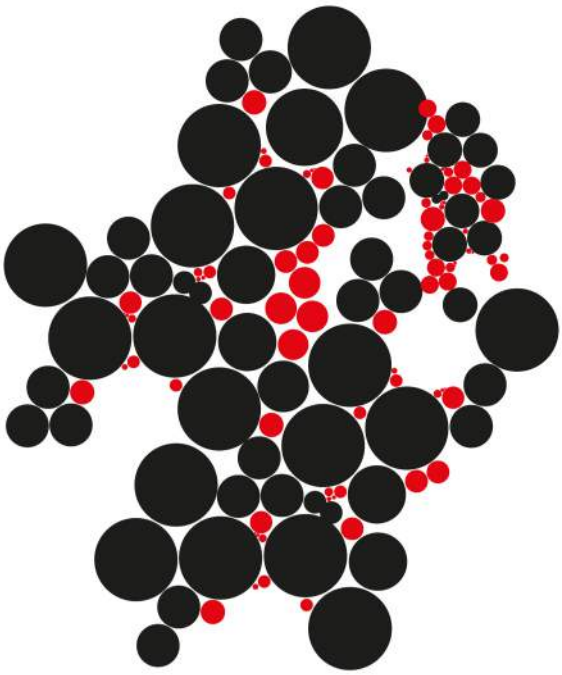

# Master Thesis

The first steps towards a quantitative measurement scale of Causation and Effectuation in a non-entrepreneurial student context


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# Preface

This thesis is the final part of the Master of Business Administration with the specialisation in Innovation and Entrepreneurship. This thesis is submitted to the facility of Management and Governance of the University of Twente.

*"Effectuation articulates a dynamic and iterative process of creating new artifacts in the world"* (Smith, J.B., 2012)

In line with the effectuation theory, this master project embraced contingencies. The project started as a dynamic process in which iterations allowed the research goal to change. This to improve the output and relevance of the master thesis. The effectuation theory reminds me that challenges along the road should not always be avoided, sometimes they should be embraced!

First of all, I would like to thank my first supervisor Martin Stienstra for his guidance, feedback and interesting discussions. Also my gratitude towards my second supervisor Michel Ehrenhard. I would like to thank Harry van der Kaap for his input with regard to the statistical challenges. I thank my parents for their constant support, encouragement and motivation during this challenging process. Further, my gratitude goes to my friends and family. In specific I would like to thank Steven Mannes, Bastiaan Kosters, Gerrit Overweg and my brother Robbert Krebbers for their comments and insights. Finally I would like to express my appreciation towards the respondents for filling out the questionnaire and providing me with the dataset.

Lennert Krebbers

# Abstract

Entrepreneurs need to go through the entrepreneurial process in order to be able to identify, evaluate and exploit opportunities (Shane, 2012). This thesis investigates the entrepreneurial processes effectuation and causation in a non-entrepreneurial context. The objective is to develop a measurement tool that is able to capture the decision-making of students. This to investigate if students use a higher proportion of effectual or causal decision-making.

An empirical quantitative study had been performed and data is collected by questionnaires. The scale development steps of Netemeyer, Bearden & Sharma (2003) were used to develop the measurement scale. Twenty-five scale items were developed based on existing scales in effectuation literature. These items were redefined for the student context. The questionnaire contained questions for each principle of effectuation and causation, all unipolar 7-point likert scale items. To reduce fatigue of respondents, a limited amount of two to three questions were chosen for each dimension. All scale items were judged by a variety of scholars and students. A scenario instrument was developed which addresses a hypothetical business case, in which respondents are able to make entrepreneurial decisions.

Before the scale items were useful for analysis, factor analysis was performed. Factor analysis was used to find the underlying dimensions within the questionnaire. This to investigate if the principles' questions clustered together (Field, 2009) is intended by theory. Multiple assumptions were met to determine whether the data meets the requirements for factor analysis. The internal consistencies within the principles scored on the low side. Especially the Cronbach's alpha and item-to-total scores of the effectuation principles were quite mediocre. Low internal consistencies could be due multiple reasons and should not be intermediately discarded.

A selection of ten scale items was chosen for the final parsimonious measurement scale (Alsos, Clausen & Solvoll, 2014). Containing one item for each of the ten principles of effectuation and causation. The causation items loaded together on one factor. This was the same for the effectuation items except for the principles 'means' and 'control', which cross-loaded on the causation factor as well. Face validity, construct and discriminant validity were confirmed while known-group validity was not.

A paired sample t-test was conducted, the test compared the mean scores of effectuation with causation. There was a small but significant result that students use a higher proportion of causal decision-making. Further an interesting finding is that student entrepreneurs prefer effectual decision-making while non-entrepreneurial students prefer causal decision-making.

# Contents

# List of Tables

Chapter 1

# Introduction

In this chapter the general interest of the research paper will be addressed, namely entrepreneurship. Thereafter, the thesis shifts from the general interest to the specific research objective, scale development. The following aspects will be discussed during this chapter: the theoretical background, research goal, research question and research strategy.

## 1.1 Theoretical background

### 1.1.1 Entrepreneurship

The amount of journal publications involving entrepreneurship is growing steadily (Duxbury, 2012). Entrepreneurship is a complex multifaceted phenomenon, which has been the topic of research in a variety of academic fields. Entrepreneurship is important for economic growth, survival, productivity, innovations and job generation. The relationship between entrepreneurship and performance varies across different units of analysis, depending on the firm, to the region and the country (Audretsch, 2003; Hayton, George & Zahra, 2002). Although entrepreneurship is vital for economies, there is still little consensus of what constitutes as entrepreneurial activities (Audretsch, 2003).

Shane (2012, p. 12) defines entrepreneurship as "*the identification, evaluation, and exploitation of opportunities*". There is no one single definition of entrepreneurship, although most scholars agree that it is focussed on the process of change (Audretsch, 2003) and the study of the firm formation (Shane, 2012). Entrepreneurship includes new venture creation, self-

employment, corporate venturing and many other forms exist (Hayton et al., 2002). The process from the initial idea to a successful venture is dependent on a combination of activities and decisions made by an entrepreneur (Telman, 2012). Entrepreneurial decision-making behaviour is strongly linked with the human mind of the entrepreneur. Both conscious and unconscious factors such as "*expressions of the cognitions, motivations, passions, intentions, perceptions, and emotions*" (Carsrud & Brännback, 2009, p. xvii) influence the decision-making of entrepreneurs. Previous research tried to examine unique personality traits, or characteristics that distinguishes entrepreneurs from non-entrepreneurs. Scholars were unable to successfully demonstrate these unique differences. This simplistic way of defining an entrepreneur has been mostly discarded. Still, many researchers believe that understanding the entrepreneurial mind, will provide better knowledge on how the process of entrepreneurship leads to new venture creation. (Sarasvathy, 2008a; Carsrud & Brännback, 2009). When adopting the definition of Shane (2012), entrepreneurs need to go through the entrepreneurial process in order to be able to identify, evaluate and exploit opportunities.

### 1.1.2 Entrepreneurial processes

There are various approaches that entrepreneurs can take to start and develop new ventures. Entrepreneurs follow a sequence of activities and decisions to get from the initial idea to a (successful) new venture (Telman, 2012). This process is defined as the entrepreneurial process. To develop understanding of the entrepreneurial processes, Moroz & Hindle (2012) discuss common characteristics within 32 different models of decision-making. Only four models simultaneously present both generic and unique characteristics. Generic entails that the model covers a range of entrepreneurial contexts and activities. Distinct models describe activities unique to the field of entrepreneurship. The models are Gartner‘s (1985) emergence perspective, Bruyat & Julien‘s (2001) value creation perspective, Sarasvathy‘s (2001) creation process perspective (effectuation) and Shane‘s (2003) opportunity discovery perspective (causation) (Moroz & Hindle, 2012). Moroz & Hindle (2012) concluded that none of the four models unequivocally are both generic and distinct. Effectuation gained attention during the last ten years and is referred to as the most prominent theoretical perspective that changed the understanding of entrepreneurship (Perry, Chandler & Markova, 2012). Further empirical research with regard to the effectuation model would enhance entrepreneurship literature.

