships, which would have been difficult to achieve through a qualitative approach (Smithson, 2005).

Adopting a dominant quantitative approach meant that the demands of such a strategy are met. The criterion that qualified this study as quantitative approach revolved around measurement, reliability, validity and generalizability (Schwab, 2005). Each of these criteria and how were they adopted in this research are discussed below.

3.4.1.1 Measurement

A measure is defined as a score or observed value that is taken empirically to represent a construct (Edwards and Bagozzi, 2000). The main pre-occupation of this research was measurement, firstly to validate an existing measurement scale on EO and then secondly, to develop a new measurement scale for II. Edwards and Bagozzi (2000) pointed out that tools such as questionnaires, documentation and observation can be useful in measuring latent variables.

3.4.1.2 Causality

Statistical analyses were done to establish causality between the variables to provide credibility to both the measurement scales. Accepting the advice of Tharenou et al. (2007), this research accepts the proposition that correlation is not a sufficient criterion to indicate causality. When a particular statistical test like a regression test would not provide the required confidence levels, structural equation modelling (SEM) using path analysis was applied (Kline, 2005; Andrew, 2005). The effects of the intervening variables were studied and minimized using tests for multi-collinearity to ensure that the causal effects established are valid. The results of the tests for multi-collinearity are reported in chapter 4, while the SEM results appear in chapter 5.

3.4.1.3 Reliability

Reliability refers to the extent to which a measure is free from random measurement errors (Smithson, 2005). If measures have low reliability, they will limit the statistical power to predict relationships. Since this research uses a multi-item scale, internal consistency between the items is important to ensure that there is little random measurement error (Cronbach et al., 2006). Cronbach's alpha is a widely used technique to test and establish reliability of the research instrument. Alpha coefficients were calculated using the average correlation between the items (Hair et al., 2010). This study accepts an alpha score >0.7 as an acceptable indicator of reliability as suggested Schutte et al. (2000, p. 56). The results of reliability tests for each of the factorial structures of EO and II are reported in chapter 4, tables 4.7 and 4.8, respectively.

Homoscedasticity was checked using Tabachnik and Fidell's (2007) and Pallant's (2005) recommendations through Levene's test and multi-collinearity through tolerance levels and variance inflationary factor (VIF) and desirable scores (tolerance >10 and VIF <2.5). These tests are reported in chapter 4. However, since reliability is not a sufficient criterion for validity, the validity of the research instrument was also assessed.

3.4.1.4 Validity

Measurement validity refers to the appropriateness of a test to measure what it aims to measure (Adcock and Collier, 2001). A valid test ensures that the results are an accurate reflection of the dimension undergoing assessment. Validity is the degree of confidence that a researcher can have in inferences drawn from scores and the confidence that a researcher can have in meaning attached to the scores (Tharenou et al., 2007). Validity was an important aspect of this research as the existing and proposed measurement scales should demonstrate validity. Clark and Watson (1995) argued that validity is more critical in scale development than reliability as it does not satisfy the goals of uni-dimensionality. Clark and Watson (1995) and Qasem (2014) recommended that uni-dimensionality and validity can be achieved through factor-analysing the items. Internal validity refers to the validity of the measurement and test itself, whereas external validity refers to the ability to generalize the findings to the target population (Shuttleworth, 2009). Different types of validity were assessed in this research, which included four main types of validity, namely face validity, content validity, criterion-related validity and construct validity, all of which are critical to scale development.

Face validity and content validity – Face validity measures whether a scale measures what it states it is measuring (Hardesty and Bearden, 2004). Content validity refers to whether the items designed for the measure adequately cover the domain of interest (Gravetter and Forzano, 2009). The face and content validity in this research are expected to be strong as the contents of the measure were representative of the wider body of theories that it is trying to assess. Although the measures of EO showed face and content validity through earlier studies, the measures related to II did not have empirically demonstrated validity. However, the literature has covered different functional areas and not just entrepreneurship, and included additional functional domains of innovation, operations, marketing and strategy. The objective was to ensure that all variables of interest are included in the conceptual framework of this study. It can be safely said that the items in the measure have adequately sampled the domain but would be further tested with empirical evidence.

Criterion-related validity – Criterion-related validity should ideally predict what the researcher is interested in both currently (concurrent validity) and in future (predictive validity). In line with Smithson's (2005) suggestions, concurrent validity is expected to be present, since the results of this study are expected to support the a priori factor structure of both EO and II.

Construct validity – Construct validity refers to whether a measure relates to other measures in ways predicted by an underlying theory of the construct (Gravetter and Forzano, 2009). It is considered to be the dominant validity model that subsumes all other types of validity evidence (Kane, 2006). It is determined by its two opposite measures expressed through convergent and discriminant validity. Convergent validity determines the extent to which a measure correlates with measures with which it theoretically should be associated. On the other hand, discriminant validity determines the extent to which a measure does not correlate with measures with which it theoretically should not be associated (Levinson and Rodebough, 2011).

External validity – or generalisability is an important quality criteria in quantitative research and there are trade-offs between validity and generalisability. This study ensured that both are adequately balanced and the findings are generalizable not only across the Omani corporate sector but also transferable to similar proximal settings.

3.4.2 Tests for Validity of Measures

The validity of the measures was tested in this study through different methods. Face validity was checked through preliminary qualitative investigations from the experts in the field and academics having research experience in the field. This was done both at the pilot study phase as well as before administration of the final questionnaire survey. Content validity was established through an exhaustive literature search and secondary data evidence. Criterion-related validity was tested through concurrent and predictive ability of the measures. These were done with existing scales as well as application and testing of the scales (particularly the newly developed II scale) with a few companies in the corporate sector.

Construct validity was tested through convergent and discriminant validity. Convergent validity was assessed through average factor scores and average variance extracted (AVE) scores. Average factor scores >0.7 indicates presence of convergent validity, while AVE scores >0.5 also indicates presence of convergent validity (Bagozzi and Yi, 1990). Discriminant validity was assessed by comparing AVE scores of each of the first—order factors with shared variance between factors. When the AVE for each factor is greater than its shared variance with any other factor, discriminant validity is supported. Therefore, when the AVE is greater than shared variance scores, discriminant validity is established (Fornell and Larcker 1981; Farrell, 2009). External validity was checked using some of the methods suggested by Firestone (2003) and supported by Polit and Beck (2014), which include statistical and analytic generalization methods. The tests of the validity of the measures is reported in chapter 4, section 4.11.

3.5 Scale Development

Since this research is largely positioned towards validating and developing scales, a discussion of scale development is useful. The recommendations of Spector (1992) were followed to develop the scales in this study. As already discussed, a scale should demonstrate psychometric properties and should be construct valid. Spector (1992) explained that a summated rating scale should have four major characteristics. Firstly, the scale should contain multiple items so that all items are summed. In this study, a large item pool of items was drawn from the literature. Spector (1992) argued that including many items enhances the reliability by allowing random errors of measurement to average out. Secondly, he argued that each item should measure something that has an underlying quantitative continuum; thirdly, each item should have no right answer; and finally, each item in a scale is a statement which is rated by the respondents. Spector (1992) recommended five steps for scale development. These are followed in this study and shown through figure 3.1.

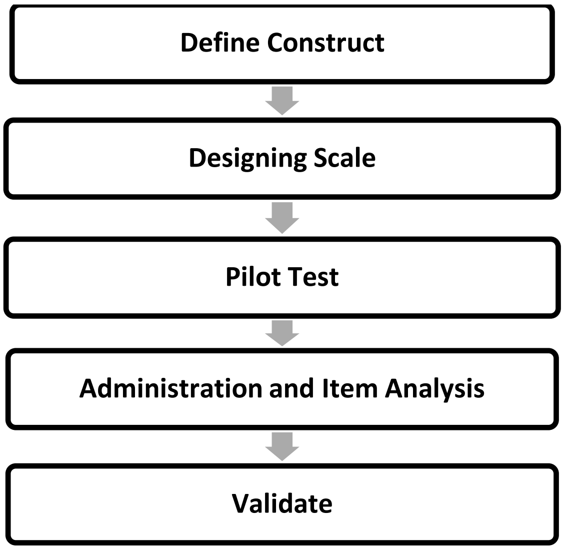


Figure 3.1: Steps in Scale Development source: Spector, 1992, p. 8)

3.5.1 Defining the Construct

In this study, the researcher faced a bigger challenge of not having an already well-defined theoretical construct, particularly of II. Therefore, care was taken to define the construct properly. The literatures regarding the conceptualization of II were studied, while the refinements and discussions on delineating the construct further were also analysed. It was ensured that there are no theoretical abstractions and the variables and item statements are well understood by the subjects. Since the hypotheses are developed a priori, much of the research took a confirmatory approach, with theoretical ideas guiding the validation strategy (Lubke et al., 2004). Since 'Innovation' was the main dimension under investigation, it was defined as the 'ready to innovate' dimension under the EO construct, while under the II construct it was considered as innovation output and was studied as degree and frequency of incremental and radical innovation. Spector (1992) suggested that when constructs are not well defined, the scale and the construct will evolve together. Developing and clarifying constructs, in this study, has both empirical and theoretical utility, as it added explanatory power to the theory and was supported empirically.

3.5.1.1 Operationalization of Constructs

Construct validity, discussed earlier in this section, becomes important when a quantitative study attempts to operationalize the constructs. Construct validity refers to the *"adequacy of the operational definition and measurement of the theoretical constructs"* (Farrington, 2003, p. 47). An important element of defining the construct is to operationalize the constructs. Conceptualization of how key constructs interact in a study is a key aspect of any research (Martin and Cohen, 2013). The constructs, which are not directly measurable, must be clearly defined through variables. According to Sheilds and Rangarajan (2013), the measures for the constructs should be empirically observable. In line with the quantitative approach, this study has also used variables to measure constructs. Table 3.3 shows key questions that led to the operationalization of the constructs.

Table 3.3: Key questions that lead to operationalization of constructs

Construct	Variable	Operational Issues
EO	Innovation	How can innovation be measured within EO? What is the exact nature of innovation within EO? How can firms be ready to innovate before innovation takes place? Are innovation building capabilities important?
	Risk Taking	Can risk be classified as external and internal risks? Can risk be measured within the context of organizational culture, structure and strategies? Which type of risks contribute to the measurement of EO?
	Proactiveness	Should proactiveness be measured in terms of competitors and products and markets? Does environmental monitoring for new opportunities improve proactiveness?
	Competitive Aggressiveness	Can competitive aggressiveness be achieved through differentiation, lowers costs and efficient processes? Do external partnerships help to achieve competitive superiority?
	Autonomy	Does providing freedom and delegating responsibilities promote autonomy and improve entrepreneurial activities?
II	Incremental innovation	Does incremental changes to products, services and processes contributes towards innovation intensity? Do customer feedback and supplier feedback matter in deriving incremental innovation? Are the existing markets and customers primary recipients of incremental innovation?
	Incremental Innovation Frequency	Do the frequency of incremental innovation matter in achieving innovation intensity? Can a base period of two years measure the frequency of incremental innovation?
	Radical innovation	Does radical changes to products, services and processes contributes towards innovation intensity? Are new market and new customers required for radical innovation? Can the same organizational structure be suitable for radical innovation? Does radical innovation change the competitive rules and modify customer behaviours?
	Radical Innovation Frequency	Do the frequency of radical innovation matter in achieving innovation intensity? Can a base period of two years measure the frequency of radical innovation?

3.5.2 Designing the Scale

3.5.2.1 Using a Questionnaire

Questionnaire is an appropriate instrument for data collection, particularly when the research calls for larger sample sizes, which are also widely distributed (Borg and Gall, 1996). This is also one of the main reasons why a questionnaire has been chosen over structured interviews. The use of a questionnaire with a large sample allowed the researcher to generalize the findings with acceptable confidence levels (Brace, 2008). Considering the epistemological positioning of this research, self-completed questionnaire allowed capturing 'reality as it is' without researcher' influence, which is common obstacle in qualitative approaches. Considering the use of a deductive approach, the literature guided in identification and measurement of measures. Based on the recommendation of Gillham (2008), survey questions were framed based on the researcher's understanding, observation, knowledge and judgement in identifying key issues related to variables of interest.

3.5.2.2 Design of the Questionnaire

The questionnaire was designed in a horizontal format, which compressed the space and allowed the respondents to complete the questionnaire with ease as against vertical formats that increase the length of the questionnaire (Mann, 2006).

There were a few challenges faced during the design and administration of the questionnaire survey. Firstly, the challenge was to ensure that respondents understood the meaning of the concepts and secondly, the challenge was to derive maximum information within the limited scope and format of the questionnaire. In order to address these challenges, the researcher included an explanation of key terms in the covering letter. The questions were revised multiple times to ensure clarity.

Once the construct was clearly defined, the second step was to design the scale. Two most important elements that were considered in scale development were agreement and evaluation. Agreement, which was used in this study, asked the subjects the extent to which they agree with the items, ranging from total disagreement to total agreement. The response choices were rated from low to high as all the items, barring a few were negatively stated. This latter was done in order to ensure that the items are not ticked randomly. The respondents were given clear instructions on how to complete the questionnaire. A common frame of reference about key constructs and dimensions being investigated was included in the questionnaire, as suggested by Mellenbergh (2008). It was also made clear to the respondents that the aim of the scale was not to evaluate a person or the job but general characteristics that can be attributed towards a construct or dimension delineation.

This study used a Likert-type response format as well as Likert scales. There is a common misunderstanding that Likert scales imply Likert response formats and vice versa as they are isomorphic (Jamieson, 2004). There should be a distinction between response format (information capture protocol or device), response format coding (meaningful coding) and scale (the ability of the instrument to measure a construct), because either they are fused together or misunderstood (Carifio and Perla, 2007). There is a difference between a Likert-type response format and a Likert scale. A Likert scale can be differentiated into macro and micro conceptual structures. At micro level each item on its own does not qualify as a scale. At macro level each item ideally captures the information of the relevant variables which together captures the information related to the construct. The scale should have an emergent property of a group of items that connect them into a whole (Kerlinger and Lee, 2002). Therefore, a response format cannot be just termed as a scale (Uebersax, 2006). To qualify as a scale, it should have semantic, grammatical and mathematically scalar properties. In this sense, the Likert response format is a 'passive/selective' as opposed to a 'generative' and 'open-ended' response format (Nasser and Carifio, 1994). The anchoring points used were on a bipolar scale from 1 to 6. Carifio and Perla (2007) stated that the anchor points as the responding format produced data that was empirically linear and interval in character. They argued that interval type data which has an underlying continuum with rank ordering points is ideally captured through these anchoring points. Vickers (1999) supported the view that interval scale data also has the properties of ordinal data and hence, non-parametric tests can be applied. Additionally, Johns (2010) pointed out that while Likert opted for five anchorage points, there is no theoretical reason to rule out different lengths of response scale. After all, the options are supposed to reflect an underlying continuum rather than a finite number of possible attitudes.

The theory of the summated rating scale states that the classical test theory distinguishes between the true score and the observed score (Traub, 1997). A true score is the theoretical values on the variable of interest. An observed score is the actual score derived from the measurement process (Allen and Yen, 2002). If one had perfectly reliable and valid measurement, the observed score would equal the true score as the true scores can be inferred rather than directly observed. According to classical test theory, each observed score is comprised of two components, the true score and random error. Errors, by being random, are assumed to be from a population with a mean of zero. This implies that with multiple observations, errors will tend to average zero (Streiner, 2003). One way to increase reliability, therefore, was to increase the number of items. This is the theory behind the summated rating scale and hence, a number of items were included in the scale.

3.5.2.3 Questionnaire Administration

The questionnaire was administered after the pilot study and an initial round of qualitative feedback on the research instrument. Once, the researcher was satisfied that the measures were appropriate and would be correctly understood and interpreted, the questionnaire was administered through the Oman Chamber of Commerce and Industry (OCCI). All the firms that participated in the study were members of the OCCI. The questionnaires were collected over a period of eight months. The OCCI had communicated about the research to the target population, identified by the researcher, and subsequently sent out the questionnaire to the firms electronically. The questionnaire was completed by those respondents who agreed to be part of the survey.

The covering letter explained to the respondents the objectives of the survey. No ethical issues arose and neither was any bias found in the process of data collection through the questionnaire survey. The respondents were informed about the confidentiality of the responses. Some of the questionnaires were returned electronically, while most were returned as hard copies. The initial response was good, however some follow up telephone calls were made to increase the response rate. Some the questionnaires were personally administered by the researcher during the conferences and workshops held by the OCCI. The response rate through this process was much higher since the researcher was personally present to follow up and answer any queries.

3.5.3 Item Analysis

Spector (1992) stated that the purpose of item analysis would be to find items that form an internally consistent scale. Internal consistency among a set of items indicates that they share common variance or that they are indicators of the same underlying construct. It is to be noted here that a large item pool may result in lower item-remainder coefficient values (Gatignon, 2010). In other words, the number of items has an impact on the magnitude of coefficient values. Based on the qualitative and quantitative tests, items from the pool were later reduced.

True to the empirical conventions and strong influence of positivism and realism, this study adopted primarily a deductive approach with most of the measures identified from the theoretical frameworks (Fisher, 2004). Although, the dependence on the literature in empiricism is not warranted, this study has utilised the literature to investigate empirical irregularities. Hjorland (2005) pointed out that empiricists have been using evidences from the literature in knowledge utilisation. Since the relationship between theory and research in this study was not so wide, “middle range theories” have been used for empirical investigation as suggested by Merton and Bodie (2005) and Hedström and Udehn (2009).

Existing scales and measures helped to further the development of theory (Ashworth, 2003). Further, the measures were identified from related studies on the topic. This approach aided in identifying measures from various strands of literature in the process of refining and developing the EO and II scales. These scales were used in earlier studies either testing only three dimensions of EO or were developed to test only one of the dimensions of EO in more detail. An initial pool of 70 items was drawn from the literature representing 5 factors of EO and 2 factors of II. Table 3.4 lists the sources from which EO and II measures were drawn.

Table 3.4 Major sources from which the measures were drawn

Existing EO Scales	Measures adopted	Existing II Measures	Measures adopted
Original Entrepreneurial Orientation (EO) Scale (Covin and Slevin 1986, 1989) EO Modified Scale (Morris and Sexton (1996)	**3**	Entrepreneurial Intensity Model Morris and Kuratko (2002) Morris et al. (2008) and Liao et al. (2005)	**6**
Innovation Capacity Model (Hurley and Hult, 1998), Innovation Capability-Rigidity Paradox (Atuahene-Gima, 2005). Organizational Climate Models, Amabile, 1996; Isaksan et al., 1999)	**7**	Two Dimensional Innovation Intensity Model (Burns, 2013) Innovation Ambition Matrix (Nagji and Tuff, 2012) Innovation Models suggested by Bastic and leskovar-Spacan, 2006), Tonnessen (2005) and Kuratko et al., 2013) and Christensen and Overdorf (2005)	**8**
Corporate Entrepreneurship Audit (CEA) Scale (Burns, 2013) Autonomy Scale (Lumpkin et al., 2009)	**9**	Innovation Pyramid (Kanter, 2010) Measures suggested by Oke (2007) Prahlad and Mashelkar (2010); Nijssen et al. (2005)	**7**
Opportunity Recognition Scale (Ardichvili et al., 2003)	**6**	Innovation Radar Model (Sawhney et al., 2006; Chen and Sawhney, 2012) Assink (2006)	**4**
Competitive Aggressiveness Model (Ferrier, 2002)	**8**	Measures of Incremental and Radical Innovation suggested by Bessant and Tidd (2011); Janssen et al. (2006)	**2**
Risk taking and Risk Management Models (Dess and Lumpkin, 2005) Nishimura (2015) and Bekefi et al. (2008	**7**	Measures of Incremental and Radical Innovation suggested by Verganti (2004), Avermaete et al. (2003) Puga and Trefler (2007), Farris et al. (2010)	**3**

Table 3.4 shows that a number of measures were adopted from the existing scales, while some of the measures were selected from models and measures suggested in the literature. Selection of II measures, particularly, was more challenging considering the complex epistemology and ontology of the innovation construct. Nonetheless, developing a pool of items based on sound psychometric principles was essential. Therefore certain guidelines were followed for the selecting items. According to item development theorists (Hinkin 1998; Hinkin and Tracey, 1999; Kerlinger and Lee, 2000), researchers must select measures that have a clear

operational definition; show good alignment between definition and measure (content validity); have high reliability; and have high construct validity.

3.5.4 Piloting

According to Spector (1992), item analysis requires data collection based on which items can be analysed. Although Spector (1992) recommended a moderate sample size, he also suggested an adequate level of representativeness of the target population. In order to analyse the items and assess face validity, the pilot study in this research involved quantitative and qualitative feedback from academics and managers from the corporate sector representing the population. The discussions on the results of the pilot study are shown at the end of this chapter.

3.5.5 Validation

Exploratory Factor Analysis (EFA) followed by Confirmatory Factor Analysis (CFA) is the most commonly used analytic techniques for data reduction, refining and validating constructs (Hair et al., 2010 and Tabacknik and Fidell, 2007). These data analysis tests were frequently used in the studies reviewed for validation of constructs and scale development. Hinkin (1995) reported that 71% studies reported the use of some type of factor analytical technique to derive the scales. Principal Components Analysis (PCA) with orthogonal rotation was the most frequently reported factoring method (33%). Retaining factors with eigenvalues greater than 1 was the most commonly used criterion for retention of factors (Lubke et al., 2004). Since there is adequate evidence that factor analysis has been successfully used to validate items, this study also uses EFA and CFA as the data analysis tools to validate the items and prove their ability to represent the constructs of interest in this research (Levine, 2005). These tests were employed to understand shared variance of measured variables that is believed to be attributable to a factor or latent construct (Suhr, 2006).

Items with high factor loadings (>.40) were retained in the measurement models, while the significance level ($\leq$.05) of path coefficient was considered for causal models. In the context of SEM, the CFA is often called the 'measurement model', while the relations between the latent variables (with directed arrows) are called the 'structural model' (Kline, 2011). Arveyet al. (1990, p. 700) further argued that "*... this* *resulting structure should be viewed as rationally constructed with the aid of empirical evidence*." The conceptual model and the resultant relationships hypothesized in this study were tested using structural equation modelling and path diagrams utilising Amos (SPSS, version 22), as recommended by Pallant (2005).

3.5.5.1 Exploratory Factor Analysis

EFA helps to determine which items belonged to a particular factor and is important to establish validity of measures (Hair et al., 2010). The items with eigenvalues >1 were considered during the EFA. Once the tests are conducted, items with loading lower than 0.4 were deleted from the item pool. The identified number of items should have an overall Kaiser-Meyer-Olkin (KMO) measure of above 7.5, with a significant chi-square value (Thomson, 2004) and this was followed. PCA of filtered items was selected during factor analysis. All the identified items were subjected to orthogonal varimax (and alternatively promax rotation to crosscheck results) with Kaiser Normalization.

3.5.5.2 Confirmatory Factor Analysis

CFA evaluates an a priori hypothesis and is largely driven by theory (Preedy and Watson, 2009). CFA analyses require the researcher to hypothesize, in advance, the number of factors, whether or not these factors are correlated, and which items/measures load onto and reflect which factors. It is argued that modification indices used in CFA are somewhat exploratory in nature and hence the notion that CFA is solely confirmatory may not be entirely true (Asparouhov and Muthén, 2009). Both EFA and CFA were conducted to test the factorial structures of EO and II and to test whether the measures reflected the factors and the study constructs and finally to test the causal relationship between EO and II. The strength of the relationships in this model was studied using path diagrams as suggested by Kline (2005). Path analysis further supported the findings established through EFA in this study (Byrne, 2006).

3.6 Population and Sample

After the initial pilot study, it was found that the corporate sector comprised of a total of 285,577 firms, out of which roughly 7,000 are large firms. In order to determine the sample size, Yamane's formula was utilised, as follows.

N = sample size	**7000**
N = total population (1000)	n
e = precision error (0.05)	0.05
P = estimated population proportion (40%)	0.4
α= 0.05	0.05
Z = 1.96	1.96

$$\frac{1.96^2 \times 0.4 \times 0.6 \times 7000}{1.96^2 \times 0.4 \times 0.6 + 7000 \times 0.05^2} = 350$$

Based on Yamane's formula, the ideal sample size was above 350. Guadagnoli and Velicer (1988) have recommended a minimum sample size of 200 for CFA. Tabachnik and Fidell (2007) suggested that the numbers of respondents for factor analysis should be twice the size of items in the questionnaire. McCallum et al. (2001) suggested that the traditional 'item to sample ratio' of 4:1 is appropriate. However, if the communalities are high, recovery of population factors in sample data is normally very good, almost regardless of sample size. When the communalities are low, a larger sample size is required because the phenomenon is being amplified by poorly over-determined factors.

A target sample of 450 firms representing all of corporate sectors (based on the International Standard Industrial Classification) was set, realizing that all questionnaires may not be returned or fit for analysis. Clark and Watson (1995) recommended use of a heterogeneous sample that can represent the target population. A mix of convenience and judgement sampling were used to select the corporate firms through the list available at the Oman Chamber of Commerce and Industry. Judgement was exercised to ensure that the sample represents most of the industries in the corporate sector in Oman. Questionnaires were distributed only to senior-level managers in these firms. Each firm was considered as a single respondent and hence the unit of analysis is the firm. A total of 415 questionnaires was returned and 404 were found fit for analysis.

3.7 Qualitative Strategy in this Research

The role of qualitative strategy in this research remained limited to developing the items for the questionnaire during the pilot study phase and later at the stage of data analysis. Although the qualitative approach was influenced by an interpretivist approach, the research aspirations remained largely drawn from positivist philosophy. Myers (2013) argued that qualitative research can be influenced by positivist ideology. The researcher particularly wanted to understand in depth why particular factors showed greater prominence, while other factors showed lower values. These were positivist objectives related to measurement characteristics which utilised a qualitative approach.

Qualitative research draws its strength from its ability to provide a deeper understanding of the social phenomenon that is being investigated. Silverman (2002) argued that this may not be possible through purely quantitative data. The inclusion of qualitative approach in this study, despite a dominance of positivist and realist philosophy, is an indication of the acceptance that qualitative strategies are increasingly used to test the theories (Silverman, 2002).

3.7.1 Interviews

According to Edwards and Holland (2013), qualitative interviews include a wide variety of interview formats, which includes structured, semi-structured and unstructured interviews. Although they may vary in style, these interview formats have a common approach, which is exchange of dialogue through a topic-centred approach and bringing out the context through a flexible and fluid structure. In this study, semi-structured interviews were used with the objective to bring preliminary issues to the surface and seek deeper information on the subject of investigation (Seekaran, 2009). An initial round of interviews was done to establish the face validity of the measures being tested. The interview style was semi-structured as the questionnaire items were shown to the experts from the field and the academics. As mentioned earlier, a second round of qualitative interviews were conducted after the process of the questionnaire survey was completed. Semi-structured interviews were conducted face to face in the offices of the respondents with the interviews lasting between 45 and 60 minutes.

The interview appointments were taken in advance and since it took a long time to obtain appointments, the researcher ensured that maximum information is sought in the limited time and therefore made an adequate level of preparation for the interviews. The participants were already informed about the purpose of the interview and issues like confidentiality were addressed at the beginning. The researcher explained to the participants the format of the interview and how much time the interview would take. All the interviews barring one was completed on schedule. The researcher ensured that no bias crept into the discussion and the researcher did not try to influence the respondent in any way. The semi-structured interview guide helped in asking questions, as a number of probes were helpful to investigate the issues in depth (appendix 2). The interviews were verbal only as a few of the respondents did not want to be recorded. This was one of the reasons the interviews took longer as notes were taken and the discussions were interrupted seeking clarification and confirmation of what was said. Once the transcripts of the interviews were ready, they were sent to the interviewees for respondent validation. The data from the interviews were analysed based on common themes and selected quotes were included in the study with the objective of making the participant's voice evident as much as possible.

3.7.2 Sampling for Qualitative Research

Theoretically, homogeneous sampling was expected in this research, and with this in mind, a mix of convenience and judgement sampling strategy was adopted. Patton (2002) argued that the sample can be considered homogeneous based on certain demographic variables. The single most important variable in this study was the 'level' of managers. All the managers selected in this study were senior-level managers. For the purpose of the semi-structured interviews, 20 managers were chosen. These managers had similar experiences across firms. Although the sectors were different, most of the EO and II factors were experienced by the sample population. Therefore, methodologically speaking, these respondents were expected to converge on as many items of the EO and II scales as possible. At the same time, they were expected to shed light on the nature of the constructs and interpret the EO and II relationship in greater detail.

3.8 Using a Mixed Research Strategy in this Research

This research at methodological level can be at best termed as positivist-realist with interpretivist overtones. This calls for mixed methods research. Yin (2013) argued that adopting mixed methods is an art must be carefully practised. The purpose of mixed methods research was to collect and analyse data (combining statistical and thematic data) and subsequently integrating the findings to draw inferences from both quantitative and qualitative approaches (Tashakkori and Teddlie, 2009). The effort is to seamlessly move between different data types, which not only complement each other but also provide confidence to the findings (Tashakkori and Teddlie, 2009). The entire process of data collection was completed in three phases. As discussed earlier, the qualitative insights were sought at the early stages (phase 1) of the research to test the face validity of measures, followed by the quantitative survey (phase 2), which aided in establishing the reliability and validity of measures. The final phase (phase 3) of data collection again involved qualitative investigation to enhance the meaning and interpretation of the quantitative findings. Figure 3.2 shows how different research philosophies influenced research strategies and research tools that were used strategically at different phases of this research.

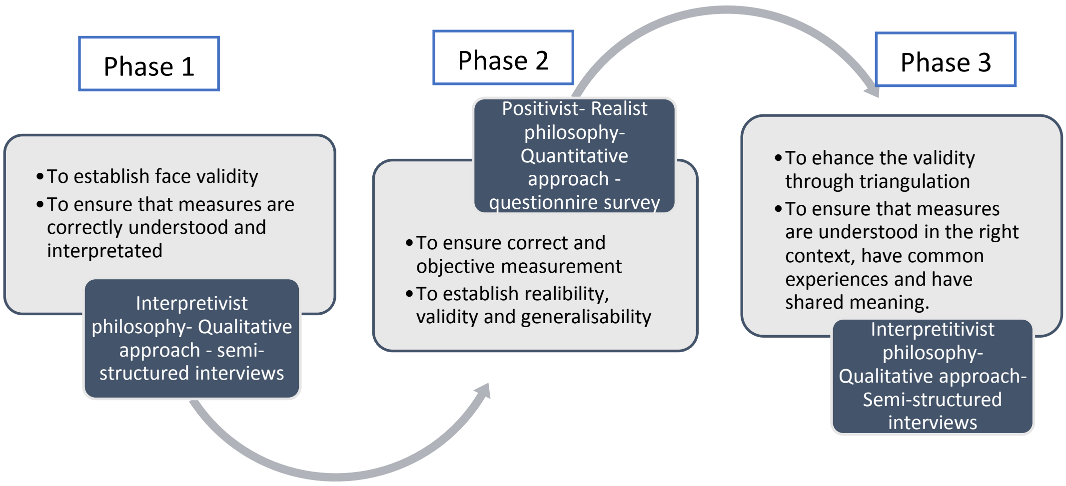


Figure 3.2: Integration of research philosophies reflected in integration of research approaches and tools

Since a mixed method was used in this research, establishing validity through a qualitative tool enhanced validity of the quantitative findings. The findings are robust as items not only showed statistically validity, but were well interpreted and summarized by respondents who were not only integral to the phenomenon under investigation, but also observed it from a strategically superior and high vantage point. In qualitative traditions, these respondents narrated an account of what and why respondents have responded in such or such a fashion and bring together the context and meaning of their responses. As suggested by Creswell (2014), statistical data was complemented by narrative data. Further, as Yin (2013) argued, qualitative findings enhances the generalizability on the basis of similar situations and scenarios, while quantitative findings would generalize to populations.

3.9 Triangulation

As evident from the above discussion, this research used a ‘triangulation’ approach for the collection of data, which comprised of semi-structured interviews and questionnaire survey and hence, are both qualitative and quantitative in nature.

Crimp and Wright (1995) and Ashley and Boyd (2006) supported the use of mixed methods research and suggested that qualitative research is used to explain quantitative data. Sabine and Holland (2009) argued that the qualitative research provides reassurance to numerical findings and should be considered as complementary rather than being in competition. A combination of questionnaires and semi-structured interviews is supported by Devine and Heath (1999) and Borg and Gall (1996). Hence, this research adopted a combination of qualitative and quantitative analysis. Although epistemologically, mixed methods are not compatible, many researchers such as Glaser (2004) and Scandura and Williams (2000) argued that technically they can be fused together. Further, Bryman and Bell (2015) opined that these are tendencies rather than definitive connections.

3.10 Pilot Study

Anderson and Arsenault (1998) explained that before carrying out the main study a pilot study is considered to be very important. Borg and Gall (1996) stated that the pilot study provides additional knowledge that leads to improved and reliable research. Pilot studies are a crucial element of a good study design. Conducting a pilot study does not guarantee success in the main study, but it does increase the likelihood. Eldgridge et al. (2016) suggested pilot study designs mirror future studies and can pre-empt obstacles.

