

**Gordon Institute
of Business Science**
University of Pretoria

**The influence of effectuation and causation strategies on
corporate innovation in conditions of increased industry
uncertainty**

**A research report submitted by
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Master of Business Administration.

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ABSTRACT

Located in the nexus of corporate strategy and entrepreneurship, this study aims to improve the decision making of corporate organisations regarding innovation, when faced with uncertainty. This research is motivated by the question; What can decision makers and managers, in corporate organisations, learn from entrepreneurs? With the assertion that traditional approaches to corporate strategy do not account for unexpected changes, the entrepreneurial, non-predictive decision making logic of effectuation is considered.

The study finds evidence that causation and effectuation can coexist in an innovative organisation, but that effectuation is associated with relatively higher levels of innovation than causation. Based on the results observed, the study goes on to argue for the treatment of industry uncertainty as a formative construct, consisting of multiple components. This follows the observed polarised impact of generalising uncertainty which could lead to the wrong strategy, whether causal or effectual. A framework of this interaction was provided. Ultimately, the context of the uncertainty facing the organisation should determine the correct strategy to follow for corporate innovation, or even whether to increase the focus on innovation.

The findings of this research were found to also have implications for the application of effectuation to corporate strategy, as currently conceptualised and measured. Adaptation of this theory to the corporate context may be necessary, providing recommendations for further research.

KEYWORDS

Effectuation

Causation

Strategy in uncertainty

Corporate innovation

Corporate entrepreneurship

DECLARATION

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

Refilwe Mauda

13 January 2016

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CHAPTER 1: INTRODUCTION TO THE RESEARCH PROBLEM

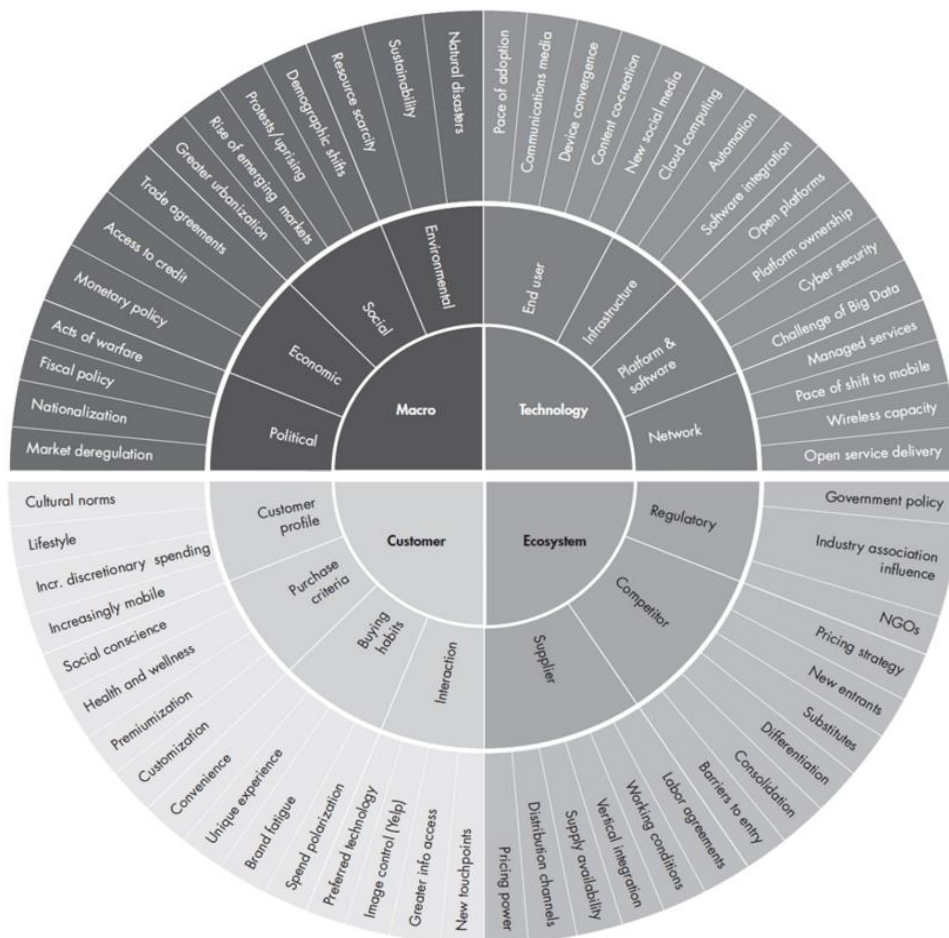
1.1. Introduction

This study explores the influence of effectuation and causation strategies on corporate innovation in conditions of increased uncertainty.

1.2. Background to the research problem

Corporate organisations are increasingly faced with tremendous uncertainty and turbulence. In fact, in a recent study by Toner, Ojha, de Paepe and Simoes de Melo (2015), they found that business leaders today are confronted with increased uncertainty along four primary dimensions of technology, ecosystems, customers and macro issues, as demonstrated in the diagram below. It is not only the prevalence, but also the cofounding impact of these multiple sources of uncertainty that increase complexity.

Figure 20: Dimensions of uncertainty facing business leaders today



Source: Toner et al. (2015)

These challenges have led to increased discussion of how business leaders can prepare for a future that seems impossible to predict. As recently as these strategic management questions have arisen, it is interesting to note that even as far back as 2001, it was proposed that prediction was becoming harder to perform than before (Sarasvathy, 2001).

In response to this complex business environment, organisations are increasingly developing new and innovative ideas to help achieve most, if not all, objectives (Quaye, Osei, Sarbah, and Abrokwah, 2015). In fact innovation is increasingly seen as a source of competitive advantage for companies (Brettel, Mauer, Engelen and Küpper, 2012).

The above assertions therefore mean companies are faced with a challenge of decision making, on innovative ideas, about a future they cannot predict. Herein lies the motivation for this research. How then can business leaders increase their chances of achieving objectives in this complexity?

1.3. Research problem and scope

“Under uncertainty, traditional approaches to strategic planning can be downright dangerous” – (Courtney, Kirkland and Viguerie, 1999)

In addition to the above, Courtney, Kirkland and Viguerie (1999), go on to argue that traditional approaches to strategy tend to require prediction, often resulting in management underestimating uncertainty. This is because the future is not only unknown but often unknowable (Sarasvathy, 2001). For the continued survival of an organisation in this context, a different approach to making decisions about the future is necessary (Wiltbank, Dew, Read, & Sarasvathy, 2006).

If the future for which organisations are making decisions, involves innovation as submitted earlier, then therein lies another issue. McCaffrey and Pearson (2015) suggest that corporates often adopt the wrong approach to innovation. According to them, innovation in business is constantly hampered by a concentration on goals, as well as other cognitive biases. This leads to the conclusion that not only are corporates often limited in strategising about the future, they are limited in their approach to innovation; the very protection they are seeking against uncertainty. How then, can organisations approach innovation under described conditions of uncertainty?

Consequently, the quest for innovation within the firm as described has been observed to resemble the entrepreneurial activities of opportunity exploration and that of new venture creation (Mthanti and Urban, 2014). This view provides a platform for

entrepreneurship thinking in large corporate organisations. In fact Blank (2013) found that an increasing number of corporates are considering the use of entrepreneurship practices. It is therefore fitting to research the application of an entrepreneurial theory in corporate strategic management.

The dichotomous concepts of effectuation and causation, which predominantly reside in entrepreneurship theory are therefore considered. As a non-predictive theory, effectuation differs from causation as it focuses on the means rather than a given end goal (Sarasvathy, 2001), and is used by entrepreneurs as a decision making heuristic in times of uncertainty. Causation, on the other hand, is consistent with traditional strategy approaches of predictive logic that are largely goal orientated. (Brettel *et al.*, 2012).

It is largely rudimentary in that it was first conceptualised in its current form and introduced by Sarasvathy (2001). It was popularised through a study that observed how expert entrepreneurs act when faced with an unknown future, compared with MBA students (who are expected to become decision makers in organisations). As further elaborated in Chapter 2, these entrepreneurs were found to 'effectuate', using the means they had, to create an emergent future. This was in contrast with the MBA students who seemed to rely on pre-defined goals and previous information to plan a future, often not knowing what to do when faced with uncertainty (Sarasvathy and Dew, 2005).

Effectuation and causation are regarded as two different approaches to venture creation, with effectuation thought to consist of four main dimensions; flexibility, affordable loss experimentation, and pre-commitments. These will be expounded in Chapter 2 and further explored throughout this research.

Having been developed from an entrepreneurship perspective, research opportunities exist to explore the theory of effectuation and test its application in large corporates, (Svensrud and Åsvoll, 2012), especially because of its relevant scope of application as described. Organisations exhibit a need for non-predictive decision making logic to assist with innovation. This study makes a connection of all these and explores the influence of effectuation and causation strategies on corporate innovation, in conditions of increased industry uncertainty.

As demonstrated, this research therefore locates the application of effectuation and causation to corporate strategy in the area of corporate innovation, which is in turn seen as an 'intersection' between the two disciplines of entrepreneurship and corporate strategic management.

1.4. The need for the research

This research is driven by both business and theoretical need. In fact research in this corporate entrepreneurship nexus today can offer tangible benefits and significant impact to emerging strategy (Kuratko, Hornsby and Hayton, 2015).

As explored in the previous section, there is an identified business need for this research. By investigating how effectuation and causation strategies influence corporate innovation, it contributes to improved decision making in corporate organisations, especially in conditions of uncertainty.

Essentially the study explores what decision makers and managers in corporate organisations, can learn from entrepreneurs. Should managers in large corporations adopt the non-predictive effectuation strategies observed in entrepreneurs, and if so, how? Hence providing recommendations that address pertinent business issues of today.

Furthermore, it is the aim of this study to contribute to the nexus of corporate strategy and entrepreneurship theory, which is seen as increasingly becoming relevant. With little regard for potential benefits, often the two fields are polarised into opportunity exploration and exploitation, but as Svensrud and Åsvoll (2012) suggest, seeking entrepreneurial opportunities is in itself also a strategic behaviour aiming to create value. Potential new insights of high value to both entrepreneurship and corporate strategy are envisaged by this trans-disciplinary research.

Also, the theory around effectuation is still largely rudimentary. While several theoretical and empirical studies have been conducted, very few have applied effectuation outside the entrepreneurship context. It has been the suggestion of several studies that more research, especially empirical in nature (Perry, Chandler and Markova, 2012), be done to add to its development in this context of corporate strategy. Researchers have been encouraged to do this by examining the consequences of using effectuation, in the process testing its application (Perry *et al.*, 2012). It is therefore the aim of this research to contribute to the development of this theory, extending its context to corporate strategy, and ultimately contributing to the 'corporate effectuation' discussion as popularised by Blekman (2011).

In addition, the results of research by Chandler, DeTienne, McKelvie and Mumford (2011) provided measuring scales for both effectuation and causation, including the sub-constructs of effectuation. This enabled further research into these topics as shown. There exists an opportunity to examine and refine the measuring scales that were

operationalised. It is the intention of this research to contribute in this regard (Svensrud and Åsvoll, 2012).

1.5. Research objectives

Insights for both entrepreneurship and corporate strategy are envisaged by this research, as guided by the following five research objectives:

- Determine the influence of effectuation and causation strategies on corporate innovation, thus contributing to improved decision making in corporate organisations in conditions of uncertainty.
- Provide practical recommendations to managers in large corporates on the use of effectuation and causation strategies as a means to innovate, providing insights from the nature of the relationship, observing between the research variables.
- Add to the developing research on the application of effectuation to corporate strategic management, making any theoretical contributions as learnt from insights gathered.
- Use the process of this research to examine and validate the measuring scales for effectuation and causation that were operationalised by Chandler *et al.* (2011), adding to the development of this theory.
- Provide a basis for further research into this topic by offering concrete findings, as well as make insightful recommendations for further research

1.6. Conclusion

Having observed the increasing complexities that characterise the business environment today, a theoretical lens is borrowed from entrepreneurship. Traditional strategy theory and approaches to innovation, which are largely goal and prediction orientated appear to not be sufficient. With this background and as introduced, the research aims to bridge this gap by providing insights on the observed influence of the entrepreneurial concepts of effectuation and causation in corporate strategy. Key to the objectives of this study, is to provide relevant management recommendations to support organisations in their decision making regarding innovation.

Existing literature was used to be thoroughly attuned to the topic. This helped to determine the right research questions to ask as well as the correct methodology to follow. Ultimately, theoretical and practical insights are expected from investigating this topic.

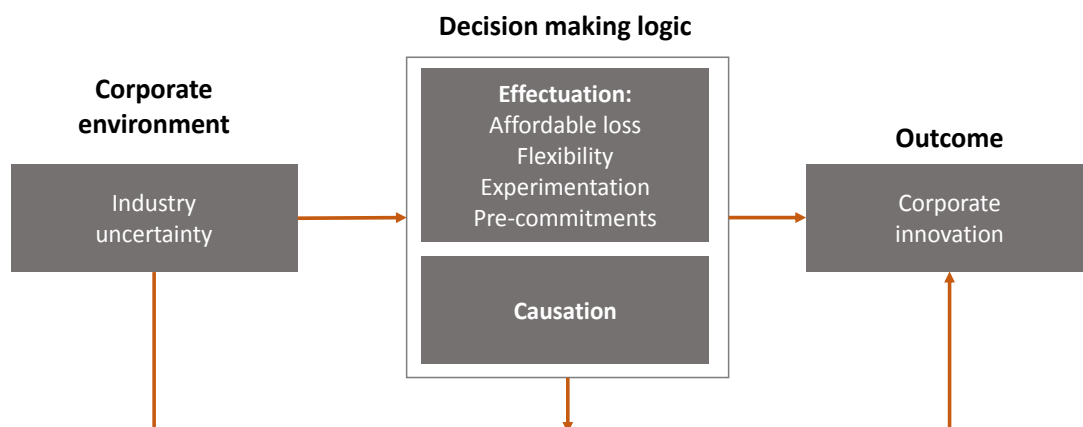
CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

The research title expresses an interest in the variables of corporate innovation, effectuation, causation and industry uncertainty. As introduced, it seeks to explore the possible influence of the decision making logic of effectuation and/or causation on corporate innovation, especially when organisations are faced with increased uncertainty. Effectuation and Causation are concepts that originated in entrepreneurship literature and are applied to corporate strategic management, to essentially explore what managers in corporates can learn from entrepreneurs.

The diagram presented below provides the overall scope of the research variables and objectives. It also gives the context in which this literature review was conducted. The basis of this hypothetical framework is essentially that: based on context (Industry uncertainty) an organisation's actions are based on a decision logic (Effectuation/Causation) to achieve a desired outcome (corporate Innovation). The arrows indicate the relationships of interest within the scope of this research, yet without suggesting that the relationships that are not drawn do not exist. These are elaborated upon in Chapter 3.

Figure 21: Research context framework and scope - The influence of effectuation and causation strategies on corporate innovation in conditions of increased uncertainty



Source: Author, with input from Harms & Schiele (2012)

In addition to this, reviewing existing literature and theoretical representation on the relevant variables will provide learnings, as well a basis for the proposed research questions and hypotheses.

To be able to explore if and how effectuation fits in the context of corporate strategic management, existing literature on the firm's decision making process in uncertain situations is first discussed. Subsequently, the theory of effectuation and its current theoretical application is expounded. Lastly how all this fits into the corporate innovation and recent applications of this theory to corporate strategic management is discussed.

2.2. Decision making in strategic management

Firms are generally considered to be rational decision makers that seek to sustain competitive advantage over time and therefore constantly have to answer the question; what to do next (Wiltbank et al., 2006)? These decisions have to be made in conditions of uncertainty, where the future is not just unknown but often unknowable (Sarasvathy, 2001). It then follows that the decision making process and the philosophy behind it will subsequently influence the strategies chosen and therefore the outcome (Harms & Schiele, 2012).

2.2.1. The future: Prediction vs. control

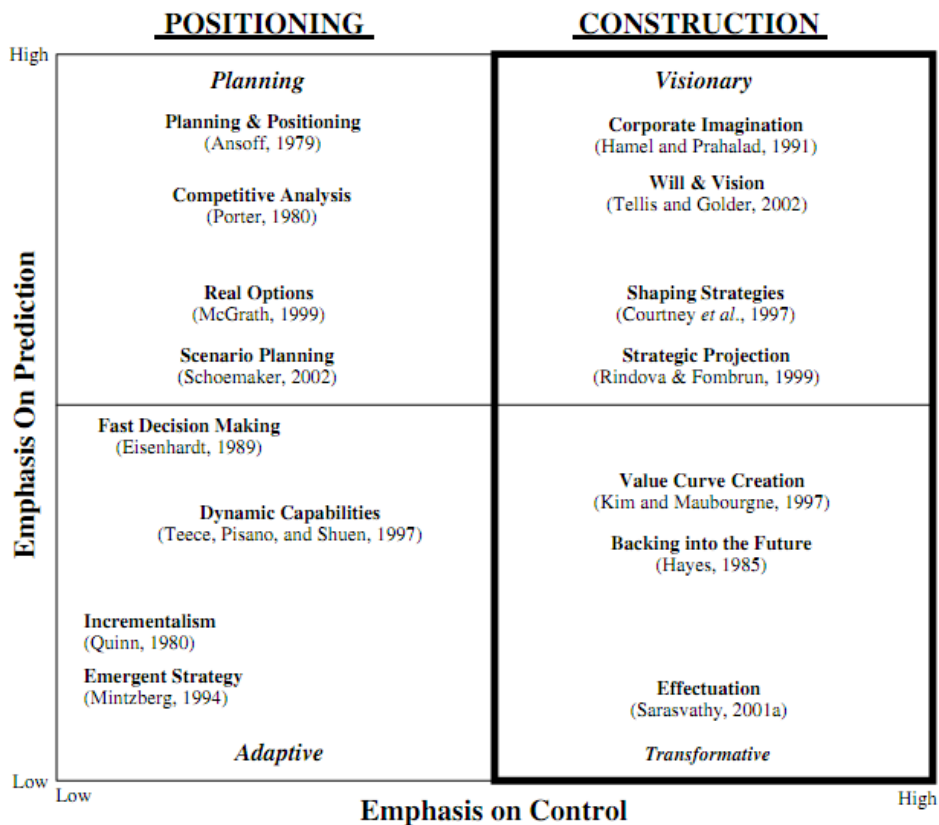
Drawing from an extensive literature review of 169 peer reviewed articles; Wiltbank, Dew, Read, & Sarasvathy (2006) suggested that the strategic management literature is fundamentally represented by two schools of thoughts: The Ansoff planning school advocating for rational strategies to better predict the future; and the Mintzberg learning school which advocates for better adaptation by firms (Mintzberg & Mintzberg, 1978). This is further supported by Christenson and Donavon (2000) who suggested that defining and implementing a firm's strategy involves intended (deliberate) and emergent strategy processes. Both the design and planning strategies are aimed at better positioning the firm (Wiltbank et al., 2006).