### Effectuation and causation

Effectuation has been the concept of more than 100 peer-reviewed academic papers (Read & Dolmans, 2012). In many cases, this logic is defined as the opposite of causation (Perry et al., 2012). Both effectuation and causation can be seen as construct of multiple entrepreneurial heuristics (Sarasvathy, 2008a). Effectuation is a control-oriented decision-making process. The starting point of the venture creation is based on the existing means. "*Effectuation processes take a set of means as given and focus on selecting between possible effects that can be created with that set of means*" (Sarasvathy, 2001, p. 245). Causal behaviour is goal-driven. Causal entrepreneurs pursue opportunities found by a purposeful search process with the focus on predicting the future (Perry et al., 2012). "*Causation processes take a particular effect as given and focus on selecting between means to create that effect*" (Sarasvathy, 2001, p. 245). Sarasvathy (2001) noted that effectuation would be more effective in settings characterised with high levels of uncertainty. Causal strategies are useful when uncertainty is low and the future is predictable. Sarasvathy (2008a, p. xi) uses an example to address the importance of uncertainty. "*Someone [is] thinking about creating the first overnight package delivery service or a restaurant with a new type of food*". In this example, problems of uncertainty determine the decision-making of entrepreneurs. The amount of likely customers and their willingness to pay for the services is unknown. Individuals differ in desires and conceptions of what is important (Sarasvathy, 2008a). Therefore an infinite amount of decision-making steps are possible which could all lead to successful businesses. This thesis focusses on the decision-making strategies effectuation and causation.

Sarasvathy (2008a) developed five behavioural principles that relate to effectuation and causation. "*The five sub-constructs include: (1) beginning with a given goal or a set of given means; (2) focusing on expected returns or affordable loss; (3) emphasising competitive analysis or strategic alliances and pre-commitments; (4) exploiting pre-existing knowledge or leveraging environmental contingencies; and (5) trying to predict a risky future or seeking to control an unpredictable future*" (Perry et al., 2012). These behavioural principles are further addressed in the theoretical framework.

The next section addresses the need for taking a quantitative approach for analysing entrepreneurial decision-making.

### 1.1.3 Prior research scale development Causation and Effectuation

Several empirical attempts have been made to measure effectual behaviour (Alsos et al., 2014). Most research takes a qualitative approach for measuring effectuation and causation. Either experimental studies, that analyse think-aloud verbal protocols or field studies are conducted (Chandler, DeTienne, McKelvie & Mumford, 2011). To further develop effectuation research, it is important to collect data based on quantitative approaches (Perry et al., 2012). Secondly, the existing published effectuation scales in literature will be discussed. Thereafter this section addresses the limitations regarding the existing scales, when measuring the decision-making of students. Finally, the development of a new measurement scale will be discussed.

#### Quantitative Research

More quantitative empirical effectuation research could help moving the research stream from a nascent to an intermediate phase (Perry et al., 2012). It is appropriate to use methods such as questionnaires to collect data. Quantitative measures allow researchers to study antecedents and outcomes of causation and effectuation with large sample sizes. Larger sample sizes stimulate more advanced statistical analysis and verification (Chandler et al., 2011). The available scales do not fully measure the whole constructs of effectuation and causation. They do not cover all of the principles of causation and effectuation (Perry et al., 2012). The three most adopted scales are summarised:

1. Wiltbank, Read, Dew & Sarasvathy (2009) focused on only one effectuation sub-construct 'control' versus the causation sub-construct 'prediction'. The unit of analysis was angel investors (U.S.).
2. Chandler et al. (2011) developed a scale that measures causation as one construct and effectuation as multiple sub-constructs (experimentation, affordable loss, flexibility, pre-commitments). This scale is most often used when measuring effectuation and causation. The unit of analysis was entrepreneurs (U.S.).
3. Brettel, Mauer, Engelen & Küpper (2012) recently developed a scale that measures four of the five sub-construct of effectuation and causation. The unit of analysis was R&D managers in a corporate context (Germany).

### 1.1.4 Sample of students

Different contexts have been the unit of analysis of in effectuation research. Effectuation was analysed for managers (Brettel et al., 2012), investors, (Wiltbank et al., 2009) and entrepreneurs (Chandler et al., 2011). Although, most research regarding effectuation involves entrepreneurs (Dew, Read, Sarasvathy & Wiltbank, 2009). Perry et al. (2012) state that effectuation research could benefit from investigating other varieties of samples. Wiltbank et al. (2009) compared experts (entrepreneurs) and novices (MBA students) as unit of analysis. Experts and novices deviate when making business decisions, they employ different entrepreneurial decision-making strategies (Dew et al., 2009). Sarasvathy, Dew, Read & Wiltbank (2007) also investigated the decision-making strategies of MBA students. They used a think-aloud protocol to identify markets for new product developments.

Multiple studies use a sample of students (Dew et al., 2009). In line with these other studies, a student sample is utilised. Chapter 2 explains this sample choice in more detail. Recent quantitative scales cannot be used to measure the effectual and causal decision-making of students. The existing scales measure decision-making based on actions taken within companies. Karali, Verheul, Thurik & Halbe (2014) investigated how many students started their own companies while studying (in the Netherlands). The percentage of student-entrepreneurs in 2012-2013 was 3% and by 2013-2014 this number increased to 6%. The amount of student-entrepreneurs is rising but still most students did not start their own companies. The decision-making of all students cannot be based on actual entrepreneurial behaviour. Which strategies students will use during new-venture creation requires a different measurement approach. This approach should be able to measure the decision-making of students in non-entrepreneurial settings.

In line with entrepreneurs, it is expected that students utilise a variety of different decision-making mindsets. Entrepreneurship literature could benefit from analysing decision-making strategies of students. To be able to measure effectual and causal decision-making of students, a new measurement tool needs to be developed. The next section will address the requirements to develop this scale.

### 1.1.5 Scale development

Scales can be used to measure phenomena that are believed to exist in theory, but cannot be measured directly (DeVellis, 2003). For the student context, a measurement tool needs to be developed which could measure decision-making logics of students. The unit of analysis is not student entrepreneurs with own businesses. The measurement tool should be able to measure decision-making logics of all types of students. Previous quantitative research mainly takes a behavioural approach based on actions taken by entrepreneurs when starting new firms (Alsos et al., 2014). In line with this previous research, a behavioural approach will be used. To be able to develop a measurement scale certain steps needs to be taken. Aspects such as dimensionality, reliability and validity are very important (Netemeyer et al., 2003). Chapter 3 describes the steps taken to develop the measurement tool.

## 1.2 Research gap

Existing quantitative measurement scales of effectuation and causation cannot be used to capture entrepreneurial decision-making of students. The questions are based on entrepreneurs or managers that have (or work in) companies. Most student are no entrepreneurs or corporate decision-makers. Being able to measure the thinking logic of students creates opportunities for entrepreneurship research. The new scale will allow scholars to study antecedents and outcomes (Alsos et al., 2014) of effectual and causation decision-making of students. According to Perry et al. (2012), researching effectuation and causation quantitatively would require a scale which addresses each principle separately. To cover the whole constructs of effectuation and causation all principles should be added to the scale.