Pilot studies fulfil a range of important functions and can provide valuable insights for other researchers (Teijlinen and Hundley, 2002). A pilot study was done with the primary objective of pre-testing the research instruments, particularly the questionnaire. It is advised in research to attend to matters sequentially and the pilot study allowed such an approach (Kannan and Gowri, 2015). The primary strategy used during the pilot study was both qualitative and quantitative. The questionnaire items were shown to 5 academics working in academic institutions in different counties, which included Oman, India and the UK. The questionnaire was also sent to 20 senior managers working in different sectors of the Omani corporate sector. The following were checked during the pilot study phase:

- Quality of the responses in terms of accuracy was cross-checked and probed especially with regards to perceptions related to innovation.
- The responses were assessed on the basis of how far they are focused on the questions asked and modifications made in factors and related items.
- Responses to negatively worded questions were checked.
- Robustness of measures was checked and modifications made in scaling.
- An overall assessment was done on the feasibility of the research instrument and its administration.
- The appropriateness of the hypotheses was checked.
- The conceptual model was modified in the light of splitting of the number of factors.

Based on the feedback received, the researcher felt that investigating the sectorial differences was beyond the scope of the study and focused on establishing the validity of the scale. Sectorial differences, if any, would not have added to the validity of the scale and would have shifted the focus from the scale to the sector undermining the generalizability of the scale.

Based on the analysis of the above, the following changes were made to the research instrument.

3.10.1 Modifications in the Conceptual Model

The main modification in the conceptual model was related to the risk taking factor. The literature indicated that the risk-taking dimension had two major aspects to it, namely internal and external risk taking. However, the risk-taking dimension was not modified until empirical evidence indicated otherwise. The feedback from the managers and academics indicated that internal and external risk taking should be split into two factors. However, conceptually risk was considered as one dimension and therefore the risk-taking dimension was split as internal and external risk-taking dimensions for the purpose of data analysis only and the conceptual model was modified accordingly to reflect the same. The modified conceptual model in figure 3.3 shows EO as a second-order construct consisting of the six first-order factors, namely ready to innovate, competitive aggressiveness, autonomy, internal risk taking and external risk taking and proactiveness. Similarly, II is a second-order construct consisting of two first-order factors, namely degree and frequency of innovation.

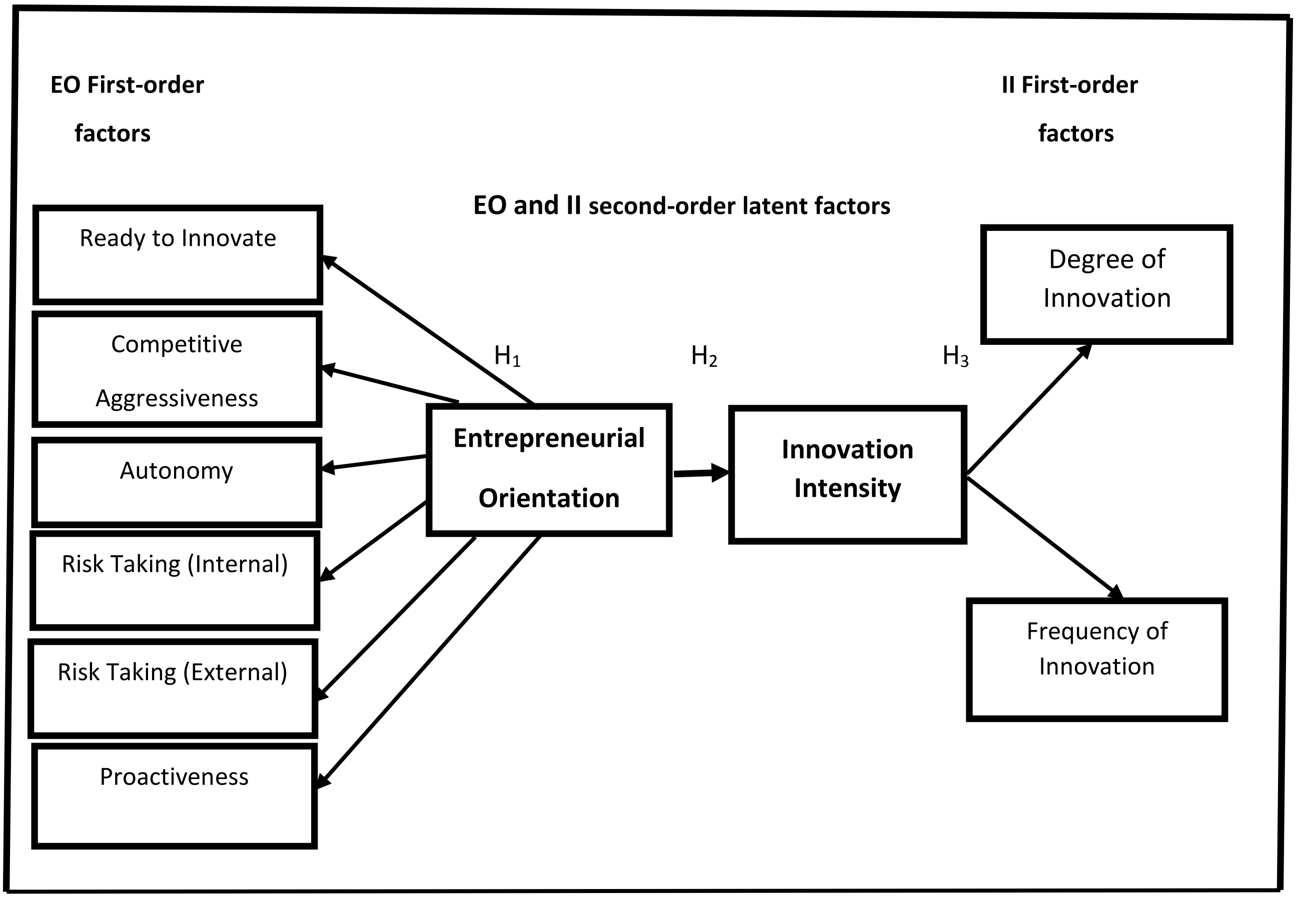


Figure 3.3: Modified Conceptual Framework after pilot study

3.10.2 Modifications in Items

The initial pool of 70 items was reduced to 53 after feedback was taken both qualitatively and quantitatively. These 53 items (28 for 5 factors of EO, 25 for 2 factors of II) were retained for the main study. The items removed for each factor were those which seemed to overlap with each other. The number of negatively worded items was also reduced. The wordings of the items was modified for clarity. Finally, the research instrument comprising of 53 items was finalized for the main study. Table 3.5 shows the number of items retained for the final study and their description.

Table 3.5: Final pool of items after the pilot study

Construct	Dimension	Number of Items	Item description
EO 28 items	Innovation	6	Behaviours, processes, and capabilities that lead may lead to innovative outputs
	Competitive Aggressiveness	6	Beating competitors on costs, processes, partnerships and creating differentiation
	Autonomy	5	Empowerment, decentralized organizational structure
	Internal Risk Taking	3	Organizational structure and strategies to reduce and manage risk
	External Risk Taking	3	Commitment of resources to market risks, risk opportunity assessment
	Proactiveness	5	Monitoring and leading in the market, managing change and new partnerships
II 25 items	Incremental Innovation Degree	7	Market penetration, product, service and operational improvements, attaining customer and supplier loyalty
	Incremental Innovation Frequency	6	Frequency of incremental efforts over the last two years compared to last five years
	Radical Innovation Degree	6	Development of new markets, new products services and operational processes, exploiting radically new technologies changing competitive dynamics, changing customer behaviours
	Radical Innovation Frequency	6	Frequency of radical innovation over the last two years compared to last five years

3.10.3 Modifications in Scaling

Initially, a 6-point scale was employed in this study, as used by Spector (1988) in developing the Work Locus of Control (WLCS) containing 6 response choices or anchor points. Following the recommendations of Carifio and Perla (2007), 'no neutral' response choice was used in the scale. The choice options ranged from 'disagree very much' to 'agree very much'. Based on the responses derived from the participants, mainly through the interviews during the pilot study, a neutral choice was included and the scale was reduced to 5-point, as originally developed by Likert (1932). Giving a neutral option and using a 5-point scale ensured that respondents were not forced to have an opinion and they could also remain neutral if they were not sure about a fact or issue. This enhanced the reliability of the findings (Jamieson, 2004). Once the research instrument was refined and the items were found to be reliable, the questionnaire was ready for the main survey. The respondents for the pilot study were not included in the sample for the main survey. The questionnaire survey was followed up with semi-structured interviews with managers. The findings of the main survey are presented in the next chapter.

Chapter 4: Results of the Data Collection and the Data Descriptions

4.1 Introduction

This chapter reports the results of the data collection, particularly descriptive data related to sample characteristics, results of tests of homogeneity of variance and multi-collinearity tests. Further, it reports on reliability and validity of measures. This chapter also reports on the results of exploring factorial structures using exploratory factor analysis (EFA). The chapter starts by highlighting the modifications on the piloted questionnaire based on the feedback from industry experts and academics.

4.2 Modifications Based on Qualitative Feedback on the Piloted Questionnaire

The pilot study was helpful to reduce the data and refine the items. After the pilot study, qualitative feedback was sought from industry experts and academics on the main survey instrument. The industry experts were satisfied with the depth and breadth of the issues covered. However, they suggested a few changes which were incorporated. The following feedback was received from the industry experts and academics.

The industry experts opined that the senior management professionals would be able to understand and respond to the questions. They also pointed out that they did not see any overlap of items on different factors. However, one industry expert pointed out that for radical innovation measures, the word 'radical' should be prominently used so that it brings clarity to the respondents when answering the question. This suggestion was incorporated and the questions related to radical innovation degree and frequency were reworded.

The academics were also satisfied with the rigour of the questionnaire items and opined that conceptually the items represent their dimensions. A few changes were suggested by two academics.

One academic suggested that capabilities and resources are important measures for the competitive aggressiveness dimension and hence this item was included in the list of items for competitive aggressiveness. It was also pointed out that venture units and their contribution to innovation is an input measure and hence should be measuring readiness for innovation. Hence, the question related to venture units was added to the ready to innovate dimension.

There were two other comments from the second academic. It was suggested that technological innovation should be included as a measure for radical innovation. Another suggestion was to include process innovation along with product and service innovation rather than in a separate question for process innovation.

All the suggestions were incorporated in the questionnaire. The modified questionnaire was finally administered to the sample. The final version of questionnaire can be seen in appendix 1.

4.3 Firm and Sample Characteristics

The data in table 4.1 and figure 4.1 show that the sample companies are from 15 different industries in Oman's corporate sector. The largest number was from the manufacturing sector (20.5%) followed by service activities (12.6%) and financial and insurance (10.9%) sectors, respectively. Construction, wholesale and retail, education and health, information and communication, arts and entertainment, transportation and storage, and accommodation and food also formed part of the sample, with low representation (5% or below). The lowest presence was from the mining, water supply and waste management, real estate, agriculture and fishing sectors with an average of 2% each.

Table 4.1: Summary of sample companies – Industry distribution

Industry Code					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agriculture and fishing	10	2.5	2.5	2.5
	Mining	10	2.5	2.5	5.0
	Manufacturing	83	20.5	20.5	25.5
	Water Supply and Waste Management	11	2.7	2.7	28.2
	Construction	26	6.4	6.4	34.7
	Wholesale and Retail	24	5.9	5.9	40.6
	Transportation and Storage	21	5.2	5.2	45.8
	Accommodation and Food	27	6.7	6.7	52.5
	Information and Communication	20	5.0	5.0	57.4
	Financial and Insurance	44	10.9	10.9	68.3
	Real State	13	3.2	3.2	71.5
	Education	22	5.4	5.4	77.0
	Human Health	25	6.2	6.2	83.2
	Arts and Entertainment	17	4.2	4.2	87.4
	Other Service Activities	51	12.6	12.6	100.0
	Total	404	100.0	100.0	

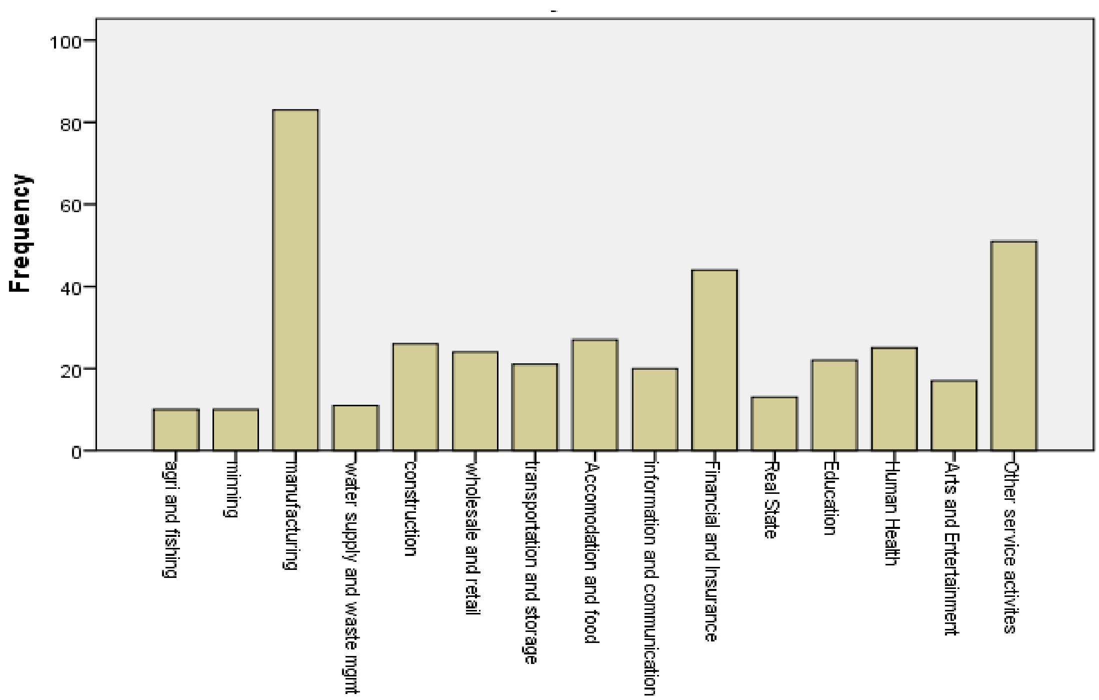


Figure 4.1: Sample companies – Industry distribution

The sampling unit, as discussed in the previous chapter, involved one respondent for each organization, preferably from the team of senior managers. Table 4.2 and figure 4.2 show that among the sampled companies, the senior managers that had 0–3 years of experience constituted 9.4%, while senior managers that had 4–7 years of experience constituted the majority (44.1%). The senior managers that had 8–11 years of experience constituted 35.1% and the senior managers that had 12–15 years of experience constituted 9.4% and finally, the senior managers that had over 15 years of experience constituted 2%.

Similarly, the respondents that have spent considerable time in the industry formed the majority of the respondents (table 4.3 and figure 4.2). Among the sampled companies, the senior managers who had 0–3 years of experience constituted 5.2%, while senior managers who had 4–7 years of experience constituted the majority (46.8%). The senior managers who had 8–11 years of experience constituted 35.4% and the senior managers who had 12–15 years of experience comprised of 10.4% and finally the senior managers having over 15 years of experience comprised 2.2%.

The data shows that the majority of senior managers had considerable experience in their companies representing their companies not just by the virtue of their position but also by their experience.

Table 4.2: Summary of respondent work experience in their company

Number of Years in the Company		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0–3yrs	38	9.4	9.4	9.4
	4–7yrs	178	44.1	44.1	53.5
	8–11yrs	142	35.1	35.1	88.6
	12–15yrs	38	9.4	9.4	98.0
	15yrs and above	8	2.0	2.0	100.0
	Total	404	100.0	100.0	

Table 4.3: Summary of respondent work experience in the industry

Number of Years in the Industry		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0–3yrs	21	5.2	5.2	5.2
	4–7yrs	189	46.8	46.8	52.0
	8–11yrs	143	35.4	35.4	87.4
	12–15yrs	42	10.4	10.4	97.8
	15yrs and above	9	2.2	2.2	100.0
	Total	404	100.0	100.0	

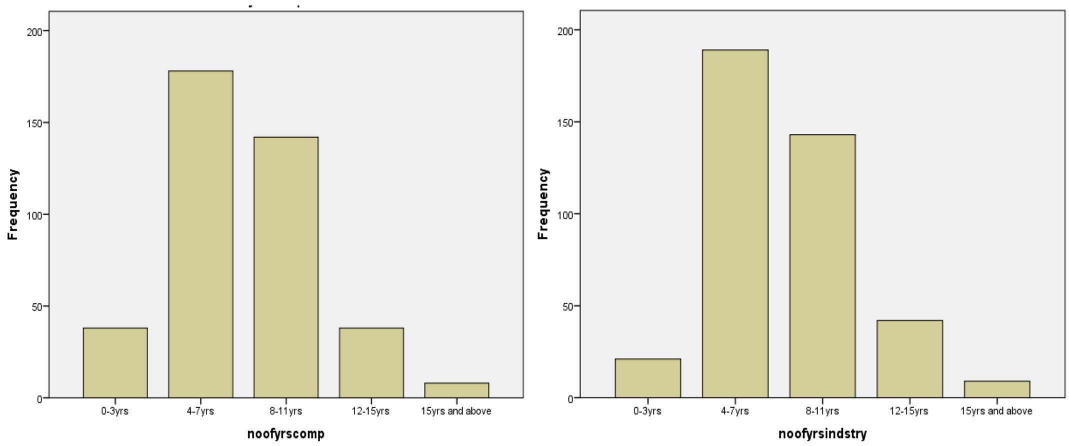


Figure 4.2: Respondent work experience in their company and the industry

In order to assess the size of the firms, the total number of staff was considered as the key criterion. As evident from table 4.4 and figure 4.3, the majority of the firms that constituted the sample comprised of employees numbering 100–150 (59.4%), while the of number of employees 76–100 constituted 26.7% of the companies. The sampled firms that employed more 150 employees constituted 7.9% of firms, while in 7.9% of the firms, employee numbers ranged from 1–75.

Table 4.4: Total number of staff in the sample firms

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1–50	1	0.2	0.2	0.2
	51–75	23	5.7	5.7	5.9
	76–100	108	26.7	26.7	32.7
	101–150	240	59.4	59.4	92.1
	150 and above	32	7.9	7.9	100.0
	Total	404	100.0	100.0	

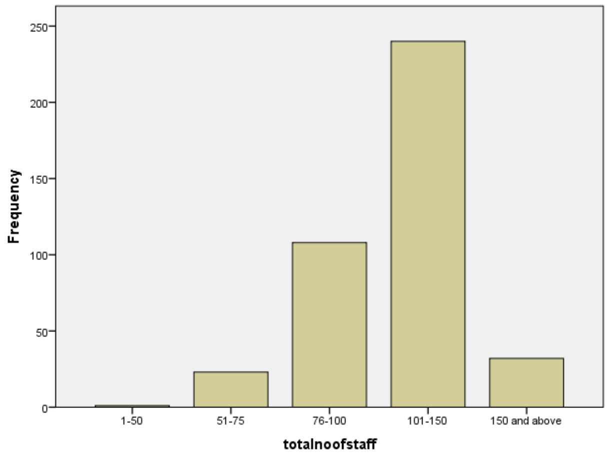


Figure 4.3: Total number of staff in the sample firms

4.4 Mean, Median and Standard Deviation on all Items

The results of the mean, median and standard deviation for all the measured items representing EO and II constructs show that the average value and the median are close to 4 (on a scale of 1–5). Standard deviation, which is a measure of the differences of each observation from the mean were mostly grouped showing values ranging from 0.7 to 0.8. The results are shown in appendix 4.

4.5 Homogeneity of Variance Tests

Theoretically, homogeneous sampling was expected in this research, and with this is mind, a mix of purposive sampling and random sampling strategy was adopted. Patton (2002) argued that the sample can be considered homogeneous based on certain demographic variables. Homoscedasticity was checked using Tabachnik and Fidell’s (2007) and Pallant’s (2005) recommendations through Levene’s test. Levene’s test helps to provide an analysis of equality of variances for any given variable across different groups. Tests on homogeneity of variances indicted that the sample across all the sectors were homogeneous (indicated by Levene statistic >.05 and single column Tukey HSD) on all demographic factors such as industry distribution, number of years in the company, number of years in the industry, and total number of staff. Table 4.5 shows the Levene statistic >.05 and P values <.05 for industry distribution, indicating that the respondents did not significantly differ in their opinion on factors and the representing items. The tables showing the Levene statistic for other sample characteristics such as number of years in the company, number of years in the industry, and total number of staff are shown in appendix 3.

Table 4.5: Industry Distribution – Homogeneity of Variance on EO factors

Test of Homogeneity of Variances				
Items	Levene Statistic	df1	df2	Sig.
EORI1	1.534	14	389	.096
EORI2	2.009	14	389	.011
EORI3	1.976	14	389	.019
EORI4	1.581	14	389	.082
EORI5	2.400	14	389	.014
EORI6	1.223	14	389	.256
EOR1	1.656	14	389	.062
EOR2	1.106	14	389	.351
EOR3	1.252	14	389	.235
EOR4	2.081	14	389	.012
EOR5	1.540	14	389	.094
EOR6	1.352	14	389	.174
EOP1	2.214	14	389	.155
EOP2	1.432	14	389	.135
EOP3	1.432	14	389	.135
EOP4	1.310	14	389	.198
EOP5	2.387	14	389	.008
EOC1	2.243	14	389	.009
EOC2	2.541	14	389	.010
EOC3	2.548	14	389	.020
EOC4	1.065	14	389	.388
EOC5	2.490	14	389	.046
EOC6	1.218	14	389	.259
EOA1	1.607	14	389	.074
EOA2	1.149	14	389	.313
EOA3	1.764	14	389	.042
EOA4	1.257	14	389	.232
EOA5	1.859	14	389	.029

4.6 Multi-collinearity

Multi-collinearity is the condition when high inter-correlations are found between the independent variables. To rule out multi-collinearity, variance inflationary factor (VIF) scores were checked. If there is multi-collinearity, VIF scores would show how much variance is inflated (O'Brien, 2007). Tabachnik and Fidell (2007) suggested desirable scores for VIF to be <2.5, which was achieved here. O'Brien (2007) also recommended values <2.5 as this value is equal to an R^2 of .60 with the other variables. Table 4.6 shows the results of multi-collinearity on all items. Most of the items are well below the recommended VIF of 2.5 except a few (for example, IIF1 and III7).

Table 4.6: Tests for Multi-collinearity

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.298	.788		-.378	.706		
	EORI3	.269	.052	.259	5.190	.000	.675	1.481
	EORI4	.210	.056	.195	3.754	.000	.626	1.597
	EORI5	.208	.050	.206	4.152	.000	.682	1.466
	EORI6	.144	.054	.130	2.658	.008	.708	1.412
	EOR1	-.036	.065	-.028	-.548	.584	.624	1.603
	EOR2	-.164	.062	-.136	-2.647	.008	.639	1.564
	EOR3	.085	.060	.078	1.410	.159	.550	1.819
	EOR4	.093	.054	.085	1.726	.085	.696	1.437
	EOR5	.017	.056	.016	.300	.764	.601	1.663
	EOR6	.025	.055	.022	.455	.650	.687	1.455
	EOP1	.115	.056	.107	2.070	.039	.625	1.600
	EOP2	-.068	.056	-.068	-1.206	.228	.534	1.874
	EOP3	.012	.054	.012	.230	.818	.657	1.523
	EOP4	.102	.056	.091	1.832	.068	.677	1.478
	EOP5	.026	.055	.024	.479	.632	.663	1.508
	EOC1	-.005	.062	-.004	-.084	.933	.624	1.604
	EOC2	.025	.069	.021	.361	.718	.512	1.955
	EOC3	.032	.065	.027	.495	.621	.575	1.740
	EOC4	-.052	.063	-.044	-.823	.411	.599	1.671
	EOC5	.000	.064	.000	.006	.995	.716	1.396
	EOC6	-.077	.065	-.057	-1.185	.237	.720	1.389
	EOA1	.181	.060	.156	3.045	.003	.642	1.558
	EOA2	-.006	.055	-.006	-.115	.908	.662	1.512
	EOA3	-.039	.059	-.035	-.664	.507	.614	1.630
	EOA4	.034	.058	.028	.588	.557	.747	1.338
	EOA5	-.022	.055	-.020	-.407	.684	.715	1.399
	III1	-.033	.067	-.031	-.493	.622	.414	2.413
	III2	.051	.093	.039	.550	.583	.331	2.019
	III3	.023	.096	.015	.237	.813	.406	2.462
	III4	-.082	.091	-.057	-.900	.369	.426	2.346

	III5	.041	.083	.031	.495	.621	.441	2.266
	III6	-.027	.072	-.021	-.383	.702	.564	1.773
	III7	.063	.083	.050	.763	.446	.388	2.580
	IIF1	-.049	.082	-.042	-.605	.546	.344	2.905
	IIF2	.024	.102	.015	.234	.815	.413	2.424
	IIF3	-.037	.081	-.030	-.455	.650	.387	2.587
	IIF4	.092	.074	.081	1.238	.216	.394	2.537
	IIF5	-.044	.054	-.041	-.828	.408	.688	1.454
	IIF6	.000	.064	.000	.005	.996	.604	1.655
	IIR1	-.134	.068	-.107	-1.963	.050	.572	1.749
	IIR2	.004	.057	.003	.066	.948	.873	1.146
	IIR3	-.143	.075	-.113	-1.901	.058	.477	2.095
	IIR4	.057	.074	.048	.779	.436	.447	2.236
	IIR5	.093	.086	.074	1.076	.283	.354	2.821
	IIR6	.050	.087	.039	.575	.566	.361	2.771
	RIF1	.058	.073	.047	.792	.429	.480	2.082
	RIF2	-.004	.086	-.003	-.049	.961	.423	2.364
	RIF3	-.021	.079	-.016	-.261	.794	.430	2.327
	RIF4	-.019	.075	-.017	-.252	.801	.390	2.564
	RIF5	.021	.081	.019	.261	.794	.315	2.177
	RIF6	-.020	.065	-.014	-.305	.761	.752	1.330

4.7 Reliability

4.7.1 Reliability of EO Factors

The reliability of the research instrument is important so that it produces consistent results across items (De Vellis, 2012). Therefore, this research instrument, which demonstrates internal consistency, is considered reliable and indicates rigour and trustworthiness (Robert and Priest, 2006). Cronbach’s alpha is usually used as an index to denote reliability and values >.7 are considered reliable with a low amount of measurement error (Nunnally and Bernstein, 1994; Mohsen and Dennick, 2011). Malhotra and Birks (2007) also accepted values <.70 and argued that it satisfies internal consistency reliability. The reliability test of the interval scaled data for the factorial structure of EO measures showed good internal consistency as the Cronbach’s alpha values were >.7 (table 4.7)

Table 4.7: Reliability of EO factors

Factors	Cronbach's Alpha	Number of Items	Total Cases
Ready to Innovate	.779	6	404
Competitive Aggressiveness	.734	6	404
Autonomy	.735	5	404
Risk Taking	.773	6	404
Proactiveness	.701	5	404

4.7.2 Reliability of II Factors

Similarly the reliability of each of the factorial structures of each of the II factors was also tested. The reliability test of the interval scaled data for II factorial structures showed good internal consistency as the Cronbach's alpha value was >.7 indicating low measurement errors (table 4.8).

Table 4.8: Reliability of II factors

Factors	Cronbach's Alpha	Number of Items	Total Cases
Incremental Innovation Degree	.820	7	404
Incremental Innovation Frequency	.787	6	404
Radical Innovation Degree and Frequency	.866	12	404

Further, the factorial structures of EO and II measures were tested using exploratory factor analysis. Sections 4.9 and 4.10 give the details of the results of EFA for EO and II constructs, while section 4.8 shows the EFA results of all the items (table 4.9).

4.8 Exploratory Factor Analysis – All Items

EFA was employed to understand shared variance of measured variables, which is believed to be attributable to a factor or latent construct (Suhr, 2006). At the same time EFA was employed to identify the complex interrelationships among groups of items which are part of a unified construct (Russell, 2002). All 53 items were subjected to EFA, which was used to identify the underlying dimensions, or factors, that explained the correlations among a set of variables (De Vellis, 2012). No prior assumptions were made about the relationships among the factors. The items were subjected to principal components analysis (PCA) with varimax rotation. The items with eigenvalues >1 were considered during the EFA. Larsen and Warne (2010) noted that that the eigenvalue explains how much the variance in the observed variables is explained by a factor. Once the tests are conducted, items with loading <.4 and overlapping items were deleted from the item pool after an iterative process. Tables 4.9, 4.11 and 4.14 show data with moderate to high communalities without cross-loadings, plus several variables loading strongly on each factor. Usually the items load near to 1 or 0 on eigenvectors (factors) and loadings close to 1 are considered to be high. Some researchers have argued that theoretically, item communalities should be considered high if the values are >.8 (Velicer and Fava, 1990). However, it might be difficult to achieve this threshold with real data. Commonly, the acceptable range in the social sciences falls within .40 to .70. Tabachnick and Fidell (2007) cite .32 as a good rule of thumb for the minimum loading of an item, which equates to approximately 10% overlapping variance with the other items in that factor. These magnitudes are also supported by Neill (2013) and Costello and Osborne (2005). In this research the minimum cut-off value of .4 has been taken to retain the items loading on to their respective factors. Initially, the orthogonal method with varimax rotation was used, which produced the rotated component matrix. Table 4.9 shows the rotated component matrix for all the items finally retained after EFA. Considering the cut-off value chosen for this study, the loadings indicated that the factor structure with relevant items is valid.

Table 4.9: Rotated Component Matrix for all factors and related items retained after EFA

Rotated Component Matrix[a]											
	Component										
	1	2	3	4	5	6	7	8	9	10	11
EORI1			.662								
EORI2			.767								
EORI3			.702								
EORI4			.682								
EORI5			.654								
EORI6			.641								
EOR1									.828		
EOR2									.734		
EOR4						.674					

EOR5						.757					
EOR6						.705					
EOP3							.771				
EOP4							.729				
EOP5							.768				
EOC1				.674							
EOC2				.784							
EOC3				.740							
EOC4				.709							
EOC5				.566							
EOC6				.602							
EOA1					.691						
EOA2					.697						
EOA3					.669						
EOA4					.598						
EOA5					.643						
III1		.763									
III2		.845									
III3		.778									
III6		.599									
III7		.722									
IIF3								.517			
IIF5								.654			
IIF6								.766			
IIR3	.724										
IIR4	.745										
IIR5	.796										
IIR6	.778										
RIF1	.733										
RIF2	.755										
RIF3	.755										
RIF4	.767										
RIF5	.821										

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

There was a total of 53 items out of which 28 items were from the EO group and 25 items were from the II group. Table 4.9 shows that out of 53 items subjected to EFA, 42 items were retained, 25 items related to the EO group, 17 items related to the II group. A total of 11 items (3 from EO factors, 8 from II factors) were deleted.

4.9 Exploratory Factor Analysis – EO Factors

EFA was also employed separately for both EO and II constructs. All 28 items were subjected to PCA with oblique method using promax rotation to ensure that the items converged correctly onto their factors. Rotation gives a new set of loadings and in this process maximizes the loadings on extracted factors, while the loadings on other factors are minimized (Brown, 2009a). When researchers assume that the factors are not correlated, orthogonal rotation is suggested. However, in social sciences, it is difficult to assume that factors may not have any correlations, hence oblique rotation was used for individual EO and II factors. Oblique method with promax rotation produces the pattern matrix, which is shown through table 4.11. Tabachnick and Fiddell (2007, p. 646) suggested that oblique rotation can be used in case of doubt. Brown (2009) suggested that at exploratory level at least one orthogonal and one oblique rotation can be tried, which has been used in this study.

The Cattell scree plot was also used to determine how many factors to retain. For the scree plot, on the X-axis components are plotted, while on the Y-axis eigenvalues are plotted. The eigenvalues drop as they moves towards the right, towards later components. When the drop stops, it creates a curve and an elbow-like graph emerges. According to Cattel (1952), all components after the one starting the elbow should be dropped. The same standard has been followed in this study for all the scree plots. The Kaiser-Meyer-Olkin (KMO) values (table 4.10) were the starting point, which indicated the appropriateness of factor analysis for the data. The items showed an overall KMO measure of .727, which is considered satisfactory. The scree plot and pattern matrix showed that the items converged on six factors instead of five factors as hypothesized. The risk-taking dimension was split into two factors. Subsequently, these two factors were named as risk taking-external (EOR1 and EOR2) and risk taking-internal (EOR4, EOR5 and EOR6). A total of 25 items were retained after conducting EFA for EO factors. Table 4.11 shows the items retained through the pattern matrix. The pattern matrix is an output of promax rotation and it shows the factorial structure of the EO factors and the representative items.