The underlying logic of positioning strategies is based on the assumption that a firm can anticipate the future and be ahead of competitors, leading to a higher probability of success (Svensrud & Åsvoll, 2012). Inferring therefore that, to the extent that the future can be predicted, it can be controlled (Wiltbank et al., 2006). Adding to this debate, the learning school of strategy suggested that the complex nature of strategy overwhelms the prescriptions of the design, planning, and positioning schools (Quaye et al., 2015), advocating more for an emergent view of strategy through organisational experience.

The matrix represented below was provided as a summary of existing research in strategy and where it fits in the prediction-control decision making continuum by Wiltbank et al. (2006).

Wiltbank et al. (2006) have gone on to argue for the separation of prediction and control, implying that opportunities can be pursued using control-orientated but non-predictive means. As shown below, the theory of effectuation is viewed as a ‘construction’ approach and is located in this space of high control – low prediction quadrant. Although this theory shares similarities with most adaptive schools of strategy, it is with this element of ‘high control’ which they differ and this is further elaborated in the subsequent sections.

Figure 22: Representative literature on firms' decision making - Prediction vs. Control



Source Wiltbank et al. (2006)

2.2.2. Decision making under uncertainty

Firms as entities, are decision makers with bounded rationality (Robbins & Judge, 2015), and when faced with uncertainty, rationality would lead firms to form expectations based on past experiences (Dew, Read, Sarasvathy, & Wiltbank, 2008). In a business context that is dynamic an often not a continuation of the past, decision making under uncertainty therefore becomes a challenge. To this end, some criticism against classical strategy models include their inherent inability to handle unexpected changes in the environment (Cook & Yamamoto, 2011).

To combat the limitations of bounded rationality, strategies that avoid anticipation and prediction of events in the distant future use decision rules that are based on 'short-run reaction to short-run feedback' (Dew et al., 2008). The challenge of anticipating and predicting the long run is therefore eliminated. This appears to be the frame that assist some entrepreneurs to deal with uncertain futures, prioritising experimentation and flexibility over long term planning (Blank, 2013).

Adding to this, (Toner et al., 2015) explained that companies that seem to organise quickly around the right choices are not in some way better at predicting the future, but are able to clearly define which uncertainties the organisation faces. This allows for the organisation to control for this uncertainty, supporting the low-prediction but high-control assertion Wiltbank et al. (2006) explored by earlier.

2.3. Theory of effectuation and application to corporate strategic management

The theory as conceptualised was researched and existing literature on its application to corporate strategic management explored.

2.3.1. Effectuation and causation

The theory of effectuation is based on the rationale that the future is unpredictable and to the extent that we can control it, there is less need to make predictions (Sarasvathy, 2001). It is a decision making heuristic in situations of uncertainty, when planning and inferences cannot be made. It is further referred to as the process that begins with a set of given means and focuses on selecting between possible effects (outcomes) that can be created, contrasting it with a prediction based process of causation that focus on selecting between means to create a pre-determined effect (Sarasvathy, 2001) Effectuation is therefore consistent with emergent strategy, while causation with planned

strategy approaches (Perry et al., 2012).

Notwithstanding, this theory was developed from an entrepreneur's perspective, offering a contrasting view to the traditional economics-based view of how entrepreneurs discover opportunities (Sarasvathy, 2001). Instead of searching markets for supply-demand mismatch, or focusing on goals which are based on an unpredictable and uncontrollable future, entrepreneurs are observed to focus on the available set of means, over which they have control (Sarasvathy & Dew, 2005).

Adding to the distinction between effectuation and causation, Fisher (2012) suggested that causation processes tend to be used in identifying and exploiting existing markets with lower levels of uncertainty. This is in contrast with effectuation which is used in identifying and exploiting opportunities in new markets with high levels of uncertainty (Fisher, 2012).

The major differences between the two approaches are summarised in the table below:

Table 1: The difference between Effectuation and Causation

	Causal thinking	Effectual thinking
View of the future	Predictive: The future is a continuation of the past, prediction logic is both necessary and useful.	Creative: Effectual logic and agents shape the future, prediction is neither easy nor useful.
Basis for taking action	Goal-oriented: Predefined goals determine action and constrained by limited means.	Means-oriented: Goals are emergent based on given means, not vice versa.
Attitude toward risk and resources	Expected return: Pursue maximum expected return.	Affordable loss: Focus on limiting downside potential.
Attitude toward outsiders	Competitive analysis: Desire to limit competition and ownership dilution.	Partnerships: Create alliances, to co-create the future.
Attitudes toward unexpected contingencies	Avoiding: Careful planning towards defined targets - contingencies are obstacles to be avoided.	Leveraging: Contingencies seen as opportunity to rethink of new possibilities.

Source: Sarasvathy (2001)

Effectuation does not in principle assume superiority over causation, but exists as a parallel logic to be used in unpredictable situations (Svensrud & Åsvoll, 2012). Even as

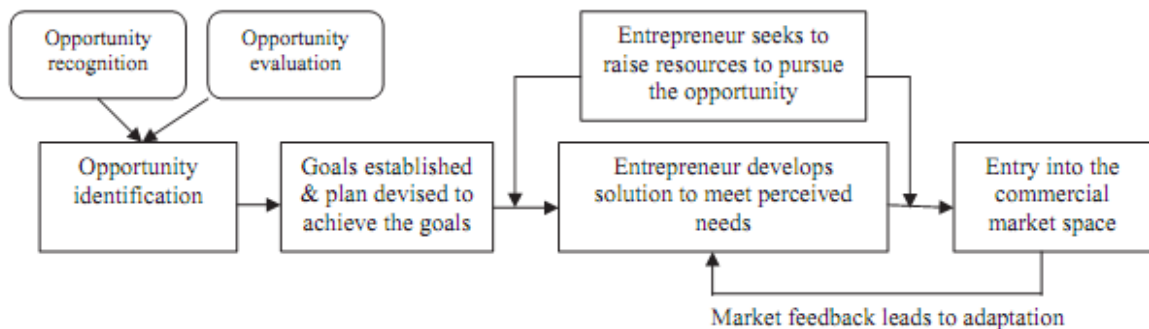
conceptualised, Sarasvathy (2001) proposed that causation and effectuation are two different approaches to new venture creation. In support of this, Rust (2010) found that even with entrepreneurs, few follow pure causal or pure effectual strategies and processes, but instead adopt a combination of the two approaches.

2.3.2. Causal vs. effectual strategy process

There is clear distinction between the strategy processes of organisations following effectuation versus causation. This is demonstrated by the following representations.

As shown in the diagram below, central to the causal approach is intentionality in opportunity identification and exploitation, with emphasis on systematic information gathering and planning (Fisher, 2012). Opportunities are identified, followed by a decision to pursue. Goals and enabling plans are devised. Thereafter resources are acquired to develop a solution to address the opportunity identified, in the hope to gain market entry. The feedback loop allow for adaptation of the solution.

Figure 23: The causal strategy approach

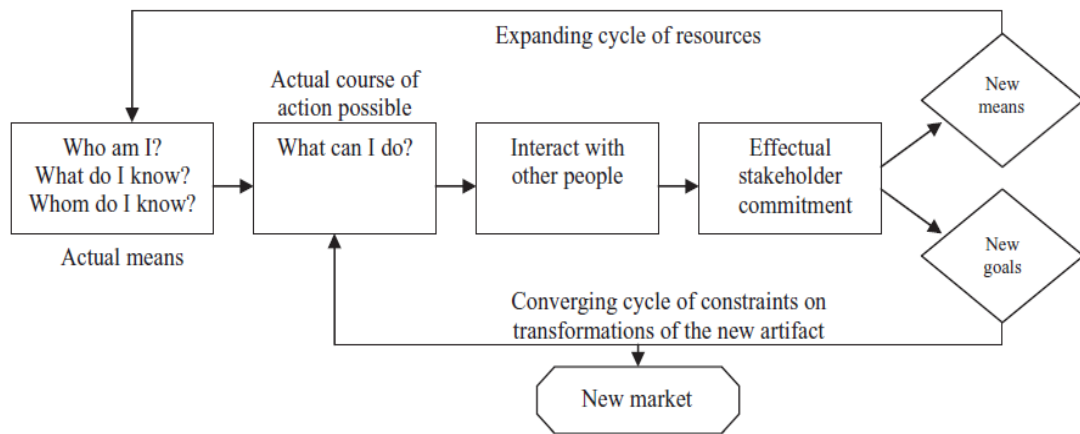


Source: Fisher (2012) as adapted from 'The classic approach to entrepreneurship' by Shah and Tripsas (2007)

However, business environments are often ambiguous, dynamic and unpredictable. This, coupled with information asymmetry, inhibit entrepreneurs to readily recognise and evaluate opportunities before actual exploitation (Fisher, 2012).

In contrast, the non-predictive effectual strategy process focuses on existing resources and use experimentation techniques to gather more information about the future (Blekman, 2011). This is further illustrated in the diagram below. The process starts with the means and through interaction with others, new means and new goals could emerge. New means acquires add to the resources of the firm while new goals could lead to new markets or products being explored.

Figure 24: The effectual strategy approach



Source: Dew et al. (2008) and Wiltbank et al. (2006)

However, the theory of effectuation was fundamentally developed from an entrepreneurial perspective of new venture creation. This speaks to the purpose of this research and will be further explored in the subsequent sections.

2.3.3. Elements of effectuation and causation

To advance the theory of effectuation from the principles presented by Sarasvathy (2001), research went into developing validated measures of causation and effectuation, the most widely used being from Chandler et al. (2011). This was a validation study that was aimed at establishing the empirical distinctions between causation and effectuation. Chandler et al. (2011) concluded that effectuation is a formative construct with four distinct sub-construct; experimentation, affordable loss, flexibility and pre-commitment. It was apparent in the factor analysis conducted that causation items were highly correlated with one another, while the effectuation items loaded separately, suggesting that effectuation is a multi-dimensional construct (Chandler et al., 2011).

Flexibility: This is described as the ability to adapt to new knowledge, changing circumstances and unexpected events. Where unexpected contingencies are not avoided but are viewed as opportunities for new goals and new possibilities (Dew et al., 2008). This also implies that the structure of the organisation is dependent on contingent opportunities (Sarasvathy, 2001).

Affordable loss: This decision logic is used as criterion to evaluate resource investment as opposed to using the traditional expected return (Wiltbank et al., 2006). In evaluating

opportunities, an entrepreneur will ask themselves how much they are willing to lose, as opposed to how much they expect to gain. They commit resources with an understanding and acceptance that they may be lost, rather than on the probabilities of expected returns Fisher (2012). This further demonstrates the focus on what exists now and can be controlled, eliminating the need to predict what the returns of the opportunity will be.

Experimentation: This dimension of effectuation involves a series of trial-and-error activities and incremental changes when exploring opportunities. Sarasvathy (2001) and Wiltbank et al., (2006) made the suggestion that this is a low cost method of probing the future.

Pre commitments: According to Sarasvathy (2001), this dimension involves establishing early relationships and alliances with strategic partners such as customers, competitors and suppliers. Here, investing in partnerships is favoured over competitive analysis; focusing on who to work with rather than who the competition is. This is done in order to reduce the uncertainty associated with new venture creation (Fisher, 2012).

While validating these scales of effectuation and causation, Chandler et al. (2011) discovered that pre-commitments is the only sub-construct of effectuation that is shared with causation, as it also entails planning and exploitation of pre-existing knowledge. Furthermore, the exploratory factor analysis conducted revealed a clear distinction between the pre-commitment items and the other measures of effectuation. The pre-commitments scale, by Chandler et al. (2011)'s own admission, was not as strong as the others. This led them to conclude that the measures developed may not accurately capture what Sarasvathy (2001) initially conceptualised with regards to pre-commitments and call for further research in this regard.

To support Sarasvathy (2001), Chandler et al. (2011) also show that causation is negatively correlated with uncertainty, indicating that causal strategies are more likely going to be adopted in conditions of low uncertainty. On the other hand, the same research showed that experimentation is positively associated with uncertainty.

With these measures and associated scales as a basis, further research into this rudimentary theory was therefore enabled. To this end, different researchers have gone on to observe effectuation and causation under various conditions. However very few have applied this to corporate strategy, therefore limiting the targeted sources available

for reference. Notwithstanding, some of the findings and conclusions reached are discussed in various sections of this research, and compared with results in Chapter 6.

2.3.4. Industry uncertainty and dynamism

Industry uncertainty and dynamism was explored in the context of effectuation and causation.

From the start, the theory of effectuation was conceptualised as a non-predictive decision making logic that assists entrepreneurs deal with an unknowable future, inherently implying a positive relationship with uncertainty (Sarasvathy, 2001). To support this, the use of effectuation in hostile and unpredictable business environments has been suggested as a beneficial strategy (Wiltbank et al., 2006). This research therefore undertook to understand the influence of hostility, dynamism and unpredictability of the business context in which an organisation operates, on the other variables of corporate innovation and effectuation/causation. This is particularly relevant and motivated this research. Firms are indeed observed to be facing increased levels of dynamism, competition and uncertainty, causing them to explore strategies that give them competitive advantage (Blank, 2013).

This research adopts the term Industry uncertainty to encompass all these notions of industry hostility, dynamism and unpredictability. Furthermore, the focus was more about the level of uncertainty faced by an organisation in the industry it operates in, as opposed to other types of uncertainty external to the organisation, for example, country uncertainty. Research done by Slevin and Covin (1997) developed a measuring scale to establish the level of environmental hostility faced by a firm, and was regarded relevant to this research. It was therefore used to measure Industry uncertainty.

Some research has been conducted on the impact of industry uncertainty on effectual/causal strategies. For example, Harms and Schiele (2012) found that the use of effectuation is driven by both perceived uncertainty and experience. In their research about internationalisation of new venture, they showed that increased experience may reduce the need to use effectual strategies in favour of causal-based approaches in predictable environments. In unpredictable environments however, they found that entrepreneurs with a greater degree of international experience were more likely to use effectuation. With experience as a moderator, this study essentially demonstrated that effectuation is positively correlated with uncertainty, and negatively with causation.

On the other hand Mthanti & Urban (2014) could not establish a significant relationship between industry uncertainty (as reflected by hostility and dynamism) and effectuation.

The findings on causation have also been unclear. It was unclear to Harms and Schiele (2012) if experienced managers are more or less likely to use causation in situations of uncertainty. Hence leading to the conclusion that uncertainty may not have a systematic influence on the use of effectuation and/or causation. The exploratory factor analysis they conducted revealed that uncertainty (used synonymously with dynamism), separated into two different components, which were subsequently labelled technical dynamism and general dynamism. A negative relation between general dynamism and causation was observed while, while a positive association between technical uncertainty and effectuation was established. Harms and Schiele (2012) suggested further research to establish why the findings are different across the types of uncertainty.

2.4. Corporate innovation as an entrepreneurial activity

Corporate innovation as an entrepreneurial activity within a firm was also considered.

Entrepreneurship is mainly associated with creating, recognising or discovering new opportunities in the form of products, markets or new firms (Sarasvathy & Venkataraman, 2001). On the other hand, corporate strategic management is considered as a discipline concerned with achieving ends such as profit, market share and sustained competitive advantage. In fact the two fields are commonly polarised, seen as separation between invention and commercialisation or exploration and exploitation (Svensrud & Åsvoll, 2012). They went on to suggest that entrepreneurial opportunity-seeking, is simultaneously strategic behaviour with the aim of value creation, therefore bringing the two fields closer than most imagine.

(Kuratko et al., 2015) suggested that in fact the inherent benefits of entrepreneurial action in corporate organisations has been established, entrepreneurship has a significant role to play in strategic management and vice versa.

Consequently, firms invest in disruptive technologies to pursue innovation, with the assumption that new market opportunities will be created. This therefore links the quest for innovation and new markets to a level of entrepreneurial orientation in the firm, similar to that observed in new venture development (Mthanti & Urban, 2014). Corporate innovation therefore is widely regarded as a source of competitive advantage (Brettel et al., 2012), often as a response to a changing competitive landscape as Goodale, Kuratko, Hornsby, and Covin (2011) have argued.

The relevance of corporate entrepreneurship orientation and innovation to firm survival has also been emphasised by Brettel et al. (2012) while researching this in relation to research and development (R&D) in large organisations. This increasing relevance of corporate innovation is seen to have given rise to the idea of corporate-innovation-as-a-strategy (Goodale et al., 2011) and is observed by an increased number of corporates adopting entrepreneurial theory and practices (Blank, 2013).

Corporate innovation therefore appears to be influential in the firms' quest to recognise, create or discover opportunities, in order to explore new business domains or new business within existing domains (Goodale et al., 2011). This research therefore recognises the corporate innovation process as one of the major intersections of entrepreneurship and corporate strategic management, and will be focused on the application of effectuation and causation strategies to corporate innovation, with the aim of improving decision making in increased uncertainty.

2.5. Corporate effectuation

Following the above notions of corporate innovation and decision making under high uncertainties caused by an unpredictable future; the argument to apply the theory of effectuation to corporate strategy is considered.

Does it follow that in instances where firms need to innovative, or explore new opportunities, then the entrepreneurial decision making heuristic of effectuation exists or can be applied to achieve effectual ends in these conditions of uncertainty?

Dew and Sarasvathy, (2002:20) have argued that: "One of the more fertile areas for research based on the theory of effectuation, will involve large corporations and the commercialisation of new technologies that they create". Notwithstanding, limited research had been done to test and advance this theory to be applied to large corporations (Svensrud & Åsvoll, 2012) and (Perry et al., 2012). In fact the researcher was limited to a number of targeted studies when exploring this nexus.

2.5.1. The benefits of effectuation to corporate organisations

Several researchers have argued for the use of effectuation in corporates as a management strategy, even referring to it as 'corporate effectuation' (Blekman, 2011).

To begin, Svensrud & Åsvoll (2012) propose that when considering the development of opportunities, effectuation is as important in large corporations as it is in start-ups. They further suggest that many large corporations could gain competitive advantage through

balancing between invention and innovation which can be facilitated by effectual strategies.

Offering an appreciation for effectuation, Brettel et al. (2012) argued that strategic approaches for high levels of continued innovation in corporates are limited, allowing an opportunity for entrepreneurial theories to be tested and applied. Brettel et al. (2012) explored this by applying effectuation to innovative corporate R&D projects, successfully establishing a positive statistical relationship between the two. Brettel et al. (2012) further supported their decision to research the use of effectuation in corporate R&D projects by arguing that the current R&D literature doesn't conclusively establish planning, which is associated with causal strategies, as a success factor. This, according to them, offers an avenue to research other approaches such as effectuation.

In a context where most managers use prediction, managers in large firms could use effectual strategies to differentiate themselves and gain competitive advantage (Svensrud and Åsvoll, 2012). In support of this notion, Blekman (2013) expressed the concern that managers in corporate organisations seem to be more concerned with how to make employees meet existing targets in the most efficient way. He suggested that managers could benefit from an effectual mind set, that instead considers employees as potential 'effectuators' and facilitate for employees to reach even better goals.

Observing the difference between entrepreneurs and managers (Dew, Read, Sarasvathy, & Wiltbank, 2009), also found that managers were more likely to focus on pre-selected goals and predictive information and not enough on emergent goals that take into account a changing environment. Dew et al. (2009) further called for addition of this entrepreneurial effectuation teaching to MBA education, as these are likely to go on to be decision makers in organisations.