## 1.3 Research goal

The goal is to develop a measurement tool which can be used to measure effectual and causation decision-making of students. This to investigate if students use a higher proportion of effectual or causal decision-making.

## 1.4 Research question

The following research question is formulated to achieve the research goal:

> To what extent can the entrepreneurial decision-making process of students be measured by a new measurement scale of causation and effectuation?

And the sub-research question is:

> Do students use a higher proportion of effectual or causal decision-making.

## 1.5 Research strategy

The design of the study will be exploratory and quantitative (Alsos et al., 2014). A self-administered questionnaire with likert scale items (Babbie, 2007) will be developed and distributed. The unit of analysis is a student sample. The questionnaire will be based on a scenario which introduces a business case. Respondents are asked to imagine themselves in this context and answer the survey questions. New measurement items will be generated for the student context based on existing scales found in literature. Statistical analyses are conducted to investigate whether the new items can be used to measure effectuation and causation. Decisions of which items to retain are based on the scale development guidelines (Netemeyer et al., 2003). The new measurement scale will be used to investigate effectual and causation decision-making preferences of students.

## 1.6 Structure

Chapter 2 addresses the theoretical framework. The entrepreneurial processes causation and effectuation and their sub-principles are described. Additionally, this chapter describes the prior quantitative research of effectual and causal measurement scales. Thereafter, the sample choice of students is discussed. Chapter 3 combines the methodology and the results. Multiple statistical methods are used and analysed, which each present results. Finally the discussion & conclusion are given in Chapter 4 and limitations & suggestions for further research are given in Chapter 5.

Chapter 2

# Theoretical framework

In this chapter a literature review is given of all relevant concepts related to this master thesis. The concepts effectuation and causation and their underlying principles are analysed. Furthermore an overview of the existing quantitative effectuation research will be given. Finally the sample of students will be addressed. This to clarify why students are a suitable unit of analysis for measuring the decision-making logics effectuation and causation.

## 2.1 Entrepreneurial processes: effectuation and causation

The main body of entrepreneurship research is based on rational decision-making. With the assumption that entrepreneurs make goal-driven decisions when pursuing entrepreneurial opportunities (Perry et al., 2012). Teaching the goal-driven approach has been the centre of the curriculum of most business schools (Perry et al., 2012; Sarasvathy, 2001). This decision-making approach is referred to by Sarasvathy (2001) as causation. When using causal processes, the entrepreneurs focus on exploiting existing opportunities (Read, Song & Smit, 2009). They "*take a particular effect as given and focus on selecting between means to create that effect*" (Sarasvathy, 2001, p. 245). This by predicting, analysing, planning and exploiting these profitable opportunities (Alsos et al., 2014). Sarasvathy (2001) argued that next to causation, entrepreneurs could apply effectual entrepreneurial decision-making logics when pursuing entrepreneurial opportunities (Perry et al., 2012). According to Sarasvathy (2001) experienced entrepreneurs do

not follow the causal logics taught in business schools. Instead these expert entrepreneurs use a set of practical effectual principles (Alsos et al., 2014). The combination of these principles is defined as the construct effectuation. "*Effectuation processes take a set of means as given and focus on selecting between possible effects that can be created with that set of means*" (Sarasvathy, 2001, p. 245). The theory of effectuation created a paradigmatic shift in the way entrepreneurship is understood (Perry et al., 2012) and according to Fisher (2012), within entrepreneurship literature, effectuation is the most prominent theoretical perspective. This because, effectuation creates opportunities to develop more understanding of the entrepreneurial process. The main difference between effectuation and causation is the way decisions are being made (Sarasvathy, 2001).

To illustrate the difference between effectuation and causation, a practical example is given. Imagine a chef cooking dinner. The way a chef would prepare a meal could be approached from both a causal and effectual logic. A causal chef would determine the menu beforehand. The first step is deciding what dish (goal) the chef wants to prepare. After this goal is set, all steps are taken to achieve this effect. Recipes are developed, ingredients are bought and then, the meal is cooked. Meanwhile, the effectual chef would start with his means. The chef first checks the already available ingredients and appliances (means) in the kitchen cupboards. Based on these available means the menu is created. Often the menu emerges while he prepares the meal. The effectual approach has the possibility to design entirely new unintended meals (Sarasvathy, 2008a). The approaches differ in means (effectuation) and outcomes (causation).

Sarasvathy, Dew, Velamuri & Venkataraman (2003) identified three views on how opportunities come into existence. By opportunity recognition, discovery or creation. Uncertainty influences the emergence of opportunities. Entrepreneurs adopt different strategies to deal with uncertainty when exploiting new business opportunities. Effectual logics is likely to be more effective in situations when greater levels of uncertainty are perceived by the entrepreneur (Perry et al., 2012; Alsos et al., 2014). Overall, effectual strategies are used during the earlier stages of new venture creation. This when the future is unpredictable, goals are unclear and the environment is driven by human action. Afterwards when the business is more predictable and the market emerged, goals are clear and the environment is independent of our actions, more causal strategies are emphasised (Perry et al., 2012; Sarasvathy, 2008a). Sarasvathy & Kotha (2001) mention that entrepreneurs face three types of uncertainties while they create opportunities: knightian

uncertainty (known as true uncertainty (Knight, 1921)), goal ambiguity and environmental isotropy. Knightian uncertainty indicates that it impossible to calculate probabilities or expected consequences for the future, outcomes are unknown. Goal ambiguity refers to the problem that entrepreneurs do not yet have a clearly defined goal yet. Their preferences are still vague and change constantly. Environmental Isotropy involves the difficulty to determine beforehand what is relevant and what is not, when dealing with an uncertain future (Sarasvathy, 2008a). The degree of uncertainty influences the decision-making process of entrepreneurs (Sarasvathy, 2001).

Sarasvathy (2001) identifies the processes causation and effectuation as contrasting constructs for entrepreneurial decision-making. Not all scholars agree that these constructs are contrasting opposites (Alsos et al., 2014), but there is a mutual understanding that the constructs are independent strategies (Sarasvathy & Kotha, 2001). Sarasvathy (2001) framed multiple entrepreneurial behavioural principles for both effectuation and causation. When entrepreneurs use effectual logics they focus on affordable loss instead of causal expected return, on commitments with external stakeholders rather than competitive market analyses, on exploiting contingencies rather than avoiding them, and on controlling an unpredictable future rather than predicting an uncertain one (Alsos et al., 2014). Sarasvathy (2008a) renamed, defined and conceptualised five main principles for both effectuation and causation. Using these principles would be beneficial for effectuation research. This to increase the standardisation so that every scholar can use and operationalise the same constructs (Perry et al., 2012; Alsos et al., 2014). An overview of these principles is presented in Table 2.1.