Table 4.10: KMO and Bartlett's test for EO factors

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.727
Bartlett's Test of Sphericity	Approx. Chi-Square	2278.911
	Df	300
	Sig.	.000

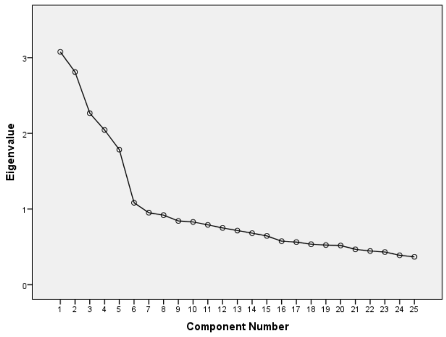


Figure 4.4: Scree Plot for Entrepreneurial Orientation factors

Table 4.11: Pattern Matrix- Entrepreneurial Orientation factors

Pattern Matrix[a]	Component					
	1	2	3	4	5	6
EORI1	.657					
EORI2	.760					
EORI3	.709					
EORI4	.741					
EORI5	.742					
EORI6	.641					
EOC1		.673				
EOC2		.785				
EOC3		.746				
EOC4		.715				
EOC5		.754				
EOC6		.684				
EOA1			.704			
EOA2			.701			
EOA3			.700			
EOA4			.754			
EOA5			.684			
EOP3				.786		
EOP4				.725		
EOP5				.762		

EOR4					.667	
EOR5					.736	
EOR6					.741	
EOR1						.826
EOR2						.759
Extraction Method: Principal Component Analysis. Rotation Method: Promax with Kaiser Normalization.						
a. Rotation converged in 5 iterations.						

Table 4.12 (A-E) shows the description of the items retained and deleted based on the exploratory factor analysis.

Table 4.12 A: Ready to Innovate (all 6 items retained)

Code	Item description	Retained	Deleted
EORI1	My organization has a culture where creativity and innovation is highly regarded	√	
EORI2	Management in my organization actively seeks and rewards innovative ideas	√	
EORI3	Staff in my organization get time for learning and innovation during their daily routine	√	
EORI4	My organization focuses on developing new competencies even if the existing ones are effective	√	
EORI5	Venture units in my organization facilitate and enable new product and service development	√	
EORI6	My organization is open to sourcing of ideas from shared forums and professional groups	√	

Table 4.12 B: Competitive Aggressiveness (all 6 Items retained)

Code	Item description	Retained	Deleted
EOC1	My organization places emphasis on beating competitors to enter new markets	√	
EOC2	My organization places emphasis on pushing costs lower, faster than our competitors do	√	
EOC3	My organization has adequate level of capabilities and resources to compete aggressively	√	
EOC4	My organization places emphasis on creating important partnerships with suppliers/ retailers, on a higher level, than the competitors	√	
EOC5	My organization uses multiple strategies to attack the competitors	√	
EOC6	My organization find ways to differentiate itself from competitors	√	

Table 4.12 C: Autonomy (all 5 Items retained)

Code	Item description	Retained	Deleted
EOA1	Staff members in my organization are not given the freedom to act	√	
EOA2	Staff members in my organization are allowed to deal with problems and opportunities	√	
EOA3	Operating divisions or sub-divisions in my organization are quite independent	√	
EOA4	The middle level managers in my organization have to take consent from senior management to take decisions	√	
EOA5	Top management in my organization assign new responsibilities to staff	√	

Table 4.12 D: Risk Taking (5 Items retained)

Code	Item description	Retained	Deleted
EOR1	Innovation in my organization is perceived as too risky and is resisted	√	
EOR2	Missing an opportunity in the market is considered as a risk in my organization	√	
EOR3	To make effective changes to our offering, my organization is willing to accept moderate level of risk		X
EOR4	In my organization, if a manager takes a risk and fails, he or she is not penalized	√	
EOR5	There are structure in my organization to monitor and manage risk	√	
EOR6	My organization has a number of strategies that helps us to manage and reduce risks	√	

Table 4.12 E: Proactiveness (3 Items retained)

Code	Item description	Retained	Deleted
EOP1	My organization initiates actions to which competitors respond		X
EOP2	Change in my organization happens regularly		X
EOP3	My organization usually leads the market in product and service development	√	
EOP4	My organization participates in strategic alliances/ partnerships / joint ventures with outside companies	√	
EOP5	Staff in my organization are encouraged to proactively monitor changes in the environment	√	

4.10 Exploratory Factor Analysis – II Factors

EFA was employed separately for the II construct. All 26 items were subjected to PCA with orthogonal method using promax rotation to ensure that the items converged correctly on to their factors. The items showed an overall KMO measure of .861 (table 4.13), which is considered good. The scree plot and pattern matrix showed that the items converged on 3 factors. Incremental innovation dimension was split into two factors (degree and frequency). While the degree and frequency of radical innovation showed as a single dimension. After conducting EFA, a total of 17 items were retained. Table 4.14 shows the items retained through the pattern matrix. The pattern matrix was generated as a result of promax rotation and it shows the factorial structure of the innovation intensity factors and the representative measures.

Table 4.13: KMO and Bartlett's test Innovation Intensity factors

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.861
Bartlett's Test of Sphericity	Approx. Chi-Square	3100.331
	df	120
	Sig.	.000

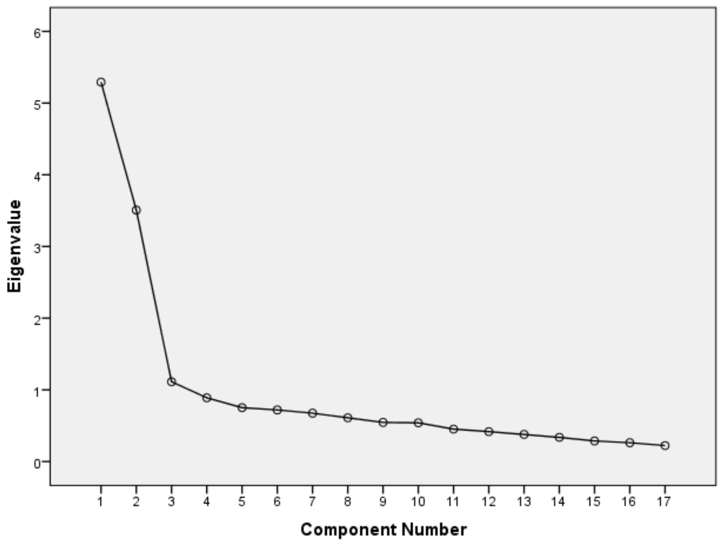


Figure 4.5: Scree Plot for Innovation Intensity factors

Table 4.14: Pattern Matrix - Innovation Intensity factors

Pattern Matrix[a]			
	Component		
	1	2	3
III1		.717	
III2		.862	
III3		.783	
III6		.712	
III7		.712	
IIF3			.580
IIF5			.752
IIF6			.804
IIR3	.729		
IIR4	.753		
IIR5	.799		
IIR6	.775		
RIF1	.727		
RIF2	.755		
RIF3	.758		
RIF4	.768		
RIF5	.822		
Extraction Method: Principal Component Analysis Rotation Method: Promax with Kaiser Normalization			
a. Rotation converged in 4 iterations			

Table 4.15 (A-B) shows the description of the items retained and deleted after conducting EFA.

Table 4.15 A: Incremental Innovation degree and frequency (8 Items retained)

Code	Item description	Retained	Deleted
III1	My organization has considerably penetrated the markets in which it operates	√	
IIF1	The frequency with which my organization has penetrated existing target markets has been higher over the last two years		X
III2	My organization continuously removes deficiencies from products and services	√	
IIF2	The frequency of product and/or service improvements in my organization has been higher over the last two years		X
III3	The innovation in my organization is aimed at retaining existing customers	√	
III4	My organization makes improvements to the operational processes		X
IIF3	The frequency with which my organization has met the demands of its customers has been higher over the last two years	√	
III5	My organization takes feedback from customers and suppliers to understand industry trends		X
IIF4	The frequency with which my organization has used feedback from customers and suppliers to monitor industry trends has been higher over the last two years		X
III6	My organization uses customer feedbacks in order to improve products and services	√	
IIF5	The frequency with which my organization has used customer feedback to improve product and service has been higher over the last two years	√	
III7	My organization is skilled at meeting the demands of the customers	√	
IIF6	The frequency of process improvements in my organization has been higher over the last two years	√	

Table 4.15 B: Degree – Radical Innovation Degree and Frequency (9 Items retained)

Code	Item description	Retained	Deleted
IIR1	My organization finds and develops new target markets		X
RIF1	The frequency with which my organization has found or created new target markets has been higher over the last two years	√	
IIR2	My organization continuously shapes and modifies customer behaviours		X
RIF2	The frequency with which my organization has influenced customers' behaviours has been higher over the last two years	√	
IIR3	My organization introduces new products, services and processes, which are radically different from existing products and services in the market	√	
RIF3	The frequency of introduction of radically different product and services in my organization has been higher over the last two years	√	
IIR4	My organization has utilized radically new technologies in our products, services and processes	√	
RIF4	The number of times my organization has utilized latest technologies in our products, services and processes has been higher over last two years	√	
IIR5	My organization has been able to change the industry dynamics through its new product/ service	√	
RIF5	The frequency with which my organization has changed the industry dynamics has been higher over the last two years	√	
IIR6	My organization introduces new products, services and processes, even if it compromises the sales and value of existing products and services	√	
RIF6	The frequency of new products, services introduction that has been at the cost of existing products, services and processes has been higher over the last two years		X

4.11 Validity of EO and II Measures

Face and Content Validity – the pilot study and the qualitative feedback received in phase 1 were helpful in establishing face and content validity. The experts from the field and academics from the domain area expressed their opinion that the constructs adequately cover the domain of interest. Further, an exhaustive literature search in the areas of entrepreneurship, innovation, strategy and operations management ensured that the content of the measures are satisfactorily represented.

Criterion-related validity – criterion-related validity was established through some of the indicators. Since construct validity was established concluding that the operationalization of measures reflects the construct, the performance of these measures can be predicted as they are developed to assess the EO and II performance in a firm. Since some of the measures are adopted from existing scales, the concurrent validity is already established. Predictive validity can also be expected as the reliability and generalisability of the measures are high. Particularly for II, a sample of ten firms applied the scale to their firm and the results showed that the firms could distinguish their position on the two-dimensional scale of degree and frequency (section 8.8). This is an indication of predictive validity.

Construct validity – The results indicated convergent validity as each item loaded significantly on its respective first-order factor and subsequently the higher-order construct. The factor loadings displayed no cross-loading to any other first-order factor of the same construct. The average factor loadings and the AVE scores met the threshold standards with scores for average loadings >0.7, while the AVEs for the study constructs and their respective first-order factors were >0.5 indicating convergent validity. The AVE comparative scores were higher than its shared variance scores which indicated presence of discriminant validity. The method to assess discriminant validity as proposed by Fornell and Larcker (1981) was confirmed by Hair et al. (2006, p. 778) who noted that "*the variance extracted estimates should be greater than the squared correlation estimate*." Based on this method, the table in appendix 5 shows presence of convergent and discriminant validity. Further, the convergence of items on their respective factors above the threshold standards and low co-variances between factors in CFA (measurement models) also indicate presence of convergent and discriminant validity. The results of CFA are shown in chapter 5.

External Validity – the presence of validity of measures also indicated that generalisability of the EO and II measures are high and inferences from this study can be made to the larger population. A large sample size with good response rates from different sectors and insights from qualitative inquiry showed that the scales can be applied across the corporate sector in Oman. A mixed methods approach and richness of different forms of data support extrapolation of results. Like most quantitative studies, statistical generalisability in this research was achieved through appropriate sampling methods, while analytic generalization was achieved through confirmatory qualitative strategies whereby participants could reflect on the generalisability of results with sufficient levels of richness and depth.

4.12 Conclusion

All the tests conducted for the collected data showed satisfactory results. The data were quite homogenous and there were no issues with multi-collinearity. The EFA for individual factors showed that the items loaded freely onto to their factors and the factorial structures were derived through EFA. All the relevant measures such as KMO, Bartlett's test, factor loadings, showed satisfactory results and the values that were considered for retaining the items were as per the recommended standards. The results of reliability indicated that the research instrument was reliable and further tests could be conducted. The assessment of validity also showed that the measures are valid with different types of validity (face, content and construct) being established. Further, the qualitative support from the respondents also enhanced the validity of the measures, which are subsequently discussed in the next chapter. The 42 items related to EO and II that loaded onto their respective factors through EFA were subjected to tests of CFA using SEM and the results are discussed in the next chapter.

Chapter 5: Data Analysis

5.1 Data Analysis Techniques

Exploratory factor analysis (EFA) was conducted to identify the underlying factor structure of both EO and II constructs. The possible factor structure needed to be verified and to meet this objective confirmatory factor analysis (CFA) was conducted. This chapter shows the results of data analysis, starting with correlation analysis and then mainly focusing on CFA, which is the most commonly used analytic technique for data reduction, refining and validating constructs (Hair et al., 2010; Tabacknik and Fidell, 2007). CFA was specifically employed in this study because of its ability to represent the constructs of interest (Levine, 2005). Data were also analysed using structural equation modelling (SEM). SEM was used in this study to evaluate second-order latent constructs which in this study are entrepreneurial orientation and innovation intensity. SEM was helpful in defining these latent constructs through a number of observed variables or their indicators, usually through measurement models (Kline, 2011). SEM, however, is more associated with structural models (Westland, 2015), and so was also utilised here to develop and test path and structural models. These structural models calculate the relationship between the latent constructs and also demonstrate the causal relationship between the latent constructs (Kaplan, 2007).

5.2 Correlation

In order to assess the relationship between the variables, the Pearson product-moment correlation test was computed for the 9 factors identified through EFA in the previous chapter. The correlation values ranged from .013 to .465. Most of the correlation values showed positive correlation except between external risk taking and proactiveness which were negatively correlated to each other. The factors that showed significant positive correlation were internal and external risk taking, $r = .349$ with $p \leq .05$. Ready to Innovate was positively and significantly correlated with incremental innovation degree $r = .451$ with $p \leq .05$. Ready to Innovate and external risk taking were also found to be significantly correlated, $r = .207$ with $p \leq .05$. Further, ready to innovate was also significantly and positively correlated with incremental innovation degree, $r = .451$ and incremental innovation frequency, $r = .409$ with $p \leq .05$.

Radical innovation frequency and degree were also significantly correlated with incremental innovation frequency, r =.298 with p <.05. Finally, incremental innovation frequency and incremental innovation degree were significantly correlated, r =.465 with p <.05. The correlation matrix is shown in table 5.1.

Table 5.1: Correlation Matrix

	RTI	INTRSK	EXTRSK	PRO	CA	AUT	INCRD	INCRF	RADDF
Ready to Innovate	1								
Risk Taking (INT)	0.073	1							
Risk Taking (EXT)	0.207*	0.349**	1						
Proactiveness	0.060	0.077	-0.070	1					
Competitive Aggressiveness	0.033	0.044	0.042	0.056	1				
Autonomy	0.019	0.008	0.022	0.056	0.025	1			
Incremental Innovation Degree	0.451**	0.040	0.052	0.0847	0.026	0.068	1		
Incremental Innovation Frequency	0.409**	0.059	0.089	0.027	0.013	0.029	0.465**	1	
Radical Innovation Degree and Frequency	0.071	0.032	0.018	0.045	0.013	0.045	0.017	0.298**	1

* Correlation is significant at the .05 level (2-tailed) ** Correlation is significant at the .01 level (2-tailed)

5.3 Confirmatory Factor Analysis for Individual Factors

CFA is an appropriate method that tests the hypothesis that factors are associated with specific items. CFA was conducted to confirm whether the factors reflect the items, by feeding the exact number of items identified through EFA. Specifically, here CFA was used to test the five-factor structure of entrepreneurial orientation and two-dimensional structure of innovation intensity. Therefore, the model was specified to determine which items will load onto each factor. All the factors and representative items (total 42 items) retained through EFA were subjected to CFA using SPSS (version 20) utilising PCA with Varimax Rotation and Kaiser Normalization (Kaiser, 1974). Through CFA, it was confirmed that the number of items identified for each latent variable during the EFA indeed explained the relationship between the latent variables and their measures.

Three parameters were used for conducting CFA for each of the factors. These were Kaiser-Meyer-Olkin (KMO), Bartlett's tests, Total Variance Explained (TVE) and component matrix showing item loadings. The KMO statistic is an indication of the proportion of variance in a variable which may have been caused by mutual primary factors and also indicates the usefulness of factor analysis for these factors (Cerny and Kaiser, 1977). It shows the sample adequacy for each variable. The component matrix shows the correlation between items and variables or factors. KMO scores >.8 are considered to be extremely good (Kaiser, 1974). Field (2005) recommended KMO scores >.50 as acceptable if the sample size is adequate.

Bartlett's tests of sphericity are an indication of the homogeneity of variance showing that the sample comes from populations with equal variances (Levene's statistic has been already used during EFA to test homoscedasticity). Bartlett's tests of sphericity values should be ideally <0.05. The TVE shows how much each factor explains the percentage of the total variance. The total amount of variance is partitioned according to their contribution. Each part and corresponding variances adds up to the TVE. The TVE is an important indicator of confirmation of the initial factor structures derived through EFA and sometimes also indicates a goodness of fit measure and scores close to or >50% are considered satisfactory (Lorenzo-Seva, 2013). Each of the factors in CFA showed the TVE values. Factors that explained higher percentages of variance were considered valid and included in the specified model. The following sub-sections show the results of CFA and explain the KMO, Bartlett's tests, TVE and item loadings on each of the items representing the factors.

5.3.1 Ready to Innovate (RTI)

The first factor 'ready to innovate' showed a KMO score of .82 (table 5.2) indicating sampling adequacy. The results of CFA confirmed that the 6 items' convergence on the RTI factor during EFA is valid and the 6 items (EORI1–EORI6) together account for almost 48% variance. The factor loadings were >.6 indicating validity of the items explaining this EO dimension.

Table 5.2: Ready to Innovate

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.826
Bartlett's Test of Sphericity	Approx. Chi-Square	555.022
	df	15
	Sig.	.000

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Factor Loading	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
EORI1	.662	47.659	47.659	2.860	47.659	47.659
EORI2	.776	13.747	61.406			
EORI3	.699	11.014	72.420			
EORI4	.700	10.892	83.312			
EORI5	.661	9.464	92.777			
EORI6	.636	7.223	100.000			
Extraction Method: Principal Component Analysis.						

5.3.2 Competitive Aggressiveness (CA)

The factor 'competitive aggressiveness' showed a KMO score of .83 (table 5.3) indicating sampling adequacy. The results of CFA confirmed that the 6 items' convergence on CA factor during EFA is valid and the 6 items (EOC1–EOC6) together explain almost 47% variance. The factor loadings were >.5 indicating validity of the items explaining this EO dimension.

Table 5.3: Competitive Aggressiveness

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.830
Bartlett's Test of Sphericity	Approx. Chi-Square	539.948
	df	15
	Sig.	.000

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Factor Loading	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
EOC1	.680	47.041	47.041	2.822	47.041	47.041
EOC2	.789	13.409	60.450			
EOC3	.740	12.432	72.882			
EOC4	.711	10.603	83.485			
EOC5	.576	9.300	92.785			
EOC6	.594	7.215	100.000			
Extraction Method: Principal Component Analysis.						

5.3.3 Autonomy (AUT)

The 'autonomy' factor showed a KMO score of .72 (table 5.4) indicating sampling adequacy. The results of CFA confirmed that the 5 items' convergence on AUT factor during EFA is valid and the 5 items (EOA1–EOA5) together explain almost 44% variance. The factor loadings were >.5 indicating validity of the items explaining this EO dimension.

Table 5.4: Autonomy

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.729
Bartlett's Test of Sphericity	Approx. Chi-Square	297.489
	df	10
	Sig.	.000

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Factor Loading	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
EOA1	.695	44.435	44.435	2.222	44.435	44.435
EOA2	.688	18.097	62.531			
EOA3	.697	14.420	76.952			
EOA4	.581	12.648	89.600			
EOA5	.665	10.400	100.000			
Extraction Method: Principal Component Analysis.						

5.3.4 Risk Taking – External (EXTRSK)

The factor 'risk taking – external' showed a KMO score of .52 (table 5.5) indicating sampling adequacy. The results of CFA confirmed that the 2 items' convergence on EXTRSK factor during EFA are valid and the 2 items (EOR1 and EOR2) together explain almost 72% variance. The factor loadings were >.8 indicating validity of the items explaining this EO dimension.

Table 5.5: Risk Taking – External

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.520
Bartlett's Test of Sphericity	Approx. Chi-Square	85.081
	df	1
	Sig.	.000

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Factor Loading	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
EOR1	.845	71.825	71.825	1.437	71.825	71.825
EOR2	.847	28.175	100.000			
Extraction Method: Principal Component Analysis.						

5.3.5 Risk Taking – Internal (INTRSK)

The factor 'risk taking – internal' showed a KMO score of .62 (table 5.6) indicating sampling adequacy. The results of CFA confirmed that the 3 items' convergence on INTRSK factor during EFA is valid and the 3 items (EOR4–EOR6) together explain almost 56% variance. The factor loadings were >.7 indicating validity of items explaining this EO dimension.

Table 5.6: Risk Taking – Internal

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.629
Bartlett's Test of Sphericity	Approx. Chi-Square	129.772
	df	3
	Sig.	.000

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Factor Loading	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
EOR4	.725	56.013	56.013	1.680	56.013	56.013
EOR5	.793	24.197	80.210			
EOR6	.726	19.790	100.000			
Extraction Method: Principal Component Analysis.						

5.3.6 Proactiveness (PRO)

The 'proactiveness' factors showed a KMO score of .68 (table 5.7) indicating sampling adequacy. The results of CFA confirmed that the 3 items' convergence on PRO factor during EFA is valid and the 3 items (EOP3–EOP5) together explain almost 59% variance. The factor loadings were >.7 indicating validity of the items explaining this EO dimension.

Table 5.7: Proactiveness

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.683
Bartlett's Test of Sphericity	Approx. Chi-Square	156.123
	df	3
	Sig.	.000

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Factor Loading	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
EOP3	1.756	58.531	58.531	1.756	58.531	58.531
EOP4	.648	21.588	80.119			
EOP5	.596	19.881	100.000			
Extraction Method: Principal Component Analysis.						

5.3.7 Incremental Innovation – Degree (INCRD)

The factor 'incremental innovation degree' showed a KMO score of .79 (table 5.8) indicating sampling adequacy. The results of CFA confirmed that the 5 items' convergence on IINCRD factor during EFA is valid and the 5 items (III1, III2 III3, III6, III7) together explain almost 59% variance. The factor loadings were >.6 indicating validity of the items explaining this II dimension.

Table 5.8: Incremental innovation – Degree

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.798
Bartlett's Test of Sphericity	Approx. Chi-Square	736.921
	df	10
	Sig.	.000

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Factor Loading	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
III1	.779	58.733	58.733	2.937	58.733	58.733
III2	.861	15.797	74.530			
III3	.807	11.383	85.913			
III6	.613	8.170	94.083			
III7	.749	5.917	100.000			
Extraction Method: Principal Component Analysis.						

5.3.8 Incremental Innovation – Frequency (INCRF)

The factor 'incremental innovation frequency' showed a KMO score of .62 (table 5.9) indicating sampling adequacy. The results of CFA confirmed that the 3 items' convergence on INCRF factor during EFA is valid and the 3 items (IIF3, IIF5, IIF6) together explain almost 54% variance. The factor loadings were >.7 indicating validity of the items explaining this II dimension.

Table 5.9: Incremental innovation – Frequency

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.621
Bartlett's Test of Sphericity	Approx. Chi-Square	107.392
	df	3
	Sig.	.000

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Factor Loading	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
IIF3	.707	54.018	54.018	1.621	54.018	54.018
IIF5	.721	24.895	78.913			
IIF6	.776	21.087	100.000			
Extraction Method: Principal Component Analysis.						

5.3.9 Radical Innovation – Degree and Frequency (RADDF)

The factor 'radical innovation degree and frequency' showed a KMO score of .91 (table 5.10) indicating sampling adequacy. The results of CFA confirmed that the 9 items' convergence on RADDF factor during EFA is valid and the 9 items (table 5.10) together explain almost 59% variance. The factor loadings were >.7 indicating validity of the items explaining this II dimension.

Table 5.10: Radical Innovation – Degree and Frequency

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.914
Bartlett's Test of Sphericity	Approx. Chi-Square	1968.435
	df	36
	Sig.	.000

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Factor Loading	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
IIR3	.725	58.612	58.612	5.275	58.612	58.612
IIR4	.748	7.946	66.558			
IIR5	.797	7.014	73.572			
IIR6	.780	6.458	80.030			
RIF1	.728	5.135	85.164			
RIF2	.757	4.608	89.772			
RIF3	.758	4.191	93.963			
RIF4	.769	3.328	97.291			
RIF5	.823	2.709	100.000			
Extraction Method: Principal Component Analysis.						

5.4 Structural Equation Modelling – Two-step Approach

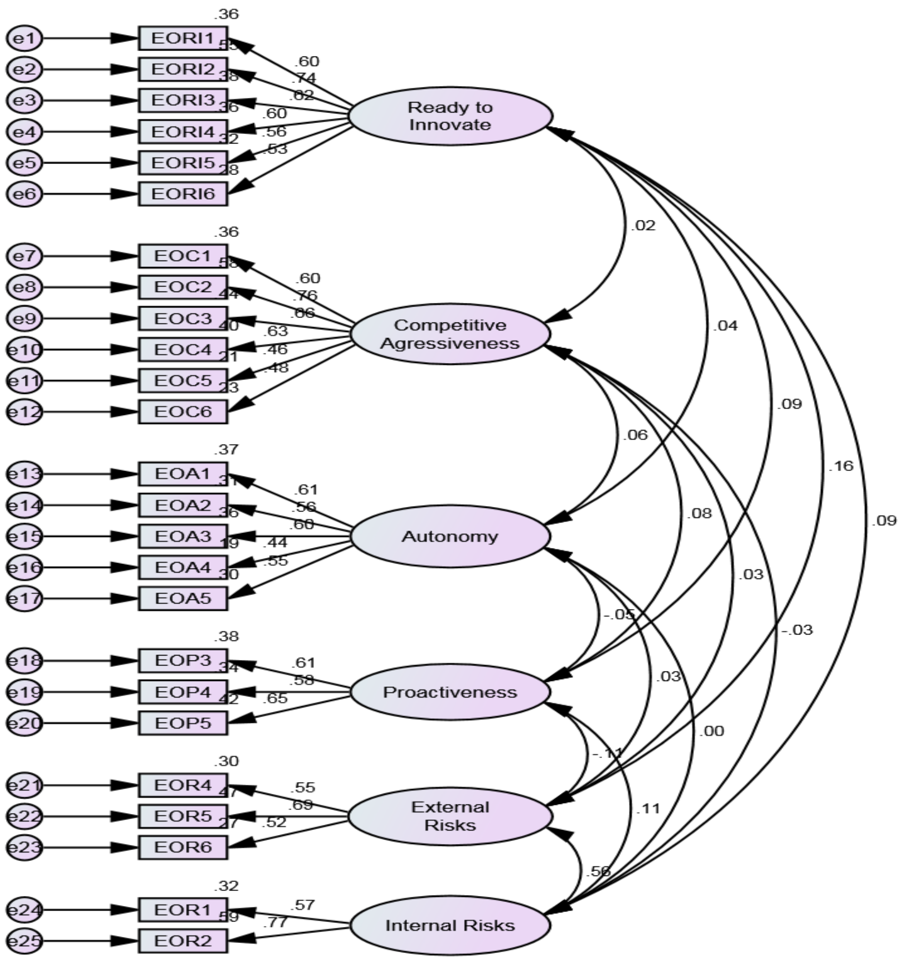
Anderson and Gerbing (1992) recommended adopting a two-step approach to the use of SEM. The two-step approach involves development of measurement and structures models as two distinct sub-models in model building. They argued that measurement modelling is an approach through which the observed measures within the construct are allowed to correlate freely. The confirmatory structural model in the second step specifies the causal relationship of the constructs with each other. Hu and Bentler (1999) and Anderson and Gerbing (1988; 1992) contended that developing a structural model along with a measurement model provides confirmatory assessment of both convergent and discriminant validity. As against a one-step approach where both measurement and structural models are specified simultaneously, a two-step approach is better as it minimizes "*interpretational confounding*" (Burt, 1973, p. 4). In such a case, fit indexes may become inflated compromising a meaningful interpretation of the constructs. In a two-step approach, since no constraints are placed on structural parameters, interpretational confounding is reduced as a measurement model is estimated separately. Considering the benefits and rigour of the two-step approach, the recommendation of Anderson and Gerbing (1988) for a two-step approach was followed to execute structural equation modelling.

5.4.1 Stage 1 – Measurement Models

According to the two-step approach, a measurement model is a base model which also allows a comparison with structural models. A measurement model was developed for both the constructs, which showed the covariance values between the latent variables and regression values for the indicators situated in their factor structures. Measurement models have the ability to show covariance values (or correlation between latent variables) and account for measurement errors. SPSS Amos (version 22) was used for testing the measurement and structural models. Figure 5.1 shows the measurement model for the entrepreneurial orientation construct. Absolute fit indices in the measurement and structural models indicate how well the conceptual model fits the data (McDonald and Ho, 2002; Gaskin, 2012). Fit indices with the recommended ranges as shown in table 5.11 have been considered in this study.

Table 5.11: Model fit Ranges (Sources: Baumgartner and Hombur, 1996; Hu and Bentler, 1999; Tabachnick and Fidell, 2007)

Absolute Fit Indices	Recommended Range
Minimum value of discrepancy C, divided by degrees of freedom (CMIN/DF)	lower than .2 indicating acceptable model fit
Goodness of Fit Indices (GFI)	0 and 1, value of .9 or greater generally indicating acceptable model fit
Adjusted Goodness of Fit (AGFI)	0 and 1, value of .9 or greater generally indicating acceptable model fit
Comparative Fit Indices (CFI)	0 and 1, value of .9 or greater generally indicating acceptable model fit
Root Mean Square Error of Approximation (RMSEA)	0 to 1, lower values indicating good model fit. Values of .06 or less indicate acceptable model fit



CMINDF 1.324; GFI .937; AGFI .921; CFI .954; RMSEA .028

Figure 5.1: Measurement Model – Entrepreneurial Orientation

The fit indices for the model were all very good with CMINDF 1.324. CMIN/DF a relative χ^2, is an index of data fit that may have been reduced by dropping one or more paths. GFI in SEM is equivalent to R^2 in multiple regression and both GFI and AGFI should be close to .1, which indicates a good fitting model. GFI and AGFI indexes are very sensitive to sample size (and hence sometimes not reported) and therefore the values can be flexible with a slight downward bias acceptable (Sharma et al., 2005). GFI and AGFI values in the measurement model in figure 5.1 were .937 and .921, respectively, which showed that the values were above the desired level. Comparative fit index (CFI) is a very reliable and most often reported index as it is least affected by sample size. The CFI value in the above measurement model (figure 5.1) is .954 which indicates a good fitting model. Another commonly reported fit index is the root mean square of approximation (RMSEA), which estimates the lack of fit in compared (perfect) and saturated models. Diamantopoulos and Siguaw (2000) concluded that RMSEA is one of the most reliable and informative fit indices. RMSEA values lower than .10 are considered to be indicative of a good fitting model (Browne and Cudeck, 1993). RMSEA values in the range of .05 to .10 indicate a fair fit according to (MacCallum et al., 1996), .07 according to Steiger (2007) and .06 according to Hu and Bentler (1999). The RMSEA value in the measurement model in figure 5.1 was .028, which was as per the desired level.

In this measurement model, three main parameters were used. These are measurement weights or regression slopes from each factor or observed variables represented through one-directional arrow in figure 5.1. The standardized regression weights were all above the threshold value of .4, which is the recommended threshold.