Moreover, as an approach that is not trying to predict the future, effectuation can offer practical advantages to strategic management (Wiltbank et al., 2006). They argued that when organisations continually ask themselves 'what else can we do with these resources' creativity is enhanced as new goals are endogenous to the strategy-making process, as opposed to being pre-defined and exogenous. The latter was seen as an inhibitor to creativity in the organisation. Adding to the advantages, the costs of trying to predict and plan for an unknowable future are reduced, including the costs of failure associated with predictive planning (Fisher, 2012).

Svensrud and Åsvoll (2012) suggested that in the early stages of opportunity discovery and growth, effectuation can be good for innovation in large corporation. To this end, they further proposed that the time element in innovation affect the management capabilities

needed to manage the opportunity through its different stages. This led them to the conclusion that effectual management qualities could be more valuable in initial stages, whereas causation qualities fit well in the latter phases of the opportunity.

2.5.2. Considerations to the application of effectuation in corporates

On the other hand, it is also evident that applying the theory of effectuation as part of corporate strategy may have to take into account the differences that exist between entrepreneurial (often small businesses) and large corporates. Svensrud and Åsvoll (2012) cautioned that the theory may be incomplete as it relates to the corporate environment, as there may be aspects that were not a consideration in the entrepreneurial environment where this theory was developed.

Furthermore, components of the theory of effectuation could be observed differently in corporate organisations. In analysing some ventures and drivers of the entrepreneurial behaviour, Fisher (2012) found strong evidence of affordable loss, flexibility and experimentation as dimensions that explain the behaviour in the case studies examined. Looking at the data, they however found that pre-commitments was the only dimension of effectuation that was not observed, and did not fit with the case study data. It was not clear if the ventures under study used agreements with suppliers and customers to reduce uncertainty, as affordable loss suggests.

In what he calls the orchestration of corporate effectuation, Blekman (2013) suggested that implementing effectuation in a corporate involved understanding what is unique and specific to that large organisation, as well as a shift in mind set and behaviours. He recommended that organisational structure, human resource processes and other operational processes be reviewed to facilitate effectuation. Furthermore the support offered by top management in terms of policies and attitude towards failure will be critical to the implementation of effectuation in a corporate organisation.

In addition to this, Svensrud and Åsvoll (2012) proposed that integrating concepts such as existing tacit knowledge and dynamic capabilities could add an important dimension to effectuation theory and literature, especially when considered in a corporate environment. They argued that in order to successfully implement an effectual strategy, the dynamic capability of the firm to identify opportunities and its ability to change the structure of the organisation to exploit these opportunities becomes a competitive advantage, and therefore as a missing dimension in thinking about implementing effectual strategies in large corporates. This is primarily because the theory was developed from an entrepreneurial perspective that is associated with creating,

recognising or discovering new opportunities in the form of products, markets or new firms (Sarasvathy & Venkataraman, 2001), and existing knowledge and capabilities that are found in established large corporates may need to be considered (Svensrud & Åsvoll, 2012).

Consequently, in thinking about corporate effectuation and causation, the trade-off between creativity and efficiency should be considered (Sarasvathy & Venkataraman, 2001). This is especially because the two processes have been observed to be not necessarily diametrically opposed, with companies seemingly able to use both (Harms & Schiele, 2012). The implication of exploration and exploitation strategies on resource allocation is therefore critical (Christensen & Donovan, 2008), if effectuation and causation are to be considered as co-existing processes in an organisation.

2.6. Conclusion

The firm's decision making process was explored, demonstrating how effectuation as a low-prediction and high-control strategy, is more effective when dealing with unexpected changes in the environment. The concepts of corporate innovation and corporate entrepreneurship as a strategy were also considered to provide a basis for the use of effectuation in corporates. Lastly, existing research on the application of effectuation in corporates was explored, highlighting benefits and challenges.

It is therefore among the objectives of this proposal, to investigate the applicability of this theory and contribute to this developing literature on corporate effectuation.

CHAPTER 3: RESEARCH QUESTIONS AND HYPOTHESES

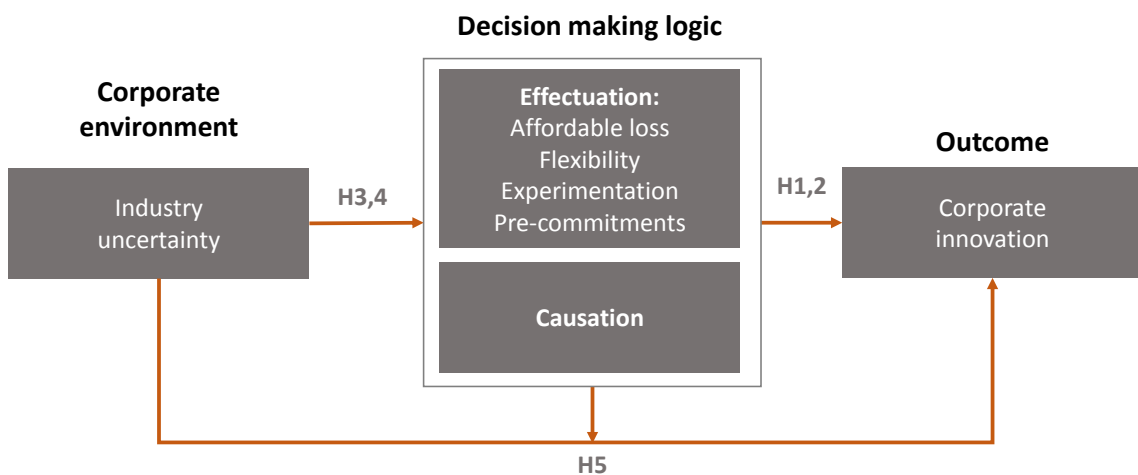
3.1. Introduction

Informed by literature and research objectives, the research questions were determined to establish relationship of interest, broken down further into hypotheses presented below. The sources of the variables to be tested as well as the research instrument used are discussed in Chapter 4.

3.2. Research questions and hypotheses to test

The framework below provides context to the research hypotheses, demonstrating the link that each proposed hypothesis was set out to make.

Figure 25: The context of research hypotheses and associated variables



Source: Author with input from Harms & Schiele (2012)

Research Question 1:

Are organisations with higher levels of corporate innovation more likely to be using effectuation or causation as a strategy?

H1: There is a positive relationship between the prevalence of effectuation and levels of innovation in an organisation.

Effectuation is viewed as a multidimensional construct (Chandler et al., 2011), therefore the following four sub-constructs will also be examined:

H1a: There is a positive relationship between the prevalence of flexibility and levels of innovation in an organisation.

H1b: There is a positive relationship between the prevalence affordable loss and levels of innovation in an organisation.

H1c: There is a positive relationship between the prevalence of experimentation and levels of innovation in an organisation.

H1d: There is a positive relationship between prevalence of pre-commitments and levels of innovation in an organisation.

H1_{Alternative}: There is a negative relationship between the prevalence of effectuation and levels of innovation in an organisation.

There is no literature explicitly suggesting that following a causation strategy could lead to a decrease in the levels of innovation in an organisation. Hence the second hypothesis (**H2**) proposes that:

H2: Effectuation is more correlated with levels of corporate innovation than causation.

H2_{Alternative}: Causation is more correlated with levels of corporate innovation than effectuation.

Research Question 2:

Do levels of industry uncertainty influence the prevalence of effectuation or causation in an organisation?

H3: There is a positive association between industry uncertainty and the prevalence of effectuation in an organisation

Effectuation is viewed as a multidimensional construct (Chandler et al., 2011), therefore the following four sub-constructs will also be examined:

H3a: There is a positive association between industry uncertainty and the use of flexibility in an organisation.

H3b: There is a positive association between industry uncertainty and the use of affordable loss in an organisation

H3c: There is a positive association between industry uncertainty and the use of experimentation in an organisation

H3d: There is a positive association between industry uncertainty and the use of pre-commitments in an organisation

H3_{Alternative}: There is a negative association between industry uncertainty and the use of effectuation in an organisation

The relationship between uncertainty and causation is also considered and Hypothesis 4 is proposed:

H4: There is a negative association between industry uncertainty and the use of causation in an organisation

H4_{Alternative}: There is a negative association between industry uncertainty and the use of causation in an organisation

Research Question 3

In situations of increased industry uncertainty, does the prevalence of effectuation increase corporate innovation?

H5: The relationship between industry uncertainty and corporate innovation is moderated by the prevalence of effectuation

H5_{Alternative}: The relationship between industry uncertainty and corporate innovation is not moderated by the prevalence of effectuation

3.3. Conclusion

As demonstrated by literature, the prevalence of corporate innovation can be influenced by a decision making logic followed by the organisation, as well as the context in which these decisions are being made. This therefore is the basis from which the research questions and accompanying hypotheses were formulated. The first two hypotheses are central to the research and enabled the researcher to establish whether organisations with higher levels of corporate innovation are more likely to be using effectuation or causation as a strategy. The following two hypotheses aimed to establish the influence of uncertainty in the prevalence of effectuation or causation in an organisation, with the last hypothesis formulated to help the researcher understand if ultimately the use of effectuation increase corporate innovation in the context of increased industry uncertainty. Consequently, the results are set out in Chapter 5, the implications of which are discussed in detail in Chapter 6.

CHAPTER 4: RESEARCH METHODOLOGY

4.1. Introduction

The research methodology and design was carefully chosen to match the research questions and to best address the associated hypotheses. In this chapter, the methodology followed is outlined, its strengths and limitations as well highlighted. Accordingly, the research instrument, sampling method, process of data gathering and analysis are also discussed.

4.2. Research philosophy and approach

Through this research, the application of the rudimentary theory of effectuation developed for entrepreneurship was tested in a corporate setting. Its potential influence on corporate innovation was established structurally through collecting data and observing quantifiable variables to establish relationships; therefore following an epistemological philosophy of positivism (Saunders, Lewis, & Thornhill, 2012). This structured methodology was suited for meeting the objectives of this research, established relationships that provided practical and theoretical recommendations.

4.3. Research design

The research conducted was deductive and quantitative in nature. The focus was on using data collected through a self-administered questionnaire to test a theory that has already been identified (Saunders et al., 2012). The researcher sought to understand more about this theory by testing it in a new context, using statistical analysis. Furthermore this research was exploratory in nature, as the hypotheses developed were composed to understand the relationships between the identified variables, and to further determine if what was observed might be explained by an existing theory (Zikmund, Babin, Carr, & Griffin, 2010).

4.3.1. The research instrument: Questionnaire

The choice of the research instrument was informed by the research objectives and design. A questionnaire was deemed appropriate for collecting the numeric data for analysis.

To facilitate testing of research hypotheses, a questionnaire consisting of 32 targeted questions was used. Respondents were required to answer statements and provide observations about their respective corporate organisations on a seven-point Likert

scale, indicating whether they agreed or disagreed with the statements provided.

The questionnaire was made up of three main parts, testing the four main variables: corporate innovation, effectuation, causation and industry uncertainty as summarised in the table below. Furthermore, a question establishing which industry the respondent's organisation operated in, was added as a demographic and possible confounding variable to be tested. The complete questionnaire used is provided in Appendix 1.

In the first section, the questions used to measure corporate innovation were drawn from two existing research questionnaires. The research by Covin/Miller and Slevin (1989) to establish entrepreneurial orientation in a firm, developed and validated a questionnaire that encompassed corporate product innovation. This questionnaire continues to be referenced by various researchers to establish innovation in an organisation including recent work by; Mthanti and Urban (2014), Covin and Wales (2012), Barringer and Bluedorn (1999). In addition to this and as part of the research to study the application of effectuation in corporate R&D, Brettel et al. (2012) developed a questionnaire to measure levels of market innovation in a corporate. Combining these two allowed a more comprehensive view of innovation in a corporate, covering both product and market innovation.

The second and major part of the questionnaire draws from Chandler et al. (2011) who established measures for both effectuation and causation activities. The questionnaire was developed following an extensive validation study to establish measures of effectuation and causation (Chandler et al., 2011). The study followed a multi stage process using semi structured interviews. The resulting questionnaire has been used by other researchers seeking to explore the theory of effectuation both in the entrepreneurial and corporate environment, including Mthanti and Urban (2014), Harms and Schiele (2012) as well Li, Tse, and Zhao (2009).

The context in which the company operates, was expected to be an influencing and possibly a moderating factor (Slevin & Covin, 1997), even when looking at the application of effectuation or causation to corporate innovation. To establish the level of industry uncertainty facing an organisation in the third part of the questionnaire, questions were drawn from a questionnaire on industry uncertainty by Slevin and Covin (1997).

A summary of the research instrument is provided below.

Table 2: Research questions and variables measured

Question No.	Variable (Component)	Purpose
1-6	Corporate Innovation	To measure the level of innovation in the respondents' corporate organisation and establish how this is influenced by the other research variables. This is the core dependent variable of the research
7-13	Causation	To measure and determine whether the organisation is following a causal strategy, and if a relationship with other variables can be established
14-26	Effectuation and its sub-constructs: Flexibility, Affordable loss, Experimentation and Pre commitments	To measure the use of effectuation and its four sub-constructs, as a decision making logic and how this is influenced or influences other research variables
27-32	Industry uncertainty	To establish the context and level of uncertainty in which a corporate organisation operates and determine how this affects the use of effectuation/causal strategies and relationship with Corporate Innovation
33	Industry	To determine the industry in which the respondent operates, to determine how this may be related to other variables of interest

Source: Author

All the questionnaires used to compile the research instrument were accessible in the public domain and are not proprietary. Refer to Appendix 1 for the complete questionnaire.

The questionnaire was piloted to test for efficacy before it was distributed. During the pilot, the questionnaire was distributed to a group of five employees from different corporate organisations in South Africa. This was done to ensure that all questions could be well understood by respondents and address any gaps. This was especially important because the questionnaire used was a product of different researches conducted to establish measures of the respective variables. Feedback regarding the overall experience of completing the questionnaire was also gathered and changes made to enhance the data collection process.

4.3.2. Additional subject matter experts interviews

Owing to the fact that this research was using a rudimentary and entrepreneurial theory of effectuation, as developed by Sarasvathy (2001), and seeking to apply it in a new context of strategic management in corporates, additional subject matter experts (SME)

interviews were conducted. This was in order to offer practical observation in this relatively new discussion, especially since there is limited literature available for the application of effectuation in corporate strategy. Furthermore, the responses were used to offer any additional practical explanation to the observations made from the quantitative data in the discussion of results (Chapter 6).

The research design remains quantitative, with use of interviews as additional insights to add to the results discussion. The questions asked were composed along the same dimensions as the quantitative questionnaire and is attached in Appendix 3.

Initially three SMEs interviews were planned, but due to limited time and scheduling clashes, only two were conducted as shown below.

Table 3: SME interview candidates and their profiles

	Profile of the Subject Matter Expert	Area of Interest and research
SME 1	An assistant professor at an international business school, with a PhD in Entrepreneurship and Strategy, has published numerous journal articles and chapters in books, including on the subject of effectuation and causation.	Entrepreneurship, Turnaround Management and Strategy
SME 2	The Dean of a reputable South African private business school, with a PhD in Business Administration (Entrepreneurship) as well as numerous published journal articles.	Entrepreneurship, Corporate Entrepreneurship, Strategy, Leadership and Innovation
SME 3 (Interview did not take place as planned)	Author of a book on the topic of Corporate Effectuation and Professor at an international business school	Entrepreneurship, Corporate entrepreneurship and Innovation

Source: Author

4.4. Population, sampling method and size

One of the most critical aspects of quantitative research is sampling, through which inferences are made regarding the population of interest. According to Zikmund et al. (2010), sampling is defined as any process that leads to conclusions being drawn based on measurement of a portion of the population. The sample, which is a subset a population should therefore be representative. The reliability of a sample as an estimate of a whole population is not always legitimate, especially when there are sampling errors (Zikmund et al., 2010).

To establish the potential influence of effectuation and causation to corporate innovation, the survey questions were statements requiring respondents to answer based on observations of ongoing actions in their respective organisations. The research's target population was therefore employees in medium and large sized corporates across all industries in South Africa.

Initially, the sample was to be drawn from an existing database of a third-party annual innovation survey conducted in South Africa. However an agreement could not be reached with the organisation responsible because of high costs and issues of propriety that were raised regarding the methodology used in the survey.

Snowball sampling, a non-probability method (Saunders et al., 2012) was used in which questionnaires were distributed to individuals in the researcher's personal and professional network, who are in middle to senior management positions across industries in corporate South Africa. These individuals then were asked to distribute the questionnaire in their own network. The non-probability technique had the following advantages:

- Improved access to firms as it leveraged the researchers' network
- Non probability techniques can be useful and effective in exploratory research (Wegner, 2012)
- It was cost effective to conduct (Neuman, 2011)
- It addressed the time constraints associated with MBA research

The shortcomings associated with this types of non-probability sampling are that of possible homogeneity (Saunders et al., 2012) and potential bias in the statistical findings as although the respondents are in different organisations across various industries, some sections of the population may have been omitted in the selection (Wegner, 2012).

The sample size was approximately 350 employees, with a response rate of approximately 43%, equating to 150 responses.

4.5. Data collection process and data type

Survey Monkey, an online survey tool, was used to design the questionnaire. This allowed for easier, cost effective distribution aided by network effects and not restricted by geography. In addition, respondent's anonymity could be guaranteed.

The questionnaire was self-administered and collected via two main channels: online through the Survey Monkey platform and as an email PDF attachment that respondents could complete. Accordingly, the link was distributed to potential respondents through

email, WhatsApp and Facebook messages, with a covering letter explaining the main purpose of the study. A total of 150 responses were collected, after data cleaning they were all deemed complete and usable for analysis.

The data collected through 32 of the 33 questions was measured on a seven - point Likert scale, which yielded discrete interval data with sufficient numeric properties, allowing a wide range of statistical analysis (Wegner, 2012). The last question asking for the industry of the respondent's company was included as a qualitative variable and therefore was categorical with no numeric properties.