The first principle argues that effectuation and causation have different starting points. The causation model starts with a desired goal and all required means (resources) are gathered to achieve this goal. In contrast, effectuators start with who they are, what they know, and whom they know Sarasvathy (2001, 2004). Effectual entrepreneurs do not set predetermined goals, based on the available means they imagine possible outcomes (opportunities) to create with those means (Dew et al., 2009). Each entrepreneur has a different set of means (i.e., assets, traits, knowledge, experience, education, training, networks, partnerships and expertise) (Chandler et al., 2011; Read & Dolmans, 2012). Each combination of means has the possibility to create many different possible outcomes. Effectuation takes the means as given. This because, it is easier to control the available means, over which entrepreneurs have control, then trying to collect means over which there is no control. Causal entrepreneurs use outsiders when this is

| Principles | Effectuation | Causation |
|---|---|---|
| *1. Basis for taken action:* Means vs. Goals | The emphasis is on creating something new with existing means (who I am, what I know, and whom I know) rather than discovering new ways to achieve given goals. | The emphasis on selecting a goal first and then choosing between given means or seeking to acquire the means necessary to achieve the selected end. |
| *2. View of risk and resources:* Affordable loss vs. Expected return | Limiting risks by understanding what one can afford to lose at each step, instead of seeking large all-or-nothing opportunities. Goals and actions are chosen where there is an upside even if the downside ends up happening. | The focus is on maximizing returns by selecting optimal strategies. Beforehand, future sales and possible risks are calculated to measure expected returns. |
| *3. Attitude toward outsiders:* Partnerships vs. Competitive analysis | Involves negotiating with any and all stakeholders who are willing to make actual commitments to the project, without worrying about opportunity costs, or carrying out elaborate competitive analyses. Furthermore, who comes on board determines the goals of the enterprise. Not vice versa. | Market research and competitive analysis should be done to estimate the potential risks and returns to the venture. |
| *4. Attitude toward unexpected events:* Leveraging contingencies vs. avoiding contingencies | Acknowledging and appropriating contingency by leveraging surprises rather than trying to avoid them, overcome them, or adapt to them. | Minimizing unexpected outcomes by avoiding contingencies and focussing on reaching the pre-set goal. |
| *5. View of the future:* Control vs. Prediction | This principle urges relying on and working with human agency as the prime driver of opportunity rather than limiting entrepreneurial efforts to exploiting exogenous factors. Avoiding predictive information in favor of what the decision maker and her stakeholders can actually control at any given point in time. | Focus on predicting the uncertain future. The decision maker chooses between alternative means based on forecasts about pre-selected favorable outcomes. |

*Based on (Sarasvathy, 2001, 2008a,b)*

Table 2.1: Overview of the principles of effectuation and causation.

in line with the pre-set goal. There is a clear vision of the desired future which outsiders do not change. Effectual entrepreneurs brings individuals on board who add value (new means). Effectual goals emerge due to cooperation (Dew et al., 2009).

Causal entrepreneurs try to maximise the potential expected returns. By calculating cost-benefit analysis, risks are determined and an optimal strategy is chosen (Sarasvathy, 2008a). Sometimes financial investments such as loans are required to achieve these goals (Sarasvathy, 2001). Causal entrepreneurs focus on the upside potential, when a business fails the losses could be substantial. Effectuation is based on affordable loss. Effectual entrepreneurs try to control downside of investments. They only invest what

he and his stakeholders are willing to lose in the worst case scenario. The limited means, mostly small bets are leveraged in creative ways to generate new ends and new means (Sarasvathy, 2008a). The unpredictable future is not controlled by goals. By only investing affordable resources, the level of uncertainty can be lowered and risks can be reduced (Sarasvathy, 2008a; Read et al., 2009).

Effectuation emphasises partnerships and pre-commitments. New markets are created by collaborating with stakeholders. Stakeholders' involvement is not based on pre-set goals. Only stakeholders who actually commit and help shape the new venture are allowed to be involved (Sarasvathy, 2008a). Only those relations which share both the risks and benefits from the success of the new venture can be called effectual partners (Chandler et al., 2011). These partners agree to focus on co-development, instead of focusing on future pay-offs (Sarasvathy, 2001; Sarasvathy & Dew, 2003), The effectual network helps to reduce and or eliminate uncertainty and removes entry barriers (Sarasvathy, 2008a). Causal entrepreneurs perform extensive competitive market analyses and use strategic planning. This to determine risks and returns (Sarasvathy, 2001). Causal reasoning assumes that competitors are rivals, their moves need to be anticipated and countered (Sarasvathy, 2008a). Collaborations are only formed through deliberate activation with an existing network, merely with regard to achieving the pre-determined goal (Dew et al., 2009; Sarasvathy & Dew, 2003). Causal entrepreneurs protect their possessions by allowing only limited ownership and influence of outsiders (Read et al., 2009).

The causal entrepreneur tries to avoid contingencies, this to lower uncertainties. The focus is on minimising the impact of unexpected events by careful planning and predicting how the future will unfold. To be able to reach the pre-set goal, the entrepreneur avoids surprises and obstacles. Even when new information becomes available, the course of actions should remain as planned in spite of contingencies. This to avoid unnecessary new investments and avoid delays (Read et al., 2009; Sarasvathy, 2008a). Effectual entrepreneurs leverage uncertainty to be able to exploit them as a resource. They treat unexpected events as an opportunity to create new and better outcomes (Sarasvathy, 2008a). Instead of avoiding new information they try to embrace them by rethinking possibilities to imagine new effectual targets (Read et al., 2009). Because effectuators begin with very loosely defined goals, their planning allows change during the whole process and new goals and visions can be formed (Chandler et al., 2011). Allowing contingencies creates opportunities to turn the unexpected in new valuable

and profitable outcomes (Sarasvathy, 2008a).

The final principle addresses the underlying logic of effectuation and causation, this with the main focus on the view of the future. Causal entrepreneurs try to control the future by predicting it. Based on already obtained knowledge about the past, analyses are conducted to determine goals and expected returns. By controlling the past, they try to predict the uncertain future (Sarasvathy, 2001). Effectuation focusses on the controllable aspects of an unpredictable future. Effectual entrepreneurs have control by depending on their available means. Not by chasing uncontrollable goals (Sarasvathy, 2008a). To the extent entrepreneurs can control aspects of the future, they do not need to predict it (Sarasvathy, 2001).

## 2.2 Prior quantitative effectuation research

Only a few a attempts are made to empirically operationalise effectual behaviour. According to Perry et al. (2012), this lack is surprising because the effectual approach could be beneficial in situations when causal assumptions are not met. Quantitative effectuation research has potential to add significant contribution to entrepreneurship literature (Perry et al., 2012). Most often qualitative methods are used to measure effectuation, such as think-aloud protocols. Sarasvathy (2001) described effectuation and causation both as cognitive processes (Perry et al., 2012). She found that there are behaviours that are typical of effectuation and causation. It is complex to develop consistent and observable behaviour variables based on cognition-theory (Perry et al., 2012). The principles are no static individuals principles, they could be interpreted as overlapping difficult to measure principles. Previous attempts to operationalise effectuation theory are based on the behaviour perspective (Alsos et al., 2014). The development of quantitative measures of effectuation and causation are listed ascending on the year of publication.

Wiltbank et al. (2009) investigated venture capitalists (angel investors) in the U.S.. They display the 'control' and 'prediction' principles as overarching measures of effectuation and causation. Causation was measured with six items (variables) and effectuation with eight items. The measurement tools was based on a scenario instrument. This to capture the hypothetical angel investment decisions in an innovative computer company (Chandler et al., 2011). Wiltbank et al. (2009) conclude that angel investors that emphasised control strategies experience fewer investment failures compared

to angel investors that employ prediction logics (Perry et al., 2012). This without experiencing lower returns or fewer investment home-runs. In cases of high uncertainty, angel investors who emphasised control were generally more successful. Because this study examined only one sub-construct of effectuation and causation, the study did not consider and cover the whole constructs of effectuation and causation.

The validated measurement scale of Chandler et al. (2011) is most often adopted by other scholars (Perry et al., 2012). Entrepreneurs from young firms in the U.S. were investigated. Chandler et al. (2011) examined if the sub-constructs of causation and effectuation are distinct. They developed measure scales to measure the underlying constructs. The constructs of causation correlated highly with each other while the constructs of effectuation did not. They stated that causation can be defined as an unidimensional construct and effectuation as a multidimensional construct. Causation was measured with seven items and effectuation with thirteen items. Effectuation was measured with the sub-constructs experimentation, affordable loss, flexibility and pre-commitment. Chandler et al. (2011) found that pre-commitment was a shared principle of both effectuation and causation. They argue that effectuation may be a formative construct opposed to causation, which could be seen as a reflective construct. Effectuation as a formative construct is formed by lower-order sub-constructs while causation as a reflective construct is reflected by the lower-order sub-constructs. Underlying sub-constructs of a formative construct may be independent of each other. This could indicate that all the principles of effectuation should be covered to be able to measure this construct. Chandler et al. (2011) did not use all principles described by Sarasvathy (2008a).