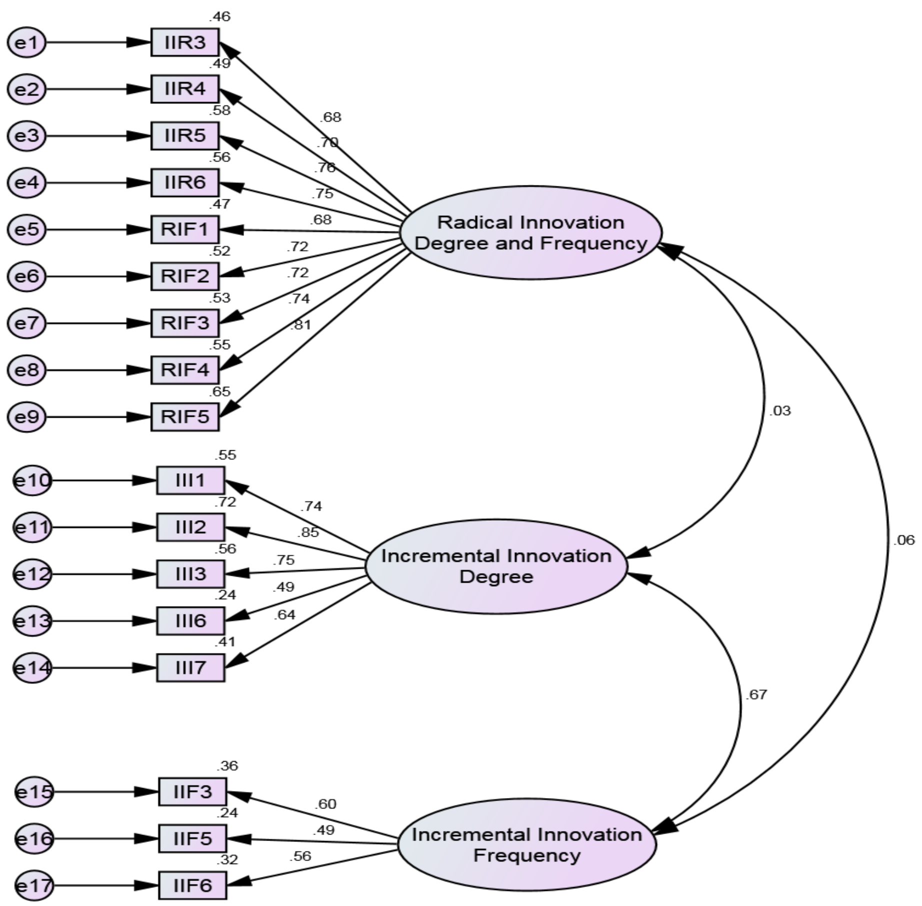
The second parameter used are the measurement errors or residual variances (e1 to e25 in figure 5.1) that have an impact on observed scores. These errors are not correlated as their means are assumed to be equal to zero (Little et al., 2006). The third parameter used was the corresponding covariance parameter between the factors (with two-headed arrows). These covariance parameters shown in figure 5.1 are quite low ranging from .00 to .11, showing evidence of the discriminant validity of the measures. The only covariance value that was high (.56) is between the two risk-taking factors, as they are closely related. The standardized regression weights shown through table 5.12 were >.4. All the values demonstrate significance shown through (*** $p < .001$) in table 5.12.

Table 5.12: Standardized Regression Weights: (EO measurement model)

Items		Factors	Estimate	P values
EORI1	<---	RTI	.599	***
EORI2	<---	RTI	.744	***
EORI3	<---	RTI	.616	***
EORI4	<---	RTI	.602	***
EORI5	<---	RTI	.561	***
EORI6	<---	RTI	.528	***
EOC1	<---	CA	.603	***
EOC2	<---	CA	.763	***
EOC3	<---	CA	.661	***
EOC4	<---	CA	.631	***
EOC5	<---	CA	.462	***
EOC6	<---	CA	.480	***
EOA1	<---	AUT	.606	***
EOA2	<---	AUT	.558	***
EOA3	<---	AUT	.603	***
EOA4	<---	AUT	.439	***
EOA5	<---	AUT	.551	***
EOP3	<---	PRO	.614	***
EOP4	<---	PRO	.584	***
EOP5	<---	PRO	.648	***
EOR4	<---	EXTRSK	.547	***
EOR5	<---	EXTRSK	.689	***
EOR6	<---	EXTRSK	.522	***
EOR1	<---	INTRSK	.570	***
EOR2	<---	INTRSK	.766	***

This study was able to validate the EO scale with the factor scores showing high convergent validity, with the covariance scores showing high discriminant validity.

Next, the measurement model of innovation intensity was tested. CFA earlier in this chapter has shown that the incremental innovation factor had split into two factors. However, both are considered as a single factor as they represent degree and frequency of incremental innovation. The measurement model for innovation intensity is shown in figure 5.2.



CMINDF 2.082; GFI .910; AGFI .891; CFI .918; RMSEA .060

Figure 5.2: Measurement Model – Innovation Intensity

The fit indices for the measurement model for factors of the innovation intensity construct showed average results. CMIN/DF 2.082 GFI and AGFI values in this analysis (figure 5.2) were .910 and .891, which were close to the desired level. CFI value in the model was .918. RMSEA value in this model was .060, which is close the desired level. Steiger (2007) argued that a cut-off value of .07 for RMSEA is also acceptable, while MacCallum et al. (1996) considered even .80 as acceptable fit. The regression and standardized regression weights are shown through table 5.13. The standardized regression weights were >.4. All the values are significant shown through (*** p <.001) in table 5.13.

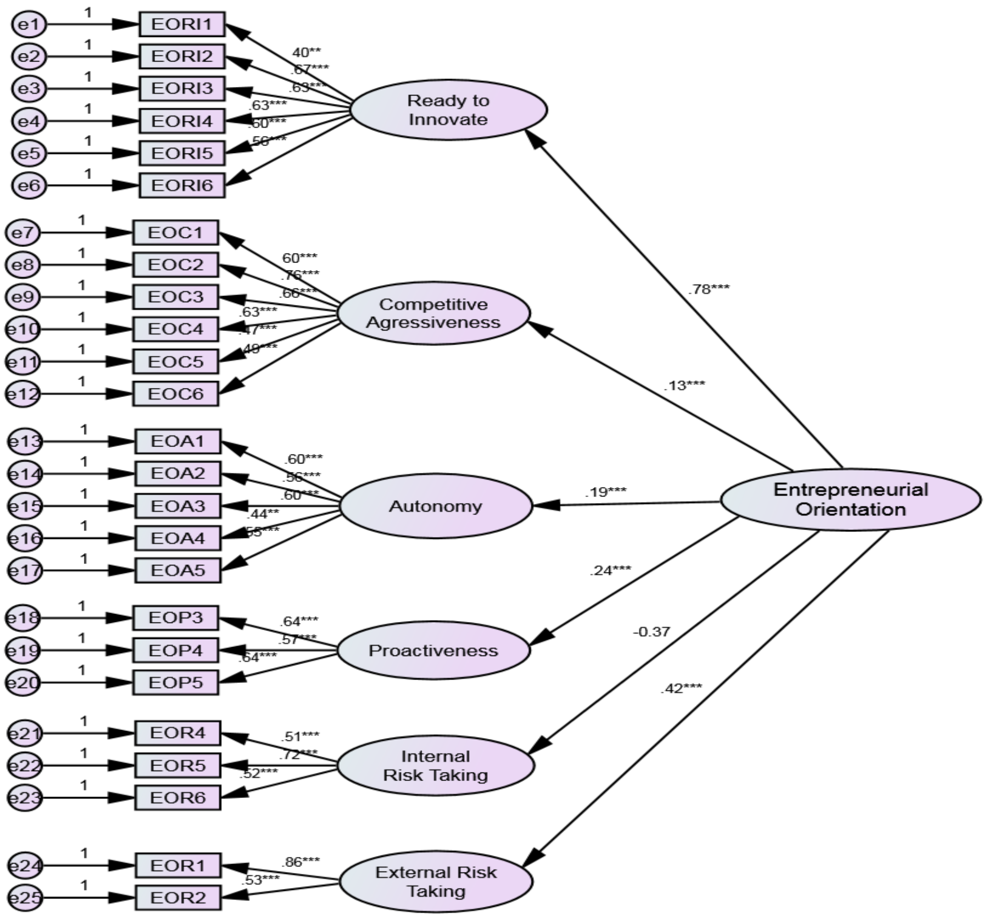
Table 5.13: Standardized Regression Weights: (II measurement model)

Items		Factors	Estimate	P values
IIR3	<---	RADDF	.680	***
IIR4	<---	RADDF	.704	***
IIR5	<---	RADDF	.763	***
IIR6	<---	RADDF	.749	***
RIF1	<---	RADDF	.684	***
RIF2	<---	RADDF	.721	***
RIF3	<---	RADDF	.725	***
RIF4	<---	RADDF	.740	***
RIF5	<---	RADDF	.808	***
III1	<---	INCRD	.739	***
III2	<---	INCRD	.851	***
III3	<---	INCRD	.748	***
III6	<---	INCRD	.485	***
III7	<---	INCRD	.640	***
IIF3	<---	INCRF	.604	***
IIF5	<---	INCRF	.494	***
IIF6	<---	INCRF	.564	***

The measures tested through EFA and CFA showed that they were appropriate measures of EO and II and indicated scored satisfactory on reliability and validity parameters. Further the measures were tested through structural model shown through path diagram (figures 5.3 and 5.4) and the complete SEM model (figure 5.5) as per the hypothesized relationship.

5.4.2 Stage 2 – Structural Models
Entrepreneurial Orientation

Once the measurement model established the validity of the items, the next step was to test the causal path in the model and confirm whether the hypothesized factors and their measures indeed represent EO and II constructs in this study. These were done through path diagrams, which is the method of depicting that the second-order construct of EO and II are reflected through the factorial structures of first-order factors. As in measurement models, the numbers along the path are standardized path coefficients. Each one represents the strength of relationships between observed variables joined by one-directional arrows directed from the construct to the measures. These factor loadings on each set of observed variables indicate the strength of relationships to their respective factors. The path diagram in figure 5.3 shows that all the coefficients are standardized means and they all use the same scale to quantify the construct. The objective of using path analysis was to further establish that the observed variables are true measures of the latent variable. The reliability – of how much a factor influences a set of items or observed variables – and validity – whether the factors correctly measures what it is supposed to measure – had been already established through earlier tests. Figure 5.3 shows the path diagram for the EO factors and its six reflective components.



CMINDF 1.302 GFI .930 AGFI .917 CFI.947 RMSEA .027

Figure 5.3: Path Model – Entrepreneurial Orientation

The structural model in figure 5.3 shows that the second-order EO consists of six first-order six factors (risk taking split into two factors). Out of these, five factors were found to be significant (p <.05 significance level were accepted). From table 5.15, it is clear that the 'internal risk taking' factor is not a significant measure of EO as p value is 2.95 >.05. The absolute fit indices for the model were all very good with CMIN/DF 1.302. GFI and AGFI values in this analysis were .930 and .917, respectively, which were at the desired level. The CFI value in the model was .947. The RMSEA value in this model was .027, which was according to the desired level. The path coefficient values showed that among all the factors 'ready to innovate' with the highest coefficient value of .78 is a significant measure of the EO construct. Internal risks showed negative values and is not a significant measure of EO (-0.37), while external risk taking was found to be a significant measure of EO (.42). Proactiveness and competitive aggressiveness were also found to be significant measures of EO showing coefficient values of .24 and .13, respectively. The factor loadings for the first and second-order factors with significance (p values) are shown in table 5.14. All the above-mentioned five factors were found to be significant (p <.05).

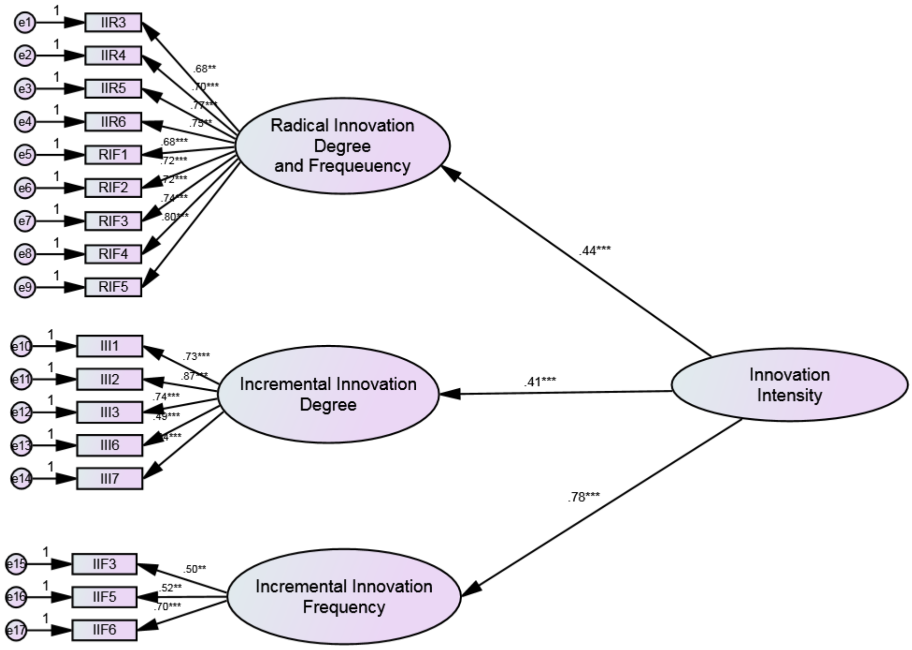
Table 5.14 Standardized Regression Weights (EO structural Model)

			Estimate	P values
Ready to Innovate (RTI)	<---	EO	.781	***
Competitive Aggressiveness (CA)	<---	EO	.137	***
Autonomy (AUT)	<---	EO	.196	***
Proactiveness (PRO)	<---	EO	.241	***
External Risk Taking (ERSK)	<---	EO	.424	***
Internal Risk Taking (IRSK)	<---	EO	-.372	.295
EORI1	<---	RTI	.404	.007
EORI2	<---	RTI	.671	***
EORI3	<---	RTI	.635	***
EORI4	<---	RTI	.634	***
EORI5	<---	RTI	.602	***
EORI6	<---	RTI	.561	***
EOC1	<---	CA	.607	***
EOC2	<---	CA	.760	***
EOC3	<---	CA	.665	***
EOC4	<---	CA	.637	***
EOC5	<---	CA	.472	***
EOC6	<---	CA	.493	***
EOA1	<---	AUT	.603	***
EOA2	<---	AUT	.564	***
EOA3	<---	AUT	.608	***
EOA4	<---	AUT	.439	.002
EOA5	<---	AUT	.551	***
EOP3	<---	PRO	.647	***
EOP4	<---	PRO	.579	***
EOP5	<---	PRO	.640	***
EOR4	<---	EXTRSK	.514	***
EOR5	<---	EXTRSK	.720	***
EOR6	<---	EXTRSK	.529	***
EOR1	<---	INTRSK	.861	***
EOR2	<---	INTRSK	.533	***

The findings showed that the innovation dimension is indeed an important factor representing EO and was not well defined. Therefore, based on the literature and responses, this study can claim that the innovation factor in fact measures ‘ready to innovate’ rather than innovation itself.

Innovation Intensity

The objective of developing the structural model was to confirm whether the hypothesized factors – degree and frequency of innovation – are indeed the reflective measures of innovation intensity.



CMINDF 1.959 GFI .923 AGFI .875 CFI.908 RMSEA .052

Figure 5.4: Path Model – Innovation Intensity

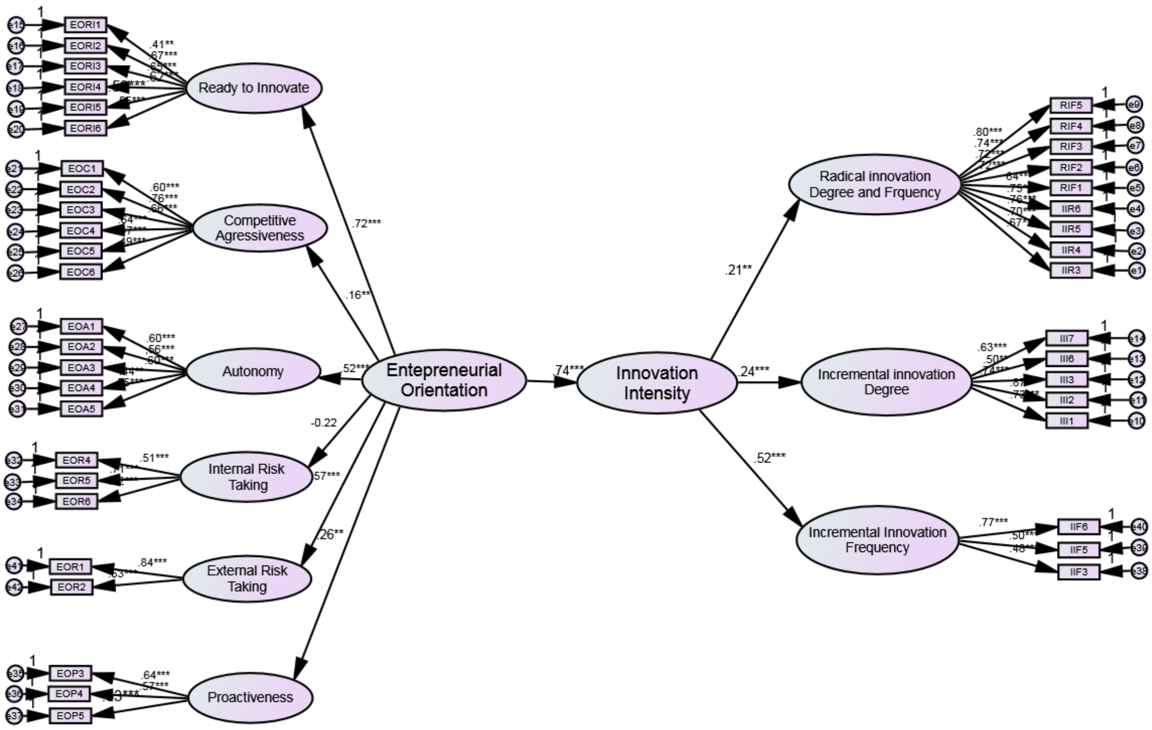
The structural model in figure 5.4 shows that the two factors of degree and frequency of innovation (incremental innovation split into two factors – degree and frequency) are reflective components of innovation intensity. The absolute indices for the structural model for II showed acceptable results. The fit indices for the model were satisfactory with CMINDF 1.959. GFI and AGFI values were .923 and .875, respectively, which were close to the desired level. The CFI value in the model was .908. The RMSEA value in this model was .052, which was close to the desired level. The path coefficients showed that among all the factors 'incremental innovation frequency' with the highest value of .78 is a significant measure of II construct, followed by degree and frequency of radical innovation (.44) and degree of incremental innovation (.41). The structural model of II showed that incremental and radical innovation are significant measure of II. The factor loadings for the first and second-order factors with significance (p values) are shown in the table 5.15. All the three factors were found to be significant (p <.05).

Table 5.15: Standardized Regression Weights: (II structural model)

			Estimate	P values
Radical Degree and Frequency (RADDF)	<---	Innovation Intensity	.443	***
Incremental Innovation Degree (INCRD)	<---	Innovation Intensity	.414	***
Incremental Innovation Frequency (INCRF)	<---	Innovation Intensity	.782	***
IIR3	<---	RADDF	.684	.002
IIR4	<---	RADDF	.705	***
IIR5	<---	RADDF	.766	***
IIR6	<---	RADDF	.755	***
RIF1	<---	RADDF	.684	***
RIF2	<---	RADDF	.721	***
RIF3	<---	RADDF	.725	***
RIF4	<---	RADDF	.741	***
RIF5	<---	RADDF	.808	***
III1	<---	INCRD	.731	***
III2	<---	INCRD	.871	***
III3	<---	INCRD	.748	***
III6	<---	INCRD	.489	.004
III7	<---	INCRD	.641	***
IIF3	<---	INCRF	.503	***
IIF5	<---	INCRF	.524	.004
IIF6	<---	INCRF	.697	.001

Conceptual Model

Finally, the hypothesized conceptual model had to be tested, particularly the relationship between the two main constructs in this study – entrepreneurial orientation and innovation intensity. The entire structural model depicting the relationship between entrepreneurial orientation and innovation intensity is shown in figure 5.5.



CMINDF 1.547 GFI .957 AGFI .848 CFI.912 RMSEA .049

Figure 5.5: Structural Model representing the Conceptual Framework

The complete structure equation model in figure 5.5, shows that all the factors except internal risk taking are significant. All the five factors of EO, namely ready to innovate, competitive aggressiveness, autonomy, external risk taking and proactiveness (p <.05), were found to be significant measures of EO. Similarly, degree and frequency of radical and incremental innovation were found to be significant measure of II. Finally, entrepreneurial orientation was found to significantly and positively influence innovation intensity.

The absolute fit indices for the model were good with CMIN/DF 1.547, GFI and AGFI values in this analysis were .957 and .848, respectively, which were close to the desired level. The CFI value in the model was .912. The RMSEA value in this model was .049, which was as per the desired level.

The path coefficient values showed that the latent construct EO significantly and positively influenced innovation intensity, showing a path coefficient value of .74, p <.05). Among the EO factors 'ready to innovate' was a significant measure of EO construct with a high and positive coefficient value of .72, followed by external risk taking with a coefficient value of .57 and competitive aggressiveness .16. The highest value of an II measure was evident in incremental innovation frequency with a path coefficient of .52 followed by incremental innovation degree .24, while the degree and frequency of radical innovation showed a path coefficient value of .21 (figure 5.5). Most of the values that were significant in stage 1 were found to be significant in stage 2. All the factors reflecting EO and II showed significance ($p < .05$), except internal risk taking (-0.22 $p > .05$). The factor loadings for the first and second-order factors with significance (p values) in the SEM model are shown in the table 5.16.

Table 5.16: Standardized Regression Weights: (Complete SEM model)

			Estimate	P values
Autonomy	<---	EO	.521	***
Ready to Innovate	<---	EO	.720	***
Competitive Aggressiveness	<---	EO	.166	.004
Internal Risk	<---	EO	-0.22	.061
External Risk	<---	EO	.572	***
Proactiveness	<---	EO	.260	***
Innovation Intensity	<---	Entrepreneurial Orientation	.742	***
Radical Innovation Degree and Frequency	<---	Innovation Intensity	.217	***
Incremental Innovation Degree	<---	Innovation Intensity	.242	***
Innovation Intensity	<---	Incremental Innovation Frequency	.524	***
IIR3	<---	RADDF	.679	***
IIR4	<---	RADDF	.701	***
IIR5	<---	RADDF	.765	***
IIR6	<---	RADDF	.751	***
RIF1	<---	RADDF	.643	***
RIF2	<---	RADDF	.721	***
RIF3	<---	RADDF	.725	***
RIF4	<---	RADDF	.740	***
RIF5	<---	RADDF	.808	***
III1	<---	INCRD	.730	***
III2	<---	INCRD	.870	***
III3	<---	INCRD	.740	***
III6	<---	INCRD	.501	.001
III7	<---	INCRD	.637	***

EORI1	<---	RTI	.412	.004
EORI2	<---	RTI	.674	***
EORI3	<---	RTI	.652	***
EORI4	<---	RTI	.625	***
EORI5	<---	RTI	.599	***
EORI6	<---	RTI	.552	***
EOC1	<---	CA	.602	***
EOC2	<---	CA	.761	***
EOC3	<---	CA	.667	***
EOC4	<---	CA	.640	***
EOC5	<---	CA	.470	***
EOC6	<---	CA	.490	***
EOA1	<---	AUT	.605	***
EOA2	<---	AUT	.560	***
EOA3	<---	AUT	.602	***
EOA4	<---	AUT	.441	.003
EOA5	<---	AUT	.550	***
EOR4	<---	EXTRSK	.516	***
EOR5	<---	EXTRSK	.715	***
EOR6	<---	EXTRSK	.525	***
EOP3	<---	PRO	.642	***
EOP4	<---	PRO	.575	***
EOP5	<---	PRO	.632	***
IIF3	<---	INCRF	.488	***
IIF5	<---	INCRF	.502	***
IIF6	<---	INCRF	.778	***
EOR1	<---	INTRSK	.840	***
EOR2	<---	INTRSK	.530	***

The findings confirmed not only that EO influences II but also the fact that EO measures are input factors that impact II (output factors). Together these factors contribute towards the making an organization entrepreneurial and innovative.

5.5 Qualitative Findings and Analysis

As discussed in the methodology chapter, the research approach involved supporting quantitative findings with qualitative data. Semi-structured interviews were conducted with managers representing different sectors. These semi-structured interviews were conducted after analysing the quantitative data. The objective was to triangulate the quantitative findings with more in-depth views and to probe and evaluate whether the measures tested through the quantitative methods are appropriate and valid. Specifically more subjective information was sought on the quantitative findings and with respect to any weaknesses in these findings and in areas where more clarification was sought. A total of 5 managers were interviewed from five different sectors representing services (education, health, retail, financial services) and manufacturing. These managers were not part of the questionnaire survey. The managers confirmed that the five factors are appropriate and valid measures of EO. The managers also agreed that degree and frequency of innovation are appropriate and valid measures of II. The views of managers are summarized based on common themes and some quotes are retained to highlight their view points. The findings of the qualitative data indicate that it supports the quantitative findings and the views of the managers do not vary significantly in terms of confirming the measures of EO and II. In fact the qualitative findings complement the quantitative findings. The findings are presented below.

5.5.1 Ready to Innovate

The respondents were of the view that although most organizations today talk about innovation and innovation manifests itself in some way – either through vision, mission or strategies objectives –on a firm’s agenda, there is lack of clarity on how these can be achieved. Firms do make efforts to be innovative but are let down by lack of an organizational culture that can support innovation. They agreed that a firm must create innovative potential, capabilities, culture of experimentation – all of which will provide a fertile ground for innovation to take place. One of the interviewees from the education sector commented:

> *“the organisational climate is created by its members and the perception is always strong and even if the climate has changed, the perception lingers... our innovativeness has improved over the past one year, but it takes a lot to convince the employees to think and do the extraordinary, they keep focusing on conventional thinking. There are only few who take the lead, but we want a climate where everyone is innovative.”*

One of the managers pointed out that only a few employees are innovative and this does not create a culture for innovation. The human resource policies of many firms are not aligned or integrate to support innovation within the firms. One of the interviewees from the manufacturing sector commented that *“employees have* *brilliant ideas but they do not have means to test them and experiment with them. If the organizations would not support these ideas it may not lead to innovation".*

The findings of the qualitative interviews resonate with the quantitative measures, as the managers are of the same opinion that the measures for ready to innovate are relevant and appropriate and matter in their organizations. They particularly focused on organizational culture, employee engagement and joint sharing and learning.

5.5.2 Competitive Aggressiveness

The managers were of the view that competitive aggressiveness largely depends on the market structure in which the firm operates and is critical in deciding how much a firm can aggressively challenge the competitors. One of the managers was of the view that competitive aggressiveness is a posture, which a firm adopts and the top management should decide which strategic posture they wish to adopt and accordingly develop capabilities to beat the competition. One of the interviewees from a manufacturing unit commented that:

> *"Competitive aggressiveness to a large extent depends on the top management. Top management of a firm should be able to give the confidence to employees that they can engage intensely with the competition."*

Another interviewee commented that

> *"You might want to challenge anyone in the market including the market leaders, but do you have the capability to do so is an important question."*

However, one of the managers differed in his opinion and added that one does not necessarily have to beat a competitor to succeed in the market, or for being entrepreneurial, for that matter. Firms may enjoy their own market spaces and focus on customers, rather than competitors. However, one of the managers disagreed with this view and argued that competitive aggressiveness ensures that you always lead in the market and your employees are also competitive and strive for market leadership. When probed further, the managers mentioned some of the criteria based on which competitive aggressiveness is possible. One of the interviewees from a retail establishment commented that:

"In our industry the basis for competition is price and this largely depends on costs. If we are unable to reduce our costs, we are unable to pass this as benefit to customers to improve customer loyalty and market share. However, having said that reduction of cost is not easy, especially if you want to be a cost leader in the market. It requires strong collaboration with stakeholder, particularly suppliers and retailers."

Another interviewee commented that,

"We work closely with our suppliers. They not only provide us our raw material on time and at lower cost, but also we share the same strategic goals."

Overall, the measures of competitive aggressiveness were found to be relevant and valid by the managers and they could shed more light on these measures particularly on strategies, capabilities and market positioning.

5.5.3 Autonomy

The managers were of uniform opinion that autonomy is essential for an organization to be entrepreneurial. Innovation, risk taking and proactiveness all depend on how much the employees are given freedom to take decisions. Citing an example as a garment retailer he commented:

"Entrepreneurial actions in an organisation is not only the prerogative of the top management, it must come from the employees. We do give a lot of freedom to our employees to find opportunities, take risks, experiment and innovate." He quoted an example: *"Recently when one of our floor managers came up with an idea of involving customers in clothing design, we gave him the freedom to implement his innovative idea. He created a section in our store which is now called 'customer designs' and showcases designs suggested by customers. It went very well with our customers and we received not only appreciation but also increase in our sales".*

One of the managers opined that although giving autonomy to employees may make the firm entrepreneurial, it works in few industries, for example, the creative industry. In some industries such as banking and insurance, autonomy does not play an important role.

Another interviewee provided more perspective to the issue. Being from the advertising firm, he noted the following:

> *"We do give freedom to our employees. However, not all employees enjoy that freedom, new employees need to be guided closely. Employees who have been with us for more than four years are given more freedom because they understand our capabilities and practices."*

Overall, the managers agreed that autonomy is an important measure of entrepreneurial orientation and this measure works well along with other EO measures. The discussions revolved around empowerment and support of employees, and creation of organizational structures that are independent and support innovation and other EO measures.

5.5.4 Risk Taking

Most of the managers agreed that risk-taking strategies in firms are important, while they also highlighted that many firms take calculated risks. One of the managers said they are not new entrepreneurs in business who would take a wild risk in the market. Similar views were shared by an interviewee from the financial sector, who pointed out that:

> *"Our organisation is not restricted by risks that come in our way. However, we understand that just taking blind risks may not be a good strategy. Managing and mitigating risk may also be an equally good strategy. All I am saying is, identify and reduce the risk and have strategies and systems in place that can manage the risk. If you call it risk averse, I would not agree."*

The managers agreed that risk taking was closely associated with innovation. They pointed out that being innovative involved taking risks. However, the managers pointed out that at the corporate level, risks have to be calculated and most of the time, managers are developing strategies to manage and mitigate risks. The managers were able to differentiate between internal and external risks. They mentioned that internal risk, like innovation, must be supported by organizational culture and human resource strategies. Firms must constitute committees and structures to manage and monitor risk. Risk registers, risk planning and risk ownership are critical risk management strategies that firms use to manage and mitigate risks, they added. External risks on the other hand, are related to markets, innovation and opportunities and the results are more tangible. This fact is enumerated by one of the respondents. The interviewee from the real estate sector argued that

> *"If you take all precautionary steps, then you are not talking about risks. Some firms put all their efforts to develop internal systems and measures to prevent and mitigate risk. This does not indicate entrepreneurial behaviour. Risk taking involves taking bold steps and committing to risky projects."*

Similar views were shared by another manager who was from the real estate sector argued that

> *"If you take all precautionary steps, then you are not talking about risks. Some firms put all their efforts to develop internal systems and measures to prevent and mitigate risk. This does not indicate entrepreneurial behaviour. Risk taking involves taking bold steps and committing to risky projects."*

One of the managers added that firms vary in terms of external risk-taking strategies and it also depends on market and competition, which may also vary at different times. One of the managers felt that risk taking is very important measure of entrepreneurial orientation and pointed out that *"in today's economic environment not taking risk is the biggest risk"*.

Overall, the managers agreed that risk taking is an important measure of entrepreneurial orientation. However, all the managers were not in agreement with nature of risks and they seemed to be divided on the degree and nature of risks. This is also reflected in the quantitative findings where internal risks were not found to be a significant measure of EO.

5.5.5 Proactiveness

The managers opined that proactiveness contributes towards entrepreneurial orientation. The managers agreed that proactiveness enables a firm to be monitoring the environment and keeping itself abreast with the developments in the market and the industry. One of the interviewees from the tourism sector (Accommodation and Food) commented:

> *"Most of the organisations are able to identify opportunities in the market. If an organisation is not able to identify opportunities in the market, the organisation is not entrepreneurial. However, although most organisations can identify opportunities, does not logically mean that they are all able to capitalise on the opportunities. It depends on two important questions. One, whether the organisation has the capabilities and resources to fill that gap in the market. Second, whether the organisation is willing to commit itself to the opportunity considering the risks involved."* She quoted an example: "*most our accommodation services were in the cities and Muscat sector was our primary revenue generator. However, new opportunities came when we found that the tourists want to visit interior regions and experience deserts and wadis. We did capture that opportunity and committed resources before many of our competitors and today, we enjoy a large market share. However, our competitors found it too risky to commit such high fixed costs at such a short notice".*

The managers opined that it is challenging to keep abreast with new technologies. As far as technologies are concerned, most of the time firms are not able to invest in research and development budgets compared to the leaders in the industry. They would invest much more than average firms. Lower research and development budgets mean that many times firms are not aware of new developments that might be the key to customer solutions.

The managers felt that proactiveness is also an appropriate measure of EO and work in tandem with other EO measures. They felt that firms must be alert to monitor opportunities and trends in the market and leading in specific markets particularly where technology is the basis for competition is challenging and hence must devote resources so that it can lead in such markets.

5.5.6 Radical Innovation Degree and Frequency

The managers expressed the opinion that innovation intensity is an important concept, while analysing innovation outputs. They opined that innovation outputs may vary across firms and industries. One of the managers pointed out the innovation outputs may not be always tangible. They did associate both radical and incremental innovation with degree of innovation although they argued that radical innovation is more associated with size and impact rather than frequency. They argued that radical innovation is not frequently experienced and it takes an innovation culture, strategies, vision backed by research and development to produce radical innovations.