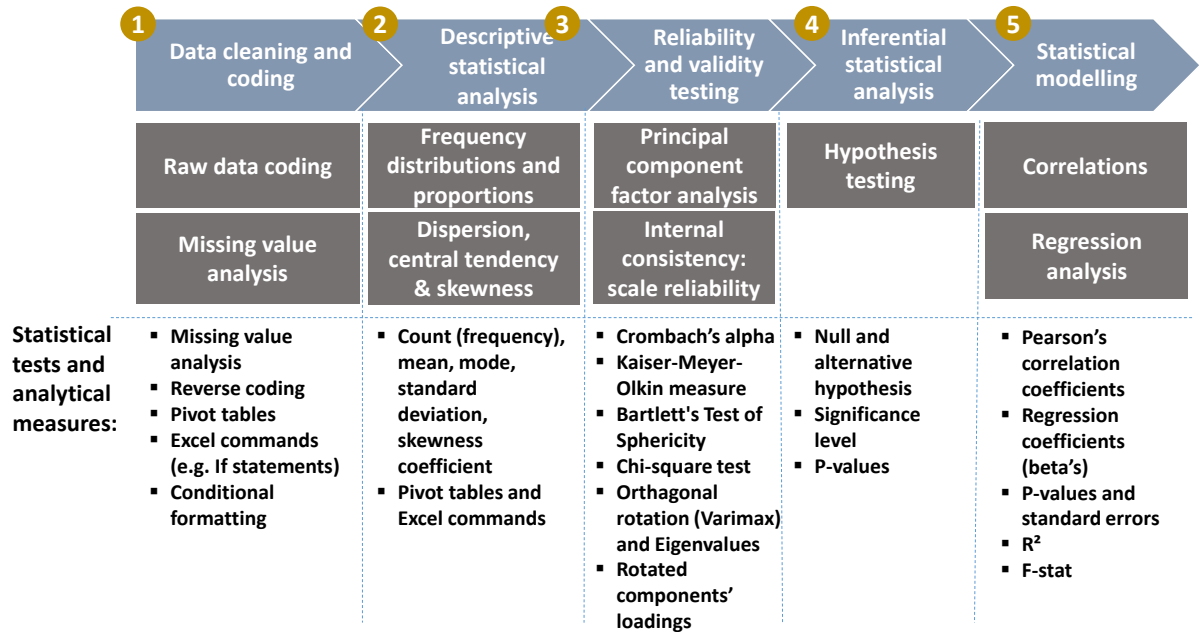
4.6. Measurement and unit of data analysis

A unit of analysis represents an entity that is being analysed, including who or what is being analysed and who is providing the data (Zikmund et al., 2010). Employees in middle and senior management in medium to large corporate organisations in South Africa were required to answer statement and provide observations about their respective corporate organisations. Each response would be aggregated and analysed as behaviour of the respective corporate organisation (Zikmund et al., 2010). This therefore represents the unit of analysis.

4.7. Data analysis

The approach used to analyse the data was determined by both the type of data received and the research hypotheses it was set out to test. To achieve this, analysis software applications; Excel and SPSS were both used. The analysis consisted of five main steps: data cleaning and coding, descriptive statistical analysis, reliability and validity testing, inferential statistical analysis and statistical modelling for relationships. This is further elaborated in the diagram below.

Figure 26: Data analysis process and statistical tests



Source: with input from from Wegner (2012)

4.7.1. Data cleaning and coding

Data collected is usually in its raw form, in need of cleaning and sense checking for any anomalies (Wegner, 2012). This process of preparing the data enabled further analysis:

- Firstly respondents' data was imported from Survey Monkey into Excel, the response scale was coded and transformed from text to a numeric seven-point scale.
- Questions were checked against the scales to determine if any reverse coding was necessary. This is when items that are worded differently from others (positively or negatively) are re-coded so that a high values indicate the same type of response for all questions (Field, 2013).
- A 'missing value analysis' was also conducted to determine any responses that were incomplete and not usable.
- The qualitative data from the demographic variable of 'Industry' was also cleaned for spelling errors and similar industries were categorised.

4.7.2. Descriptive statistics

Descriptive statistics were used to organise data into summary descriptive measures, that were used to communicate profiles, patterns and trends found in the data (Wegner, 2012). Pivot tables and other Excel commands were used extensively in this part of the analysis, with tables and charts used to display the data.

The descriptive statistics used to analyse data in this research include:

i. Categorical frequency distributions and proportions: This was used to summarise categorical data in terms of number of occurrences as well as relative importance in the category presented in tables, histograms and bar charts (Field, 2013).

ii. Central tendency, dispersion and skewness: Arithmetic mean was used as a central location measure to analyse the numeric central tendency of responses. In addition the mode was observed for every question, to give an indication of the most popular answer for the different variables being measured. Standard deviation and coefficient of variation were used as measures of dispersion to indicate how data is spread around the mean; and skewness coefficient to describe the shape and symmetry of the frequency distribution (Wegner, 2012).

4.7.3. Reliability and validity testing

SPSS software was used to conduct the following tests of reliability and validity. These tests helped to establish if the research was measuring the underlying variables as intended. Establishing this informs the generalisability of the results.

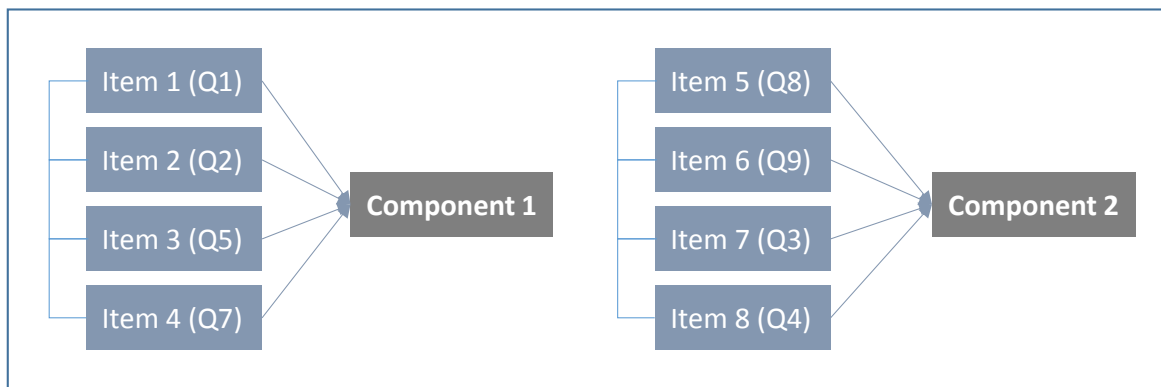
4.7.3.1. Principal components factor analysis and data translation

Data was collected through a questionnaire that combined items from 4 different researches to measure the variables of interest. In addition, the research questionnaire contained items with scales that were developed in an entrepreneurial setting, and was being applied in a corporate environment. As a result Principal Component Analysis (PCA), an exploratory factor analysis and variable reduction technique, was conducted to assess correlations among the items, validate the scales and used to determine emergent components (Weiers, 2011). This method has also been found appropriate for exploratory research, even when the researcher has an idea of the variables being investigated (Suhr, 2005). It also served a purpose of eliminating redundant items in the process (Weiers, 2011), in turn providing additional empirical findings with implications to the development of this theory.

In addition to this, previous research had suggested that further research was needed to continue to examine and refine the measures of effectuation and causation constructs especially when applied to corporates (Harms & Schiele, 2012; Svensrud & Åsvoll, 2012), as well as test how they interact with uncertainty as an antecedent (Mthanti & Urban, 2014). It is one of the objective of this research to add to this developing conversation on the application of effectuation to corporate strategic management. This phase of the data analysis therefore became important for both testing the reliability of the data as well as a finding in itself.

PCA reduced the number of items (in this case questions) to a smaller number of principal components (groupings) which accounted for most of the variance in the observed data (Suhr, 2005). The components extracted by PCA are said to be emergent constructs, consisting only of the correlated items that belong to them respectively. The diagram below illustrates this concept.

Figure 27: An illustration of what Principal Component Analysis achieves



Source: Adapted from Suhr (2005)

To achieve this component extraction, PCA uses a number of tests as described below.

Firstly, the correlation matrix between the questions must contain two or more correlations of greater than 0.3. This shows that the questions are at the very least related and the PCA that follows will be able to determine how they are related (Field, 2013).

To test for sufficient correlations among these items, Kaiser–Meyer–Olkin (KMO)'s measure of sampling adequacy is used. Only items of sampling adequacy of 0.5 were retained, as shown by the anti-image correlation in the SPSS output (Weiers, 2011).w. Furthermore an overall score of sampling adequacy should also be greater than 0.5. If

any item has a measure of less than 0.5, it is removed and the PCA iteration will be repeated. The thresholds for this test are shown below.

Table 4: KMO measures – Overall sampling adequacy

KMO Measure	Meaning
$KMO \geq 0.9$	Marvellous
$0.8 \leq KMO < 0.9$	Meritorious
$0.7 \leq KMO < 0.8$	Middling
$0.6 \leq KMO < 0.7$	Mediocre
$0.5 \leq KMO < 0.6$	Miserable
$KMO < 0.5$	Unacceptable

Source: (Field, 2013; Weiers, 2011)

Additionally, the Bartlett's test of sphericity compares the nature of observed correlation matrix between the items. This Bartlett's test yields a chi-square value that is then tested through hypothesis testing for significance (Field, 2013). It essentially checks if there is a redundancy between the questions that can be summarised within the fewer components (Field, 2013; Weiers, 2011). The significance level for Bartlett's test in this research is 0.01 and the null hypothesis of zero correlation will be rejected accordingly.

To determine the number of components to retain, Eigenvalues of greater than 1 were retained. This indicates the amount of variance explained by each principal component. Visually, this will be represented in a scree plot, where the number of components that explain most of the variability in the data is visible. Consequently, the cumulative variance explained by the resulting components should be greater than 60 per cent (Field, 2013) for PCA to be considered valid.

Several iterations of the PCA were required, as items that did not meet the requirements of the previous steps were removed.

Finally component loadings were examined as presented in the rotated component matrix. These represent the score of each item against the component it belongs to. A score of greater than 0.5 was considered good (Field, 2013). Moreover, items that did not meet these were removed to improve the 'item to total component' correlation (Suhr, 2005). Effectuation was defined in the research as a multi-dimensional construct therefore its component score was calculated as an un-weighted summation of the

associated sub-constructs defined by the PCA output, following the methodology used by Harms & Schiele (2012).

Orthogonal varimax rotation was used to validate the scales, this is essentially a linear transformation of the solution to make interpretation easier (Suhr, 2005). An orthogonal rotation transforms components loadings to be equivalent to correlations between the observed items and components, according to Suhr (2005), therefore making it easy to interpret.

Following the PCA, the resulting components and the associated items (questions) were compared against the original questionnaire, and renamed accordingly. Any new emerging constructs were observed and the deleted items highlighted for further consideration against literature in Chapter 6. This process of translation to new components, prepared the data for further reliability tests (Chrombach's alpha) as well as hypotheses testing as required by the research questions.

4.7.3.2. Chrombach's alphas

To verify that the items for a component are legitimately related, measuring the same entity or the same construct, Chrombach's alpha was computed (Weiers, 2011). If the Chrombach's alpha is 0.60 or greater for exploratory research, there is support for the consistency of the items justifying their use in a summated scale (Field, 2013). In the process of computing Chrombach's alphas, an inter-item correlation matrix is also computed. This should contain positive numbers, otherwise it shows that one item has a negative impact on another, therefore do not belong in the same scale. Furthermore, the SPSS output gives an indication of the 'Chrombach's alpha if the item is deleted' against each question. For all items to be legitimately related, then there should be no improvement if this number is compared to the computed Chrombach's alpha (Field, 2013).

Table 5: Chrombach's alpha- Internal consistency measures

$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 < \alpha$	Unacceptable

Source: (Field, 2013; Weiers, 2011)

4.7.4. Inferential statistics

Inferential statistics are used to project from a sample and draw conclusions about population (Zikmund et al., 2010). Hypothesis testing was used to statistically test if 'claims' or research hypotheses that were developed and discussed in Chapter 3 are accepted to be probably true or probably false (Wegner, 2012). Claims were made about the relationships among the variables under study and these were tested.

For each one of the five hypotheses, a null hypothesis $H(i)$ was used to state the claim tested, and an associated alternative $H(i)_{\text{alternative}}$ was stated as an opposing statement that would be accepted if the null hypothesis is rejected based on statistical evidence (Wegner, 2012). A level of significance (α) was set at 10 per cent as a decision rule to accept or reject a null hypothesis (Zikmund et al., 2010), unless explicitly stated in a particular test in Chapter 5. The level of significance essentially determines strictness of the hypothesis test by determining the probability of rejecting the null hypothesis in favour of the alternative (Weiers, 2011)

4.7.5. Statistical modelling

Regression analysis and correlation analysis was used to quantify the relationships between the variables as specified in the hypotheses, as well as measure the strength of this relationship (Wegner, 2012).

To measure the linear association between two variables, Pearson's correlation coefficient (r) was used. It takes the values between -1 and 1, with numbers -1 and 1 indicating a strong one-to-one association of the pair of variables being tested. A negative ' r ' shows a negative (or inverse) relationship, whereas a positive correlation coefficient is an indication of a positive (direct) relationship between the two variables measure (Zikmund et al., 2010). To establish the strength of association, an ' r ' between 0 and 0.3 is considered weak, between 0.3 and 0.5 is moderate and greater than 5 are considered strong. The same applies with the negative numbers that exhibit an inverse relationship.

Simple and multiple regression analysis was also used to determine the relationship between defined independent/predictor variable(s) and dependent variables. According to Wegner (2012) regression analysis uses a method of 'ordinary least squares' to mathematically determine a line of best fit between independent and dependent variables, thereby establishing a relationship. The strength of this relationship was judged by interpreting the regression coefficients or betas (β), which represent the

magnitude of the movement of the dependent variable, when the associated independent variable changes by 1 unit (Weiers, 2011).

To determine the statistical significance of the relationship established through the regression analysis, P-values were used. This tests a null hypothesis that the coefficient is equal to zero, that is, there is no statistically significant relationship between the predictor variable and the predicted one. A low P-value (less than 0.05) indicate that the null hypothesis can be rejected in favour of the alternative, meaning that a beta that has a P-value less than 0.05 has a meaningful statistical relationship with the dependent variable (Wegner, 2012).

The overall significance of the regression model was judged by the coefficient of determination R^2 computed statistical model, which indicates the total percentage variation in the dependent variable, which is explained by the independent variable(s) as explained by Zikmund et al. (2010). In addition, the significance of the model's F-stat was examined, and a low P-value of less than 0.05 was used to make this determination in the same way as explained above.

Scatter plots were also used to visually display both the nature and strength of the relationship between variables. In the case of observed correlation coefficients of greater than 0.3, multicollinearity was considered before the regression analysis was done.

In general, the data analysis was as methodical as it was iterative, leading to insightful findings outlined in Chapter 5.

4.8. Ethical considerations

The research involved interaction with human subjects and due consideration was given to any ethical issues that may arise during data collection (Saunders et al., 2012). Furthermore, an application to the ethics committee for ethical clearance was made and approved. With regards to the participating respondents, confidentiality was be observed.

4.9. Limitations of the research methodology and considerations

Firstly, data was collected through a self-administered questionnaire and relies on perceptual data, making it prone to perceptual and cognitive biases (Robbins & Judge, 2015).

Some limitations were also observed with the data collected: The sample was cross industry and non-probability in nature (snowball), as previously described. Furthermore, although the questionnaire targeted middle to senior management in the respective corporates, who are likely to be involved in decision making, this could not be controlled. All these could lead to strength and generalisability of the results being compromised.

Additionally, the research instrument contains questions that were developed in a different context: Firstly the theory of effectuation and causation, its associated principles and measures were developed based on an entrepreneurial perspective. There may be some missing antecedent, especially in the context of corporate strategic management. The questionnaire also contained questions from various researches as previously explained. All these meant that the process of validating and establishing reliability of the data collected became critical; hence the use of Principal factor analysis and Chrobach's alphas.

Lastly, there may have been some confounding variables influencing the data, especially because the population sampled consisted of multiple industries. The data was not controlled for variables such as firm size. This information was not collected and future studies could incorporate this to improve relevance.

4.10. Conclusion

The methodology used is the heart of any research project, and was carefully considered in this research. This also applied to the research instrument selected. Also, the research objectives and hypothesis required extensive quantitative analysis; making sampling, data collection process and analysis of great importance. Furthermore, any limitations of this research were also considered to highlight any issued that may affect the relevance of the results of the data analysis.

CHAPTER 5: RESULTS

5.1. Introduction

In this chapter, the results of the study will be presented in this order:

- A description of the sample obtained
- The results of the reliability and validity tests
- Data translation for further analysis
- Inferential and statistical results of the research hypotheses tested

5.2. Description of the sample obtained

The 150 respondents' data was downloaded from Survey Monkey and the missing value analysis indicated that all the quantitative fields were complete and therefore the data was usable. This was however not true for the last qualitative question on Industry, with 4 missing responses as shown in Figure 12 below.

The distribution of answers received per question is set out in the heat-map below, as well as the associated mean and standard deviation. The percentages indicate the proportion of the respondents that answered that particular question with that response, indicating the frequency of selecting that option. The heat map uses colour intensity in line with increased incidence if the respective answer.

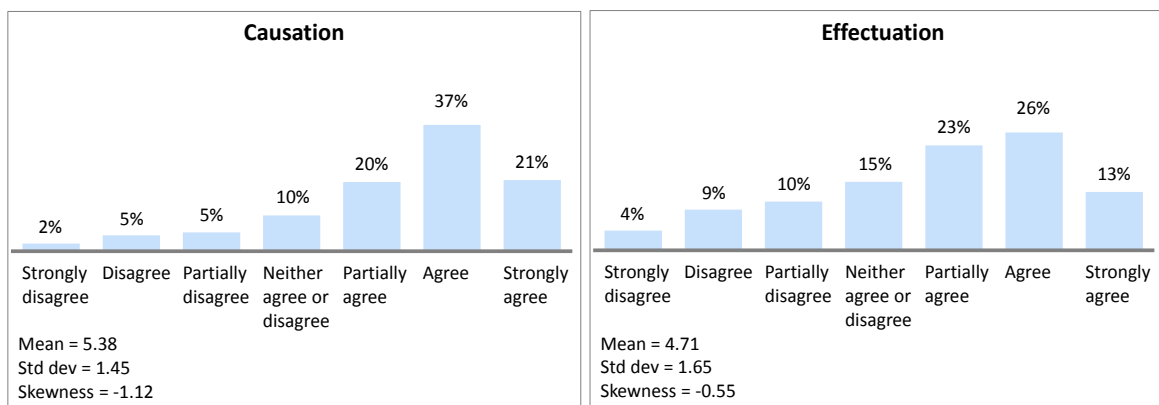
As it can be observed that most questions have a mean above 4, indicating that most respondents tended to agree, partially agree or strongly agree with most of the questions asked. This is further reflected by a general tendency of the increasing scale of red as it moves to the right, with the exception of some responses in the 'Effectuation: Experimentation' and 'Industry Uncertainty' sections.