Brettel et al. (2012) created a survey instrument for the R&D context. They investigated R&D managers in Germany. They developed a bipolar measurement scale where on one side effectuation and on the other side causation. Effectuation and causation are treated as opposites and mutually exclusive (Alsos et al., 2014). Four of the five principles are measured by this scale. They did not account for the overarching 'control' and 'prediction' principles. Each principle is represented by four to seven two-sided items (Alsos et al., 2014). Two-sided items do not use a likert scale of agree to disagree. They contrast two statements, one of effectuation against one of causation. A total of twenty-three items are used. Brettel et al. (2012) concluded that effectuation has a positive relationship with R&D project success in large organisations when there is a high level of innovativeness. This adds to empirical research that effectuation is not only useful for new

ventures creation, but also for other forms of entrepreneurship.

Alsos et al. (2014) investigated the before mentioned scales in order to address the issues related to validity. The current scales were reviewed and a list of problems was drafted. To analyse these problems further, they adopted a qualitative research approach. Think-aloud protocols were used to examine how entrepreneurs understood the measurement items of Chandler et al. (2011). The entrepreneurs were asked why they chose their specific response and how they interpreted the questions. This qualitative assessment resulted in several issues related to the Chandler et al. (2011) scale. Building on this validity assessment, new scale items were developed. A quantitative study was performed in Norway, investigating new start-up entrepreneurs. Their ten item parsimonious measurement scale was supported by various types of validity. Both effectuation and causation are measured as uni-dimensional constructs. In line with theory, Alsos et al. (2014) found that effectuation correlates significantly with uncertainty and negative correlations were found between causation and uncertainty.

## 2.3 Student sample

Large-scale studies of entrepreneurship in the U.S. found that many of the demographic characteristics of new venture starters are representative of the non-entrepreneur population. "*Entrepreneurs look similar to the population from which they arise* (Perry et al., 2012, p. 13). Effectuation research requires a wide range of samples of varieties of individuals. Recent samples that collect data for effectuation research, are often entrepreneurs and managers. Insight could be gathered about the effectuation process by using other samples (Perry et al., 2012). Chandler et al. (2011) agree and state that future research could benefit from using different samples.

Dew et al. (2009) mention several studies in which samples of students are utilised. Recent studies tried to investigate whether student entrepreneurs differ from other kinds of entrepreneurs (Politis, Winborg & Dahlstrand, 2012). One of the most important features of today's global economy is the growing role of young entrepreneurial new ventures (Zahra & George, 2002). Universities play an important role in promoting entrepreneurship. Most university-level study programs are intended to increase entrepreneurial awareness and to prepare aspiring entrepreneurs (Bae, Qian, Miao & Fiet, 2014). Bae et al. (2014) investigate the impact of entrepreneurship education on the student's entrepreneurial intentions. Aspect such as, students'

perception on entrepreneurship, entrepreneurial intentions and self-efficacy of students were analysed. Other studies used students for management and entrepreneurship research (Dew et al., 2009). Students are vital for entrepreneurship literature because they will become the entrepreneurs of the future (Karali et al., 2014).

Research regarding if and why students decided to become entrepreneurs already received attention in entrepreneurship literature. There is however, little known about the entrepreneurial decision-making logics of students. Dew et al. (2009) mention an example in which students are used to test a model of managerial decision-making. Dew et al. (2009) used a sample of students to measure the decision-making of novice entrepreneurs. They compared the effectual and causal logics between experts and students. Think-aloud protocols were used in which the students solved decision-making problems for new venture creation. Thus, recent studies indicate it is possible to use a sample of students to investigate entrepreneurial decision-making logics. The development of a measurement tool to investigate the decision-making logics of student would stimulate other research opportunities. A few opportunities are listed in the future research.

In line with the research goal, this thesis investigates to which extent it is possible to measure the entrepreneurial decision-making process of students. More specificity, are students inclined to use a higher degree of causal or effectual principles when making entrepreneurial decisions. Perry et al. (2012) mention that additional measurement scales are required to fully capture effectuation and causation based on all dimensions. In line with previous scale development efforts, an behavioural approach is taken to measure effectual and causal logics (Alsos et al., 2014). The next chapter addresses the scale development procedure.

Chapter 3

# Methodology & results

An empirical quantitative study had been performed. This chapter will address the sample of the study, collection method and the scale development steps of Netemeyer et al. (2003). The scale development steps both contain parts of the methodology and results. Multiple analyses are performed with subsequent results. To stimulate clarity, methodology and results are combined in one chapter.

## 3.1 Sample

The previous chapter already explained why students are used as unit of analysis. It was not possible to investigate all students in the population, so a sample frame was created (Babbie, 2007). Only student who are still studying or recently graduated (no more than one year) were selected for the sampling frame. This to ensure that the student's decision-making is based on the logics learning during their study programs. Only students of applied science and universities are selected. These students have a stable academic knowledge background with a common baseline of knowledge. This is done with the intention to reduce the probability that individuals lack interpretations of terminology and concepts used in the questionnaire (Dew et al., 2009).

The collection of data has been a group effort of multiple master students, each investigating different research questions. Together it was decided to focus on a high quantity sample with a broad sample variation. This was done, to stimulate data analyses for each research goal. Besides the level of education, no predefined criteria were established to specify the

sample, such as: which university, study programs, age, gender, study year, nationality and so on. These criteria were addressed in the questionnaire as control variables, each master student was able to decide their own selection criteria when analysing the data.

## 3.2 Data collection

The University of Twente has been the starting point of collecting data. This for the main reason that the data collectors studied at this university and had high accessibility to obtain respondents. The data was collected by self-administrated questionnaires. Different data collection methods had been used to obtain a total of 759 respondents. 532 (70%) respondents filled in the effectuation and causation questions and over 82% of the respondents studied at the university of Twente (based on the students who finished the questionnaire). The website surveymonkey.net was used to develop the survey. The website offered the option to digitally and manually add responses. The following methods of data collection were used:

1. Personal email addresses were contacted through online public telephone directory of the University of Twente.
2. Personal requests by the data collectors each within their own personal environment.
3. Distribution of hard-copies at the library of the University of Twente.
4. Data collection by social media, Twitter and Facebook contacts.

The digital sample received an email with an internet link. By introducing the subject and objective of the study, subject awareness was increased. The sample of hard-copies individuals received the instructions verbally. To increase the response rate, reminders were sent digitally. To promote participation and stimulation of finishing the questionnaire, three prizes of fifty Euro were randomly distributed. Respondents were assured confidentiality. No individual data can be obtained from the published data. Surveymonkey offered the possibility to edit the survey by personal preferences. A limited amount of questions on every page offered a clear overview and layout. Digital respondents were unable to skip questions. This requirement reduced the number of missing values. Hardcopy respondents were able to skip questions. After the data collection, the data was composed to an SPSS file in order to be analysed.

## 3.3 Scale development

Effectuation and causation are latent variables. These constructs are not directly observable or quantifiable. Measurement of latent variables requires a combination of other variables which are observable and measurable (Netemeyer et al., 2003). To adequately operationalise the constructs effectuation and causation for the context of students, each dimension of effectuation and causation needs to be measured by scales. When developing scales, steps need to be followed in line with scale development literature. The four-step approach described by Netemeyer et al. (2003) was used to develop the scale. The steps are:

1. Construct definition and content domain (Section 3.4).
2. Generating judging measurement items (Section 3.5).
3. Designing and conducting studies to develop and refine the scale issues to consider (Section 3.6).
4. Finalising the scale (Section 3.7).