One of the interviewees whose company manufactured confectionaries commented:

> *"We do have experience with radical innovation. Two years back when we were experimenting with new designs and packaging, our venture division floated a design that made radical innovation in our products. The chocolates were shaped as vegetables and had to be microwaved to eat it. It immediately caught the fancy of new target market such as vegetarians and party organisers. We want to grow in this direction and attract new target segments with new designs."*

One of the managers interestingly pointed out that although intensity implies size and impact, many firms may not have experienced radical innovation to be able to relate to it or opine about it.

Overall, the managers agreed that radical innovation is an important dimension of II, however the degree of innovation is more important as far as radical innovation is concerned. They agreed that the size and scope of radical innovation degree, particularly required resources, commitment and strategies, which although are challenging, must provide high level of competitive advantage.

5.5.7 Incremental Innovation Degree and Frequency

The managers were more enthusiastic to talk about incremental innovation. They opined that incremental innovation is more associated with frequency rather than degree and firms must have been in a better position to relate to it and express an opinion about it. One of the interviewees who manufactures packaged chips with local flavours commented:

> *"We believe in continuous improvements and we improve our products almost every year. If we do not bring or show improvements in our products, our customers ask for it. It now almost taken for granted that we are expected to improve our products. However, such expectations in short intervals puts a pressure on us. We try different methods. For example, we made our packaging very innovative last year and I must say that gave us a good advantage in the marketplace and got us more market share".*

The managers were further probed and asked whether an organizational culture and strategies are required to produce incremental innovation. The managers were of the view that it does require a shift in a firm's culture, strategies and entrepreneurial orientation to be able to produce incremental innovation, but existing structure and strategies can allow such innovations to take place. The frequency of these innovations has to be sustained and that requires commitment and leadership. One of the managers added that if a firm maintains and promotes the entrepreneurial orientation in the organization, it can frequently produce incremental innovations. The managers agreed that the capabilities and resources for incremental innovation are less and do not strain a firm's resources and hence frequency can be sustained. They also pointed out the risk associated with incremental innovation is lower and hence employees and the firms are able to initiate and sustain it. The managers related incremental innovation around products, markets and customers and agreed that strategies for improvement is a key driver of incremental innovation.

One of the interviewees from the transportation and logistics sector commented:

> *"Our innovation efforts revolves around our customers. We proactively engage with our customers and ask for feedback. We must satisfy our customers. It*

takes lot of effort and high cost to gain a new customer, hence losing a customer is not desirable to use ta all. We have over the last few years expanded our market share in the markets we operate and we are happy about it. We want to grow in the same direction and with same strategies".

Overall, the qualitative interviews with managers were quite useful as they provided support to quantitative findings and whenever they were probed further they provided insights into the measures and helped to develop discussion and conclusions in chapter 6.

5.6 Conclusion

The quantitative results through CFA and SEM tests and qualitative findings through semi-structured interviews showed similar and consistent results. The measurement and structural models showed that the measures are valid and both EO and II scales can be applied in the corporate sector in Oman. The conceptual model developed in this study was also found to be valid with EO showing impact on II. The qualitative findings addressed some of the weaknesses in the quantitative findings, by providing meaning and context to the results. Most of the quantitative findings were confirmed by the managers. Both quantitative and qualitative findings are triangulated and discussed in the light of the literature in chapter 6. The findings from quantitative tests and qualitative interviews were helpful to assess the hypothesis and research objectives, which are discussed in the next chapter.

Chapter 6: Analysis of the Structural Equation Modelling (SEM) Results

6.1 Introduction

The quantitative and qualitative analysis of data in the previous chapter was helpful to test the hypotheses. The analysis of the results also indicated achievement of the research objectives. In the subsequent sections in this chapter, the research hypotheses and research objectives are discussed in the light of the results and analysis.

6.2 Discussion of Hypotheses in Relation to SEM

In chapter 2, based on the literature review, 3 research hypotheses and 4 research objectives were developed, which were framed around the conceptual model. The following section discusses these hypotheses. From the complete SEM (figure 5.5), it can be seen that out of the six factors that were tested as measures of EO, five factors were found to be valid and significant measures of EO. Therefore, *H_1**:** The five factors, namely ready to innovate, competitive aggressiveness, autonomy, risk taking and proactiveness are appropriate and significant measure of EO* is supported significantly and positively. Since risk taking was conceptually considered as one dimension and it was split for data analysis purposes only, the hypothesis is accepted.

Ready to innovate was found to be an appropriate and significant measure of EO. Ready to innovate with a path coefficient of .72, $p < .001$ supports the research hypothesis 1 positively and significantly. The literature on innovation within the context of EO was not well defined. Original conceptualization of this dimension concerned both input and output measures, hence there was a lack of clarity in its conceptualization. The measures tested for innovation in this study were related to 'ready to innovate', specifically focusing on input measures. The analysis of results supported by the literature indicated that the innovation factor in fact measures 'ready to innovate' rather than innovation itself. This was also confirmed by the qualitative findings as the respondents observed that ready to innovate is an important condition for innovation to take place. Based on the arguments, hypothesis 1 is supported and ready to innovate was found to be an appropriate and significant measure of EO.

Competitive aggressiveness was also found to be an appropriate and significant measure of EO. From the complete SEM, it can be seen that the path coefficient of .16, $p < .05$ supports research hypothesis 1 positively and significantly. The discussion in literature related to directly and intensely challenging the competitors with strong differentiation and an array of competitive strategies was found to be valid measure. Competitive aggressiveness leads to improved bargaining power and even market leadership. A key aspect that emerged was that the firms need to develop their capabilities to be able to challenge the competition. Based on the arguments, hypothesis 1 is supported and competitive aggressiveness was found to be an appropriate and significant measure of EO.

From the complete SEM, the autonomy dimension showed path coefficient value of .52, $p < .001$ supporting research hypothesis 1 positively and significantly. The conceptualization of the autonomy dimension in the literature is in line with the results of the SEM analysis. The autonomy dimension relates to creating an organizational climate that is free of organizational constraints and employees are given the freedom to take initiatives, risks and be creative. Qualitative findings from managers indicated that they agreed that such an organizational climate is essential to enhance the entrepreneurial orientation of the organization. Based on the arguments, hypothesis 1 is supported and autonomy was found to be an appropriate and significant measure of EO.

From the complete SEM, one of the risk-taking dimensions showed path coefficient value of .57, $p < .001$ supporting research hypothesis 1 positively and significantly. However, internal risk taking was found to be negative and not significant. Considering, the high coefficient value of .52 and highly significant $p < .001$ value associated with external risk taking research hypothesis 1 was supported. The conceptualization of risk taking in the literature also pointed towards measures of external risks as valid measure of EO and the qualitative findings supported the view that risk taking, specifically external risk taking required substantial commitment of resources and uncertainty in the market.

From the complete SEM, the proactiveness dimension showed path coefficient value of .26, $p < .05$ supports research hypothesis 1 positively and significantly. The conceptualization of the proactiveness dimension in the literature is in line with the results of the SEM analysis. In the literature, the proactiveness dimension is mainly associated with a proactive approach, leading in the market with identification of opportunities through environmental scanning. Qualitatively, the factor was well supported with the view that being proactive is essential, if the firms aim to capitalise on opportunities. However, leaders in the market enjoy higher leverage in terms of technology and research and development. Based on the arguments, research hypothesis 1 is supported and proactiveness was found to be an appropriate and significant measure of EO.

From the complete SEM, it can be seen that the path coefficient of .74 between EO and II with a significance level of $p < .001$ supports research hypothesis 2. Therefore, *H_2: EO directly and significantly influences II* is supported significantly and positively. In the literature, the relationship between the constructs has not been tested. The results of SEM indicate that EO not only influences II but also is an antecedent to II and presence of EO factors prepares an organization to produce innovation outputs, which can be either incremental or radical.

From the complete SEM (figure 5.5), it can be seen that all the three factors (conceptually degree and frequency of innovation) that were tested as measures of II were found to be valid and significant. Therefore, *H_3**:** Degree and frequency of incremental and radical innovation are appropriate and significant measure of II* is supported significantly and positively. Although incremental innovation was split into degree and frequency, conceptually it is one factor and hence the hypothesis is accepted.

The complete SEM also shows that incremental innovation degree with a path coefficient of .24, $p < .001$ supports research hypothesis 3 positively and significantly. Similarly incremental innovation frequency with a path coefficient of .52, $p < .001$ supports the research hypothesis 3 positively and significantly. The literature supported the view that incremental innovation frequency is quite evident considering nature of incremental changes and resources associated with incremental innovation. The impact of incremental innovation may be low but it is the frequency that brings the impact in the market. Qualitative findings also supported the view that frequency of incremental innovation is more evident than degree of incremental innovation, hence firms can easily associate with such type of innovation. This may be perhaps the reason why the frequency was identified as a separate and distinct factor in SEM. Although it is shown as a distinct factor (separate from degree) for the purpose of analysis, it is conceptually and empirically a single factor termed as incremental innovation (degree and frequency). Based on the arguments, hypothesis 3 is supported and degree and frequency of incremental innovation was found to be an appropriate and significant measure of II.

The complete SEM also shows radical innovation degree and frequency with a path coefficient of .21, $p < .05$ supports research hypothesis 3 positively and significantly. In the literature, radical innovation was mainly associated with bringing radical changes in the market, product and services, customers and technology. Qualitatively, the results supported the view that firms experience radical innovation rarely, and hence they can relate to its impact but not frequency. Based on the arguments, hypothesis 3 is supported and degree and frequency of radical innovation was found to be an appropriate and significant measure of II. Table 6.1 summarizes the results related to the hypotheses.

Table 6.1 Hypotheses accepted after data analysis

Hypotheses	Path coefficient	Significance	Status
H_1: The five factors, namely ready to innovate, competitive aggressiveness, autonomy, risk taking and proactiveness are appropriate and significant measures of EO	.72, .16, .52, .57, .26	$p < .05$	Accepted
H_2: EO positively and significantly influences II	.74	$p < .001$	Accepted
H_3: Degree and frequency of incremental and radical innovation are appropriate and significant measures of II	.24, .52, .21	$p < .001$	Accepted

6.3 Results and Research Aims and Research Objectives

The overall aims and objectives of the research have been achieved. The aim of the study was to refine and develop EO and II scales and analyse the causal relationship between EO and II. Both EO and II scales were developed and causal relationship between EO and II was established. The refined EO scale developed through this study contains 25 items, while the newly developed II scale contains 17 items (shown in chapter 8). Each of the research objectives is discussed below.

Research Objective 1: *To refine and validate the EO scale*

This study established the fact that there was a need to refine the EO scale, considering the debate on the dimensionality and absence of a universally accepted scale for EO. There was an inconsistent use of three- and five-factor models and the measures showed overlaps. The debate on the aggregation of scores of EO measures also added to the confusion about the nature and role of each of the dimensions to the overall measurement of EO. Clearly, delineating the factors and the measures, and reducing overlaps have certainly produced a more refined scale of entrepreneurial orientation. Clarifications into the dimensions were essential and a more exhaustive list of items were developed and tested. The items showed medium to high regression weights ranging from .4 to .8 showing significant p values for all the items. The factor loadings showed that the all the factors are valid and significant. The EO scale was not only conceptually refined but also validated empirically within the corporate sector in Oman. The measures were found to be reliable and valid.

The refined EO scale showed that innovation dimension is indeed an important factor and the factor was not well defined within the EO framework. The items related to ready to innovate indicated that it consisted of input measures of innovation. Therefore, based on the literature and results, this study concludes that the innovation factor within the EO framework in fact is a measure of 'ready to innovate' rather than innovation itself, showing high coefficient of .72 and proving to be a significant measure of EO.

Research objective 2: *To explore the causal relationship between EO and II.*

This study empirically confirmed the unexplored relationship between EO and II and found that EO does influence II with a coefficient of .74 with $p < .001$.This study was also able to confirm that EO is an antecedent to innovation intensity as illustrated though the conceptual framework. The causal relationship was also confirmed through qualitative investigations.

The complete SEM (later shown as ETM in figure 8.3) showed that all the measures of EO are input measures and hence, EO facilitates a number of outputs particularly innovation intensity, which is a critical output of an entrepreneurial organization. Therefore, an organization having an entrepreneurial orientation can cause innovation intensity to occur. Among all the factors, ready to innovate contributes largely towards producing innovative outputs by the entrepreneurial organization. The output measures of innovation were also developed through degree and frequency of incremental and radical innovation, which ultimately measures the innovation intensity of the firm.

Research Objective 3: *To empirically test the conceptual idea that degree and frequency of innovation are the critical measures of II.*

The measurement model and subsequently the structural model indicated that radical and incremental innovation degree and their frequencies represent the measures of innovation intensity. The degree and frequency of incremental and radical innovation showed coefficient values which were statistically significant with $p < .001$ and this was also confirmed qualitatively. The measures were found to be reliable and valid.

Research Objective 4: *To develop a two-dimensional II scale that is applicable in the corporate sector in Oman.*

This study has been able to develop a two-dimensional measurement scale for innovation intensity (figure 8.2). The scale presents itself as a two-dimensional grid with four quadrants representing varying levels of degree and frequency of innovation. The scale is applicable in the corporate sector in Oman and the scale was also pilot tested with a few companies within the corporate sector showing the potential for its application.

The results of quantitative and qualitative findings are discussed in the light of the literature in the next chapter.

Chapter 7: Discussion

7.1 Introduction

This study has synthesized the entrepreneurial orientation research with innovation research, hypothesizing that EO influences innovation intensity. Two important constructs from the field of corporate entrepreneurship and innovation were selected for this study and issues related to their measures and scaling were addressed. The measurement scale for entrepreneurial orientation was refined, developed and tested in the context of the Omani corporate sector. At the same time, a two-dimensional scale for innovation intensity was developed. The theoretical framework was tested on a sample of 404 firms representing 15 different industries in the Omani corporate sector. This chapter discusses results in the light of the quantitative and qualitative findings and the literature. The chapter begins with the discussion on the entrepreneurial orientation construct and its measurement. It further discusses the results related to the development and testing of the innovation intensity construct. Finally, the relationship between entrepreneurial orientation and innovation intensity is discussed.

7.2 Entrepreneurial Orientation

One of the key premises of this thesis is that the five factors comprising of ready to innovate, competitive aggressiveness, autonomy, risk taking and proactiveness are reflective components of EO. This was found to be true. This study confirmed that EO is a second-order construct consisting of five factors as structural model showed GFI 0.930 (figure 5.3) and GFI 0.957 in the SEM model (figure 5.5). The five factors are able to measure a range of entrepreneurial activities that make a firm entrepreneurial. By studying all the five factors together and validating the measures, this study has been able to provide a more comprehensive analysis of EO. Through the extensive literature review in chapter 2, it was reported that there were inconsistencies in the use of the five-factor model versus the three-factor model (comprising only innovation, risk taking and proactiveness). Hughes and Morgan (2007) reported that the majority of studies on EO had only examined three out of five factors and hence the scales were incomplete.

Another key premise of this thesis is that EO dimensions are input measures. Many researchers fell in line with this conceptualization of EO. Yiu and Lau (2008), Yu (2010) and Foss et al. (2008) argued that EO is resource based model that promotes entrepreneurial outputs. Lee and Chu (2011) hypothesized that EO is resource and capability developing framework that provides competitive advantage to firms. The quantitative and qualitative results showed that EO is an enabling model, comprising of EO measures that facilitate innovation intensity. The measures of EO were designed to test this assumption and were found to be valid. This is in line with Schillo (2011), Vora and Polley (2012), Rauch et al. (2009) and Hosseini (2012) who also reported EO as an enabling framework. Foss et al. (2008) also contended that EO drives resources and capabilities of a firm. A number of studies reported in chapter 2 studied the effect of EO on organizational performance, indicating that EO impacts organizational performance and hence is an enabling framework. The relationship between EO and firm performance has dominated the studies on EO and it had reached a point of diminishing returns, with no new insights emerging out of such studies. This study answered the call to take EO research in new directions so that it benefits theoretical understanding and professional practice. The modified EO scale developed in this study can be used by managers in the corporate sector to understand how EO can be enhanced through its various dimensions. Therefore, it is important for an entrepreneurial firm to be able to assess areas of strength and weakness, which can be done through adoption and practices of measures presented in the EO scale.

7.2.1 Ready to Innovate

Among all the factors, ready to innovate was the most prominent measure of EO construct with a path coefficient value of .72 $p >.001$ in the SEM mode (figure 5.5) and path coefficient value of .78 $p >.001$ in the structural model (figure 5.3). The result indicates that ready to innovate is a key factor that enables measurement of entrepreneurial orientation of an organization. The implications of this finding is that EO may be compromised without being ready to innovate and an organization may not be able to leverage other dimensions. An entrepreneurial organization may be proactive but will not be able to exploit and capitalise on the opportunities without innovation, which to large extent depends on its state of readiness to innovate. Similarly, an entrepreneurial organization may not be able to compete aggressively in the market without the potential to innovate.

Previous studies, reported in chapter 2, had used the innovation dimension in general terms with a mix of input and output measures. Baregeheh (2009) pointed that the conceptualization of innovation has varied over the last forty years of research on innovation and is used interchangeably with innovativeness. This study clarified that conceptualization of innovation within the EO construct relates to input measures and enhances the readiness of an entrepreneurial organization to innovate. Therefore, this study termed this factor as 'ready to innovate'. This indicates that innovation within the EO framework facilitates and prepares the organization for innovation. The items related to this dimension were tested with this assumption and were found valid. This study argues that the earlier definitions of innovation implied innovation as an input measure, but did not explicitly clarify it. This is evident in the definitions by Garcia and Calantone (2002, p. 113) where the elements such as "*propensity of the firms to innovate and develop new ideas"* were used to define the concept and Lumpkin and Dess (1996, p. 142) who conceptualized it as *"a willingness to depart from existing technologies or practices".*

The results of this study are in line with studies done by De Jong and Hartog (2010), who studied innovative work behaviour, Rodrigues et al. (2010) who termed it as 'innovativeness', and Kamaruddeen et al. (2011) who argued that innovativeness is about developing the organization's capability to innovate. All these studies have one argument in common, which is that a firm must first be ready to innovate and develop its ability to innovate, before it can actually start innovating. Isaksen (2007a) argued that most organizations ignore a critical factor which relates to readiness, willingness and capabilities to embrace change and innovation. Rodrigues et al. (2010) provided better context to the discussion by arguing that innovation can be result of innovativeness.

The results of the study suggest that the measures of the ready to innovate dimension fit with Whittington's (2006) explanation, namely practice, praxis and practitioners. Practice represents shared beliefs, norms, behaviour and activities that can be altered (Seidl, 2006). Praxis refers to enacting ideas into motion, while the practitioners are the ones who make innovation happen. Therefore, the culture of innovation would involve management seeking and supporting ideas from these practitioners, practitioners motivated to generate, develop, and implement ideas. The organizational culture seeks and rewards new ideas, resources are committed for innovative activities. Isaksen (2007b) contended that ideas generated by employees have to be encouraged and supported by the senior management.

The findings of this study also have implications for studies that are focused on investigating the effect of organizational climate in promoting creativity and innovation within organizations. Ready to innovate is about providing the right organizational conditions and climate for innovation to take place and support innovative initiatives.

Organizational climate models are similar to the EO construct, as they discuss the enabling role of climate in facilitating creativity and innovation. Creativity, however, is not part of 'ready to innovate' dimension, as it is linked with cognitive abilities, expertise, skills, personality dimensions and motivation (DiMaggio and Powell, 2005). It is, moreover, an individual activity, while innovation is a group- and organizational-level activity and requires the coordination of cross-functional teams and even external parties if the organizational innovation strategies allow it (Sayer and Walker, 1999).

Ideas must incubate while they are evaluated and hence employees must get time for learning and innovation. Top management should commit to the development of resources and capabilities, without which an organization cannot be ready to innovate. Kanter (2010) and Mbiziet al. (2013) laid importance on developing necessary capabilities for innovation.

'Ready to innovate' is similar to innovativeness but this thesis takes this dimension beyond its original conceptualization. While most of the discussion on innovativeness relates to building capability, ready to innovate is a broader dimension and includes measures such as innovation building capabilities but is not limited to it. It also includes measures such as organizational culture and climate, role of venture units and external partnerships that contributes towards making an organization ready to innovate. It is argued that capabilities can be developed both internally as well as externally.

The implication of this finding is that ready to innovate will come at a cost, the benefits of which may not be immediately evident and hence top management buy-in is essential. The willingness to commit to costs associated with ready to innovate will come not only through internal mechanisms but also through external partnerships. Gaba and Meyer (2008) pointed out that entrepreneurial firms create private venture capital practices which are engaged in creating start-ups with a focus on innovation. These venture units help the firm to access a wide range of new technologies which can enable innovation. Sourcing of ideas from shared forums and professional groups can improve an organization's ability to innovate through collaborative capabilities, access to technical know-how and access to new technologies. Two such collaborative partnerships that are evident are crowdsourcing (Howe, 2008) and open innovation (Penin, 2008).

Howe (2008) suggested that these collaborative partnerships can be with professional forums, venture capitalists, universities and even customer groups. These measures were found valid but come with a word of caution. External partnerships not only require commitment of resources, but also involve risks and hence organizations may be reluctant to engage with external partners. Further, many organizations may commit themselves to making the organization ready to innovate, but with short-term vision and during times of economic pressures, may not fully commit themselves. This will result in the organization expecting innovation but without a ready state and it may be caught in a spiral leading to abandonment of its innovation strategies.

7.2.2 Competitive Aggressiveness

This study found competitive aggressiveness as an important dimension of EO with a path coefficient value of .16 and $p < .05$ (figure 5.5). Many studies in the past did not include the competitive aggressiveness dimension as a part of the EO framework and only focused on innovation, proactiveness and risk-taking dimensions. Although the results were significant, the path coefficient value was lower compared to other dimensions, particularly ready to innovate. The lower value indicates that firms in the corporate sector do not relate the competitive aggressiveness dimension strongly to EO. This may be related to lack of confidence as to which competitive aggressiveness measures may be effective, which may vary based on market structures. Most of the competitive strategies identified by the managers through qualitative interviews were related to costs and aggressive posturing by the management. Top management may have to prioritize the competitive aggressiveness strategies based on market requirements and customer preferences. Blackford (2014) supported this view that the top management's competitive aggressiveness posturing translates into organizational competitive aggressiveness. Achieving competitive advantage over competitors by capturing new market segments, lowering costs and building partnerships are some of these strategies and were all found to be valid measures of competitive aggressiveness. Quantitative results indicate that the measures tested for competitive aggressiveness were valid, although not strong. The lower path value may be also be as a result of the measures involving a range of competitive strategies over a broad spectrum and firms may not have been related to an array of competitive strategies that the measures proposed.

Lumpkin and Dess (1996) argued that intensely challenging the competitors would require unconventional strategies rather than conventional tactics. Two types of competitive action are identified which involve being proactive or being reactive to competitors' moves (Stambaugh et al., 2011).The representation of items on a number of indicators such as cost, processes, partnerships and differentiators indicated a number of coordinated and repetitive competitive actions are required to intensely challenge the competition (Ferrier, 2001). Competitive aggressiveness of the firm can be enhanced by the speed and multiplicity of competitive attacks by selecting a number of appropriate strategies. Ferrier and Hun (2002) found that competitive actions can be initiated on a number of fronts, which include markets, products, cost and price and development of inimitable capabilities. Porter (2008) also noted that firms often use price as a source of differentiation. This competitive action of enhancing the pricing power is facilitated by a reduction in cost.

Some authors such as Kim and Mauborgne (2005) and Staumbaugh (2011) argued that competitive aggressiveness works in combination with innovation, which can improve competitive aggressiveness and can help to increase market share and even create new markets.

Another important aspect of competitive action is whether the firm has the capability to be competitively aggressive. A firm may have the propensity for competitive aggressiveness, and may also adopt such as posture, but its ability to outperform its rivals largely depends on its capabilities to do so and the resources at its disposal to achieve its objectives (Chen et al., 2007; Yu and Cannella, 2007). Therefore, firms may prioritize the rules of engagement based on these capabilities and resources and the competitor's size and strength. An entrepreneurial firm may augment its own capabilities based on the assessment of a competitor's capabilities.

Caves and Ghemawat (1992) argued that differentiation is key to competitive advantage. Differentiating the products and services in the market was considered a key competitive strategy by Baker and Sinkula (2002). The results showed that both cost and differentiation strategy were considered valid measures of the competitive aggression dimension. Baroto et al. (2012) posited that such a hybrid strategy is the new strategy for competitive advantage as it reduces the heavy reliance of firms on costs and results in multiple sources of competitive advantage. It is argued that there are many sources for differentiation and cost and through that 'price' itself can be a differentiator. The cost savings can be further invested back into the firm to create differentiation. Therefore, driving costs down can enhance a firm's ability to compete and the firm can use it as a differentiator in the market.

Entrepreneurial firms also create partnerships that can help them to become more competitive in the market. These views were shared by Gnyawali and Madhavan (2001) who argued that inter-firm collaboration, even with a few competitors, in order to improve competitive aggressiveness in the market, has received less attention in the literature and hence the findings of this study are important indicators in that direction. Nielsen and Nielsen (2009) and Zerfass (2005) also extend this idea and argued that advances in technology allow firms to connect at a larger level. Firms can share resources, information and work on joint projects. This enhances the firms' capabilities for competitive aggressiveness. External partnership can provide a firm with valuable resources that give the firm the competitive strength. Further, organizations who forge strategic alliances share resources, information and develop relational assets over a period of time. Collaborative partnerships facilitate networking, technology transfer, financial assets and sharing of reputation and managerial skills.

Both qualitative and quantitative findings indicate that competitive aggressiveness is important for firms to determine the overall entrepreneurial orientation of the firm. In the absence of a coordinated and structured approach to competition, the real benefits of the competitive aggressiveness dimension would be difficult to achieve. Entrepreneurial firms need to be proactive in the market in terms of engaging with competitors. In order to compete aggressively in the market, firms have to compete on a number of fronts. These include internal as well as external measures. Driving costs down and capability-building are strategies that are internally focused. Finding new markets and using multiple strategies to differentiate in the market are externally driven strategies. The implications of this finding is that competitive aggressiveness is not just about challenging competitors. It has to be coordinated and structured and entrepreneurial firms can use a number of strategies that can aid in aggressively challenging competitors. Entrepreneurial firms are proactive, have an appetite for risk, employees are empowered through autonomy and the organization is ready to innovate. All factors enhance the ability of the entrepreneurial firm to compete aggressively.

7.2.3 Autonomy

Autonomy was found to be a valid dimension of EO with path coefficient value of .52 and $p < .001$ (figure 5.5). Among the EO dimensions, autonomy is perhaps the most prominent dimension that points towards that fact that EO is an input measure that influences entrepreneurial orientation and facilitates innovation intensity. Autonomy primarily relates to empowering human resources, providing the employees the freedom to generate ideas, delegate authority and responsibility. Such empowerment and delegation would encourage employees to be proactive in finding opportunities and take risks.

Zgheib (2011) and Monsen (2005) concluded that autonomy is the independent spirit that drives entrepreneurship. Autonomy directly relates to creating an organizational climate in which the employees have the freedom to act and take decisions. Amabile (1997) and Isaksen and Ekvall (2010) emphasised that organizations must provide freedom to their employees in order to promote creativity and entrepreneurial behaviour. Baker and Sinkula (2007) supported the view that when employees are given freedom to experiment, learning is enabled and it leads to entrepreneurial, particularly innovative outputs.

Autonomy at an organizational level suggests that firms do not impose constraints and restrictions on their employees (Lumpkin and Dess, 1996). Autonomy refers to making the organization conducive for entrepreneurial actions free of any obstacles. These obstacles are created when a firm does not create an organizational climate and organizational structure characterised through freedom, responsibility and empowerment. Entrepreneurial organization should make the operating divisions independent and autonomous in order to facilitate decision-making related to development of innovative ideas, capabilities and risk taking.

Autonomy is also studied within the context of autonomy of leaders. The leaders in the organization also act autonomously or even autocratically in terms of taking risky or competitive decisions for the organization. In an entrepreneurial organization employees from lower levels of the organization should participate in decision-making. Lumpkin and Dess (1996) argued that centralization and delegation of power depends on organizational size and management style. Jansen et al. (2006) found evidence that decentralization facilitated both incremental and radical innovation. They also associated flat organizational structures with fostering autonomy.

The quantitative findings, supported by qualitative findings, explain that autonomy should be practised and evidenced across the organization. EO is a firm-level phenomenon and employees at all levels can contribute towards the entrepreneurial orientation of a firm. In the absence of autonomy, the employees would not be proactive, willing to take risks and ready to innovate. Hence, autonomy is an important dimension of EO.

Although autonomy is a firm-level phenomenon, the responsibility to provide autonomy rests with the top management and if the top management is willing to enhance the entrepreneurial orientation of the firm, autonomy is an important factor to consider and implement. However, different firms can implement varying levels of autonomy. Some firms may focus only on structural autonomy, creating flat organizational structures and giving autonomy to independent units. It might be the case that in such organizations employees are not given freedom to act and are not made part of decision-making. It might also be the case that employees with higher amounts of work experience are given more freedom than new employees. In these scenarios the benefits of autonomy across the organization may not be realized. The benefits of the autonomy should be achieved at both the structural level and well as the employee level.

7.2.4 Risk Taking

The results showed that risks can be categorised as internal and external risks. The internal risk dimension was not found to influence EO, with a negative path coefficient value of -0.22 and $p > .05$ (figure 5.5). However, external risk taking was found to influence EO, with a path coefficient value of .57 and $p < .001$. Respondent firms did not consider internal risks as part of the entrepreneurial orientation and hence negative values were derived on this dimension. The findings are more in line with findings of the literature. Wiklund and Shepherd (2008), Baker and Sinkula (2009) and Eggers et al. (2013) also pointed out that risk taking not only involves taking bold steps but also commitment of substantial resources, which cannot be internally controlled. Therefore, these measures of external risk taking were found to be significant measure of EO compared to internal risk taking.

Internal risks can be managed through appropriate systems and structure that can help to manage and reduce internal risks. Firms have higher levels of control over internal risks compared to external risks. Internal risks involve creating an organizational climate in which an organization supports a risk-taking culture without negative outcomes. Such risk-tolerant organization also puts in place a number of strategies and a structure in place that can help them to manage and mitigate risks. In other words it creates low-risk environment and therefore does not support entrepreneurial orientation. Firms may mitigate the risk through a number of strategies. Lean start-ups are one of the ways firms can mitigate risks.

External risks particularly require substantial levels of financial, human and technological commitment. An entrepreneurial organization would support a risk-taking culture that commits resources without resistance. There was substantial discussion in the literature on blind risks versus safe risks that drive resistance. These views are similar to those of Dess and Lumpkin (2005) who had suggested calculated risk taking.

Risk taking has been closely related to innovation, as innovation would involve risk taking (Hoonsopon and Ruenrom, 2012). However, not all types of innovation are the same. Incremental innovation, for example, may require lower risk compared to radical innovation. Many firms believe that risks are high when new markets and new products are involved. However, this may not be true as Bekefi et al. (2008) pointed out that risk and opportunity are two sides of the same coin. Missing out on opportunities in the market, perceiving them to be too risky, may not be a good strategy. However, risk management does not always work as Borison and Hamm (2010) argued. Nishimura (2015) also supported the view that missing opportunities in the face of risk is a risky strategy. Nonetheless, the results indicate that appropriate strategies and organizational structure are required so that firms are prepared and aware of risks involved. This has to be supported by a 'risk-taking' organizational climate, where employees are not punished for failures emerging from risk-taking. Blanco et al. (2014) suggested that the senior management should periodically assess the risk-taking climate in their organizations. He pointed out that the risk-taking climate drives business practices and hence called for development of a risk culture framework.

Blanco et al. (2014) suggested that risk culture framework should include risk policies, methodologies and structure to manage risks. An entrepreneurial organization may focus only on internal risks and put measures in place to mitigate and manage risks. This may lead to risk avoidance and a focus on risk reduction rather than risk taking. In the absence of external risk-taking ability, an organization may lose out on its entrepreneurial orientation and opportunities may not be exploited. An entrepreneurial firm has to enhance its ability to exploit opportunities in the market, enhance its readiness to innovate and challenge competition, all of which involve risk taking.

7.2.5 Proactiveness

This study confirmed that opportunity seeking is an important dimension with a path coefficient value of .26 and $p < .05$ (figure 5.5). Proactiveness, within EO, is also an input measure that enhances the entrepreneurial orientation of a firm. Firms that show proactiveness, by monitoring environments, are usually the first in the market and proactively engage external parties and customers. This is in line with the conceptualization of other EO dimensions which show proactiveness as an input measure that facilitates innovative outputs. Although the quantitative results on this dimension are not very high (although significant), some of the respondents during the qualitative interviews felt quite strongly about this dimension and its relation to entrepreneurial orientation.

Their views are shared by Shane (2000) who pointed out that recognition and exploitation of opportunities are key characteristics of entrepreneurial organizations. Entrepreneurial firms should not only identify opportunities but act on them (Eckhardt and Shane, 2003). Covin and Lumpkin (2011) pointed out that this can happen when the entrepreneurial orientation of the organization allows tolerance for failure as not all opportunities may lead to successful results.