Figure 28: Distribution of responses by question

		Strongly Disagree	Disagree	Partially disagree	Neither agree or disagree	Partially agree	Agree	Strongly agree	Mean	Std. Dev
Innovation	In general, the top managers of my firm favor a strong emphasis on R&D, technological leadership and innovations	2%	12%	7%	7%	24%	31%	17%	4.98	1.661
	My firm has marketed many new lines of products or service in the past five years (or since its establishment if the company is less than 5 years)	3%	13%	7%	13%	20%	25%	19%	4.85	1.751
	Changes in product or service lines have usually been quite dramatic	5%	18%	10%	18%	19%	17%	12%	4.28	1.792
	The R&D output aimed at many new customers to our organisation	3%	11%	10%	17%	22%	29%	9%	4.68	1.590
	The R&D output catered to new customer needs that we have not served before	3%	14%	6%	17%	22%	24%	13%	4.66	1.698
	The new product required to use new sales and distribution channels	5%	14%	13%	17%	16%	24%	10%	4.37	1.755
	Causation	We analysed long run opportunities and selected what we thought would provide the best returns	2%	5%	7%	9%	16%	42%	19%	5.33
We designed and planned business strategies		1%	1%	3%	10%	19%	45%	21%	5.62	1.202
We designed and planned production and marketing efforts		1%	5%	5%	11%	15%	40%	22%	5.41	1.466
We developed a strategy to best take advantage of resources and capabilities		3%	4%	5%	8%	25%	30%	25%	5.39	1.501
We had a clear and consistent vision for where we wanted to end up		3%	3%	3%	9%	23%	33%	25%	5.47	1.460
We organised and implemented control processes to make sure we met objectives		3%	7%	7%	12%	20%	33%	18%	5.12	1.58
We researched and selected target markets and did meaningful competitive analysis		2%	7%	7%	13%	23%	33%	15%	5.05	1.52
Effectuation: Flexibility		We adapted what we were doing to the resources we had	2%	3%	7%	10%	17%	41%	20%	5.40
	We allowed the business to evolve as opportunities emerged	2%	3%	5%	15%	24%	32%	19%	5.29	1.39
	We avoided courses of action that restricted our flexibility and adaptability	1%	8%	9%	21%	30%	20%	11%	4.73	1.44
	We were flexible and took advantage of opportunities as they arose	3%	5%	5%	12%	30%	28%	17%	5.12	1.48
	Effectuation: Affordable loss	We were careful not to risk more money than we were willing to lose with our initial idea	1%	7%	12%	20%	19%	26%	15%	4.90
We were careful not to commit more resources than we could afford to lose		1%	10%	11%	16%	23%	27%	12%	4.79	1.56
We were careful not to risk so much money that the company would be in real trouble financially if things didn't workout		3%	7%	9%	11%	23%	27%	21%	5.09	1.61
Effectuation: Experimentation	The product/service that we now provide is essentially the same as originally conceptualised	13%	30%	24%	13%	6%	12%	2%	3.14	1.61
	The product/service that we now provide is substantially different than we first imagined	11%	13%	14%	16%	22%	17%	7%	4.01	1.79
	We experimented with different products and/or business models	6%	8%	13%	13%	23%	25%	11%	4.61	1.71
	We tried a number of different approaches until we found a business model that works	2%	9%	11%	16%	25%	27%	10%	4.74	1.54
Effectuation: Pre-commitments	We used a substantial number of agreements with customers, suppliers and other organisations and people to reduce the amount of uncertainty	5%	9%	11%	13%	27%	25%	11%	4.63	1.66
	We used pre-commitments from customers and suppliers as often as possible	6%	3%	7%	18%	29%	27%	10%	4.80	1.54
Industry uncertainty	The failure rate of firms in my industry is high	5%	14%	12%	21%	19%	17%	12%	4.35	1.72
	My industry is very risky, such that one bad decision could easily threaten the viability of my business unit	3%	11%	10%	14%	17%	24%	21%	4.87	1.75
	Competitive intensity is high in my industry	2%	5%	4%	6%	13%	37%	33%	5.65	1.52
	Customer loyalty is low in my industry	11%	24%	11%	9%	18%	13%	13%	3.92	2.01
	Severe price wars are a characteristic of my industry	7%	15%	7%	13%	19%	19%	19%	4.56	1.91
	Low profit margins are a characteristic of my industry	14%	17%	18%	13%	14%	15%	9%	3.79	1.92

To address the hypotheses, the research instrument was set out to measure the main variables: Innovation, causation, effectuation (as well as its four sub-constructs of flexibility, affordable loss, experimentation and pre-commitments), and industry uncertainty. To this end, a consolidated view reflecting how respondents answered by each one of these variables is presented in the frequency charts below; with associated mean, standard deviation and skewness measures.

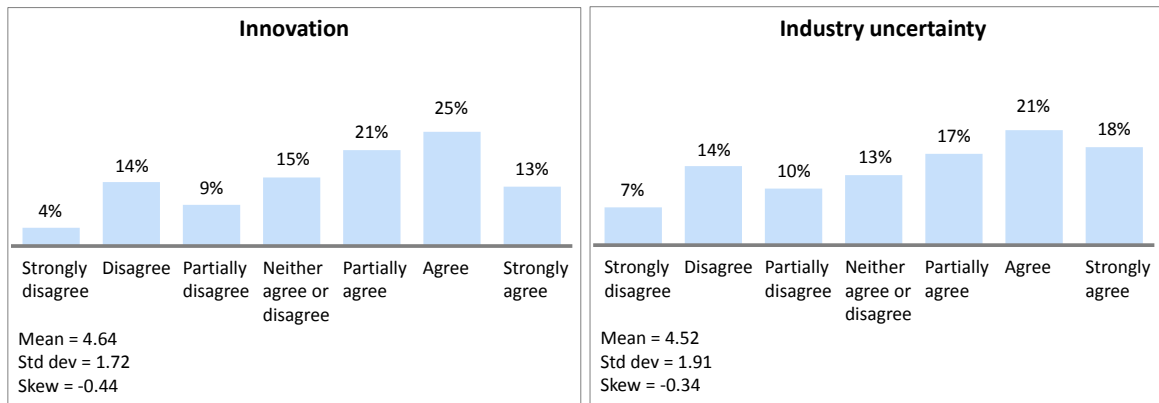
Figure 29: Descriptive statistics for Causation and Effectuation



From the charts above, 'Agree' was the most selected answer for both causation and effectuation. Causation has a higher mean of 5.38 compared to 4.71 for effectuation, indicating higher tendency to agree with the questions. This is further supported by a lower standard deviation than that of effectuation. In fact respondents chose to agree (i.e. partially agree, agree and strongly agree) with causation question 78 per cent of the time, compared to 62 per cent for effectuation. Although both graphs exhibit negative skewness with long left tails, it is more so for causation than for effectuation, indicating a lot fewer disagreeing answers pulling the skewness measure down.

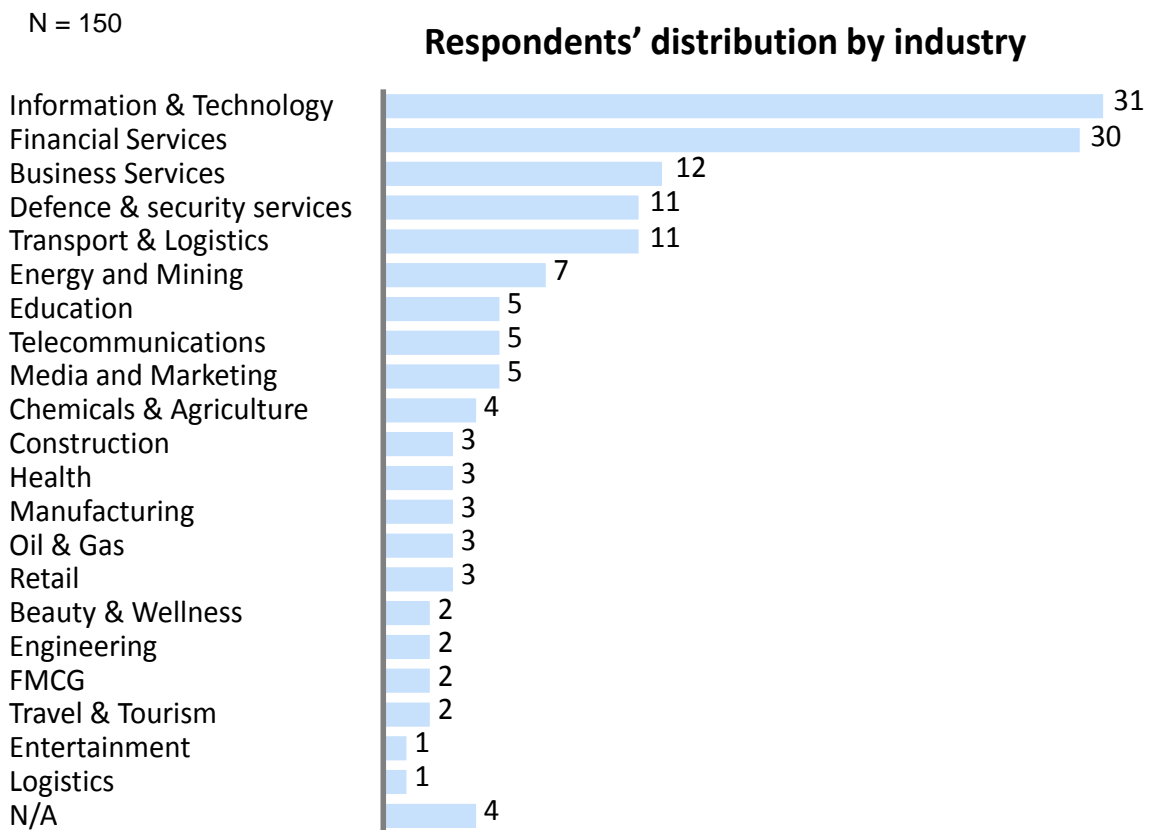
Looking at the Innovation and Industry uncertainty charts below, they both exhibit bi-modal characteristics, picking up at 'Disagree' and 'Agree'. They have a mean of 4.64 and 4.52 respectively, which is closer to 'Partially agree' but a much higher standard deviation of 1.72 and 1.91 respectively (compared to the variables above). This further reflects the bi-modal nature on both the ends of the 'agree' and 'disagree' scale shown by both the Innovation and Industry uncertainty responses.

Figure 30: Descriptive statistics for Innovation and Industry uncertainty



Responses were received from a variety of industries which were grouped and presented below. The IT and financial services industry each accounted for around 20 per cent of the respondents. This is likely due to the snowball method used to collect the sample. Four out of the 150 did not indicate the industry in which they operate.

Figure 31: Distribution by Industry in which the respondents operate



5.3. Validity and reliability tests

5.3.1. Principal component analysis

As described in the preceding chapter, PCA, an exploratory factor analysis was conducted to determine any emergent components. Orthogonal varimax rotation was used to validate the scales and the process described in Chapter 4 was followed. Results were obtained after six iterations. Several items that did not meet the criteria were deleted during the iterations and these are highlighted in the research instrument in Appendix 1.

The final output was observed and the correlation matrix between all the items was examined. It contained more than two questions with correlation greater than 0.3, indicating that the questions are at the very least related.

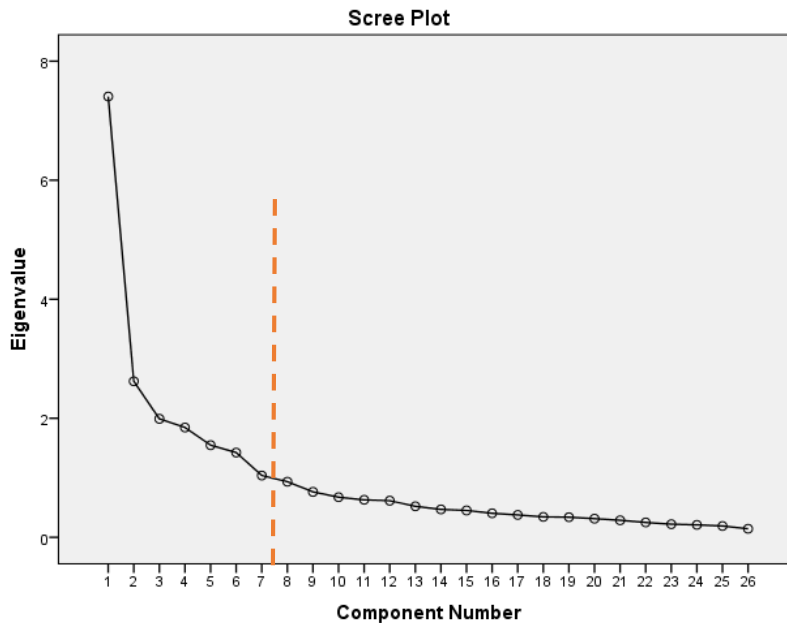
In the output table below, are the results of the KMO measure of sampling adequacy and Bartlett's test of sphericity from SPSS. The overall KMO measure was 0.832 which falls in the 'meritorious' range, indicating a good overall measure of sampling adequacy. All individual items' KMOs were also above 0.5, a good result for sampling adequacy. In addition to this, Bartlett's test yielded a significant Chi-squared, (significance less than 0.00). This confirms that all items are significantly correlated, rejecting the null hypothesis of zero correlation.

Table 6: Result of the KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.832
Bartlett's Test of Sphericity	Approx. Chi-Square	1859.309
	df	325
	Sig.	0.000

The principal component analysis with orthogonal varimax rotation yielded seven components of Eigenvalues greater than 1 as shown on the scree plot below, to the left of the dotted line.

Figure 32: Scree plot showing components extraction



5.3.2. Data translation to extracted components

The remaining items that made up each of the seven component were compared to original research questionnaire, regrouped and renamed as illustrated in Figure 14. The component loading of each of the associated items is illustrated in the rotational component matrix included in Appendix 2

. All the items' loading are greater than 0.6, above the threshold of 0.5 as discussed in Chapter 4.

As shown in Figure 14 below, Innovation as a construct remained unchanged, with the items loadings all satisfactory at 0.6 and above. From the causation scale as defined by Chandler et al. (2011), the item '*We organised and implemented control processes to make sure we met objectives*', was removed, meaning it was not correlated with the rest of the items measuring causation.

In the elements of effectuation, one item was removed from each of flexibility and experimentation scales: '*We adapted what we were doing to the resources we had*' and '*The product/service that we now provide is essentially the same as originally conceptualised*' respectively. On the other hand, the scale for affordable loss remained

unchanged while all items of pre-commitments were removed, indicating that the tests did not consider it as a emergent component.

'Competitive intensity is high in my industry' was deleted from the last construct of industry uncertainty as originally conceptualised in the questionnaire, and it was further split into two different components as follows:

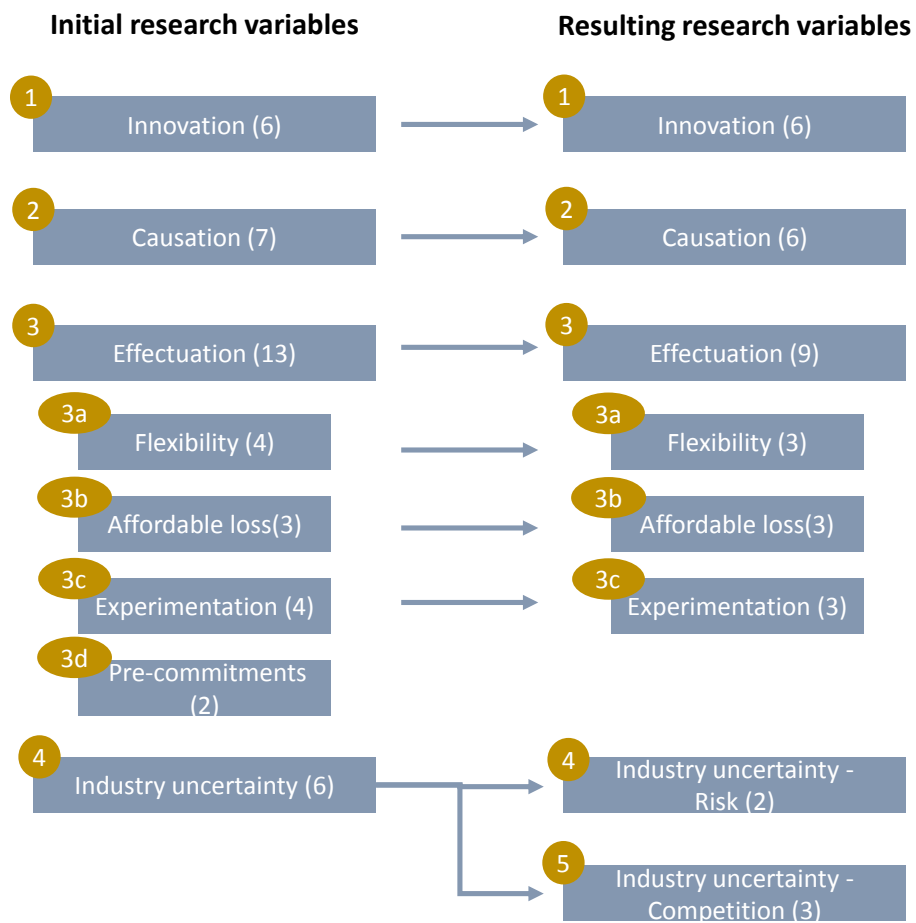
Industry uncertainty 1: *'My industry is very risky, such that one bad decision could easily threaten the viability of my business unit'* and *'The failure rate of firms in my industry is high'*.

Industry uncertainty 2: *'Customer loyalty is low in my industry'*, *'Severe price wars are a characteristic of my industry'* and *'Low profit margins are a characteristic of my industry'*

The two elements of uncertainty were observed to be indeed addressing two separate types of Industry uncertainty, with the first group seemingly addressing the risk of failure faced by the organisation and the other issues of competition. To aid the hypothesis testing and statistical analysis going forward, these two components were named accordingly and the diagram below represents the entire translation process of how the components from PCA compare with the initial research variables.

Effectuation is treated as a formative construct (Chandler et al., 2012) and regarded as an un-weighted summation of the sub-constructs remaining (flexibility, affordable loss and experimentation).

Figure 33: Transformed research variables following CPA – the number of items shown in brackets



The total number of items (questions) reduced from 32 to 26 as the items were removed during CPA to improve 'item to total component' correlation.

Table 7: Emerging components from the PCA

Resulting Components	Initial Eigenvalues	% Variance	No. of Items
Causation	7.41	15.72	6
Innovation	2.62	14.54	6
Effectuation (formative)		24.99	
Affordable loss	1.99	8.91	3
Flexibility	1.85	8.12	3
Experimentation	1.55	7.96	3
-			
Industry uncertainty - Risk	1.42	7.14	2
Industry uncertainty - Competition	1.04	6.36	3
Total		68.75	26

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 6 iterations.

As a component, causation explains most of the variance observed in the data, as it has the highest Eigenvalue of 7.41 and 15.72 per cent proportion of variance as seen in the table above. This is followed by innovation, each of the sub-constructs of effectuation and the two components of industry uncertainty. However, when considered as a formative construct, effectuation explains most of the variation observed in the data at almost 25%.

The cumulative variance explained by the all the components was 68.75%, making the PCA valid.

5.3.3. Internal consistency of the scales

The Chronbach's alphas of all the components are represented in the table below. Each of the scales were considered internally consistent and therefore valid. All items are positively correlated to the respective components, as any removal did not improve the component's Chronbach's alpha. The two components of industry uncertainty have the lowest but acceptable alphas of just above 0.6, which is still considered good for exploratory research. Causation once again has the highest measure at 0.881.

Table 8: Scale validity - Chrombach's alphas

Construct	Chrombach alpha*	No. of Items
Causation	0.881	6
Innovation	0.849	6
Effectuation	0.787	9
Affordable loss	0.826	3
Flexibility	0.829	3
Experimentation	0.765	3
Industry uncertainty	0.615	5
Industry uncertainty - Risk	0.639	2
Industry uncertainty - Competition	0.658	3

*Based on standardised values

5.4. Hypothesis testing

In this section, research hypotheses were tested through various analytical tools to answer the main research questions. The statistical evidence was observed to accept or reject the stated hypothesis against the alternative accordingly.