The measurement properties dimensionality, reliability and validity are the pillars of scale development.

## 3.4 Construct definition and content domain

The literature review is very important as starting point for scale development. The theoretical framework covered the theory of effectuation and prior quantitative scales for measurement of effectuation. This content domain will be the starting point for scale development. In line with Alsos et al. (2014), the constructs will be measured broadly. A narrow focus would under-represent the constructs by asking respondents 'identical questions' (Netemeyer et al., 2003; Alsos et al., 2014). A broad measurement scale provides practical contributions. Alsos et al. (2014) identified ten tested and validated scale items measuring both effectuation and causation. This parsimonious scale is easy-to administer without requirement of comprehensive and extensive measurement items. A broad measurement scale with few measurement items would be preferred (Alsos et al., 2014). A broad measurement method is in line with the exploratory research goal.

Dimensionality involves the amount of dimensions needed to measure the latent variable. Constructs can either be unidimensional or multidimensional. Unidimensional indicates that the items of the domain underlie a single dimension while the multidimensional view point suggests that the items tap into more than one dimensions (Netemeyer et al., 2003). In case of effectuation and causation, different findings are published. Chandler et al. (2011) state that effectuation is a multidimensional construct and causation is a unidimensional construct. Alsos et al. (2014) mention that both constructs could be measured unidimensional. Sarasvathy (2008a) describes ten dimensions for analysing the two constructs, so it could be argued that both constructs are multidimensional. From a conceptual point of view unidimensional is preferred. The next step will further address the dimensionality.

## 3.5 Generating judging measurement items

The next step was the development of measurement items. The scale was build based on previous efforts to operationalise effectuation and causation. The existing scales in literature were already presented in the previous chapter. Advantages of using validated scales is that these items are already checked for many types of validity and reliability. A large list was created with all available scale items for effectuation and causation. These items were sorted by principle. Some unpublished scale items were added as well. This with the main function to provide support for other items, not to use them itself. The most adopted scale of Chandler et al. (2011), failed to treat effectuation the same as causation as reciprocal and equally complex behavioural strategies with a similar amount of principles (Alsos et al., 2014). Perry et al. (2012) state that effectuation is a composite of all five principles. They argue that effectuation might only exist as a construct dependent on these principles. So when developing a new measurement tool, all principles of effectuation and causation should be added.

The items of Brettel et al. (2012) were used to for the first four principles of effectuation and causation. The items of Wiltbank et al. (2009) were the backbone for the principles 'control' and 'prediction'. Wiltbank et al. (2009) only examined one sub-construct as reflecting of effectuation, they did not investigate the whole of effectuation (Perry et al., 2012). The questions of Brettel et al. (2012) and Wiltbank et al. (2009) were rewritten to make them appropriate for the student context. By reframing an renaming the items, new items were generated. Some questions of Brettel et al. (2012)

were specific for the R&D context and could not be transposed for the student context. These items were removed. Some questions required some fine-tuning based on theory to align them with the student context. The items should appear consistent with the theoretical domain of effectuation and causation (Netemeyer et al., 2003).

Brettel et al. (2012) developed a dichotomous bipolar scale to force respondents to choose between two statements. They claim that the comprehensibility of the respondents would improve when forcing them to choose between effectuation and causation statements. An 6-point likert scale was used to force response to one side of the continuum (Brettel et al., 2012). This approach was not replicated during this study. Perry et al. (2012) mention that causation and effectuation are not polar opposites and represent different decision-making strategies. Decision makers are able to make selection and combinations among multiple decision-making logics, which could include principles of effectuation and causation. In line with Perry et al. (2012) each principle of both effectuation and causation will be measured separately. The 6-point likert scale does not make sense for a unipolar scale. Wiltbank et al. (2009) used a unipolar 7-point likert scale. To develop a clear monotonous scale, the decision was made to use only unipolar 7-point likert items.

Deciding on the number of items in the scale was the next part. This to find the right balance between fatigue and brevity. Too many questions will induce non-cooperation and distortion of data while a narrow approach amount could be a threat to reliability (Netemeyer et al., 2003). The scale development was a team effort of multiple master students with each their own questions. Each master student was required to minimise the amount of questions. Therefore, each principle of effectuation and causation could only be covered by a limited amount of questions. Brettel et al. (2012) used four to seven items to measure each principle. The questions were refined to fit the student context. Two to three questions were chosen for each principle.

Chandler et al. (2011) used a modified q-sort approach. They used pretests, re-conceptualisation, re-tests, item refinement and involving experts to review the scale items. Judgement of decent scale items was a team effort. Subjectively was lowered by involving scholars and master students to screen and improve the scale items. A variety of scholars and students with and without effectuation expertise were involved. Minor changes are conducted based on feedback. The scale was presented during a entrepreneur-

ship conference (in June 2014); this to gather response, comments and feedback in order to improve the scale. The first concept of the measurement scale was pilot tested. A group of twenty students were asked to complete the survey and to provide insights for improvements. The comments of these students were analysed and some minor changes were conducted. By example, a few students mentioned that negative questions are very confusing based on a 7-point likert scale. Using both positive and negative items could help avoid acquiescence, affirmation, or agreement bias (DeVellis, 2003). Mainly positive questions are used in order to remove this confusion. Only two negatively formulated questions were added, this in line with the original questions. These two questions do not require reverse coding (Field, 2009). Reverse coding entails that the low scores become high scores (1=7) and vice versa. This should only be done when the question are intentionally reversed to measure the opposite. In some cases the question could misunderstood by the respondents and therefore be argued to be reversed. One example of a wrongly understood question is addressed later in the Chapter.

It was important that the students interpreted the questions as intended. A few students were interviewed to establish if their interpretation of the questions was in line with entrepreneurship theory. Questions were asked regarding the understandability, reading easiness and difficulty of questions. Minor changes regarding English grammar and poor wording were conducted. These changes improved the wording clarity (Netemeyer et al., 2003). With regard to the interviews, no major altercations of the scale items were performed.

It was very important that all items of the domain represented the constructs of effectuation and causation. Involvement of experts and outsiders to judge the items increased the content validity (Netemeyer et al., 2003). Content validity refers to the extent to which the constructs are translated into the operationalisation of the constructs. Content validity is threatened when irrelevant items are included which measure facets outside the domain and, when relevant items are not included which measure facets of the domain. Only item with substantive individual value were added based on discussions of the master student with scholars. Questions that did contain two issues in one statement were changed.

Besides the development of the measurement items, a scenario instrument was created. Wiltbank et al. (2009) created a multi-item survey, build around a new venture development scenario. The scenario addresses a hypo-

thetical business case in which respondents are able to make entrepreneurial decisions. Their scenario describes a case in which the respondents needs to imagine themselves as an individual that invented his er her own computer device. The questions were asked to characterise what the respondent would do, to develop that opportunity. The decision-making is based on the rating of statements between agreement and disagreement. This scenario is specific to the IT section. A more general scenario was used for the student research setting. A scenario mainly used by think-aloud sessions, was available from NIKOS at the University of Twente. The scenario describes a new venture creation of a coffee corner. A set of questions are presented to ask the respondents which decisions they would make while starting a new venture. Respondents are asked to imagine themselves as entrepreneurs while answering the questions. The scenario was rewritten for quantitative research in which students would feel comfortable. The questions regarding effectuation and causation were given after the scenario, the students were asked to rate their decision-making based on the scenario. The final version of the questionnaire including the coffee corner business case can be found in Appendix A.