Applegate (2008) also pointed out that high-growth opportunities and breakthrough opportunities, which are usually accompanied by innovation, provide firms with first-mover advantage and subsequently competitive advantage. Wang et al. (2015) and Tang and Hull (2012) also viewed the proactiveness dimension as a facilitator of first-mover advantage.

The findings indicate that organizations should identify and exploit opportunities before competitors can exploit them. Entrepreneurial organizations lead the market in product and service development (Rhee and Mehra, 2013). The entrepreneurial organization also forges strategic alliances so that these opportunities are adequately exploited and market share is captured. Lau (2015) suggested that joint ventures, especially with overseas firms, provide opportunities for expanding existing businesses. Wang et al. (2012) noted that venture capitalists forge strategic alliances with entrepreneurial firms instead of just funding these organizations. The findings also indicate that in order to be proactive, organizations must be in a constant state of change. Employees in entrepreneurial organizations constantly search for opportunities by environmental scanning. Bekefi et al. (2008) had pointed that these opportunities may present themselves through technological innovations, supply chain activities and from customer and competitive intelligence. Therefore, by being proactive, firms can be entrepreneurial as it is one of the primary steps for new entry.

The ability of entrepreneurial firms to capture and exploit opportunities is also contingent upon their states of readiness to innovate and their appetite for risk. As already pointed out that through external partnerships readiness to innovate can also be enhanced, but it would not be possible until the firm is proactive. Ideally, entrepreneurial firms exploit market opportunities assisted by the above-mentioned dimensions. Therefore, the proactiveness dimension is effective when other elements of entrepreneurial orientation are effectively used. In the absence of the proactive dimension itself, other dimensions of EO may not be effectively used. The purpose of enhancing a firm's readiness to innovate is to augment its ability to deal with change and be proactive in the market. A ready to innovate state enhances the firm's ability to exploit opportunities in the market through innovation, take risks and achieve competitive superiority. Therefore, the five factors adequately represent the EO construct.

7.3 Innovation Intensity

The findings of this study have brought more clarity towards measurement of innovation, an area that has received empirical attention, but very few quantitative and empirical scales are currently available. This study confirmed that II is a second-order construct consisting of two first-order factors as structural model showed GFI 0.923 (figure 5.4) and GFI 0.957 in SEM model (figure 5.5). Degree and frequency of incremental and radical innovation was found to be an appropriate measure of innovation intensity. Degree and frequency of innovation were measured through a range of items that were quite comprehensive.

7.3.1 Incremental Innovation Degree and Frequency

The quantitative findings showed that incremental innovation degree and frequency are appropriate measures of innovation intensity with a path coefficient value of .24, with $p < .001$ and .52, with $p < .001$, respectively. Incremental innovation degree is primarily associated with improvement of products and services, focusing on existing customers and markets by staying close to customers. Incremental innovation allows firms to penetrate existing markets, meeting the needs and demands of its existing customers and retain existing customers (Goldenberg et al., 2003; Martin, 2011).

The findings of this study are in line with arguments put forward by Baker and Sinkula (1999, 2007) and Dong (2015) that incremental innovation focuses on inefficiencies, improves them and serves existing markets. This study argues that the nature of incremental innovation requires less research and development, complexity and shorter lead times, making higher frequency of innovation possible. Since incremental innovation is related to improvements and addressing customers' needs and demands, the improvisations are endless and hence there is a need to produce frequent innovation (Anonymous, 2010). Martin (2008) also pointed out that dominant design in an industry exists for longer periods of time, unless a firm comes up with radical innovation to alter or puncture the dominant design. This happens over long intervals. In the meantime, while the dominant design and technology is exploited by firms in the industry, minor modifications and improvements are made by different firms, the frequency of which is higher. This is one of the reasons frequency of incremental innovation was closely associated with innovation intensity. The quantitative results for incremental innovation frequency showed higher path coefficient value of .78 in the structural model (figure 5.4) and higher path coefficient value of .52 in the complete SEM model (figure 5.5). Marshall et al. (2009) and Chen and Bau-Guang (2012) had emphasised the need for measuring frequency of innovation, which proved to be a key measure of innovation intensity.

Market penetration, listening to customer feedback related to product, service and process design and satisfying the needs of existing customers, which were found to be important measures of incremental innovation, are linked together. When firms use incremental innovation to satisfy the needs and demands of its existing customers, they are able to further penetrate the markets. Arnold et al. (2011) hypothesized that unified information from customers provides direction to a firm to move forward in a coordinated fashion addressing customer needs and deficiencies in products and services. Ashish et al. (2009) studied market penetration of existing and new products. They concluded that the speed of market penetration and rate of diffusion is increasing at a rapid pace due to globalization.

Through incremental innovation (improvements and modifications in any elements of the product which include product design, features, price, distribution or packaging) in existing markets, firms are able to increase their market share. When entrepreneurial firms achieve increased sales from customers from the same market, market penetration strategies through the use of innovation is effective (Farris et al., 2010). Martin (2011) argued that existing customers are primary adopters of incremental innovation and hence firms by satisfying the needs of their existing customers also maintain or increase their market share. Debruyne's (2015) argument is in line with the findings of this study, that by a deeper analysis of customer needs through different channels of communication and feedback, innovation in products and services can be brought to the market.

Debruyne (2015) also called for an incremental approach to implementing innovation and involving customers in the development of products and services. Arnold et al. (2011) also found evidence that customer engagement and retention can be enhanced through incremental innovation. Chu and Chan (2009), citing PricewaterhouseCooper's (2006) report, argued that 46% of innovations emerge from customers, suppliers and intelligence networks. Focusing on the needs of existing customers, satisfying them with incremental innovation improves firm and customer relationship leading to higher rates of customer retention. Therefore, incremental innovation, although it may not be able to make radical changes, is effective and hence is an appropriate measure of innovation intensity.

Incremental innovation degree is achievable by most entrepreneurial firms as it can be executed within the existing culture and structure of the firm. However, sustaining it (frequency) is essential as a number of incremental innovations may result in the desired outcomes an entrepreneurial firm may want to bring to its products, markets or customers. Therefore, without frequency incremental innovation degree may not be effective. Frequency of incremental innovation may also build an entrepreneurial firm's capacity to innovate regularly until it becomes part of its organizational activities. Continuous incremental innovation may also build a firm's capacity and desire for radical innovation.

7.3.2 Radical Innovation Degree and Frequency

The quantitative results showed that radical innovation degree and frequency is a measure of innovation intensity with a path coefficient value of .44 in the structural model (figure 5.4) and .21, $p < .05$, in the complete SEM model (figure 5.5). Although the path coefficient value in the SEM model is low (but significant), radical innovation degree and frequency is an important measure of innovation intensity. Since radical innovation degree and frequency is low in occurrence, firms may not be able to easily relate to it and hence the path coefficient values may have been lower compared to incremental innovation degree and frequency.

The measures of radical innovation degree are mostly the opposite of measures for incremental innovation. Incremental innovation focuses on improving existing products, while radical innovation aims to introduce new products, services and processes. The measures of radical innovation involve introduction of new products and services, persuasion of radically new technologies and new target markets. Radical innovation requires different mind sets, strategies, and capabilities, and organizations have to make a substantial shift from their existing structures and strategies to enable radical innovation.

Radical innovation is attractive considering its impact in the market and on customers. However, the largesse and glamour of radical innovation comes at a price. An entrepreneurial firm has to create an entrepreneurial architecture (Burns, 2013), revamping its organizational culture, structure, strategies and leadership. The firm has to significantly depart from its existing practices and build new capabilities, even if the existing capabilities and practices are effective. Even more challenging is sustaining radical innovation on a continuous basis. An entrepreneurial firm has to be on a perpetual change spiral and the entrepreneurial architecture will have to evolve continuously.

Banu and Grant (2011) argued that radical innovation requires higher research and development, higher levels of information needs and is more complex and takes time. Radical innovation, therefore, require longer lead times, reducing its frequency. Hence, frequency is not strongly associated with radical innovation. The findings of this study also showed that incremental innovation was more prevalent in the Omani corporate sector than radical innovation. One such indication was the path coefficient values for radical innovation degree and frequency were lower in the complete SEM model.

Radical innovation may be new to a firm or new to the market. Radicality in radical innovation can be seen at organizational level, industry level, customer level and technological level (Katila, 2000). Jansen et al. (2006) reported that radical innovation creates new markets and customers. Radical innovation creates substantial competitive advantage considering the magnitude or radicalness it brings in the marketplace through radically new products and services. Kathryn (2012) pointed out that new and novel products and superior organizational performance are key measures of radical innovation. The rate of success for radically innovative products are higher. The findings of this study indicate that the novelty in new products appeals to new customers. Arnold et al. (2011) hypothesized that development of deep knowledge about the company's products influences radical innovation, as the customers will only adopt radical innovation if they understand and attach meaning to it. Arnold et al. (2011) hypothesized that diversity of customer knowledge and fragmented information from customers will lead to radical innovation as there is no coordinated direction that points towards customer needs. They concluded that depth and diversity of customer knowledge is positively related to radical innovation.

The findings of this study, in line with the literature, suggest that radical innovation has the potential to greatly impact the market and many times provides sustainable competitive advantage until the next big radical innovation happens. Radical innovation leads to market domination and firm growth (Atuahene-Gima, 2005; Tellis and Golder, 2001). Radical innovation has the potential to disrupt markets and change the rules of the competition (Prahlad and Mashelkar 2010; Nagji sand Tuff, 2012). Bessant and Tidd (2011) also agreed that radical innovation can be recognized by its potential to change the rules of competition in an industry. Although Baker and Sinkula (2007) argued that market orientation – which focuses on customer needs – does not supress radical innovation, it was questioned by Kathryn (2012) who argued that if firms do not focus on markets and customers, new and novelty products would not emerge. Ellis's (2006) meta-analysis indicated that a focus on existing customers and their needs does not allow radical innovation to take place. Hence, radical innovation is about influencing and changing the nature of consumer behaviour and the meaning they attach to the products and services they use (Norman and Verganti, 2014).

Nieto (2004) related technological innovation with development and implementation of new technologies. Zahra and Covin (1993) explained that technology policy – that is commitment to acquiring and deploying new technology – amounts to technological innovation. Technology is the main product in this innovation, which can be applied to new products and services. Since the new technology has not been used before, it makes the products, services and processes radically different. Vaughan (2013) argued that technological innovation can be associated with developing or working with new technologies to apply them to existing or new products and services. Le Bas et al. (2015) argued that technological innovation should be studied in the context of product and service innovation. If technological innovation is not commercialized through products and services, it cannot be called innovation. West et al. (2003) found process innovation (service delivery) is important to radical innovation as the level of changes required for radical innovation is able to modify customer behaviour. Incremental changes to processes may not be noticed by customers and may not lead to marked improvement in performance of firms.

7.4 Entrepreneurial Orientation and Innovation Intensity

The analysis of the findings also showed that entrepreneurial orientation with five factors was positively impacting innovation intensity, which was measured through degree and frequency of innovation. The complete SEM model (figure 5.5) showed a path coefficient value of .74 with $p < .001$ indicating significant impact of EO on II. The entire conceptual model was studied as an input–output model. It was hypothesized that since EO factors are input measures it impacts innovation intensity in a firm. This is in line with earlier arguments made in this study that innovation is not only about strategizing for innovation but also needs fertile ground to breed and produce. It particularly needs readiness to innovate, which then enables the organization to produce innovative outputs. The ready to innovate dimension is supported by other EO dimensions such as ability of the firm to be proactive, take risks in the market, challenge competition and provide autonomy to its employees.

The UK government paper *Innovation Nation* (2008) called for future studies to focus on both the supply and demand sides of innovation. The input–output model sets the stage to study innovation in a holistic perspective that takes into account both the supply side of innovation from the organizational perspective and customer and market innovation from the demand perspective. Corporate entrepreneurship is mainly characterised by new entry, innovation and strategic renewal (Antoncic, 2006; Rutherford and Holt, 2007; Yildiz, 2014). The input–output model developed through this study can be an appropriate model to study the majority of the aspects related to new entry, innovation and strategic renewal.

A number of EO input measures directly relate to new entry and most of the measures of both EO and II can facilitate strategic renewal. Hence, this study proposes to call the conceptual model the *'Entrepreneurial Transformation Model'* (ETM) (figure 8.3). The 'transformation' in the model is adapted from an operations' transformational model and implies transformation of inputs into outputs (Slack et al., 2013). ETM qualifies as an analogous model and it has the critical characteristics associated with a model. These include its ability to diagrammatically represent complex interrelationships that can aid in decision-making (Kuhn, 2005). The Entrepreneurial Transformation Model is able to provide a holistic picture of input and output stages of entrepreneurial activities, which brings clarity to the relationship between EO and II, particularly to the measurement of innovation. ETM, however, is limited to representing the relationship between EO and II only and does not represent all types of innovation. Specifically, the innovation intensity represented in the model is related to only product, service, process, customer and market innovation.

Some of the other indicators that have been regularly studied as outputs of the entrepreneurial transformation process are not included in this study. These are financial performance measures such as ‘ratio of sales to new products’ (Czarnitzki and Kraft, 2004), ‘ratio of sales in comparison to research and development budget’ (Gumusluoglu and Ilsev, 2009) and ‘book-to-market ratio’ (Tellis et al., 2009). They are not included in this study for two reasons. The first reason is the limitations of the measures themselves. Ratio of sales to new products and book-to-market ratio are quite broad and may be confounded by other factors. Ratio of sales in comparison to research and development budget has not been used as it is difficult to draw a baseline. Finally, a common measure of innovation, namely the number of patents, has also not been included as a measure of innovation because only a very small percentage of patents are realized (Jung et al., 2008) and do not guarantee financial returns and value (Von Hippel, 2005). Cromer et al. (2011) also concluded that patent count and efficient patent cycle time does not increase either profitability or market valuation of a firm. Secondly, the financial measures are outcomes of innovation intensity rather than measures of innovation intensity. Financial measures, in previous studies, have been mostly reported as a general measure of innovation without relating them to degree (incremental or radical innovation) and frequency of innovation.

The above discussion, in light of quantitative and qualitative findings, was useful to arrive at conclusions and at the same time highlight contributions of this study towards theoretical knowledge and professional practice. The discussion was particularly helpful in bring context and meaning to the measures in light of different forms of data. The conclusions of the study, limitations and future research directions are discussed below.

7.5 Conclusion

The selection of a five-factor model, in this study, is based on sound academic and empirical evidence. The measures representing the EO dimensions were found to be empirically valid. There was adequate evidence empirically and in the literature to support the measures. This study concludes that all five dimensions of EO measures, including ‘readiness to innovate’ but excluding output measures of innovation, complement each other and therefore all five dimensions are appropriate measures of EO. Presence of all EO factors is a necessary condition for EO to occur and if all five factors are not present the effectiveness of EO may be compromised, particularly in terms of producing innovative intensity. Therefore, the conclusion of this study is that all five EO factors should be included in future studies assessing EO as an organizational-level construct. Hence, the debate on the dimensionality of EO should be put to rest.

Further, this study concludes that measures related to EO are input measures that produce innovative outputs, which in this study were identified as degree and frequency of innovation and explained as the innovation intensity construct. It is important that clarity is achieved on complex and multidimensional constructs such as EO and II. It is especially important for measurement research and scale development. Earlier attempts to measure EO and to some extent II, have yielded mixed results due to lack of conceptual clarity leading to overlaps in measurement. In the light of this fact, the attempt to refine and validate the EO scale was an appropriate endeavour. Although the EO scale in previous studies contained a mix of input and output measures, it was interesting to note that most of the definitions used to define EO implied only input measures. This was a major issue related to the measurement of EO and this study was able to contribute towards better understanding of EO measures.

Most of the earlier studies posited EO influencing both organizational and financial performance of firm. It is concluded in this study that organizational and financial performance are measures of achievement, rather than outputs of entrepreneurial orientation. Innovation intensity, which is measured through degree and frequency of innovation, is an important output arising from EO, which then provides opportunities to achieve competitive advantage. This relationship needs to be clearly articulated in future studies so that the measures of innovation are not lost in the myriad layers either at input or output stages of the entrepreneurial transformation process. Therefore, the measures of EO have practical implications for managers who are interested to understand its nature, various level of contribution and its final impact on innovation intensity.

Since all dimensions and measures within EO are input measures, this study concludes that the innovation dimension, within EO, is also an input measure. This study has termed it as 'ready to innovate' as it is a much broader dimension compared to measures emphasised in organizational climate studies. Organizational climate is an essential condition that makes the organization ready to innovate, but the measures are not the same. Ready to innovate includes measures that enhance the capabilities of the firm to innovate on various fronts. An entrepreneurial firm may create a flat organizational structure and follow a management style that allows delegation and empowerment. These would create an organizational climate for creativity, but not necessarily make the organization ready to innovate. Innovation needs fertile ground to breed. A readiness to innovate state will emerge when top management supports ideas and experimentation. An entrepreneurial firm would provide time for learning and idea generation, reward innovation, develop competencies, and create venture units and external partnerships. At the organizational level, the firm would commit to departure from its existing practices, products, markets and technologies and acquire new resources. Such entrepreneurial orientation will lead to innovation intensity, witnessed through both degree and frequency of innovation. Since the ready to innovate dimension is the most contributing factor with highest path coefficient value, it is an essential condition for innovation to occur, without which innovation intensity would be difficult to witness.

Competitive aggressiveness was added to the EO construct at a later stage and is a valid measure of EO. The entrepreneurial orientation of a firm characterised through ready to innovate, risk taking and proactiveness (initial dimensions of EO) will lack context without referring to its impact on competition. After all, the entrepreneurial orientation should enhance the ability of firms to compete in the market, without which firms would not be in a position to benefit and assess the impact of ready to innovate, risk taking and proactiveness dimensions.

Initial conceptualization of the competitive aggressiveness dimension was related to responding to competitors' actions. However, later developments in the clarification of this dimension led researchers to argue that competitive aggressiveness is not only about reacting to competitors but also proactively challenging the competitors. The aggressiveness relates to competing for market share, pricing strategies and creating partnerships. However, one important conclusion is that the intensity of the challenge does not only depend on the strategic intent but also on capabilities to aggressively challenge the competitors. Hence, this aspect was found to be valid measure related to competitive aggressiveness dimension.

This study, along with many other studies, has confirmed the appropriateness and validity of the autonomy dimension. It can be safely concluded that the autonomy dimension binds all other EO dimensions together. It not only creates a climate for creativity and innovation to flourish, which most studies on organizational climate have focused, but also creates conditions for proactiveness, risk taking and competitive aggressiveness. Autonomy, among all other EO factors, is the most distinct factor in terms of being an input measure.

The risk-taking dimension is an appropriate measure of EO. There were two major themes emerging from the literature about the risk-taking dimension, which were confirmed empirically by this study. The first is related to risk taking versus risk management and risk reduction strategies. There was quite a debate in the literature on the utility and benefits and risks associated with both strategies and the literature reported lack of consensus on the risk-taking dimension. The perception of risk, therefore, is related to level of risk. Since internal risks can be managed and are within the control of the organization, they are considered less of a threat to the organization, compared to external risks. Before committing resources to internal risks, and to some extent external risks, firms can set up risk management committees and risk control measures. However, external risks are highly uncertain and have reasonable chances of occurrence and the organizational control over external risks is minimal, once it has committed to an opportunity, strategy or innovation. In conclusion, it can be argued that firms can manage internal risks and put in place risk management measures. A firm has to commit resources to external risks in the market, without which entrepreneurial orientation is difficult to achieve. Therefore, risk taking is a critical measure of EO.

Proactiveness is another key dimension that was found to be an important measure of entrepreneurial orientation. Being proactive and being first or an early entrant in the market is the essential characteristic of this dimension. The scope of opportunity in the market may vary but entrepreneurial firms should be able to exploit these opportunities, based on their objectives and potential. The proactiveness dimension, among all other EO dimensions, is also an input dimension that relates to strategies firms use to identify and capitalise on the opportunities in the market. This dimension is also very closely linked to, although quite distinct from, competitive the aggressiveness and innovation dimensions. Entrepreneurial firms are proactive, use innovative products and services with the primary objective to challenge competitors aggressively. Further, the risks vary depending on the type of innovation and depending on the outputs desired (incremental or radical), competitive challenge and scope of opportunity. Ready to innovate may not be a sufficient condition for being proactive or for that matter being competitively aggressive and therefore proactiveness is an important measure of EO.

This study concludes that the EO dimensions complement each other as the measures reflect the same underlying construct. New opportunities in the market can be exploited by being innovative, which also makes the entrepreneurial firm competitively aggressive. However, the level of competitive aggressiveness will depend on the level of the organization's state of readiness for innovation, resources at its disposal and risk appetite. Since each of the EO dimensions measures the common underlying construct, which is EO, the scores of each of the EO dimensions can be summed to generate a composite score. The earlier critiques in the literature on aggregation of EO scores did not receive much empirical support because the arbitrary weights could not be applied to the dimensions to derive the EO scores. The interpretation of the EO scale is further discussed in chapter 9.

Numerous studies have investigated the impact of EO on firm performance, but since the nature of the innovation dimension within the EO framework lacked clarity, its impact on innovation outputs were not investigated. This study empirically tested the assumption that EO factors are input factors that facilitate and create the conditions for firms to be innovative. However, measurement of this innovative output is not as straightforward as EO. It varies in its degree and frequency, which ultimately determines the innovation intensity of the firm. The entrepreneurial firm, therefore, should assess the degree and frequency of innovation (outputs) and this is appropriately reflected through the innovation intensity construct. This study concludes that a firm can be considered superior or inferior performer in terms of its innovation based on its position on the two-dimensional grid comprising of degree and frequency of innovation (figure 8.2). The position on the matrix indicates its innovative position and firms can decide if they would like to remain at or change their position on the matrix. Higher states of readiness for innovation can lead to either forms of innovation, and it would be safe to conclude that radical and incremental innovation by no means gain preference over each other. Instead, it depends on innovation objectives and requirements of innovation intensity of the organization.

It is also appropriate to conclude that the measures of incremental innovation are focused on improvements in current markets and firms are satisfied not only by the incremental improvements but also incremental benefits, as a result of such innovation. The impact of incremental innovation in the market is limited and short lived, which requires firms to continuously innovate and hence, these types of innovation are launched frequently in the market. Since incremental innovation can be achieved within existing frameworks and with minimal learning efforts, the frequency of incremental innovation is high. Therefore, incremental innovation is more associated with frequency rather than degree. This is due to the fact that the value of such innovation is derived through aggregated incremental effects over shorter periods of time. It indicates that frequency of innovation largely determines the incremental innovation measure. If a firm launches infrequent incremental innovation, it would not be able to demonstrate the intensity required with incremental innovation and hence the results may not be as effective as frequent incremental innovation.

Radical innovation, requires substantial changes to entrepreneurial architecture and new capabilities and resources are required. The measures of radical innovation involve introducing radical changes to products, services and processes, creating a radical shift in customer demand patterns and creation of new market spaces. Radical innovation also exploits radically new technologies which are applied to new products, processes and services. Therefore, radical innovation's impact can be sustained longer in the market compared to incremental innovation. Measures of radical innovation such as changing of customer behaviours and creation of new market segments, takes a substantial amount of time and effort and frequent radical innovation is not a frequently witnessed event. It also becomes difficult for competitors to match the radicalness of this innovation and the standards set by radical innovation remain in the market for some time before it is challenged by another radical innovation. New forms of customer behaviours, created through radical innovation, would create new demand patterns. Radical changes in operational and service processes would also need time to be imitated since they are internal and in the case of services, are human-resource driven. Since radical innovation is likely to occur less often (low frequency), many firms may not able to easily relate to it or more importantly deal with such high levels of change associated with radical innovation. This is one of the reasons this study also found that the firms were not able to strongly relate to radical innovation, as they did with incremental innovation. When radical innovation is low in frequency, it may not provide the competitive edge that a firm needs regularly. However, when such radical innovations are launched it does provide a substantial degree of competitive advantage to firms. Therefore, this study concludes that both incremental and radical innovation complement each other and measure the common underlying construct, which is innovation intensity.

Finally, this study concludes that EO is an essential requisite for innovation intensity to take place. Therefore, the level of entrepreneurial orientation of the firm will determine the level of innovation intensity of that firm. The measures of degree and frequency of incremental and radical innovation primarily used in this study, are product, service, process, technological and market measures and hence ETM is applicable to these categories.

However, this conclusion comes with a word of caution. Inputs at EO levels may not guarantee innovation outputs. Innovation is good as vision and strategy but until the conditions for innovation to take place are created, innovation outputs cannot be produced. The entire input and output measures have been presented as the Entrepreneurial Transformational Model (ETM) in this study. ETM is a valid model that can enable a firm to analyse and measure entrepreneurship and innovation. The ETM shows how entrepreneurial orientation (inputs) can be used to generate innovative outputs and the model presents a comprehensive picture of corporate entrepreneurship as majority of its pillars, namely new entry, innovation and strategic renewal can be studied through this model. The objective of EO is to facilitate new entry, while innovation can be useful for both new entry and strategic renewal of a firm.

7.6 Limitations

Although results, conclusions and contributions made by this study are robust and satisfactory, there are a few limitations to the study, due to the nature and scope of the research.

The first limitation is related to the depth and breadth of the study. Some of the very distinctly different sectors such as manufacturing and services sectors were part of the study. Therefore, sector-specific variables or controls could have impacted the measures but could not be part of the SEM model. There may also be moderators that influenced the hypothesized relationships. However, Schillo (2011) pointed that use of moderators that may be specific to different industries is problematic. Each industry would have separate levels of dynamism and complexity and would have a certain level of resources. Analysis of separate moderators for each industry would lead to limited recommendations and managers would not benefit from limited analysis of EO and related measures. The benefit of using a common measurement scale for different sectors was to enhance the generalizability of the measures. Moreover, the care was taken to include some measures which are common to both manufacturing and service sectors such as ‘products, services and processes’. Since the focus of the study was development and validation of measurement scales, the scales could not be tested for different sectors. The effect of this limitation was reduced through two methods: firstly, through achieving adequate sample size and good response rate statistical generalisability and secondly, through analytical generalisability whereby qualitative inquiry informed and confirmed interpretations of results. Additionally, homogeneity of variance tests did not indicate any significant differences between different groups of respondents. This gave the confidence to extrapolate the results to the corporate sector in Oman.

A second limitation is related to the size of the firms participating in the study. Most of the firms were large in size, while few small and medium companies (SMEs) also participated in the study. The limitation of this sample characteristic is that the SMEs may have a different set of capabilities, resources and strategies and may be focused on incremental rather than radical innovation. The learning curve in SMEs is different compared to large firms. If this holds true, the measures may have been undermined by their responses. However, since most of the measures showed high significance levels, it is assumed that the measures were not undermined in a significant way. The upside of including firms of varying sizes was that the generalisability of the results and measures has increased. Additionally, SMEs may find the measures valid and applicable as they might be in growth stages of their lifecycle and would soon grow to become large firms and hence the measures would align with their aspirations.

Another limitation is related to statistical values that did not explain all the variances as evident in the resulting models. Qualitative inputs had to be taken for some unexplained variances. Further, qualitative investigation into dimensions such as internal risk taking, which did not show significance, need to be further adapted and refined.

There is also a limitation related to the conceptual clarity of innovation. The concept of innovation is quite broad and its measurement was a challenge considering both tangible and intangible aspects associated with innovation. Therefore, not many studies have been able to develop a comprehensive scale to measure all aspects of innovation. This study also faces such challenges and does not claim that the innovation intensity scale represents all contexts of innovation in all research settings. The measures of innovation intensity as per this study, can be applied to product, service, process and market innovation only. Considering innovation is a broad and abstract concept, the respondents' understanding of the term innovation in general may have shaped their responses and lack of clarity on its measurement might have spilled over to the respondents' perceptions of innovation. This was anticipated during the pilot study, and a clarification of the innovation terms (including incremental and radical) were included in the questionnaire (appendix 1). Clarification and explanation of the terms were made in greater detail during the interviews with the respondents.

Another limitation of the study is related to the respondents. One senior manager (in terms of designation in the organization) was chosen for the study assuming that that the manager is the best respondent to represent the organization, since they see the organization from a holistic perspective. The views of middle-level managers were not taken into consideration due to the fact that the 'organization' was considered as a unit of analysis and hence only a single response was possible; and therefore it was beyond the scope of the study. Although single respondent bias was not evident, it might have limited the responses among a few respondents. Although both EO and II are organizational-level variables, the study might have been limited in terms of analysing any conflicting views of middle managers or new insights that might have emerged from middle-level manager analysis.

Another limitation related to respondents was that many respondents selected the neutral choice (3 on the interval scale) in the questionnaire, indicating that these respondents perhaps did not want to commit to certain questions. Therefore, bunching of data on the neutral choice could have limited the findings. Although objectivity is expected in responses from a questionnaire, there might have been some subjectivity applied in forming opinions and then responding to the questions. This was perhaps due to their cultural orientation and it was also evident during the qualitative interviews, whereby the respondents did not like to commit to ideas and wanted to have safer options. The respondents were, however, assured of their confidentiality. The cultural influences on the hypothesized relationships could not be investigated as it was beyond the scope of the study and relates to the depth versus breadth issue.

The final limitation is related to the Entrepreneurial Transformational Model. Since the ETM model has been developed from an operations perspective, its interpretation and application may be limited by different perceptions of transformation. ETM could not include different contextual influences such as cultural or sector-specific effects on ETM, which could be the part of the model, since it was beyond the scope of the study. At the same time, few studies have indicated the role and influence of speed in different types of innovation, particularly incremental innovation. Since the study was focused on the two-dimensional measure of innovation, degree and frequency, the influence of speed could not be included in the ETM model.

7.7 Future Research Directions

The research on entrepreneurial orientation can be taken forward by testing the refined EO scale, developed in this study, in different research settings and establish the transferability of the results and measures. As against a quantitative approach used in this study, a qualitative approach using case studies can also be used to understand the depth in each of the dimensions. The effect of each dimension on different parameters of organizational performance can be an area of study.

This study has opened doors for further study on both EO and II constructs and their measurement and impact. The unique contribution and impact of the EO factors on innovation intensity can be an area for future research. Therefore, the unique contribution and influence of each of the first-order EO factors on each of the first-order II factors, i.e. incremental and radical innovation can be evaluated. To start with, the influence of ready to innovate can be independently assessed on incremental and radical innovation. The same can be done for the rest of the factors of EO. Since the modified EO scale is applicable in the corporate sector in Oman, sector-wise analysis and inclusion of cultural specific variables can provide researchers the scope to adapt the scale and get possible insights into sector-specific measures.

To evaluate the application and generalizability of the II two-dimensional scale, 10 companies were asked to complete the II scale. A sample of four responses which represented each of the quadrants was plotted on the II scale (figure 8.2) and the results showed the applicability of the scale. Hence, it is suggested application and testing of the II scale on a larger sample in the corporate sector so that its validity and generalizability can be improved. Further, the II scale can also be tested for different sectors so that a deeper analysis and sector-specific meaning and value of innovation may be derived. Further, through qualitative investigations, metaphors for each of the four quadrants of the II two-dimensional scale can be developed. The views of different levels of managers can be included in similar studies and qualitative investigations would cross-validate the EO and II scales.

Further, the new II scale can also be tested in different research settings for reliability, validity and transferability. Further, the influence of external factors on II can be investigated. An interesting direction of future research would be to investigate whether the measures of intensity of the rest of the EO dimensions such as risk taking, proactiveness, competitive aggressiveness and autonomy can be independently developed and tested.

Finally, the Entrepreneurial Transformational Model and the resultant causal relationships between EO and II can also be tested in different research settings to establish the validity, transferability and acceptance of the model. If the relationship between EO and II in different research settings holds true and can be proved empirically, ETM can be considered an established theoretical model.

Withstanding the limitations, the discussion and conclusion indicates that this study has made contributions to the advance of theoretical knowledge and improvement in professional practice. The contribution to theoretical knowledge and professional practice is further discussed in chapter 8 followed by reflections on contributions in chapter 9. The next chapter particularly highlights the ETM, and the modified EO and II scales, and discusses their applications in the Omani corporate sector.

Chapter 8: Contributions to Theoretical Knowledge and Professional Practice

8.1 Introduction

The discussion of the results in the light of the literature and the quantitative and qualitative findings in the previous chapter showed that the study has substantially contributed towards the development of theoretical knowledge and has the potential to contribute towards improvement of professional practice. This relates to clarification and refinement of measures as well as development of new measures and scales, finally leading to the Entrepreneurial Transformational Model. This study has also contributed towards practices of mixed methods research.