5.4.1. Research Question 1

Are organisations with higher levels of corporate innovation more likely to be using effectuation or causation as a strategy?

This first research question has two main hypotheses:

Hypothesis 1

H1: There is a positive relationship between the prevalence of effectuation and levels of innovation in an organisation.

Effectuation is viewed as a multidimensional construct (Chandler et al., 2011), therefore the sub-constructs were also be examined:

H1a: There is a positive relationship between the prevalence of flexibility and levels of innovation in an organisation.

H1b: There is a positive relationship between the prevalence affordable loss and levels of innovation in an organisation.

H1c: There is a positive relationship between the prevalence of experimentation and levels of innovation in an organisation.

H1d: There is a positive relationship between prevalence of pre-commitments and levels of innovation in an organisation.

H1_{Alternative}: There is a negative relationship between the prevalence of effectuation and levels of innovation in an organisation.

To test H1, a simple correlation matrix was computed. It is evident that effectuation and the three sub-constructs measured are positively correlated with corporate innovation; indicated by the positive Pearson's correlation coefficients. Therefore an increase in effectuation and its sub-constructs is associated with an increase in innovation. With a coefficient of 0.59, effectuation as a whole is significantly correlated with innovation. Of the subcontracts, flexibility is the most correlated followed by experimentation and lastly affordable loss; as indicated by the orange shading scale. At 0.3, affordable loss shows a weak correlation with Innovation, while all others exhibit a relatively stronger correlation.

Table 9: Correlation matrix for Innovation, Causation and Effectuation

	1	2	3	4	5
1. Innovation	-				
2. Causation	0.41				
3. Effectuation (Formative)	0.59	0.56	-		
4. Effectuation: Flexibility	0.51	0.54	0.75	-	
5. Effectuation: Experimentation	0.46	0.31	0.70	0.32	-
6. Effectuation: Affordable Loss	0.30	0.35	0.69	0.32	0.16

A regression model was also computed to determine the strength of the relationship between effectuation as a strategy and corporate innovation.

Table 10: Summary of regression result on dependent variable of Innovation

	Regression Coefficients	Standard Error	P-value
Intercept	0.78	0.44	0.08
Effectuation: Flexibility	0.37	0.07	1.6E-06
Effectuation: Experimentation	0.30	0.06	6.3E-06
Effectuation: Affordable Loss	0.13	0.07	0.06

R² =0.37

$\alpha = 0.05$

Model F Sig = <0.00

The output in the table above shows that flexibility has the strongest relationship with innovation with a regression coefficient (β) of 0.37, followed closely by experimentation. Both these relationships are statistically significant as exhibited by P-values of less than 0.00. The weakest relationship is once again with affordable loss with a coefficient of 0.13, which when looking at the P-value, this relationship is not statistically significant. This is an indication that Affordable loss may not statistically belong in this model. The fourth sub-component of pre commitments was not tested as its items were removed during the Principal component analysis.

As a whole, effectuation has a statistically significant β of ~0.80. This was confirmed by a separate regression model of only the formative construct against innovation, shown in the result of **H2**.

To assess the strength of this regression model, multicollinearity between the 3 sub-constructs of effectuation was considered and found to be weak ($r = \sim 0.3$ or less). The R² was found to be significant at 0.37, meaning 37 per cent of the variation in the model can be explained by the relationship between innovation and these sub-constructs of effectuation. The F-stat of the overall model was also significant with a P-value < 0.00.

There is enough statistical evidence to accept the null hypothesis **H1**, (including **H1a**, **H1b** and **H1c**), therefore there is a positive relationship between the prevalence of effectuation and levels of innovation in an organisation.

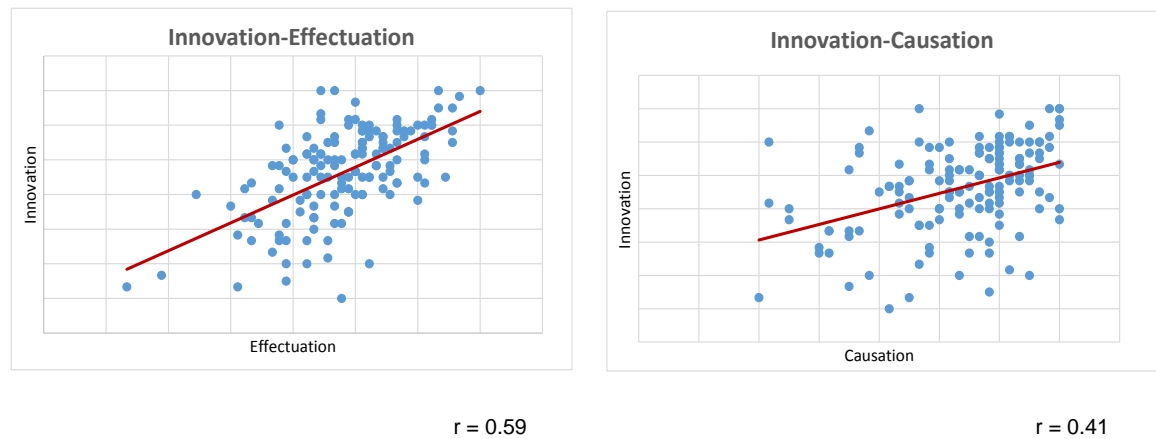
Hypothesis 2

H2: Effectuation is more correlated with levels of corporate innovation than causation.

H2_{Alternative}: Causation is more correlated with levels of corporate innovation than effectuation.

To compare the relative relationship of effectuation and causation on with Innovation, both correlation and regression coefficients were observed. The correlation coefficient between effectuation and innovation is higher at 0.59, compared with causation (0.41). This is further illustrated by the scatter plots below, indicating that although both relationships are positive, the relationship between innovation and effectuation is stronger.

Figure 34: Simple correlation of Innovation with Effectuation and Causation



The highlighted regression coefficients below further support that effectuation is more correlated with innovation. The coefficients for both models are statistically significant, although the ‘innovation-causation’ relationship is weaker as indicated by a much lower R^2 on the left.

Figure 35: The relationship between ‘Innovation-Effectuation’ and ‘Innovation-Causation’ respectively

Innovation - Effectuation				Innovation - Causation			
	Regression	Standard	R ² =0.34		Regression	Standard	R ² =0.16
	Coefficients	Error	P-value		Coefficients	Error	P-value
Intercept	0.77	0.44	0.09	Intercept	2.13	0.46	9.5E-06
Effectuation	0.80	0.09	2.2E-15	Causation	0.47	0.08	1.6E-07

α= 0.05
Model F Sig = <0.00

N=150

There is therefore enough statistical evidence to accept the null hypothesis **H2**, and it can be concluded that effectuation is more correlated with levels of corporate innovation than causation.

To give a high level indication of how the industry from which the respondents operated could be an influencing cofounding variable to the above hypotheses results, split data correlation analysis was performed in SPSS. Only industries which showed a significant difference are presented below;

Table 11: The influence of Industry on the ‘Innovation-Effectuation’ and ‘Innovation-Causation’ relationship (Selected industries)

	N	Innovation - effectuation correlation	Innovation - causation correlation
All respondents	150	0.59**	0.41**
Business Services	12	0.33a	0.80**
Financial Services	29	0.67**	0.38*
Information & Technology	31	0.51**	0.37*
N/A	4	0.968*	0.972*

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

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

a. Not statistically significant

Significant differences were observed and more notably: a stronger than average association was observed between effectuation and Innovation in the financial services industry. Also, a relatively stronger and significant association between causation and innovation was observed in business services. The reasons behind these differences and the implications thereof, are beyond the scope of this research. Furthermore the size

and quality (non-probability nature) of the sample was not regarded as sufficient to make conclusive judgment on this result.

5.4.2. Research Question 2

Do levels of industry uncertainty influence the prevalence of effectuation or causation in an organisation?

Hypothesis 3 and **4** below was tested to answer the second research question

H3: There is a positive association between industry uncertainty and the prevalence of effectuation in an organisation

Effectuation is viewed as a multidimensional construct (Chandler et al., 2011), the following four sub-constructs were also examined:

H3a: There is a positive association between industry uncertainty and the use of flexibility in an organisation.

H3b: There is a positive association between industry uncertainty and the use affordable loss in an organisation

H3c: There is a positive association between industry uncertainty and the use of experimentation in an organisation

H3d: There is a positive association between industry uncertainty and the use of pre-commitments in an organisation

H3_{Alternative}: There is a negative association between industry uncertainty and the use of effectuation in an organisation

Table 12: Correlation matrix for Causation, Effectuation and Industry uncertainty

	1	2	3	4	5	6	7
1. Causation	-						
2. Effectuation	0.56	-					
3. Industry uncertainty	0.01	0.05	-				
4. Effectuation: Flexibility	0.54	0.75	0.05	-			
5. Effectuation : Affordable Loss	0.35	0.69	0.01	0.32	-		
6. Effectuation: Experimentation	0.31	0.70	0.04	0.32	0.16	-	
7. Industry uncertainty: Risk	0.05	0.07	0.66	0.14	0.05	-0.03	-
8. Industry uncertainty: Competition	-0.03	0.02	0.87	-0.03	-0.02	0.07	0.20

The matrix above shows a weak but positive correlation of 0.05 between effectuation and overall industry uncertainty (3). When considering effectuation against industry uncertainty as two different components determined by the PCA, the strength of association is relatively better with ‘risk’ at 0.07 and relatively weaker with ‘competition’ at 0.02. It is worth noting though, that these weak correlations discussed above are too small and not statistically significant.

The different relationship that these two components of industry uncertainty have with effectuation is further indicated when looking at their association with the sub-constructs of effectuation. Although weak, flexibility is positively correlated with ‘risk’ but has a negative relationship with ‘competition’. The same pattern weak but of opposite correlation is observed with affordable loss and experimentation. This is despite that the association between all the sub-constructs of effectuation and overall industry uncertainty (3) is positive, albeit weak and statistically insignificant.

The fourth sub-component of ‘pre commitments’ was not tested as its items were found to not correlate and removed during the exploratory factor analysis.

There is therefore no evidence to accept **H3**, although there is an overall positive association between industry uncertainty and effectuation, it is weak and not statistically significant. The same applies for its sub-construct of flexibility, experimentation and affordable loss as described (**H3a, H3b and H3c**).

Following from this, the association between industry uncertainty and causation was also considered in **Hypothesis 4**.

H4: There is a negative association between industry uncertainty and the use of causation in an organisation

H4_{Alternative}: There is a negative association between industry uncertainty and the use of causation in an organisation

The association between industry uncertainty and causation is weak and statistically insignificant. It is however positive (0.01) as seen in the correlation matrix above. However when considering Industry uncertainty as two different components once again, the association is positive for Risk (0.05) and negative with 'competition' at -0.03 correlation. It can also be noted that the association, though modestly so and still insignificant, is relatively stronger when the two are considered separately.

There is therefore not enough statistical evidence to accept **H4**.

5.4.3. Research Question 3

In situations of increased industry uncertainty, does the prevalence of effectuation increase corporate innovation?

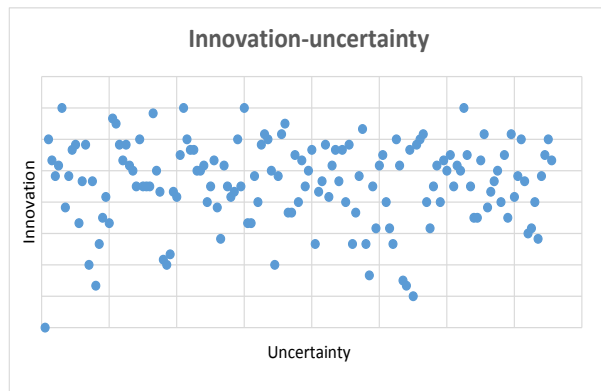
Hypothesis 5

H5: The relationship between industry uncertainty and corporate innovation is moderated by the prevalence of effectuation

H5_{Alternative}: The relationship between industry uncertainty and corporate innovation is not moderated by the prevalence of effectuation

Firstly the relationship between industry uncertainty and innovation is considered. As indicated by the scatter plot below, there is no indication of a linear relationship between the two. This is supported by a weak but positive correlation coefficient of 0.1. However, when considered separately 'risk' is negatively correlated with Innovation, and the opposite can be observed for 'competition'.

Figure 36: The relationship between Innovation and Industry uncertainty



	1	2	3
1. Innovation	-		
2. Industry uncertainty	0.128	-	
3. Industry uncertainty: Risk	-0.034	0.658	-
4. Industry uncertainty: Competition	0.188	0.867	0.196

Subsequent to this, the possible moderation effect of effectuation is considered to address the hypothesis for both ‘risk’ and ‘competition’ separately. As shown in the regression model below, a slight change of 0.013 is observed in the R² when introducing effectuation as a moderator. It is worth noting that the regression coefficient for ‘risk’ changed by 0.49, becoming more negative when the moderator was introduced. However none of the coefficients in the moderated model are statistically significant (P-value > 0.05).

Table 13: Effectuation as a moderator of ‘Industry uncertainty - Risk’ and Innovation relationship

	Base model			Including moderator		
	Regression Coefficients	Standard Error	P-value	Regression Coefficients	Standard Error	P-value
Intercept	1.04	0.50	0.04			
Industry uncertainty:Risk	-0.07	0.06	0.25	-0.56	0.30	0.07
Effectuation	0.81	0.09	0.00	0.33	0.31	0.29
Industry uncertainty:Risk x Effectuation				0.10	0.06	0.10
R ²	0.352			0.365		
Δ R ²	0.013					

α= 0.05

Model F Sig = <0.00 for both base and moderator

N=150

A similar thing can be observed in the model below, the regression coefficients for ‘competition’ and for the moderator variable (industry uncertainty: competition x effectuation) are not statistically significant and the change in both the R² and beta for ‘competition’ were very small (0.0001 and 0.06 respectively). Only the coefficient of the

'effectuation' variable is statistically significant, though reduced, at a P-value < 0.05. Both the models are however valid with F-stat significance of less than 0.00.

Table 14: Effectuation as a moderator of 'Industry uncertainty - Competition' and Innovation relationship

	Base model			Including moderator		
	Regression Coefficients	Standard Error	P-value	Regression Coefficients	Standard Error	P-value
Intercept	0.16	0.49	0.75			
Industry uncertainty:Competition	0.15	0.06	0.01	0.09	0.32	0.78
Effectuation	0.80	0.09	0.00	0.74	0.29	0.01
Industry uncertainty:Competition x Effectuation				0.01	0.07	0.83
R ²	0.3791			0.3792		
ΔR^2	0.0001					

$\alpha = 0.05$

Model F Sig = <0.00 for both base and moderator

N=150

There is therefore enough statistical evidence to reject the null hypothesis in favour of the alternative; the relationship between industry uncertainty and corporate innovation is not moderated by the prevalence of effectuation.

It is interesting to note that although not a research question, and for reason of comparison, the same model was run with causation as a moderator. Similar results were observed, leading to the conclusion that the prevalence of neither effectuation nor causation are moderators of the 'industry uncertainty – industry innovation' relationship.

5.5. Conclusion

Applying the methodology and data analysis techniques described in Chapter 4, the main research questions and hypotheses were tested and results were interpreted. Also, the description of the data was given by way of 'descriptive statistics' to give context within which the hypotheses were tested. A discussion of what these results mean in the context of the literature and objectives of the study follows in Chapter 6.

CHAPTER 6: DISCUSSION OF RESULTS

6.1. Introduction

The results of the study, as presented in the preceding chapter, are now discussed in detail against the research questions, hypotheses and literature. In addition, the insights gathered from the findings will be highlighted.

6.2. The parallel existence of effectuation and causation

From the description of the sample data collected, it is evident that the two concepts can co-exists in corporate organisations, and that the presence of effectuation does not necessarily mean the absence of causation strategies. In fact, respondents chose to agree (partially agree, agree and strongly agree) with causation questions 78 per cent of the time, and effectuation 62 per cent of the time. Several studies, including Svensrud and Åsvoll (2012) and Mthanti and Urban (2014) found evidence of both types of approaches in corporate organisations. In support, Rust (2010) also found that, even with entrepreneurs, few follow pure causal or pure effectual strategies and processes, but instead adopt a combination of the two approaches.

The findings of this research support the observation that corporates can adopt both effectuation and causation, depending on context. For Svensrud and Åsvoll (2012), it was the stage of growth of the opportunity being considered by the organisation, arguing for effectual strategies at the beginning of opportunity exploration and more causal strategies in the later stages. Whereas according to Fisher (2012), causation processes tend to be used in identifying and exploiting existing markets with lower levels of uncertainty, in contrast with effectuation being used in new markets with high levels of uncertainty. The context therefore becomes significant for strategic managers deciding to adopt one or the other, or even both; as Svensrud and Åsvoll (2012) found that effectuation and causation were not polarised in the way, they interact with other variables.

Notwithstanding this, causation seems more prevalent in corporate organisations, observed by frequencies in the descriptive statistics. This assertion is supported by the finding that causation, as a component, appears to explain the highest variation in the data as shown by the highest Eigenvalue and a scale with the highest Chrombach's alpha. The strength of causation in large corporates was also demonstrated by a model developed by Svensrud and Åsvoll (2012). This is not surprising according to SME 2,

who expects causal strategies to still be more prevalent in corporate organisations, even if these organisations were using some effectual strategies.

6.3. Component analysis and scale validation

The use of PCA as an exploratory factor analysis to determine the items and components that belong in the research instrument, became in itself an important finding. According to Chandler *et al.* (2011), who developed and validated the measurement scale of effectuation and causation constructs, as well as other researchers who have gone on to test these in corporate environments, further research was needed to continue to examine and refine these measures, as well as test how they interact with uncertainty as an antecedent.

It was therefore among the objectives of this exploratory research to continue to examine and refine these measures and contribute to this developing conversation on corporate effectuation.

6.3.1. Adaptation of effectuation and causation

As demonstrated in Chapter 5 and Appendix 2, the items under flexibility, affordable loss and experimentation immediately loaded separately into distinct components during the PCA, providing support to Sarasvathy (2001) and Chandler *et al.* (2011) that effectuation is a multidimensional construct made up of sub-constructs. This view of effectuation as a multi-dimensional or formative construct therefore seems to hold even in the corporate context. What remains unclear is how the items of these sub-constructs differ in a corporate environment, if the scales are complete and the implications of removal of some items by PCA.

In the results, all items of pre commitments as a sub-construct were evidently removed during PCA. This in itself brings particular interest to the validity and/or completeness of this as a sub-construct of effectuation and it is in line with what other researchers have found. Firstly, in operationalising the scales for effectuation as a multidimensional construct, Chandler *et al.* (2011) reported that the exploratory factor analysis conducted revealed a clear distinction between the factor loading of pre-commitment items, compared to the other sub-constructs of effectuation; flexibility, affordable loss and experimentation loaded together, whereas pre-commitment was separate. Furthermore, the scale developed for pre-commitments by Chandler *et al.* (2011) shows their own admission was not as strong as the others.

In addition to a relatively weaker scale and separated factor loading from other sub-constructs, there was evidence of double loading as pre-commitment was the only sub-construct of effectuation shared with causation (Chandler et al., 2011). They explained this double-loading by suggesting that whereas pre commitments and strategic alliances can be used to reduce uncertainty and help control the future, they also entail planning and exploitation of pre-existing knowledge, which is consistent with causal strategies.