## 3.6 Designing and conducting studies to develop and refine the scale issues to consider

During the next step, the questionnaire was administered. To effectively measure effectuation and causation, exploratory factor analysis was performed. Factor analysis explores combinations of variables that reflect effectuation and causation. Factor analysis helps identifying clusters of correlated variables, which together measure an underlying dimension. The group of interrelated variables is reduced to a smaller set of factors. The focus is on findings groups of variables that correlate highly within the group but do not correlate with other variables outside the group. Factor analysis has multiple purposes:

1. To investigate and understand the structure of a latent variable based on a set of variables.
2. To measure the underlying dimensions with a constructed questionnaire.
3. To reduce the dataset while keeping it manageable and based on original information (Field, 2009).

Before exploratory factor analysis was conduced, it was determined whether the data meets the following assumptions:

**Response bias** Multiple methods were used to obtain data. To avoid using distorted cased, multiple analyses were performed to delete response bias. Surveymonkey measured the time taken to fill-out the questionnaire. A small pilot test was performed to measure the minimum time required to read every question, and to finish the questionnaire. All respondents that finished the questionnaire within seven minutes were removed from the dataset. One person filled out the survey two times. The choice has been made to remove to second case, this to avoid repetition. A few cases were removed when respondents did not meet the level of education, only university (of applied science) students are accepted for this study. The mahalanobis distance is a method for detecting outlier in multivariate data (Penny, 1996). Insufficient values ($p<.001$) are removed from the dataset. In total, forty cases were removed.

**Descriptive statistics** The frequency distributions (histograms) of all variables were analysed. All variables were normal distributed. Based on the frequency distributions no variables were deleted from the data set (Field, 2009).

**Kaiser-Meyer-Olkin (KMO) test of sampling adequacy** The adequacy of the sample size was determined by computing the KMO value. The KMO index suggests if the data may be grouped into smaller sets of factors (Field, 2009). According to Field (2009) values between .80 and .90 are great values to perform a factor analysis. The KMO value of the student sample was .82. This indicates that the factor analysis is appropriate (Chandler et al., 2011). Furthermore, Chandler et al. (2011) mention that a sample size of 100-200 is adequate for most factor solutions. The sample size was 492, which is adequate.

**Anti-image matrix test of sampling adequacy** The anti-image correlation matrix produces individual KMO values for each variable. All measures along the diagonal should be above .5 and the measures along the off diagonal should be very small (close to zero). The anti-image matrix was analysed and all variables were sufficient and no variables were removed (Field, 2009). The anti-image matrix can be found in Table 3.1.

**Bartlett's test of sphericity** Bartlett's test of sphericity examines the difference between the correlation matrix of all variables of effectuation and causation compared to the identify matrix. The identify matrix contains values of 1 for all diagonal elements and values of 0 for all off-diagonal elements. To be able to use factor analysis at least some intercorrelations between variables are required. Perfect correlation would indicate that only one factor is sufficient and very low correlations would indicate that no variables can be combined to factors so that factor analysis is not useful. The difference between the two matrices are significant when $p<.05$ (Field, 2009). The computed Bartlett's test is significant (chi-square 2529, df=300, $p<.000$). Based on Bartlett's test, using factor analysis is appropriate.

**Internal consistency** Internal consistency examines the reliability of the data. It investigates the degree of interrelatedness among variables within a construct. Both Cronbach's alpha and item-to-total correlations were measures of internal consistency.

Cronbach's alpha tests the extent to which interrelated items have high communalities and low uniqueness. Communalities are the proportion of common variance (variance shared with other variables) present in a variable. The proportion of common variance among items is compared to the total variance. Higher Cronbach's alpha scores indicate higher interrelated reliability (Netemeyer et al., 2003). The Cronbach's alpha scores are represented in Table 3.2. Alphas of .7 are usually required to be deemed reliable (Werhahn & Brettel, 2012). Most alpha scores were on the low side. Lower thresholds can sometimes still be used for exploratory research that is in the early stages of development (Gabrielsson & Politis, 2011). This research is highly exploratory so further analysis is required before items are deleted. Cronbach's alpha scores are dependent on the scale length (Netemeyer et al., 2003). Cronbach's alpha can be a weak indicator of reliability when only a few items are included (Politis et al., 2012). All principles only contain two or three variables. Generally, lower alphas are accepted when scales are based on few items (Gabrielsson & Politis, 2011). The extremely low alphas of the 'means' principle are discussed in Chapter 4.

Next to Cronbach's alpha, item-to-total correlations were analysed. These correlations reflect the extent to which one item is correlated with the dimension or construct. Low scores (<.35) threaten the reliability (Netemeyer et al., 2003). Table includes the item-to-total scores of each item to their represented construct and dimension. Again, some scores were on the low side. The same arguments for Cronbach's alpha apply for item-to-total