8.2 Contributions to Theoretical Knowledge

Specifically, the following are the contributions of this study to the development of theoretical knowledge:

1. This study is able to highlight all the irregularities in EO research and has addressed the most prominent issues. Refinement, development and validation of comprehensive measures of EO and removing overlaps between different factors and measures was a major contribution of the study. Despite abundance of research on EO, the issues related to EO measurement were not resolved and no new insights were forthcoming. The primary issue revolved around the inconsistent use of factors. Some research used three or five factors, while some studies developed and tested a long list of measures for only one factor. These were some of the major weaknesses identified by this study in EO research. Therefore, this study developed a comprehensive set of items for all the factors through a review of existing scales and through an exhaustive literature search. This was by far the most exhaustive pool of items that has been developed. The developed measures were empirically and rigorously tested using EFA, CFA, measurement and structural modelling. The results were conclusive and a number of issues related to EO research were resolved. Firstly, the five factors were proven to be appropriate and reflective measures of EO and the fact that all measures were essential in order to be called an EO scale was established. The five factors not only

provide the complete picture of EO but also they complement each other. Secondly, rigorous testing of measures empirically through statistical and narrative data ensured that the overlaps were removed and the validity of the measures was established. The study further contributed by addressing the issue of aggregation of EO scores and concluded that EO scores can be summed since the measures reflected the same underlying construct. The refined EO scale can be tested in different research settings with cultural and sector-specific controls and has the potential to become a widely accepted scale.

2. Another contribution of this study is clarification that EO is a behavioural propensity and an enabling framework comprising of input measures that facilitate a number of entrepreneurial outputs. There were not many well-known studies conducted on EO that clarified the nature of the measures. Ironically, numerous studies investigated the effect of EO on a number of organizational outputs such financial performance and organizational performance. The measures used in these studies did not clarify the nature of measures. This study identified it as weakness of EO research. Through an exhaustive literature search and analysis of a number of definitions (including some of the original definitions), this study worked on the thesis that EO measures are input measures and all the measures used in the study representing EO were developed and tested as input measures. The results proved that EO measures are in fact input measures and it has helped to bring more clarity to EO measures. It also lends credibility to many other studies that do or aim to investigate the impact of EO on any organizational performance parameters. This finding also provides new perspective to EO research by clarifying the nature of measures and is able to address the earlier gaps that investigated the impact of EO on a number of performance indicators without clarification of the measures.

3. This study clarified that the innovation factor within EO should be termed and measured as 'ready to innovate' (input measure) rather than just innovation as used in previous studies. The original conceptualization of innovation as a

measure of EO by Lumpkin and Dess also consisted of a mix of input and output measures. Later studies also did not clarify the nature of the innovation dimension within EO, although many studies claimed that EO is difficult to visualise without innovation. In line with the above-mentioned conceptualization of EO measures and therefore innovation as an input measure, this study argued that innovation is a very broad concept and its measures need to be clearly articulated. The results of this study proved that ready to innovate is an appropriate and valid measure of EO and also throws light on its nature, which is to facilitate entrepreneurial outputs, particularly innovation outputs. This is an important contribution of the study since it provides new perspective and a new direction to EO research. The modified EO scale is presented in section 8.5.

4. This study also contributed by clarifying that the risk-taking factor comprises of internal and external risk-taking. This study confirmed that risk taking is an important measure of EO and it shed more light on the nature of the risk measures. It contributed to the knowledge that risk management and mitigation cannot be considered as valid measure of EO because it may lead to development of a risk-tolerant organization instead of risk-taking organization. Instead, risks that are external to the organization, risks that bring substantial chance of failure and risks that require substantial level of commitment of resources are a valid measure of EO. This fact further provided more clarity to the EO measure of risk taking and provided a new perspective on the nature of this measure, which can be utilised in future studies.

5. This study also provided more clarity to the competitive aggressiveness measure as earlier research reported many overlaps, particularly in terms of proactive versus reactive measures. This study sheds more light on the nature of this measure arguing the measures require a number of proactive and reactive strategies and more importantly, an adequate level of capabilities must be built before any competitive posturing is adopted.

6. This study developed quantifiable and valid measures of incremental and radical innovation degree and frequency (output measures). Innovation is a very broad concept and various measures of innovation were suggested by past studies. Incremental and radical innovation was one of the suggested measures. However, no empirically valid measurement scale for incremental and radical innovation was available. This study by developing and testing the measures through statistical and narrative data has contributed towards better understanding of these dimensions. The measures are quite comprehensive and revolve around products, services, process, technology, markets and customers. The measures also provided insight as to how incremental innovation measures were in sharp contrast to radical innovation measures. This study illustrated how frequency of innovation is a key dimension of innovation, which has not been well highlighted in past studies. These measures were developed as output measures of innovation and would inform future studies about the nature of measures and how innovative outputs can be measured. This study has provided the framework to further test the measures in different research settings.

7. Another major contribution of this study is development of the two-dimensional innovation intensity scale. Development of the two-dimensional scale for innovation is a major contribution of this study. Previous studies have proposed one-dimensional scales of innovation and there was no universally accepted scale of innovation available in the literature. This study has validated the proposed innovation intensity construct proving that both degree and frequency of innovation are important measures of innovation. The two-dimensional scale of innovation intensity is one of a kind that maps innovation on two different axes through a two-dimensional innovation intensity grid. A firm may have varying levels of innovation degree and frequency, which can be mapped on the grid. The II scale is presented in section 8.7.

8. Another important contribution of this study is to empirically establish the link between EO and II, showing how entrepreneurial orientation can lead to

innovation intensity. The entire spectrum of input and output measures is called the Entrepreneurial Transformational Model in this study. There are no previous studies that had investigated the relationship between EO and II. A number of EO studies had investigated the effect of EO on organizational performance, however none had investigated the effect of EO on innovation. This study has contributed by developing the measures of innovation inputs and innovation outputs in a single model. The ETM model is shown in section 8.9.

9. Potential application of ETM to different fields of study, which include corporate entrepreneurship, operations and project management, and strategic management, is also a contribution of this study. The ETM will serve as a foundation to study input and output measures for models like EO in corporate entrepreneurship, effect of strategies on innovative outputs (therefore applicable in the field of strategy) and the effect of innovative inputs, competitive strategies, proactiveness measures on new product development, focusing on either incremental or radical innovation (hence applicable in operations and project management).

8.3 Contributions to Professional Practice

Specifically, the following are the potential contributions of this study to professional practice:

1. This study has refined and developed the EO scale that is applicable in the corporate sector in Oman, enabling firms to assess their level of entrepreneurial orientation. As discussed in section 1.13, 'rationale for research', the Omani corporate sector needs entrepreneurial orientation in order to grow and diversify the economy in the face of depleting oil reserves and diminishing oil revenues. The EO measures can be applied by firms in the corporate sector which will give them an understanding of what it takes to be entrepreneurial and align their strategies and resources to promote entrepreneurial orientation in their organizations. This study has contributed to the Omani corporate sector by providing them with an EO scale that can

measure EO in the organizations in the corporate sector and focus on measures that are valid in this research setting.

2. Similarly, the development of the II scale is also a contribution to the Omani corporate sector which needs innovation to grow and diversify. Application of the II scale in the corporate sector in Oman will enable firms to assess their innovation intensity, through evaluation of scores on degree and frequency of innovation. Firms in the corporate sector can assess their positions on the two-dimensional II grid and align their strategies and goals based on whether they wish to remain at that position or move to another position. Such a quantifiable measure of innovation intensity is not currently available to firms.

8.4 Contributions to Research Methods

Specifically, the following are the potential contributions of this study to research methods:

1. A mix of quantitative and qualitative approaches at different stages of the research has given credence to mixed methods research. The use of qualitative investigation in predominantly positivist research showed that the value of positivist research can be enhanced through an interpretivist approach and methods. Although both the philosophical positioning were different, the interpretivist approach completed positivist and realist research philosophies through an integration of statistical and narrative data, hence providing meaning and context to statistical findings and improving their validity. Further, this study has shown how a triangulated approach can enhance the validity of measures through different forms of data, which in this study comprised of secondary data, statistical data and narrative data.

2. This study also showed that the validity, applicability and generalizability of a study and its outcomes can be enhanced by testing the measures in the same study so that its application is evident and encourages other researchers to carry out full-fledged research based on the tests conducted.

8.5 The Modified EO Scale

This study has developed and validated a comprehensive EO scale. Two major contributions in the development of the modified EO scale are related to the innovation and risk-taking dimensions. This study has clarified that the innovation dimension within the EO framework actually relates to ‘ready for innovate’ rather than being a measure of innovation. It contributes towards the understanding and clarifying of the measurement of innovation, which has generated so much interest but still lacks clarity. The five measures of risk taking are retained in the scale because the EFA and CFA results, including the measurement model, showed the reliability and validity of the risk taking measures. The modified EO scale (ready to innovate – 6 measures; competitive aggressiveness – 6 measures; autonomy – 5 measures; risk taking – 5 measures and proactiveness – 3 measures: total 25 items) is shown below.

<u>**Entrepreneurial Orientation Scale**</u>

Ready to innovate

1. My organization has a culture where creativity and innovation is highly regarded

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

2. Management in my organization actively seeks and rewards innovative ideas

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

3. Staff in my organization get time for learning and innovation during their daily routine

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

4. My organization focuses on developing new competencies even if the existing ones are effective

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

5. Venture units in my organization facilitate and enable new product and service development

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

6. My organization is open to sourcing of ideas from shared forums and professional groups

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

Competitive Aggressiveness

1. My organization places emphasis on beating competitors to enter new markets

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

2. My organization places emphasis on pushing costs lower, faster than our competitors do

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

3. My organization has adequate level of capabilities and resources to compete aggressively

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

4. My organization places emphasis on creating important partnerships with suppliers/ retailers, on a higher level, than the competitors

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

5. My organization uses multiple strategies to attack the competitors

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

6. My organization find ways to differentiate itself from competitors

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

Autonomy

1. Staff members in my organization are given the freedom to act

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

2. Staff members in my organization are allowed to deal with problems and opportunities

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

3. Operating divisions or sub-divisions in my organization are quite independent

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

4. The middle level managers in my organization does not have to take consent from senior management to take decisions

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

5. Top management in my organization assign new responsibilities to staff

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

Risk Taking

1. Innovation in my organization is not perceived as too risky and is not resisted

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

2. Missing an opportunity in the market is considered as a risk in my organization

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

3. In my organization, if a manager takes a risk and fails, he or she is not penalized

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

4. There are structure in my organization to monitor and manage risk

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

5. My organization has a number of strategies that helps us to manage and reduce risks

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

Proactiveness

1. My organization usually leads the market in product and service development

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

2. My organization participates in strategic alliances/ partnerships / joint ventures with outside companies

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

3. Staff in my organization are encouraged to proactively monitor changes in the environment

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

Total Score:

8.6 Interpretation of the EO Scale

The EO scale developed and validated through this study is more robust through a comprehensive set of items which addresses the critique on dimensionality. Clearly delineating the innovation factor, conceptually and statistically, allowed robust development of both EO (and II scales). A comprehensive set of items (total 25 items) representing all five dimensions of EO also addressed the issues related to its dimensionality.

This study has also contributed towards the debate on whether the EO scores should be summed to derive the overall EO level of the organization. The presence of convergent validity of the measures indicated that the items measure a common underlying construct. The scores on its five factors, which are reflective components of EO can therefore be summed to derive a composite score. The earlier studies have recommended summation of scores as well as use of weighted averages. However, primary importance should be given to the psychometric properties of the scale. Researchers have cautioned against poorly developed scales and use of arbitrary weights. Therefore, this study recommends aggregation of scores, rather than using weighted averages. Since the EO scale in this study demonstrated reliability and validity, summation of scores would not affect its psychometric properties. The scores on the EO scale range from a minimum of 25 to a maximum of 125. The following score ranges indicate the corresponding level of EO.

Table 8.1 Score ranges and categories indicating EO levels

Score Range	25-49	50-74	75-99	100-125
Level of EO	Minimal level of EO	Some level of EO	Good level of EO	Excellent level of EO

The possible score ranges were discussed with senior managers from the sampled firms. The scores would inform practitioners about the overall EO performance of their firms.

8.7 Innovation Intensity Scale

Many of the models which have been proposed to measure innovation are qualitative measures and the measures are based on the subjective perception of 'incrementalism' and 'radicality' by managers, experts and customers. A valid quantitative scale developed through this study has contributed towards measurement of incremental and radical innovation degree and frequency. This study has consolidated the diverse measures of radical innovation and validates that radical innovation can be measured though new products, services, processes, creation of new target markets, changing customer preferences and markets significantly, and pushing technological boundaries. These measures are comprehensive measures of radical innovation covering product, technology, customer and market innovation. Similarly, measures of incremental innovation revolved around current customer, markets and products, services and process improvements. These measures of innovation are also comprehensive measures of incremental innovation covering product, technology, customer and market innovation. Both the aspects of incrementalism and radicality are conceptually and empirically deciphered in this study. Through the development of these measures, this study has also validated the innovation intensity construct and made it empirically valid laying the foundations of further research on this construct. The II scale (innovation degree – 9 measures; innovation frequency – 8 measures: total 17 items) is shown below.

<u>**Innovation Intensity Scale**</u>

Innovation degree

1. My organization has considerably penetrated the markets in which it operates

   STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

2. My organization continuously removes deficiencies from products and services

   STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

3. The innovation in my organization is aimed at retaining existing customers

   STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

4. My organization uses customer feedbacks in order to improve products and services

   STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

5. My organization is skilled at meeting the demands of the customers

   STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

6. My organization introduces new products, services and processes, which are radically different from existing products and services in the market

   STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

7. My organization has utilized radically new technologies in our products, services and processes

   STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

8. My organization has been able to change the industry dynamics through its radically new product/ service/processes

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

9. My organization introduces new products, services and processes, even if it compromises the sales and value of existing products and services

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

Total Score:

Innovation Frequency

1. The frequency with which my organization has used customer feedback to improve product and service has been higher over the last two years

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

2. The frequency with which my organization has met the demands of its customers has been higher over the last two years

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

3. The frequency of process improvements in my organization has been higher over the last two years

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

4. The frequency with which my organization has found or created new target markets has been higher over the last two years

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

5. The frequency with which my organization has influenced customers' behaviours has been higher over the last two years

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

6. The frequency of introduction of radically different product and services in my organization has been higher over the last two years

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

7. The frequency with which my organization has changed the industry dynamics has been higher over the last two years

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

8. The frequency with which my organization has utilized latest technologies in our products, services and processes has been higher over last two years

STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE

Total Score:

8.8 Interpretation of the II Scale

This study does not recommend aggregation of scores for degree and frequency of innovation because they represent two different dimensions. Instead, the scores on degree and frequency of innovation should be individually aggregated. The scores on frequency of innovation – radical and incremental innovation combined – should be plotted on the X-axis. The scores on degree of innovation – radical and incremental innovation combined – can be aggregated and plotted on the Y-axis. The plot will place firms in one of the quadrants shown in figure 8.1. As discussed in chapter 2, the four quadrants represent a combination of degree and frequency grid of innovation. These are low-frequency low-degree, high-frequency low-degree, low-frequency high-degree and high-frequency high-degree.

(LFHD) **Low Frequency 8-23** **High Degree 28-45**	**(HFHD)** **High Frequency 24-40** **High Degree 28-45**
(LFLD) **Low Frequency 8-23** **Low Degree 9-27**	**(HFLD)** **High Frequency 24-40** **Low Degree 9-27**

Figure 8.1: Four quadrants based on scores of degree and frequency of innovation

Table 8.1 shows the score ranges for each of the quadrants of degree and frequency of innovation. The possible score ranges were discussed with senior managers from the sampled firms.

Table 8.2: Score ranges for different quadrants

Scores	Innovation Intensity Category
9–27	Low Degree
28–45	High Degree
8–23	Low Frequency
24–40	High Frequency

In order to test the application of the II scale, 10 firms were approached to complete the II scale. Although the sample size for test study cannot be considered adequate, it is an indication of how the scale can be applied.

The firms were chosen based on the accessibility to these firms based on the rapport built with these firms during the qualitative interviews. This was done after the innovation intensity scale was developed, with a time lapse of almost a year. The objective was to validate the scale through the same companies that were part of the main questionnaire survey. Table 8.2 shows the representative responses from four sample companies on each of the dimensions (9 measures for degree of innovation and 8 measures for frequency of innovation). These four responses were chosen based on their representative value to depict the scores in each of the quadrants. The objective is to enumerate how the II scale can be applied in the Omani corporate sector and firms can map their positions into the quadrants. Table 8.2

shows the individual scores on degree and frequency of innovation, which then shows the transfers into the II grid (figure 8.2). Table 8.3 shows the responses of the 4 sample companies on the degree and frequency of II measures.

Table 8.3: Responses of four different sample companies to degree and frequency of innovation

	Innovation Degree									Total
Company	D1	D2	D3	D4	D5	D6	D7	D8	D9	
Co-1	2	2	3	3	4	4	5	4	3	30
Co-2	2	1	1	1	1	1	2	1	1	11
Co-3	2	3	2	2	1	2	4	4	4	24
Co-4	1	1	1	1	1	1	2	1	1	10
	Innovation Frequency									**Total**
Company	F1	F2	F3	F4	F5	F6	F7	F8		
Co-1	4	4	4	4	2	3	4	3		28
Co-2	4	4	5	5	5	4	5	4		36
Co-3	1	1	1	2	2	1	2	2		12
Co-4	1	1	1	1	1	1	1	1		8

The scores of frequency of innovation are plotted on the X-axis and scores of degree of innovation are plotted on the Y-axis, respectively, as shown in figure 8.2.

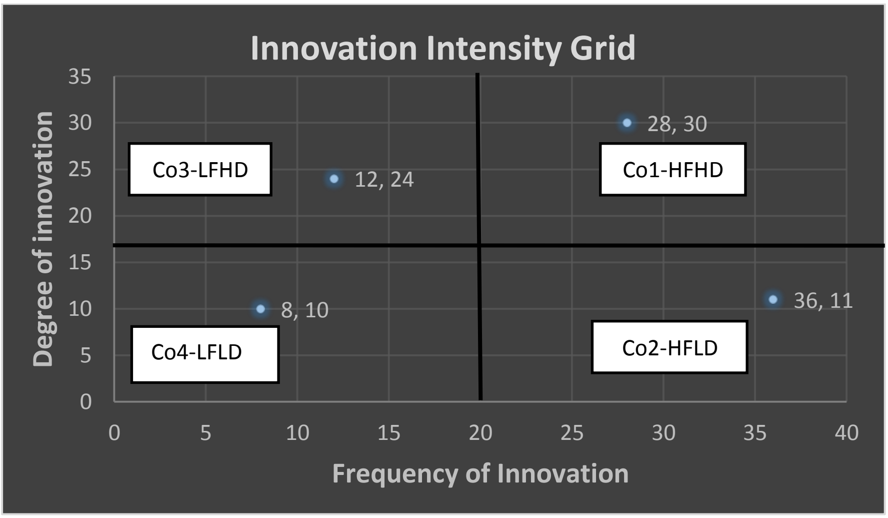


Figure 8.2: Actual mapping of scores on different quadrants of the innovation intensity grid

Figure 8.2 shows the mapping of scores of the 4 sampled firms into each of the four quadrants. Scores on degree of innovation range from 9 to 45, while on frequency of innovation they range from 8 to 40. Based on their responses, firms are placed in one of the quadrants represented as low frequency and low degree (Co-4), high frequency and low degree (Co2), low frequency and high degree (Co3), and high frequency and high degree (Co1). Firms that fall in high frequency and low degree (Co2), low frequency and high degree (Co3) and high frequency and high degree (Co1) quadrants have higher levels of innovation intensity, compared to firms that have low frequency and low degree (Co4). Firms that fall into the quadrant of 'high frequency and high degree' are exceptional performers, although it is assumed that the number of firms in this category would be very low. These firms are able to push the 'innovation envelope' and therefore perform better on both dimensions of innovation intensity.

Apart from measuring innovation on a two-dimensional scale, another important highlight of this scale is that it establishes that both radical and incremental innovation represent innovation intensity, and it is not just radical innovation that denotes innovation intensity as the degree or impact of such innovation may imply intensity. Critics might argue that radical innovation in itself can represent intensity of innovation. There are two lines of argument that defend this assumption. First, both incremental and radical innovation contribute to the competitive advantage of the firm and are effective measures of innovation. Although radical innovation has a high magnitude of impact attached to it, it does not necessarily translate to innovation intensity as different types of innovation may be required at different times. Incremental innovation also contributes to intensity. The frequency of incremental innovation adds value to incremental innovation degree and their combined effect creates innovation intensity. Therefore, the intensity is represented through both degree and frequency.

This scale of innovation intensity is a comprehensive and dynamic scale that established the 'two-dimensional' nature of innovation as against the one-dimensional view presented through some studies. Measurement of innovation intensity provides firms with a diagnostic tool through which they can measure their innovative outputs. Corporate firms can strategize for preferred innovative outputs (incremental and/or radical) in line with their strategic objectives. Considering the initial proposal of the scale, the II scale requires further validation.

8.9 Entrepreneurial Transformational Model (ETM)

The synthesis of EO and II concepts and their measures led to the development of the Entrepreneurial Transformational Model. ETM, presented in figure 8.3, is a robust model and maps the entire entrepreneurial process involving a range of inputs and outputs.

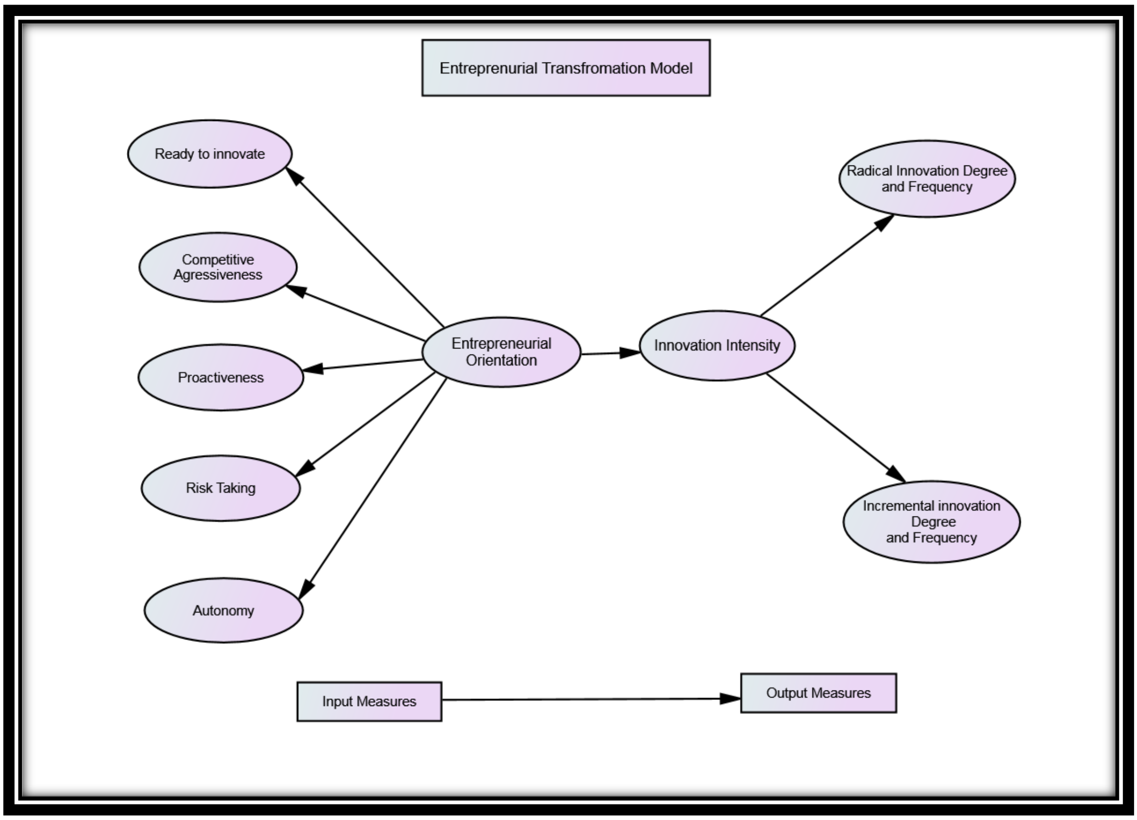


Figure 8.3: Entrepreneurial Transformational Model

This study is one of the few studies to have brought the two constructs of entrepreneurial orientation and innovation intensity together and developed a comprehensive model of entrepreneurial transformation. Many models of corporate entrepreneurship have used 'innovation' without making a clear distinction between input and output measures.

8.9.1 Potential Applications of the Entrepreneurial Transformational Model

The Entrepreneurial Transformational Model developed though this study can be applied to different fields of study. Corporate entrepreneurship is the primary field of study towards which the model contributes.

8.9.2 Application of the Model to Corporate Entrepreneurship

The primary purpose of Corporate Entrepreneurship (CE) is to facilitate new entry, utilising innovation. However, new entry must also be supported by a number of factors at the organizational level. These are adequately captured through the EO construct. Secondly, innovation which is a critical output of entrepreneurial activities, not only facilitates new entry but also makes the new entry more effective. Corporate entrepreneurship and innovation are considered to be intertwined (as discussed in chapter 1) and the ETM further enumerates how the relationship is valid and how their measures interact. The models discussed in the literature review (chapter 2) showed certain models with input measures that facilitated new entry and innovation. On the other hand, some models measure entrepreneurial outputs such as innovation without linking them to the inputs. Further, a few models confounded the input and output factors, without clarifying the measures and hence the measures were found to be lacking in clarity and precision. The Entrepreneurial Transformational Model is an appropriate model of CE as it relates to major pillars of CE, namely new entry, innovation and strategic renewal. This study has contributed firstly by clarifying the input and output measures and secondly, brought these measures into a single model that can map the entire range of entrepreneurial activities ranging from inputs that facilitate new entry to outputs that make the new entry successful.

8.9.3 Application of the Model to Operations and Project Management

Since a large part of the EO factors attribute themselves to operations, the conceptual model can be also applied to operations and project management. The transformational model in operations maps the input and output stages of operation and the Entrepreneurial Transformational Model is particularly relevant for new product, service and process design. The EO factors represent the input and process factors, while innovation represents the output factors. New entry and innovative product design are projects in their own rights and by understanding the input–process–output (IPO) model, greater clarity and success can be brought into project management.

8.9.4 Application of the Model to Strategic Management

The Entrepreneurial Transformational Model is also applicable to strategic management, as most of the EO and II factors require appropriate strategizing that may lead to strategic renewal. At the EO level, strategies relate to providing autonomy to employees, supporting employees in finding opportunities and generating innovative ideas, developing capabilities for innovation, adopting competitively aggressive strategies and promoting risk-taking strategies. The strategic options related to cost and differentiation are also covered at the EO level. At the II level, strategies relate to producing innovation outputs, particularly degree and frequency of innovation. The strategic decision relates to introduction of radically new products and services, creating new target markets, pursuing radically different technologies, and cannibalization of existing products and services. It also involves focusing on existing customers and penetrating existing markets through improving the existing products and services and doing it with high frequency as the markets evolve on a continuous basis. Strategically, firms may follow any of the strategies involving both degree and frequency of innovation.

This study has been able to make important contributions that will benefit a number of stakeholders including academicians, researchers and practitioners and on a broader level the corporate sector in Oman. The next chapter extends this discussion by reflecting on the contributions and the research process that underpinned the research outcomes.

Chapter 9: Reflections

9.1 Introduction

This chapter provides an account of the research reflecting on various stages of research process. It also sheds light on the learning and cognitive states of the researcher through the completion of this study. A change of voice to first person is essential to allow an elaboration of the research experience both at personal and professional levels.

9.2 Reflection on Methods and Contributions

Reflecting on the epistemological and ontological positioning adopted in this research was a challenge considering the scope of the research, but at the end gives me the solace that I have followed an appropriate philosophy that underpinned the research. A dominant positivist epistemology and objectivist ontology were suited for the research, since I wanted to investigate the reality as it was, rather than interpret it prematurely. The constructs and measures needed clarification and the development of measures has given clarity to the EO and II constructs and their measurement. The measures were found to reliable, valid and statistically significant – key characteristics of a quantitative research emerging from the above-discussed philosophical standpoint. Questionnaire survey was considered as the primary method of data collection, in line with the objectivist view. According to this view, it was assumed that the participants have little role in shaping reality and hence it was appropriate to consider their view on their perception of reality without influencing it through interpretation and probing.

As the research progressed, I realized that substantial contribution to theory and practice is difficult to achieve without an all-inclusive epistemology and began to appreciate the value of an interpretivist epistemology. As a result, qualitative strategies were used and qualitative inputs provided valuable insights into instrument development and testing, data analysis and interpretation of data. The interview method provided a deeper insight into the findings at different stages of research. Therefore, both quantitative and qualitative methods complemented each other and the results are, I believe, robust and rich with different forms of data informing this research.

9.3 Reflections on the Research Constructs and Research Process

The words of Megginson and Whitaker (2007) *"You have to decide is it a journey or exploration"* are an apt phrase that reflects the efforts and rigour associated with this study. I would say that the process of this research was both an exploration and journey, and an enriching learning experience. The interest in the area was embedded both at personal and professional levels. Phillips and Pugh (2005) suggested that a PhD must argue a position and should have a storyline derived from various forms of data. My storyline, in this section, is broader, encompassing the process of the research experience, intertwined with reflections on the primary thesis of this research. The following sections are an elaboration.

I have been teaching entrepreneurship at undergraduate and postgraduate levels, as well as creativity and innovation at postgraduate level for the last ten years. Therefore, both entrepreneurship and innovation are areas of extreme interest to me. Teaching both entrepreneurship and innovation gave me perspectives of both fields and I could foresee the relationship between the two constructs. However, the nature of this relationship had to be defined, tested and explained.

At the same time, teaching the executive MBA gave me the opportunity to interact with professionals from the corporate sector in Oman. When I taught corporate entrepreneurship, I found that the class was very receptive and enriching discussions occurred on this subject area. Most of the feedback that I received was about the corporate sector being young and dynamic and how it is lately witnessing innovation. There was always a desire among the professional students to know more about the strategies and tools that can enhance both entrepreneurship and innovation in the corporate sector. The discussions in the class also informed me about certain gaps in practice related to entrepreneurial orientation and innovation.

Oman is also going through a transitional period, with depleting oil reserves and negative pressure on oil prices. The country has pinned high hopes on the corporate sector as it can bail out the economy through entrepreneurial practices, particularly corporate venturing and innovation. Promotion of corporate venturing and innovation can attract investors and further the cause of diversification of Oman's economy. However, no empirical studies had been conducted in the corporate sector that investigated the level of entrepreneurship and innovation within the corporate sector in Oman. Therefore, in the absence of empirical data, guidance and measures, the corporate sector may not be able to contribute towards the diversification agenda of the Omani economy.

Considering the above background and the research setting, I investigated the theoretical models that explained corporate entrepreneurship. Among the constructs that attracted my attention were Entrepreneurial Orientation and Innovation Intensity.

There were mainly two categories of studies on entrepreneurial orientation. The first category of studies investigated the role of entrepreneurial orientation in producing or facilitating a number of outputs related to organizational performance. Organizational performance may manifest itself as financial performance (profits and return on investments etc.) or market performance (market share, sales etc.). The second category of studies were focused on improving or validating the entrepreneurial orientation scale itself and making the measures robust. Therefore, the review of these studies showed that the EO construct was robust and the EO scale can be refined and applied in the corporate sector in Oman.

As I investigated and reviewed the literature, the research gaps became evident. Two major research gaps were identified in both categories of studies. Firstly, if EO can facilitate or help to improve and organization's financial and market performance. Therefore, the measures at EO level are input measures that are essential for the outputs to occur. Secondly, financial or market performance are the results of outputs of entrepreneurial orientation. The output of EO such as innovation intensity leads to superior organizational performance. The outputs (innovation intensity), therefore, are the means through which the results are achieved, i.e. organizational performance. This fact was not highlighted in the studies reviewed in the literature.

Taking this argument further, the outputs of a firm which is entrepreneurial may be reflected in its products and services, and its ability to influence customers and markets in general. These products and services have to be innovative, without which a firm may not be able to achieve superior organizational performance. Therefore, the missing link was now evident. Firms that have an entrepreneurial orientation should produce innovative products and services in the market and develop innovative business models so that the desired financial and market performance can be achieved. Innovation is the key output that can drive organizational performance. Innovation is the property that can be applied to all types of products, services and business models. A number of studies confirmed that innovation is the most important factor of corporate entrepreneurship in general and entrepreneurial orientation in particular. Since innovation was part of the EO framework, it cannot be an output of entrepreneurial orientation. This led to identification of further gaps in the literature. The four other dimensions of EO, namely risk taking, proactiveness, competitive aggressiveness and autonomy, pointed towards input measures and therefore, innovation being part of EO should ideally be also the input measures. Further, some studies termed innovation as 'innovativeness'. Therefore, I felt strongly that the measures of EO need clarification and the scale needed refinement, particularly if it is to be applied in the corporate sector in Oman. I hypothesized that all EO factors including innovation are input measures and termed it as 'ready to innovate'.