In similar fashion, when examining the drivers of the entrepreneurial behaviour in a group of ventures, Fisher (2012) also found that pre-commitment was the only dimension of effectuation that was not observed, while there was strong evidence of the use of affordable loss, flexibility and experimentation.

The findings of this research regarding pre-commitments are consistent with existing literature, suggesting that either it doesn't belong, as one of the constructs of Effectuation, especially when applied to corporate, or alternatively, as Chandler *et al.* (2011) suggest, the measures developed may not accurately capture what Sarasvathy (2001) initially conceptualised with regard to pre-commitments and call for further research to validate this and/or assist in developing accurate items for pre-commitments.

In addition to pre-commitments, items (questions) were removed from the other sub-constructs (except for affordable loss) and from causation, calling into question the completeness of these scales as measures of these constructs. This is supported by Harms and Schiele (2012) who suggest that further research is needed to determine if these sub-constructs are complete in the context of large corporates. As demonstrated in the literature, there are certain elements unique to established corporates as compared to entrepreneurial ventures that may require us to think about effectuation and causation differently (Svensrud and Åsvoll, 2012).

6.3.2. Industry uncertainty is not a single component

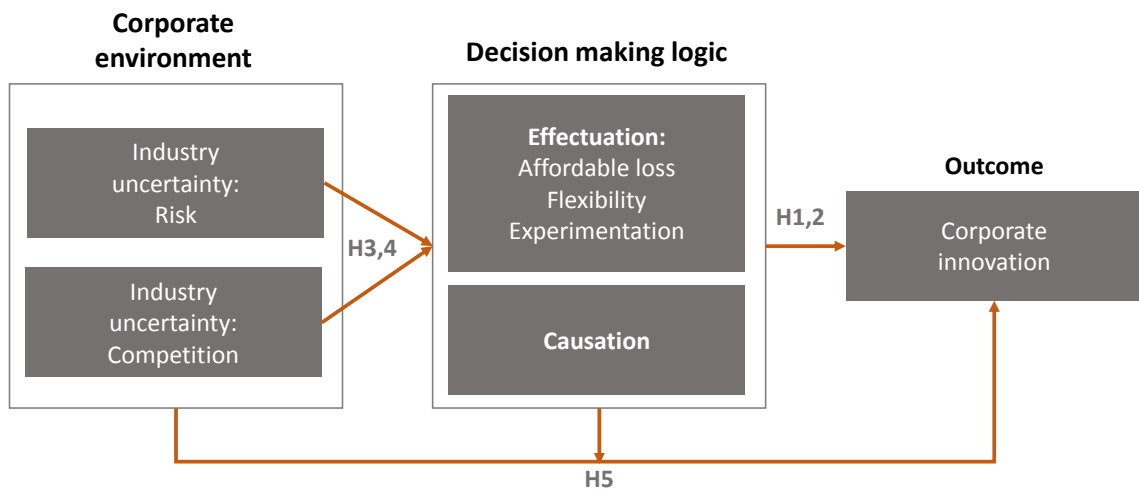
As indicated '*Competitive intensity is high in my industry*' was deleted from the Industry uncertainty scale as originally conceptualised by Slevin and Covin (1997). The remaining elements were further split into two different components which, based on the characteristics observed, were renamed as follows: 'industry uncertainty – risk' and 'industry uncertainty – competition'. Risk in this instance really refers to risk of failure as interpreted from the actual items.

A similar result was also observed by Harms and Schiele (2012) when conducting factor analysis, albeit using a different scale of Industry uncertainty and dynamism. In this case

industry uncertainty were separated into technical uncertainty and general uncertainty, which were both observed to interact differently with elements of effectuation and causation, causing Harms and Schiele (2012) to suggest further research to establish why findings were different across the types of uncertainty. All this shows that there are different elements to the component of Industry uncertainty that may have unique interactions with the other variables, as indeed was shown in the next section on hypothesis testing.

Going into hypotheses testing, the context for the research questions was therefore translated to incorporate these insights observed in the Principal components analysis of the research. The framework seen in both Chapters 2 and 3 was changed to reflect the split in industry uncertainty and the removal of pre-commitments.

Figure 37: Resulting research framework incorporating insights from PCA



6.4. Discussion of hypothesis testing results

The research hypotheses were tested in the previous chapter and to summarise the results, the following table is presented:

Table 15: Summary of results

		Hypothesis	Results
Research Question:1 Are organisations with higher levels of corporate innovation more likely to be using effectuation or causation as a strategy?	H1	There is a positive relationship between the prevalence of effectuation and levels of innovation in an organisation.	Supported
	H1a	Flexibility	Supported
	H1b	Affordable loss	Supported
	H1c	Experimentation	Supported
	H2	Effectuation is more correlated with levels of corporate innovation than causation	Supported
Research Question:2 Do levels of industry uncertainty influence the prevalence of effectuation or causation in an organisation?	H3	There is a positive relationship between industry uncertainty and the prevalence of effectuation in an organisation.	Not supported
	H3a	Flexibility	Not supported
	H3b	Affordable loss	Not supported
	H3c	Experimentation	Not supported
	H4	There is a negative relationship between industry uncertainty and the use of causation in an organisation.	Not supported
Research Question:3 In situations of increased industry uncertainty, does the prevalence of effectuation increase corporate innovation?	H5	The relationship between industry uncertainty and corporate innovation is moderated by the prevalence of effectuation.	Not supported

6.5. Research question 1

Are organisations with higher levels of corporate innovation more likely to be using effectuation or causation as a strategy?

The first hypothesis in answering the research question above, sought to first establish if there was a positive relationship between the prevalence of effectuation and levels of innovation in an organisation. In conceptualising effectuation, Sarasvathy (2001) established a relationship between effectuation and new venture creation. If as explored in the literature, corporate innovation can be likened to the entrepreneurial activity of

opportunity discovery, exploration and exploitation (Svensrud & Åsvoll, 2012; and Mthanti & Urban, 2014), can a similar positive relationship then be established between the prevalence of effectuation and innovation.

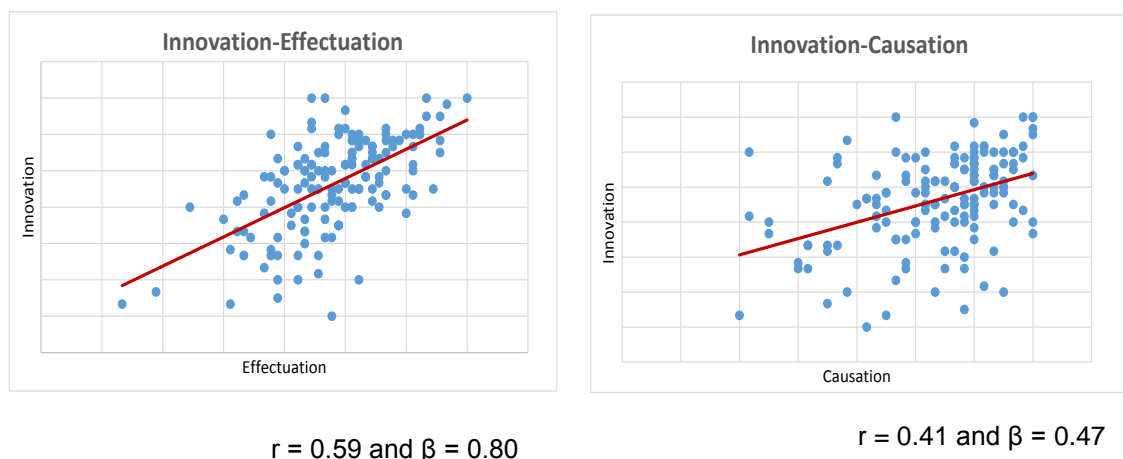
The results for **H1** established a convincing and statistically significant positive relationship between the prevalence of effectuation ($r = 0.6$ and $\beta = \sim 0.80$) therefore in line with the literature.

Each one of the tested sub-constructs of effectuation was also established to have a positive relationship with innovation; lead by flexibility, followed by experimentation and then affordable loss. This order was in line what both the SMEs interviewed said. They suggested that experimentation and flexibility are more likely to be more influential in large corporation than the affordable loss (and pre-commitments). SME 1 even went further to mention that an increasing number of organisations are adopting the more recently popularised entrepreneurship methodology of ‘The lean start-up’ which favours flexibility and experimentation over elaborate planning (Blank, 2013)

It was also evident from the results that both effectuation and causation were positively correlated with innovation in corporates, supporting most of the literature that has found evidence of both effectuation and causation in large corporates (Brettel *et al*, H&S, A&S, Thanthi and Fisher). In fact, Svensrud and Åsvoll, (2012) found that the two are not at all polarised in how they interact with variables, and go on to suggest that the interweaving relationship between effectuation and causation processes can be expected to actually be higher in corporates than in entrepreneurial ventures.

Hypothesis two (**H2**) however established that effectuation is more positively correlated with innovation compared to causation with higher regression and correlation coefficients as shown below.

Figure 38: Simple correlation of Innovation with Effectuation and Causation



Even more insightful, when comparing the two regression models, was a higher R^2 of the Innovation-Effectuation model was observed at 0.34 compared to 0.16 for 'innovation-causation; indicating that the independent variable Effectuation explains more (34%) of the change in the corporate innovation observed, as opposed to 16 per cent explained by causation.

This suggests a relatively better relationship between corporate innovation and Effectuation compared to causation, directly answering in the affirmative the first research question: **Are organisations with higher levels of corporate innovation more likely to be using effectuation or causation as a strategy.** This is supported by Svensrud and Åsvoll, (2012)'s assertion that when considering developing opportunities through innovation, effectuation is as important in large corporations as it is in start-ups, with the potential to offer corporates a competitive advantage. This finding further supports one the proposed advantage higher levels of effectuation being increased levels of creativity and innovation in an organisation (Wiltbank et al., 2006).

6.5.1. Research question 2

Do levels of industry uncertainty influence the prevalence of effectuation or causation in an organisation?

Central to the theory of effectuation, is dealing with an unknowable future. Sarasvathy (2001) conceptualised effectuation as a decision logic in increased uncertainty for entrepreneurs, inherently suggesting a positive relationship between the effectuation and uncertainty. Fisher (2012) in support continued to suggest that the use of non-predictive strategy of effectuation is more likely to happen in increased uncertainty. This second research question investigated if this was observed in corporates as well, whether increased uncertainty lead to more effectuation and less causation.

Both hypothesis 3 and 4 were rejected owing to very small and statistically insignificant correlation coefficients observed between industry uncertainty with both effectuation and causation. This was consistent with what Mthanti and Urban (2014) found when looking at high technology firms, where the interaction between effectuation and environmental hostility proved to be insignificant.

What is insightful about the results of both **H3** and **H4**, is the possible opposing effects of elements that make up industry uncertainty. The two observed types of uncertainty (risk and uncertainty) as indicated by the Principal component analysis appear to have

a polarised interaction with both effectuation and causation elements. For example in Table 12 a possible negative relationship exists between increased competition and causation, but a possible positive one with 'risk'; suggesting that companies are less likely to use causal strategies when faced with increased competition but more likely to effectuate. The same pattern of opposing effects was observed with the sub-constructs of effectuation, suggesting that perhaps a driver of uncertainty could cause the organisation to do more of one component and less of the other.

These assertions cannot however be made conclusively; the difference may be due to chance variation as shown by statistically insignificant relationships (Wegner, 2012). What this provides though, is an avenue for further research that separates industry uncertainty into sub-components, the interaction of which may be masking true relationships with research variables. (Harms & Schiele, 2012) illustrated this when they separated dimensions of uncertainty into general and technical as discussed earlier. This was after no systematic influence of uncertainty was observed on effectuation/causation when considered on a single scale, but opposing relationships were observed when separated. A negative relationship between general uncertainty and causation was observed, while a positive association between technical dynamism and effectuation was established (Harms & Schiele, 2012); a result that could have been lost.

6.5.2. Research question 3

In situations of increased industry uncertainty, does the prevalence of effectuation increase corporate innovation?

Ultimately, the research title attempts to establish the influence of effectuation/causation on corporate innovation in increased uncertainty. This is the reason for the last research question and hypothesis, which sought to understand the moderating effect of effectuation in the relationship between industry uncertainty and corporate innovation.

Essentially, does the prevalence of effectuation increase corporate innovation in situation where organisations are faced with increased industry uncertainty? In order to answer this, the relationship between industry uncertainty and corporate innovation was first tested. The possible benefit of considering industry uncertainty as separate components was once more demonstrated with small but opposing influence of risk and competition on innovation, albeit not being statistically significant. This adds support to further research into the make-up of industry uncertainty as a component.

Also of interest is the possible negative relationship between innovation and one of the components of industry uncertainty. This implies that, depending of the source of uncertainty, innovation may not be the appropriate strategy for the organisation. For example, the weak negative relationship between innovation and risk of failure observed in Figure 18 may imply the following: in some high risk industries, with a higher probability of failure, an organisation may not regard innovation as a strategy against increased uncertainty. This is in contradiction with the background in Chapter 1 that hypothesised innovation as a response that companies are seen to increasingly seek against increased uncertainty. Once again highlighting the importance of what Toner et al. (2015) found: companies that do well with uncertainty are ones that have identified its source.

Following this, the hypothesis that effectuation moderates the 'industry uncertainty - corporate innovation' relationship was tested for both risk and competition. Both were rejected by the insignificant resulting P-values of the moderated regression models conducted. This implies that increasing effectuation does not necessarily cause corporates to innovate more or less when facing industry uncertainty.

To support this conclusion, an interesting observation was made with regards to the relationship between corporate innovation and increased 'industry uncertainty due to competition', with the effectuation as a moderator (Table 14). Both competition and effectuation have a positive and significant relationship with corporate innovation through observed regression coefficients, P-values and R^2 of 0.38. But when the interaction between the two independent variables is added the coefficients are reduced, and the moderation adds nothing statistically significant to the model. This leads to the conclusion that the positive relationship between 'industry uncertainty due to competition' and corporate innovation exists, and not because of increased effectuation. Meaning that when faced with increased competition, corporates are likely to react by increasing innovation, but not necessarily by increasing levels of effectuation.

The implication of this result is significant and can add to the development of the theory of effectuation in large organisations. Either large organisations have other ways, not effectual/causal that they use to drive innovation in increased uncertainty, or the measures of the effectuation sub-constructs and causation may not be complete when considering in corporate organisations. A possible candidate for the former assertion is 'management experience' which was observed to moderate the relationship between uncertainty and effectuation by Harms and Schiele (2012). Further research is needed in regard of these findings.

6.5.3. Sample size and composition consideration

The strength and generalisability of the results observed and discussed above may be limited by the fact that the sample obtained showed a bias of numbers towards the IT and Financial services industries. At the same time, this could indicate a basis for further and more targeted study exploring the depth of these variables in a single industry. In fact, SME 1 suggested that creating a boundary and honing in to a single industry could enhance the relevance of observations. This is the approach that was taken by Mthanti and Urban (2014) when investigating effectuation and entrepreneurial orientation in high-technology firms.

6.6. Conclusion

The results observed in Chapter 5 was discussed in the context of the literature. This revealed a number of insights that are significant to both managers in corporate organisations, and to the development of effectuation as a theory. A summary of these is provided in the next chapter.

CHAPTER 7: CONCLUSION

7.1. Introduction

With the aim to improve decision making in corporate organisations, when faced with uncertainty, this research was motivated by the question; what can decision makers and managers in corporate organisations learn from entrepreneurs? The influence of the entrepreneurial concepts of effectuation and causation on corporate innovation, when observed under conditions of increased uncertainty was explored. Therefore making the study trans-disciplinary; creating a link between the field of corporate strategy and entrepreneurship.

Data was collected from a sample of 150 middle and senior managers from corporate organisations across industries in South Africa. To measure the variables of interest, the research instrument used measuring scales developed by previous research in these topics. Consequently, methodical and iterative statistical analysis was conducted, the results of which were analysed for insights.

In this chapter, key findings are provided, summarised in a model that went through iterations throughout the research process, as insights were introduced. The framework morphed from how it was initially conceptualised (based on the research scope, variables and objectives) in Chapter 2 and 3, to incorporating the result of data validation in Chapter 5 and now here to summarise key findings, including their theoretical and practical implications.

7.2. Key findings and theoretical contributions

This study has contributed to the extension of effectuation and causation from an entrepreneurship context, adding to its broader application in corporate strategy and innovation. In the process, contributions were made to the rudimentary theory itself, as currently conceptualised and measured, and in turn provided an avenue for further research.

Furthermore, this research has added to theoretical research on the nexus of corporate entrepreneurship and innovation, offering recommendations on how managers in organisations can make decisions in the dynamic business environment they find themselves.

Based on research results and in the context of literature, the following specific findings are presented and summarised in a framework as shown thereafter.

7.2.1. Effectuation and causation strategies co-exist

Effectuation and Causation strategies exist in parallel in the corporate organisations observed. Causation however is more prevalent as can be expected with corporates, which largely follow goal orientated strategies (Svensrud & Åsvoll, 2012).

It was also observed that these two are not polarised in the way they interact with other variables, that is, depending on the context, a positive relationship can exist between effectuation and innovation/uncertainty as it can with causation.

This further leads to the theoretical conclusion and the corollary: the absence of one, does not necessarily mean the presence of the other. That is, although effectuation and causation are two different approaches to opportunity exploration, they are not mutually exclusive. Organisations are likely to adopt both at varying degrees depending on context.

7.2.2. Adaptation of effectuation and causation for corporates

As revealed by Principal component analysis, the sub-components of effectuation and the associated measuring scales as operationalised by Chandler et al. (2011) may require examination and validation when applied to corporates. Pre commitments was removed as a subcomponent of effectuation. Furthermore, additional items were removed when validating the scales of the remaining components, indicating a lower 'item to total component' correlation, at least in the context of this research.

These findings contribute to the call for more research to examine these measures, but its scope and context is not enough to make a definitive change to these concepts; hence can only provide a basis for further research.

7.2.3. Effectuation leads to more innovation

Although both Effectuation and Causation were positively correlated with Corporate innovation, Effectuation was found to be conclusively associated with higher levels of innovation, supporting findings by (Mthanti & Urban, 2014), (Brettel et al., 2012) and (Svensrud & Åsvoll, 2012). This suggests that Effectuation can be a source of competitive advantage in corporate strategy.

The sample collected was limited in conclusively determining if this differs by industry; that is, if effectuation seems to be a better strategy for corporate innovation in some industries more than others, providing a basis for further research.

This was a result of testing H1 and H2.

7.2.4. Industry uncertainty is a multidimensional component

Industry uncertainty, as a context explored by this research, cannot be viewed as one component as it may comprise of elements that are polarised, leading to misinterpretation of result. This same was found by Harms and Schiele (2012). To make conclusive determinations on its relationship with other variable, exploratory factor analysis techniques are recommended. The emergent components observed will reveal what uncertainty means in the context being researched. Consequently, the nature of the relationships explored will vary depending on the nature of the uncertainty component, as shown by the “+/-” in the framework below, and tested by H3, H4, and H5. Competition and risk of failure, emerged as the industry uncertainty components in the context of this research.

It follows then that in the context of this research:

- I) Corporate organisations may react to increased industry uncertainty by increased innovation, or not, depending on the source of uncertainty
- II) Corporate organisations may react to increased industry uncertainty by using more or less effectuation and/or causation, depending on the source of uncertainty

In fact, Toner et al. (2015) argues that organisations that seemingly organise quickly around the right choices are not, as observed, better at predicting the future, but at clearly defining which uncertainties face.

7.2.5. More effectuation is not necessarily more innovation

In situations of increased uncertainty, the prevalence of effectuation does not increase levels of corporate innovation.

Although Effectuation is observed to lead to increased innovation (**7.2.3**), it is not necessarily the strategy that organisations use to achieve corporate innovation in all situations of increased uncertainty, as concluded in **7.2.4**. For example, when faced with the element of uncertainty that causes a corporate to react by increasing innovation, it

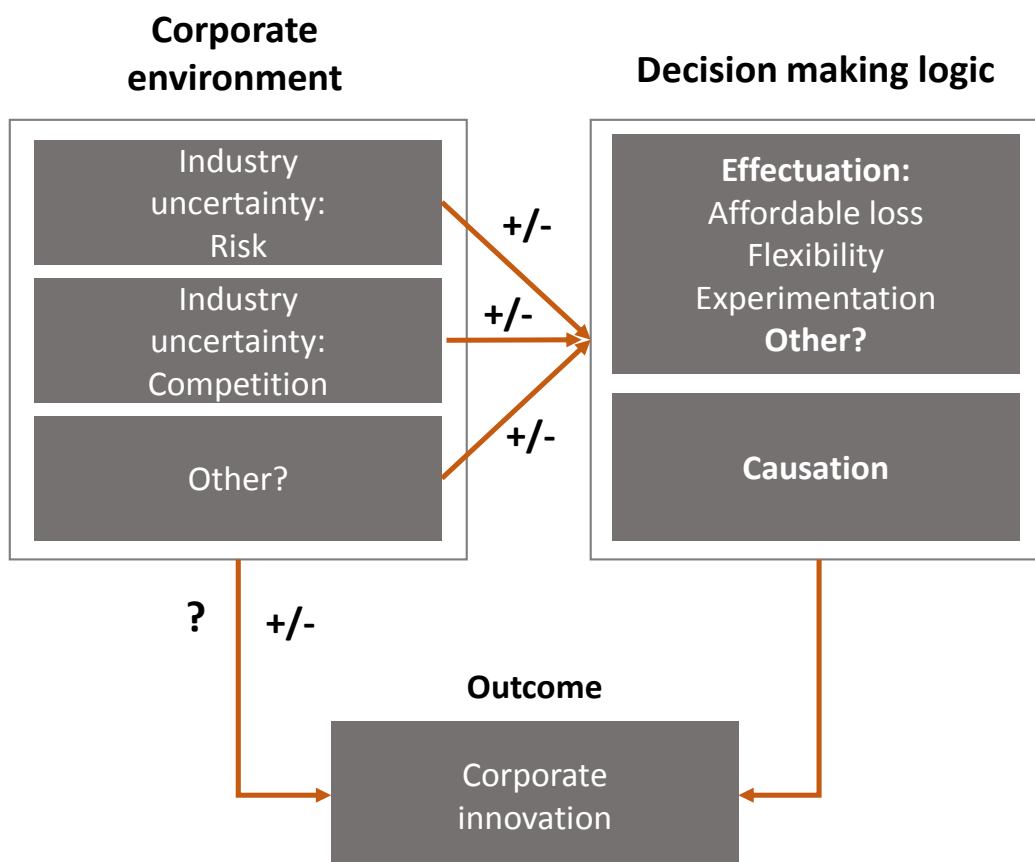
does not necessarily do so by increasing levels of effectuation. This is in spite of that organisation currently using effectual strategies.

The implication is significant to the development of the theory of effectuation in corporate organisations. Either corporate organisations have other ways, not effectual/causal, that are used to drive innovation in increased uncertainty, thereby moderating this relationship; or the measures of the effectuation sub-constructs and causation may not be complete when considering use in corporates. The former is represented by the “?” in the framework below begging the question; what else do corporates have that entrepreneurs don't, that is significant to this conversation? This therefore supports the call for more research in this regard.

Essentially, this finding explored the 3-way relationship between industry uncertainty, decision making logic (effectuation/causation) and corporate innovation as tested by H5.

The figure below captures all the findings as discussed:

Figure 39: The framework showing the interaction of the variables: Industry uncertainty, Effectuation, Causation and Corporate Innovation



As explained in the findings above, the relationship between the variables have changed from how they were initially hypothesised: with the following main adjustments:

- The decision logic of effectuation/causation influences corporate innovation as originally hypothesised, albeit more so effectuation. **(H1 and H2)**
- The effectuation/causation decision logic does not seem to moderate the relationship between industry uncertainty and corporate innovation, it could be something else. **(H5)**
- Industry uncertainty itself is not one variable but one of several components that may vary in how they interact with other variables. **(H3, H4, H5)**
- There may be a need to adapt the elements of effectuation when applied to corporate.

7.3. Implications for management

Among the objectives of this study was to provide recommendations to managers in large corporates, on the use of effectuation and causation strategies as a means to innovate, especially in the context of uncertainty. The following are recommended for managers:

Innovation through effectuation as a source of competitive advantage

- Effectuation has been shown to increase corporate innovation and can be adopted as a source of competitive advantage for the organisation.
- In a context where most managers have been found to be mostly causal in their approaches, this provides an opportunity for an organisation to differentiate itself.
- Increased creativity is associated with effectuation and can also reduce costs of failure associated with predictive planning.

Prepare organisations for the use of both effectuation and causation

- The adoption of one strategy does not mean the stopping the other.
- Corporate organisations can adopt different strategies across different divisions or at different stages of opportunity exploration.
- Managers should consider the implications of this co-existence on processes, policies and resource allocation.

Identify the major driver of uncertainty faced by the organisation to inform use of effectuation/causation:

- Context matters; knowing what type of industry uncertainty an organisation faces

will allow for the appropriate decision making and strategy (Toner et al., 2015).

- Effectuation may not be the right strategy for all situations of industry uncertainty.

Corporate innovation may not always be the answer to all types of industry uncertainty

- Once again, the driver behind what faces the organisation as an uncertainty is critical to deciding how to respond to it.

Consider what else can get you there: Increasing the prevalence of effectuation may not always increase innovation in situations of uncertainty

- Although effectuation is associated with more innovation, it may not be what is needed to increase innovation in increased industry uncertainty.
- Unlike a new venture or an entrepreneur, large corporate organisations have at their disposal more means and resources. They can influence innovation through other ways unique to that organisation.
- After all, effectuating for the sake of effectuating breaks the first step of effectuation; 'what means do I have?'

7.4. Limitations of the research

- Researching across two fields on relatively new concepts, presented a challenge of finding literature specific to the research scope. This led to a reliance on the findings of a few studies conducted in this area.
- The sample composition can be more targeted to actual decision makers in the organisation, as well as controlled.
- The non-probability methods used for sampling could affect the generalisability of the results. However, the findings are deemed relevant as they are consistent with other research, and at the very least point to opportunities for further.
-

7.5. Suggestions for future research

From the study, several gaps and opportunities for further research were identified:

At a high level, some differences in the correlation between corporate innovation and either causation/effectuation were observed by industry. This was out of scope for this study and the sample obtained was deemed insufficient to conclusively make this

determination. Further research focused on this topic is therefore suggested to add an important dimension to corporate effectuation.

Further research into firstly the scales measuring pre-commitments and then its actual association with effectuation in organisations is needed. This is to establish whether this sub construct is just not measured correctly or it should be removed from the multidimensional construct of effectuation, especially in corporates.

An extensive study to investigate the measuring scale of effectuation in a large corporate as a whole, to validate, refine or improve upon the one developed by Chandler et al. (2011) in the context of entrepreneurship, is recommended.

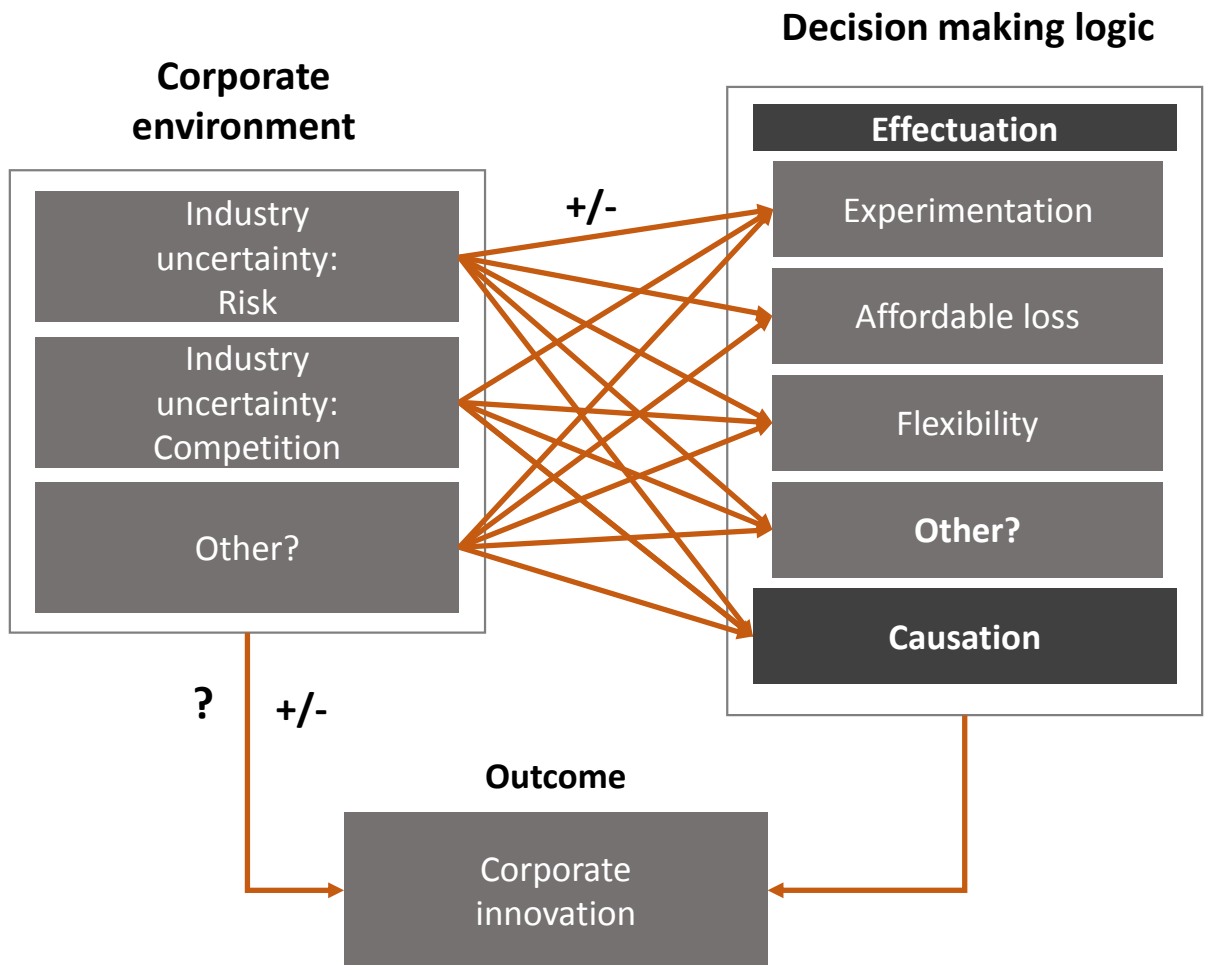
Also, uncertainty seems to contain components that are empirically different and that cause organisations to react differently, therefore further research is needed. Uncertainty might be better treated as a formative construct than a single component.

Lastly, following the findings and framework developed in this research, there exists an opportunity to investigate whether a taxonomy of decision making can be developed for innovation managers in corporates. The context being that:

- Elements of uncertainty are seen to have different relationships with effectuation and causation
- Could this relationship also exist at a sub construct level? In other words can the subcontracts be separated and treated as individual courses of action that do not have to co-exist when responding to an uncertainty?
- If so, could a taxonomy of decision making that takes into account all these relationships, and make a recommendation on what actions an organisation should take to increase innovation, be developed?
- This would have to take onto account other moderating variables that could influence the industry uncertainty-corporate innovation relationship.

A framework of how this is envisaged is provided below

Figure 40: A taxonomy of decision making suggested for further research



7.6. Conclusion

This study explored the trans-disciplinary application of effectuation in corporate strategy, as is highly relevant to emerging strategy. All the objectives of the study were achieved. It provided recommendations regarding the use of effectuation to innovation managers in corporates. It further contributed to the theory of effectuation including its application to corporate strategy, providing an avenue for further research.

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	Strongly disagree	Disagree	Partially disagree	Neither agree or disagree	Partially agree	Agree	Strongly agree
Part A							
- In general, the top managers of my firm favor a strong emphasis on R&D, technological leadership and innovations	1	2	3	4	5	6	7
- My firm has marketed many new lines of products or services in the past five years (or since its establishment if the organisation is less than 5 years)	1	2	3	4	5	6	7
- Changes in product or service lines have usually been quite dramatic	1	2	3	4	5	6	7
- The R&D output aimed at many new customers to our organization	1	2	3	4	5	6	7
- The R&D output catered to new customer needs that we have not served before	1	2	3	4	5	6	7
- The new product required to use new sales and distribution channels	1	2	3	4	5	6	7
Part B							
Causation							
- We analysed long run opportunities and selected what we thought would provide the best returns	1	2	3	4	5	6	7
- We designed and planned business strategies	1	2	3	4	5	6	7
- We designed and planned production and marketing efforts	1	2	3	4	5	6	7
- We developed a strategy to best take advantage of resources and capabilities	1	2	3	4	5	6	7
- We had a clear and consistent vision for where we wanted to end up	1	2	3	4	5	6	7
- We organised and implemented control processes to make sure we met objectives	1	2	3	4	5	6	7
- We researched and selected target markets and did meaningful competitive analysis	1	2	3	4	5	6	7
Flexibility							
- We adapted what we were doing to the resources we had	1	2	3	4	5	6	7
- We allowed the business to evolve as opportunities emerged.	1	2	3	4	5	6	7
- We avoided courses of action that restricted our flexibility and adaptability	1	2	3	4	5	6	7
- We were flexible and took advantage of opportunities as they arose	1	2	3	4	5	6	7
Affordable loss							
- We were careful not to risk more money than we were willing to lose with our initial idea	1	2	3	4	5	6	7
- We were careful not to commit more resources than we could afford to lose	1	2	3	4	5	6	7
- We were careful not to risk so much money that the company would be in real trouble financially if things didn't work out	1	2	3	4	5	6	7
Experimentation							
- The product/service that we now provide is essentially the same as originally conceptualised*	1	2	3	4	5	6	7
- The product/service that we now provide is substantially different than we first imagined	1	2	3	4	5	6	7
- We experimented with different products and/or business models	1	2	3	4	5	6	7
- We tried a number of different approaches until we found a business model that works	1	2	3	4	5	6	7
Pre-Commitments							
- We used a substantial number of agreements with customers, suppliers and other organizations and people to reduce the amount of uncertainty	1	2	3	4	5	6	7
- We used pre-commitments from customers and suppliers as often as possible	1	2	3	4	5	6	7
Part C							
Industry uncertainty							
- The failure rate of firms in my industry is high	1	2	3	4	5	6	7
- My industry is very risky, such that one bad decision could easily threaten the viability of my business unit	1	2	3	4	5	6	7
- Competitive intensity is high in my industry	1	2	3	4	5	6	7
- Customer loyalty is low in my industry	1	2	3	4	5	6	7
- Severe price wars are a characteristic of my industry	1	2	3	4	5	6	7
- Low profit margins are a characteristic of my industry	1	2	3	4	5	6	7
Part D: Please indicate the industry your organisation operates in							

*Reverse coded

Items removed by Principal Component Analysis

Rotated Component Matrix^a

	Construct (α) %Var. explained	Component loading
Causation (0.881)		
15.7%		
We designed and planned business strategies		0.828
We designed and planned production and marketing efforts		0.827
We developed a strategy to best take advantage of resources and capabilities		0.798
We had a clear and consistent vision for where we wanted to end up		0.698
We analysed long run opportunities and selected what we thought would provide the best returns		0.664
We researched and selected target markets and did meaningful competitive analysis		0.662
Innovation (0.849)		
15.4%		
The R&D output aimed at many new customers to our organisation		0.829
The R&D output catered to new customer needs that we have not served before		0.785
My firm has marketed many new lines of products or service in the past five years (or since its establishment if the company is less than 5 years)		0.710
The new product required to use new sales and distribution channels		0.670
Changes in product or service lines have usually been quite dramatic		0.642
In general, the top managers of my firm favor a strong emphasis on R&D, technological leadership and innovations		0.599
Effectuation (0.787)		
25%		
Affordable loss (0.826) 8.9%		
We were careful not to commit more resources than we could afford to lose		0.851
We were careful not to risk more money than we were willing to lose with our initial idea		0.830
We were careful not to risk so much money that the company would be in real trouble financially if things didn't workout		0.809
Flexibility (0.829)		
8.1%		
We were flexible and took advantage of opportunities as they arose		0.750
We avoided courses of action that restricted our flexibility and adaptability		0.726
We allowed the business to evolve as opportunities emerged		0.714
Experimentation (0.765) 8%		
The product/service that we now provide is substantially different than we first imagined		0.858
We experimented with different products and/or business models		0.731
We tried a number of different approaches until we found a business model that works		0.669
Industry uncertainty - Risk (0.639) 7.1%		
Customer loyalty is low in my industry		0.773
Severe price wars are a characteristic of my industry		0.725
Low profit margins are a characteristic of my industry		0.714
Industry uncertainty - Competition (0.658) 6.4%		
My industry is very risky, such that one bad decision could easily threaten the viability of my business unit		0.839
The failure rate of firms in my industry is high		0.788

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

α - Chronbach alpha based on standardised values

Appendix 3: SME Interview questions

Question 1: Corporate Innovation and Effectuation/Causation measures

- 1.1. To what extent do you think entrepreneurial strategies influences the level of innovation in a corporate organisation?
- 1.2. What is the influence (if any) of effectuation (and each of its sub-dimensions: flexibility, affordable loss, experimentation and pre-commitments) on levels of corporate innovation?
 - 1.2.1. Is there any one that is likely to be more/less an influence in a corporate setting?
- 1.3. What is the influence (if any) of causation to levels of corporate innovation, and vice versa?

Question 2: Industry Uncertainty and Effectuation/Causation

- 2.1. Do you think organisations operating under greater uncertainty are likely to use effectuation or causation decision making strategies?
- 2.2. What do you think is the nature of the relationship between effectuation measures and industry uncertainty?
- 2.3. What do you think is the nature of the relationship between causation measures and industry uncertainty?

Question 3

- 3.1. What are the unique corporate-based factors that are likely to affect the application/influence of effectuation in an organisation?