The next challenge was to identify and investigate the measures of innovation, which as pointed out earlier, were considered as output measures of an organization. Innovation is a very broad concept linked to various types of innovation such as product, service, process, market and organizational innovation. However, these are not measures of innovation but types of innovation. One particular construct, which appeared to be an appropriate measure of innovation, was innovation intensity (II). Innovation intensity was a conceptually very strong construct, which was an offshoot of entrepreneurial intensity construct. II, however, did not receive adequate representation in the literature. According to the concept of innovation intensity, the degree of innovation could be measured through incremental and radical innovation, while the frequency of innovation could be measured through the number of times incremental and radical innovation occurs in an organization. I hypothesized that EO influences II, considering the fact that EO measures are input factors, while II measures are output factors.

Once I identified the research gaps, the initial conceptual model was developed and related hypotheses and objectives were framed. The data collection methods were identified and both quantitative and qualitative strategies were chosen for the study.

Once the final questionnaire was ready, qualitative feedback was taken on the survey items and were refined based on the feedback received. The final questionnaire survey was then conducted followed by semi-structured interviews with managers. On reflection, I can safely say, it was an appropriate approach since measurement, quantification, reliability and validity were key aspects of this research. A positivist and realist orientation allowed achievement of such objectives. Further, supporting the data qualitatively allowed me to interpret the data and understand the subjective views of different managers in the corporate sector. It also allowed me to understand the context and meaning based on which the respondents might have answered the survey questions.

The study concluded that EO is an appropriate model and the 'EO-modified scale' comprehensively measures entrepreneurial orientation of an organization. The five factors were appropriate and valid measures of EO. II was also found to be a robust and valid construct that has the potential to measure innovation in the corporate sector in Oman. The degree and frequency of incremental and radical innovation were appropriate and valid measures innovation intensity. Finally, the Entrepreneurial Transformational Model (ETM) showed that EO positively and significantly influenced II. Once the two-dimensional scale of II was developed, the scale was administered to a few organizations in order to test the application of the scale in the Omani corporate sector. The scores of four organizations on each of the quadrants were mapped and it was concluded that the scale is applicable and can be further tested in different companies. Further, the term entrepreneurial transformation model was suggested through this study. The ETM can become a comprehensive model of corporate entrepreneurship as it encompasses broad activities related to new entry, innovation and strategic renewal.

I believe that I have contributed towards theory development through this study. I agree with Gresly and Ralph, who after discovering frescos in Ajanta Caves commented, *"we must form theories – we cannot be awake and not do so"* (Keay, 2000, p. 149, cited in Fisher, 2004, p. 96).

Finally, as I reflect, I believe that I have made original contributions to the development of theoretical knowledge and professional practice. Wellington (2013) argued that contribution is an important criteria for 'doctorateness' but should be supported by other indicators. One such indicator, I believe is the ability of this study to identify the depth of the research gaps and to develop a comprehensive conceptual framework and the resultant model that can be applicable to various streams of study. Another such indicator, is the ability to open avenues for future research and I believe, this study has established the preliminary framework that can spur future studies on both EO and II constructs and ETM. Finally, the application of this study to the Omani corporate sector is substantial, in terms of assessing, designing and implementing strategies related to entrepreneurship and innovation.

The discussions at all levels were critical and various critiques related to the main concepts found representation in the discussions in this study. As far as originality is concerned, Poole (2014) pointed out originality is quite subjective and that ontologically nothing can be truly original or everything can be original at a certain level. I am careful not to overestimate my contributions yet at the same time have enough confidence that my contributions have explained the phenomenon clearly, provided new insights and set foundations for future research. Poole (2014) further argued that originality is not an either/or phenomenon but the scale of originality can be looked at. I would like to go with Wellington (2013, p. 1496) who provided a list concerning original contributions. The contributions of a study can be as follows.

Building new knowledge by extending the previous work – this is achieved through clarification of the concept of EO and refining measures of EO. At the same time, development of a new scale to measure innovation intensity (II scale) also contributes towards development of new knowledge.

Revisiting a recurrent issue or debate – A number of studies cited the debate on dimensionality and measurement issues related to the EO scale. This study contributes to the debate by clarifying the measures and removing the overlaps.

Creating new synthesis – This is achieved through the synthesis of the EO and II concepts. This study shows the relationship between the two constructs, which was unexplored in earlier studies. Finally, the Entrepreneurial Transformational Model is a result of this synthesis. The final contribution, in terms of development of the ETM, requires elaboration. ETM qualifies as model as it has the characteristics of a model as per Kuhn (2005) and Sokolowski and Banks (2010), which are:

1. It shows a relationship structure that facilitates understanding, eliminating unnecessary measures.
2. It diagrammatically (network diagram) simplifies the complex interrelationship between components parts of the model.
3. The model represents a real-world phenomenon and can aid in decision-making.

The research experience was invaluable and substantially enhanced my research skills. I plan to publish research articles and undertake research on some of the areas discussed as future research directions. Throughout the research process, I acquired new knowledge and skills, which was accompanied by high and low emotional and cognitive states. These are illustrated though figure 9.1.

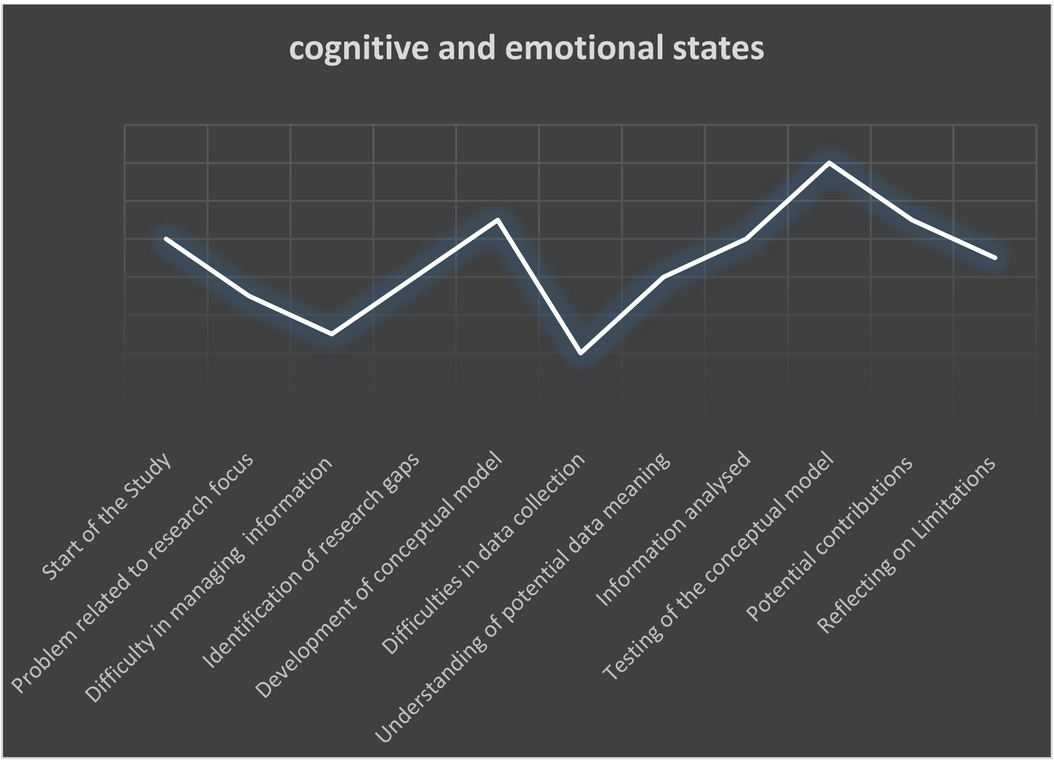


Figure 9.1: Cognitive states of the researcher during the research process

Finally, I would say that it was one of the most challenging projects of my life and I have put in my best efforts to the best of my abilities. I feel it is was worth it and this study would be valuable to others as it has been to me. As I sign off, the entire research journey can be summarized in the words of Hemmingway:

> *"There was so much to write. He had seen the world change; not just the events.... He had been in it and he had watched it and it was his duty to write of it."*

Ernest Hemmingway, *The Snows of Kalimanjaro*

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Appendix 1: EO and II Questionnaire

Omani Corporate Sector
Questionnaire Survey
Entrepreneurial Orientation and Innovation Intensity

Declaration

Dear respondent, I am a PhD scholar doing a research project on Corporate Entrepreneurship and Innovation. Thank you very much for agreeing to participate in this study and filling out this questionnaire. As a respondent, your inputs are critical to this study. It will not take any longer than 30 minutes of your time to fill out this questionnaire. Your responses will be treated as confidential and will not be disclosed (unless otherwise requested). This study is for academic purposes only and in no way aimed at evaluating you or your organization in term of effectiveness and performance. You have the right to withdraw from this study at any time.

Aims of this study

The aim of this study is to refine the scale to measure Entrepreneurial Orientation and develop a measurement scale for measurement of Innovation Intensity (Degree-radical and incremental innovation- and frequency of innovation). Your insights will help to validate the items in this questionnaire which will be incorporated into a measurement scale.

Structure and Design of the questionnaire

There are three sections in this questionnaire. Section I asks you about your sector codes and employment details, while section II asks you questions on entrepreneurial orientation. Section III asks you questions on innovation intensity. The key to answering this questionnaire is based on the 5 response sets given below. Please indicate your choices by circling 1 of the 5 options as indicated below:

1- Strongly Disagree 2- Disagree 3- Neutral 4-Agree 5- Strongly Agree

Notes:

Entrepreneurial orientations are organizational factors that create conditions for entrepreneurship to occur. Innovation intensity are output factors that measure the innovative outputs of the organization and are a measure of strength of innovation. Incremental innovation in this study refers to engagement of the organization and its staff in a number of smaller modifications and changes to products, services, processes. There is a regular and continuous effort of the organization to improve its products and services and processes. Radical innovation in this study refers introduction of radical products and services that can have a substantive impact on the market or industry. These are occasional rather than regular. Frequency refers to the number of times innovation (both incremental and radical) occurs in the organization.

Section I

Please choose and tick against your sector based on International Standard Industrial Classification (ISIC):

Division	Sector categories	Sector code	Please tick which applies to your organization (only one tick required)
A	Agriculture and fishing	1	
B	Mining and quarrying	5	
C	Manufacturing	10	
D	Electricity, gas, steam and air conditioning supply	35	
E	Water supply; sewerage, waste management	36	
F	Construction	41	
G	Wholesale and retail trade	45	
H	Transportation and storage	49	
I	Accommodation and food service activities	55	
J	Information and communication	58	
K	Financial and insurance activities	64	
L	Real estate activities	68	
M	Professional, scientific and technical activities	69	
N	Administrative and support service activities	77	
O	Public administration and defence	84	
P	Education	85	
Q	Human health and social work activities	86	
R	Arts, entertainment and recreation	90	
S	Other service activities	94	
T	Activities of households as employers; undifferentiated goods- and services-producing activities	97	
U	Activities of extraterritorial organizations and bodies	99	

Position: Total number of staff in the company:

Total number of years in the company: Total number of years in the industry:

Section 2- Entrepreneurial Orientation

2.1 Ready to Innovate

EORI1	My organization has a culture where creativity and innovation is highly regarded	1	2	3	4	5
EORI2	Management in my organization actively seeks and rewards innovative ideas	1	2	3	4	5
EORI3	Staff in my organization get time for learning and innovation during their daily routine	1	2	3	4	5
EORI4	My organization focuses on developing new competencies even if the existing ones are effective	1	2	3	4	5
EORI5	Venture units in my organization facilitate and enable new product and service development	1	2	3	4	5
EORI6	My organization is open to sourcing of ideas from shared forums and professional groups	1	2	3	4	5

2.2 Risk Taking

EOR1	Innovation in my organization is perceived as too risky and is resisted	1	2	3	4	5
EOR2	Missing an opportunity in the market is considered as a risk in my organization	1	2	3	4	5
EOR3	To make effective changes to our offering, my organization is willing to accept moderate level of risk	1	2	3	4	5
EOR4	In my organization, if a manager takes a risk and fails, he or she is not penalized	1	2	3	4	5
EOR5	There are structure in my organization to monitor and manage risk	1	2	3	4	5
EOR6	My organization has a number of strategies that helps us to manage and reduce risks	1	2	3	4	5

2.3 Proactiveness

EOP1	My organization initiates actions to which competitors respond	1	2	3	4	5
EOP2	My organization usually leads the market in product and service development	1	2	3	4	5
EOP3	Change in my organization happens regularly	1	2	3	4	5
EOP4	My organization participates in strategic alliances/ partnerships / joint ventures with outside companies	1	2	3	4	5
EOP5	Staff in my organization are encouraged to proactively monitor changes in the environment	1	2	3	4	5

2.4 Competitive Aggressiveness

EOC1	My organization places emphasis on beating competitors to enter new markets	1	2	3	4	5
EOC2	My organization places emphasis on pushing costs lower, faster than our competitors do	1	2	3	4	5

EOC3	My organization has adequate level of capabilities and resources to compete aggressively	1	2	3	4	5
EOC4	My organization places emphasis on creating important partnerships with suppliers/ retailers, on a higher level, than the competitors	1	2	3	4	5
EOC5	My organization uses multiple strategies to attack the competitors	1	2	3	4	5
EOC6	My organization find ways to differentiate itself from competitors	1	2	3	4	5

2.5 Autonomy

EOA1	Staff members in my organization are not given the freedom to act	1	2	3	4	5
EOA2	Staff members in my organization are allowed to deal with problems and opportunities	1	2	3	4	5
EOA3	Operating divisions or sub-divisions in my organization are quite independent	1	2	3	4	5
EOA4	The middle level managers in my organization have to take consent from senior management to take decisions	1	2	3	4	5
EOA5	Top management in my organization assign new responsibilities to staff	1	2	3	4	5

Section 3- Innovation Intensity

3.1 Incremental Innovation Degree and Frequency

III1	My organization has considerably penetrated the markets in which it operates	1	2	3	4	5
IIF1	The frequency with which my organization has penetrated existing target markets has been higher over the last two years	1	2	3	4	5
III2	My organization continuously removes deficiencies from products and services	1	2	3	4	5
IIF2	The frequency of product and/or service improvements in my organization has been higher over the last two years	1	2	3	4	5
III3	The innovation in my organization is aimed at retaining existing customers	1	2	3	4	5
III4	My organization makes improvements to the operational processes	1	2	3	4	5
IIF3	The frequency with which my organization has met the demands of its customers has been higher over the last two years	1	2	3	4	5
III5	My organization takes feedback from customers and suppliers to understand industry trends	1	2	3	4	5
IIF4	The frequency with which my organization has used feedback from customers and suppliers to monitor industry trends has been higher over the last two years	1	2	3	4	5

III6	My organization uses customer feedbacks in order to improve products and services	1	2	3	4	5
IIF5	The frequency with which my organization has used customer feedback to improve product and service has been higher over the last two years	1	2	3	4	5
III7	My organization is skilled at meeting the demands of the customers	1	2	3	4	5
IIF6	The frequency of process improvements in my organization has been higher over the last two years	1	2	3	4	5

3.2 Radical Innovation Degree and Frequency

IIR1	My organization finds and develops new target markets	1	2	3	4	5
RIF1	The frequency with which my organization has found or created new target markets has been higher over the last two years	1	2	3	4	5
IIR2	My organization continuously shapes and modifies customer behaviours	1	2	3	4	5
RIF2	The frequency with which my organization has influenced customers' behaviours has been higher over the last two years	1	2	3	4	5
IIR3	My organization introduces new products, services and processes, which are radically different from existing products and services in the market	1	2	3	4	5
RIF3	The frequency of introduction of radically different product and services in my organization has been higher over the last two years	1	2	3	4	5
IIR4	My organization has utilized radically new technologies in our products, services and processes	1	2	3	4	5
RIF4	The number of times my organization has utilized latest technologies in our products, services and processes has been higher over last two years	1	2	3	4	5
IIR5	My organization has been able to change the industry dynamics through its new product/ service	1	2	3	4	5
RIF5	The frequency with which my organization has changed the industry dynamics has been higher over the last two years	1	2	3	4	5
IIR6	My organization introduces new products, services and processes, even if it compromises the sales and value of existing products and services	1	2	3	4	5
RIF6	The frequency of new products, services introduction that has been at the cost of existing products, services and processes has been higher over the last two years	1	2	3	4	5

Section 4- Entrepreneurial Orientation and Innovation Intensity Measures

4.1 Entrepreneurial Orientation

ERN1	I consider my firm to be entrepreneurially oriented	1	2	3	4	5
ERN2	Entrepreneurial orientation in my firm enables superior firm performance	1	2	3	4	5
ERN3	Entrepreneurial vision is well communicated across the organization	1	2	3	4	5

4.2 Innovation Intensity

IIN1	I consider my firm to be innovative	1	2	3	4	5
IIN2	Innovation in my firm enables superior firm performance	1	2	3	4	5
IIN3	The vision of innovation is well communicated across the organization	1	2	3	4	5

End of Questionnaire

Appendix 2: Semi-structured Interview Guide

Name of the organization:

Position:

Location:

Time and duration:

Section 1 Interview questions: Entrepreneurial Orientation

[*These are conversational style questions in order to ensure that the interviews are at ease related to the topic. It aims to understand the interviewees' views on entrepreneurship in their organizations.*]

Q1. What are your views about entrepreneurship in your organization?

Q2. Does the current level of entrepreneurial activities allow you to achieve competitive advantage and improve firm performance?

Q3. What are your views on innovation in your organization?

Q4. Do you think that your organization is ready to innovate?

[***Probes*:*** *How does your organization support innovation? How does your organization develop potential for innovation? Does the HR policies support innovation? What are employees' views on innovation? How do employees respond?*]

Q5. Do you think that competitive aggressiveness is essential for your organization to be entrepreneurial?

Q6. How far the market conditions determine the competitive aggressiveness in your organization?

[***Probes*:*** *What are your competitive strategies? Do you think capabilities are important to realize your competitive strategies? What is the role of top management in promoting competitive aggressiveness? How is it communicated across the organization?*]

Q7. Do you think providing autonomy to the employees makes your organization more entrepreneurial?

Q8. What kind of autonomy do you provide to your employees?

[***Probes*:*** *How important it is to provide autonomy to the employees in the organization? Are all employees given autonomy equally or it is at the discretion of the management? Is your organization decentralized and does decision making rests with employees and/or units?*]

Q9. Do you differentiate between internal and external risks?

Q10. Does your organization support a risk-taking culture?

[***Probes*:*** *What risk management strategies are in place to manage internal risks. How do you manage external risks? How do you see the relationship between risks and opportunity?*]

Q11. Do you actively monitor the market for opportunities?

Q12. What kind of industry and market trends you particularly look for?

[***Probes*:*** *Are your employees actively engaged in finding opportunities in the market? How do you keep pace with technological developments? How do you enhance your capabilities and resources? Do you invest in research and development? Is the top management adequately committed or is it dependent on the size and scope of opportunities?*]

<u>Section 2: Interview questions: Innovation Intensity</u>

[*These are conversational style questions in order to ensure that the interviews are at ease related to the topic. It aims to understand the interviewees' views on innovation intensity in their organizations.*]

Q1. Do you think that innovation intensity (measured through degree and frequency of innovation) can be an important measure of innovation?

Q2. Can innovation intensity help you to achieve competitive advantage in the marketplace?

Q3. What are your views on radical innovation?

Q4. How is radical innovation manifested in your organization?

[***Probes*:*** *What it takes to be radically innovative? Would you strongly associate radical innovation with the degree of innovation? How far do you think radical innovation contributes towards innovation intensity?*]

Q5. What are your views on incremental innovation?

Q6. How is incremental innovation manifested in your organization?

[**Probes*:** What it takes to be incrementally innovative? Would you strongly associate incremental innovation with the frequency, rather than the degree of innovation?]

**Probes are questions that needs further investigation and may be asked based on the interviewee's responses*

Appendix 3: Homogeneity of Variance Tests for Demographic Factors

Industry Distribution – Homogeneity on Variance of II factors

Test of Homogeneity of Variances				
Items	Levene Statistic	df1	df2	Sig.
III1	.598	14	389	.867
III2	1.782	14	389	.039
III3	1.967	14	389	.019
III4	1.367	14	389	.166
III5	1.097	14	389	.358
III6	.726	14	389	.749
III7	1.315	14	389	.195
IIF1	2.036	14	389	.015
IIF2	1.672	14	389	.059
IIF3	1.295	14	389	.207
IIF4	1.626	14	389	.070
IIF5	.974	14	389	.479
IIF6	2.076	14	389	.012
IIR1	.931	14	389	.525
IIR2	1.364	14	389	.168
IIR3	1.726	14	389	.048
IIR4	1.461	14	389	.123
IIR5	2.296	14	389	.009
IIR6	2.318	14	389	.005
RIF1	2.452	14	389	.006
RIF2	2.338	14	389	.007
RIF3	1.818	14	389	.054
RIF4	2.193	14	389	.058
RIF5	1.571	14	389	.085
RIF6	1.679	14	389	.058

EO Variables and Number of Years in the Firm – Test of Homogeneity of Variances

Test of Homogeneity of Variances				
Items	Levene Statistic	df1	df2	Sig.
EORI1	1.548	4	399	.188
EORI2	1.800	4	399	.128
EORI3	.392	4	399	.814
EORI4	.215	4	399	.930
EORI5	2.358	4	399	.053
EORI6	1.117	4	399	.348
EOR1	1.341	4	399	.254
EOR2	2.217	4	399	.067
EOR3	1.597	4	399	.174
EOR4	2.684	4	399	.031
EOR5	.433	4	399	.785
EOR6	1.172	4	399	.323
EOP1	.863	4	399	.486
EOP2	1.608	4	399	.171
EOP3	1.530	4	399	.193
EOP4	.973	4	399	.422
EOP5	1.434	4	399	.222
EOC1	1.963	4	399	.099
EOC2	.891	4	399	.469
EOC3	1.957	4	399	.100
EOC4	2.527	4	399	.040
EOC5	.835	4	399	.503
EOC6	2.097	4	399	.080
EOA1	2.591	4	399	.036
EOA2	2.563	4	399	.038
EOA3	.891	4	399	.469
EOA4	3.462	4	399	.009
EOA5	3.331	4	399	.011

II variables and number of years in the firm –Test of Homogeneity of Variances

Test of Homogeneity of Variances				
Items	Levene Statistic	df1	df2	Sig.
III1	.602	4	399	.661
III2	.649	4	399	.628
III3	.421	4	399	.794
III4	.558	4	399	.693
III5	.735	4	399	.569
III6	1.744	4	399	.140
III7	1.114	4	399	.349
IIF1	2.939	4	399	.020
IIF2	.979	4	399	.419
IIF3	1.804	4	399	.127
IIF4	2.235	4	399	.065
IIF5	4.139	4	399	.023
IIF6	1.754	4	399	.137
IIR1	.476	4	399	.753
IIR2	.418	4	399	.796
IIR3	2.672	4	399	.032
IIR4	3.561	4	399	.007
IIR5	2.571	4	399	.038
IIR6	5.116	4	399	.021
RIF1	3.850	4	399	.006
RIF2	6.387	4	399	.011
RIF3	2.742	4	399	.028
RIF4	4.169	4	399	.007
RIF5	3.517	4	399	.008
RIF6	.360	4	399	.837

EO variables and Number of Years in the Industry – Test of Homogeneity of Variances

Test of Homogeneity of Variances				
Items	Levene Statistic	df1	df2	Sig.
EORI1	1.039	4	399	.387
EORI2	1.080	4	399	.366
EORI3	.794	4	399	.529
EORI4	4.628	4	399	.011
EORI5	1.409	4	399	.230
EORI6	1.712	4	399	.146
EOR1	.950	4	399	.435
EOR2	2.113	4	399	.079
EOR3	.177	4	399	.950
EOR4	5.119	4	399	.000
EOR5	1.850	4	399	.119
EOR6	.647	4	399	.629
EOP1	1.782	4	399	.132
EOP2	3.191	4	399	.013
EOP3	2.373	4	399	.052
EOP4	1.690	4	399	.151
EOP5	.025	4	399	.999
EOC1	.805	4	399	.523
EOC2	2.014	4	399	.092
EOC3	1.289	4	399	.274
EOC4	1.887	4	399	.112
EOC5	.615	4	399	.652
EOC6	1.800	4	399	.128
EOA1	4.295	4	399	.002
EOA2	1.718	4	399	.145
EOA3	1.547	4	399	.188
EOA4	1.882	4	399	.113
EOA5	1.235	4	399	.295

II Variables and Number of Years in the Industry – Test of Homogeneity of Variances

Test of Homogeneity of Variances				
Items	Levene Statistic	df1	df2	Sig.
III1	1.131	4	399	.342
III2	2.144	4	399	.075
III3	.203	4	399	.936
III4	1.067	4	399	.372
III5	.788	4	399	.533
III6	.166	4	399	.955
III7	1.399	4	399	.233
IIF1	2.811	4	399	.025
IIF2	2.296	4	399	.059
IIF3	1.853	4	399	.118
IIF4	.216	4	399	.930
IIF5	2.705	4	399	.030
IIF6	2.788	4	399	.026
IIR1	.105	4	399	.981
IIR2	2.771	4	399	.027
IIR3	1.505	4	399	.200
IIR4	2.450	4	399	.046
IIR5	.557	4	399	.694
IIR6	.606	4	399	.659
RIF1	.808	4	399	.521
RIF2	2.539	4	399	.040
RIF3	1.628	4	399	.166
RIF4	.025	4	399	.999
RIF5	.870	4	399	.482
RIF6	3.327	4	399	.011

EO Variables and Total Number of Staff – Test of Homogeneity of Variances

Test of Homogeneity of Variances				
Items	Levene Statistic	df1	df2	Sig.
EORI1	2.563	4	399	.038
EORI2	.686	4	399	.602
EORI3	2.567	4	399	.078
EORI4	3.654	4	399	.016
EORI5	1.152	4	399	.332
EORI6	2.542	4	399	.039
EOR1	2.502	4	399	.042
EOR2	1.373	4	399	.242
EOR3	4.627	4	399	.071
EOR4	1.331	4	399	.258
EOR5	.609	4	399	.656
EOR6	.273	4	399	.895
EOP1	1.620	4	399	.168
EOP2	2.133	4	399	.076
EOP3	1.363	4	399	.246
EOP4	4.361	4	399	.012
EOP5	.538	4	399	.708
EOC1	.903	4	399	.462
EOC2	2.603	4	399	.066
EOC3	.589	4	399	.671
EOC4	3.280	4	399	.092
EOC5	.488	4	399	.744
EOC6	6.615	4	399	.084
EOA1	1.110	4	399	.352
EOA2	1.308	4	399	.266
EOA3	1.267	4	399	.282
EOA4	1.364	4	399	.246
EOA5	.216	4	399	.930

II variables and Total Number of Staff – Test of Homogeneity of Variances

Test of Homogeneity of Variances				
Items	Levene Statistic	df1	df2	Sig.
III1	.386	4	399	.818
III2	.908	4	399	.459
III3	.298	4	399	.879
III4	.611	4	399	.655
III5	.889	4	399	.470
III6	.979	4	399	.419
III7	.270	4	399	.898
IIF1	.130	4	399	.971
IIF2	2.194	4	399	.069
IIF3	2.796	4	399	.026
IIF4	.889	4	399	.470
IIF5	2.557	4	399	.038
IIF6	1.210	4	399	.306
IIR1	1.554	4	399	.186
IIR2	.498	4	399	.737
IIR3	4.047	4	399	.003
IIR4	1.286	4	399	.275
IIR5	.957	4	399	.431
IIR6	.653	4	399	.625
RIF1	2.071	4	399	.084
RIF2	1.300	4	399	.269
RIF3	.781	4	399	.538
RIF4	1.533	4	399	.192
RIF5	.699	4	399	.593
RIF6	1.450	4	399	.217

Appendix 4: Mean, median and standard deviation on all items

Ready to Innovate

		EORI1	EORI2	EORI3	EORI4	EORI5	EORI6
N	Valid	405	405	405	405	405	405
	Missing	0	0	0	0	0	0
Mean		3.7086	3.7432	3.7852	3.8247	3.7802	3.8519
Median		4.0000	4.0000	4.0000	4.0000	4.0000	4.0000
Std. Deviation		.88667	.89456	.86217	.82737	.88642	.80701

Entrepreneurial Orientation- Ready to Innovate (EORI)

Risk Taking

		EOR1	EOR2	EOR3	EOR4	EOR5	EOR6
N	Valid	405	405	405	405	405	405
	Missing	0	0	0	0	0	0
Mean		3.8840	3.9778	3.9185	3.9185	3.8444	3.8691
Median		4.0000	4.0000	4.0000	4.0000	4.0000	4.0000
Std. Deviation		.70981	.74262	.81798	.81495	.84899	.80540

Entrepreneurial Orientation- Risk-Taking (EOR)

Proactiveness

		EOP1	EOP2	EOP3	EOP4	EOP5
N	Valid	405	405	405	405	405
	Missing	0	0	0	0	0
Mean		3.7506	3.7432	3.7605	3.8667	3.8469
Median		4.0000	4.0000	4.0000	4.0000	4.0000
Std. Deviation		.83223	.88901	.84398	.80037	.81525

Entrepreneurial Orientation- Proactiveness (EOP)

Competitive Aggressiveness

		EOC1	EOC2	EOC3	EOC4	EOC5	EOC6
N	Valid	405	405	405	405	405	405
	Missing	0	0	0	0	0	0
Mean		3.8617	3.9481	3.8667	3.9457	3.9086	3.9778
Median		4.0000	4.0000	4.0000	4.0000	4.0000	4.0000
Std. Deviation		.75166	.74114	.74926	.75256	.68147	.66526

Entrepreneurial Orientation-Competitive Aggressiveness (EOC)

Autonomy

		EOA1	EOA2	EOA3	EOA4	EOA5
N	Valid	405	405	405	405	405
	Missing	0	0	0	0	0
Mean		3.8296	3.9136	3.8519	3.9111	3.8642
Median		4.0000	4.0000	4.0000	4.0000	4.0000
Std. Deviation		.76954	.81747	.79776	.73592	.78905

Entrepreneurial Orientation- Autonomy (EOA)

Incremental innovation Degree (III)

		III1	III2	III3	III4	III5	III6	III7
N	Valid	405	405	405	405	405	405	405
	Missing	0	0	0	0	0	0	0
Mean		3.9407	3.8765	4.0198	3.9111	3.9432	3.9654	3.8568
Median		4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000
Std. Deviation		.84516	.68907	.59669	.61901	.66692	.68128	.71007

Incremental innovation Frequency

		IIF1	IIF2	IIF3	IIF4	IIF5	IIF6
N	Valid	405	405	405	405	405	405
	Missing	0	0	0	0	0	0
Mean		3.8864	3.9383	3.8691	3.8914	3.8198	3.8667
Median		4.0000	4.0000	4.0000	4.0000	4.0000	4.0000
Std. Deviation		.76556	.55726	.72792	.78542	.82330	.74262

Innovation Intensity- Incremental Innovation frequency (IIF)

Radical innovation Degree

		IIR1	IIR2	IIR3	IIR4	IIR5	IIR6
N	Valid	405	405	405	405	405	405
	Missing	0	0	0	0	0	0
Mean		3.9852	3.9778	3.7284	3.8123	3.7012	3.6988
Median		4.0000	4.0000	4.0000	4.0000	4.0000	4.0000
Std. Deviation		.71044	.68722	.70381	.74418	.71554	.70228

Innovation Intensity- Radical Innovation Degree (IIR)

Radical innovation Frequency

		RIF1	RIF2	RIF3	RIF4	RIF5	RIF6
N	Valid	405	405	405	405	405	405
	Missing	0	0	0	0	0	0
Mean		3.7062	3.7531	3.7481	3.7160	3.6642	3.8617
Median		4.0000	4.0000	4.0000	4.0000	4.0000	4.0000
Std. Deviation		.72103	.65497	.71114	.78088	.81193	.65298

Innovation Intensity- Radical Innovation Frequency (RIF)

Appendix 5: Convergent and discriminant validity through AVE and shared variance

	EO Factors Loadings							II Factors Loadings		
	RTI	CA	AUT	PRO	EXTRSK	INTRSK		RADDF	INCRD	INCRF
	0.657	0.673	0.704	0.786	0.667	0.826		0.729	0.717	0.580
	0.760	0.785	0.701	0.725	0.736	0.759		0.753	0.862	0.752
	0.709	0.746	0.700	0.762	0.741			0.799	0.783	0.804
	0.741	0.715	0.754					0.775	0.712	
	0.742	0.754	0.684					0.727	0.712	
	0.641	0.684						0.755		
								0.758		
								0.768		
								0.822		
Average	0.7083	0.7248	0.7086	0.7577	0.7147	0.7925		0.7651	0.7572	0.7120
Average Variance Extracted (AVE)	0.5017	0.5158	0.5021	0.5741	0.5107	0.6281		0.5854	0.5734	0.5069
AVE between factors		0.5087	0.5019	0.5379	0.5062	0.5649			0.5794	0.5462
Correlation		0.0200	0.0180	0.0590	0.1020	0.0520			0.0330	0.0460
Correlation square/shared variance		0.0004	0.0003	0.0035	0.0104	0.0027			0.0011	0.0021

Variance extracted estimates > squared correlation estimate