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. The uncertainty of a market will not block me since I rely on my own experience to imagine opportunities. | 0,62[a] | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. The decisions I make when starting my new venture will be based on the resources I have available. | -0.06 | 0,84[a] | | | | | | | | | | | | | | | | | | | | | | | |
| 3. I start my new venture without defining a clear target. | -0.05 | -0.03 | 0,80[a] | | | | | | | | | | | | | | | | | | | | | | |
| 4. Before starting my new venture, I will first acquire all resources needed to achieve my target . | 0.08 | -0.09 | 0.03 | 0,85[a] | | | | | | | | | | | | | | | | | | | | | |
| 5. I take a clearly pre-defined target as a starting point of the new venture. | 0.05 | -0.06 | 0.20 | -0.11 | 0,86[a] | | | | | | | | | | | | | | | | | | | | |
| 6. Decisions will be primarily based on minimization of risks and costs. | 0.18 | -0.09 | -0.03 | -0.12 | -0.04 | 0,79[a] | | | | | | | | | | | | | | | | | | | |
| 7. I only spend resources I have available and I am willing to lose. | -0.01 | -0,15 | -0,05 | -0,12 | 0,01 | -0,14 | 0,75[a] | | | | | | | | | | | | | | | | | | |
| 8. Decisions will be primarily based on analysis of potential future returns. | 0.03 | -0.03 | 0,10 | 0.03 | 0.04 | -0.16 | -0.03 | 0,85[a] | | | | | | | | | | | | | | | | | |
| 9. Beforehand, I will calculate how many resources I need to achieve the expected returns. | -0,05 | 0.00 | 0.10 | -0,23 | -0,14 | -0,05 | 0.02 | -0.04 | 0,87[a] | | | | | | | | | | | | | | | | |
| 10. Decisions will be made together with stakeholders based on our competences. | -0.09 | -0.14 | -0.07 | 0.01 | -0.21 | 0.03 | -0.01 | 0.00 | 0.02 | 0,83[a] | | | | | | | | | | | | | | | |
| 11. I will ask my private network to help me out with starting my new venture. | -0.04 | -0.08 | -0.06 | -0,03 | -0,01 | 0,15 | 0.09 | -0,06 | -0.02 | -0.01 | 0,73[a] | | | | | | | | | | | | | | |
| 12. I will ask customers and suppliers to pre-commit to my new venture in order to reduce risks. | 0.06 | 0,05 | 0.04 | -0.03 | 0.06 | -0.01 | -0.03 | 0.02 | 0.05 | -0.13 | -0.05 | 0,81[a] | | | | | | | | | | | | | |
| 13. I will try to identify markets by a thorough market analysis. | -0.03 | 0.02 | 0.13 | -0.08 | 0.03 | 0.00 | 0.05 | -0.11 | -0.13 | -0.11 | -0.02 | 0.01 | 0,88[a] | | | | | | | | | | | | |
| 14. I will focus on early identification of risks through market analysis. | 0.02 | 0.04 | -0.03 | -0.04 | 0.00 | -0.12 | -0.02 | -0.11 | -0.12 | 0.03 | 0.11 | -0.03 | -0.10 | 0,87[a] | | | | | | | | | | | |
| 15. I will try to identify risks by a thorough competitors analysis. | -0.01 | 0.03 | 0.04 | 0.07 | -0.12 | 0.07 | -0.03 | 0.07 | -0.07 | -0.02 | -0.09 | -0.20 | -0.17 | -0.24 | 0,87[a] | | | | | | | | | | |
| 16. I allow changes in my planning if needed, even during the implementation process of my new venture. | -0.14 | 0.00 | 0.00 | 0.04 | 0.01 | 0.12 | -0.01 | -0.08 | -0.07 | -0.03 | -0.03 | -0.06 | -0.06 | -0.02 | 0.03 | 0,79[a] | | | | | | | | | |
| 17. I expect to change my original target when confronted with new findings. | -0.06 | -0.06 | -0.07 | 0.03 | 0.04 | 0.01 | -0.02 | -0.17 | -0.09 | -0.11 | 0.06 | -0.03 | -0.05 | 0.02 | 0.00 | -0.15 | 0,76[a] | | | | | | | | |
| 18. I allow delays during the development of my new venture when new opportunities emerge. | -0.15 | -0.04 | -0.11 | 0.01 | -0.02 | -0.05 | -0.05 | -0.01 | 0.03 | 0.03 | -0.04 | -0.02 | 0.01 | 0.06 | -0.01 | -0.13 | -0.10 | 0,72[a] | | | | | | | |
| 19. I will always pay attention that my initially defined target will be met. | -0.06 | -0.07 | 0.08 | -0.16 | -0.11 | -0.05 | 0.04 | -0.12 | -0.05 | 0.01 | 0.02 | 0.00 | -0.11 | 0.04 | -0.02 | -0.06 | 0.10 | -0.05 | 0,86[a] | | | | | | |
| 20. My first priority is reaching my pre-set target without any delay. | 0.01 | -0.01 | -0.04 | 0.05 | -0.02 | -0.12 | -0.02 | 0.02 | 0.08 | -0.07 | -0.07 | -0.04 | 0.02 | -0.18 | -0.02 | 0.12 | 0.03 | 0.20 | -0.24 | 0,75[a] | | | | | |
| 21. My planning will be set before I start the implementation process and cannot be altered afterwards. | -0.18 | -0.02 | -0.12 | -0.09 | -0.07 | -0.12 | 0.08 | -0.06 | 0.10 | 0.07 | -0.02 | -0.21 | -0.01 | -0.04 | -0.07 | 0.18 | 0.13 | 0.03 | -0.05 | -0.14 | 0,70[a] | | | | |
| 22. I will try to control the future by creating it. | -0.08 | 0,02 | -0.05 | 0.06 | -0.19 | -0.01 | -0.07 | -0.05 | -0.06 | 0.01 | 0.01 | 0.06 | 0.00 | 0.01 | 0.01 | -0.12 | 0.00 | 0.05 | 0.03 | -0.02 | -0.04 | 0,76[a] | | | |
| 23. I will talk to people I know to enlist their support in making opportunities a reality. | -0.06 | 0,02 | 0.10 | -0.09 | -0.05 | -0.12 | 0.01 | 0.00 | 0.05 | -0.19 | -0.33 | -0.01 | 0.11 | -0.08 | -0.10 | -0.06 | -0.08 | -0.07 | -0.02 | 0.01 | 0.12 | -0.11 | 0,81[a] | | |
| 24. I will study expert predictions on the direction the market is "heading", to determine what course of action my new venture will follow. | 0.11 | -0.09 | 0.02 | 0.01 | -0.02 | 0.06 | -0.10 | -0.13 | -0.01 | -0.03 | -0.01 | 0.02 | -0.15 | -0.20 | -0.17 | 0.00 | 0.03 | -0.13 | -0.02 | 0.06 | -0.04 | 0.04 | -0.08 | 0,87[a] | |
| 25. I will try to control the future based on predictions of my previously obtained knowledge. | 0.03 | -0.02 | 0.06 | 0.02 | 0.03 | -0.19 | 0.02 | 0.05 | -0.02 | -0.02 | -0.15 | -0.17 | 0.01 | -0.02 | -0.17 | -0.04 | -0.06 | -0.06 | -0.04 | 0.02 | -0.05 | -0.23 | 0.03 | 0.00 | 0,84[a] |

*N=493-528 (pairwise). a. measures of Sampling Adequacy (MSA).*

Table 3.1: Anti-image matrix

| | Cronbachs Alpha (case selection) | Item to total (dimension) correlation | Item to total (construct) correlation |
|---|---|---|---|
| Causation | 0,77 | | |
| **Goal** | | | |
| Before starting my new venture, I will first acquire all resources needed to achieve my target. | 0,49 | 0,32 | 0,41 |
| I take a clearly pre-defined target as a starting point of the new venture. | | 0,32 | 0,44 |
| **Expected returns** | | | |
| Decisions will be primarily based on analysis of potential future returns. | 0,40 | 0,25 | 0,36 |
| Beforehand, I will calculate how many resources I need to achieve the expected returns. | | 0,25 | 0,39 |
| **Competitive analysis** | | | |
| I will try to identify markets by a thorough market analysis. | 0,68 | 0,45 | 0,47 |
| I will focus on early identification of risks through market analysis. | | 0,50 | 0,57 |
| I will try to identify risks by a thorough competitors analysis. | | 0,53 | 0,56 |
| **Avoiding contingencies** | | | |
| I will always pay attention that my initially defined target will be met. | 0,52 | 0,31 | 0,49 |
| My first priority is reaching my pre-set target without any delay. | | 0,40 | 0,27 |
| My planning will be set before I start the implementation process and cannot be altered afterwards. | | 0,32 | 0,25 |
| **Prediction** | | | |
| I will study expert predictions on the direction the market is "heading", to determine what course of action my new venture will follow. | 0,33 | 0,20 | 0,45 |
| I will try to control the future based on predictions of my previously obtained knowledge. | | 0,20 | 0,36 |
| Effectuation | 0,54 | | |
| **Means** | | | |
| The uncertainty of a market will not block me since I rely on my own experience to imagine opportunities. | 0,11 | 0,10 | 0,17 |
| The decisions I make when starting my new venture will be based on the resources I have available. | | 0,00 | 0,26 |
| I start my new venture without defining a clear target. | | 0,05 | -0,06 |
| **Affordable loss** | | | |
| Decisions will be primarily based on minimization of risks and costs. | 0,36 | 0,22 | 0,06 |
| I only spend resources I have available and I am willing to lose. | | 0,22 | 0,19 |
| **Partnership** | | | |
| Decisions will be made together with stakeholders based on our competences. | 0,42 | 0,27 | 0,36 |
| I will ask my private network to help me out with starting my new venture. | | 0,25 | 0,26 |
| I will ask customers and suppliers to pre-commit to my new venture in order to reduce risks. | | 0,25 | 0,17 |
| **Leveraging contingencies** | | | |
| I allow changes in my planning if needed, even during the implementation process of my new venture. | 0,52 | 0,38 | 0,29 |
| I expect to change my original target when confronted with new findings. | | 0,34 | 0,28 |
| I allow delays during the development of my new venture when new opportunities emerge. | | 0,31 | 0,28 |
| **Control** | | | |
| I will try to control the future by creating it. | 0,36 | 0,23 | 0,24 |
| I will talk to people I know to enlist their support in making opportunities a reality. | | 0,23 | 0,40 |

*n= 493-528*

Table 3.2: Cronbach's alphas & item-to-total correlations

correlation regarding exploratory research and scale length.

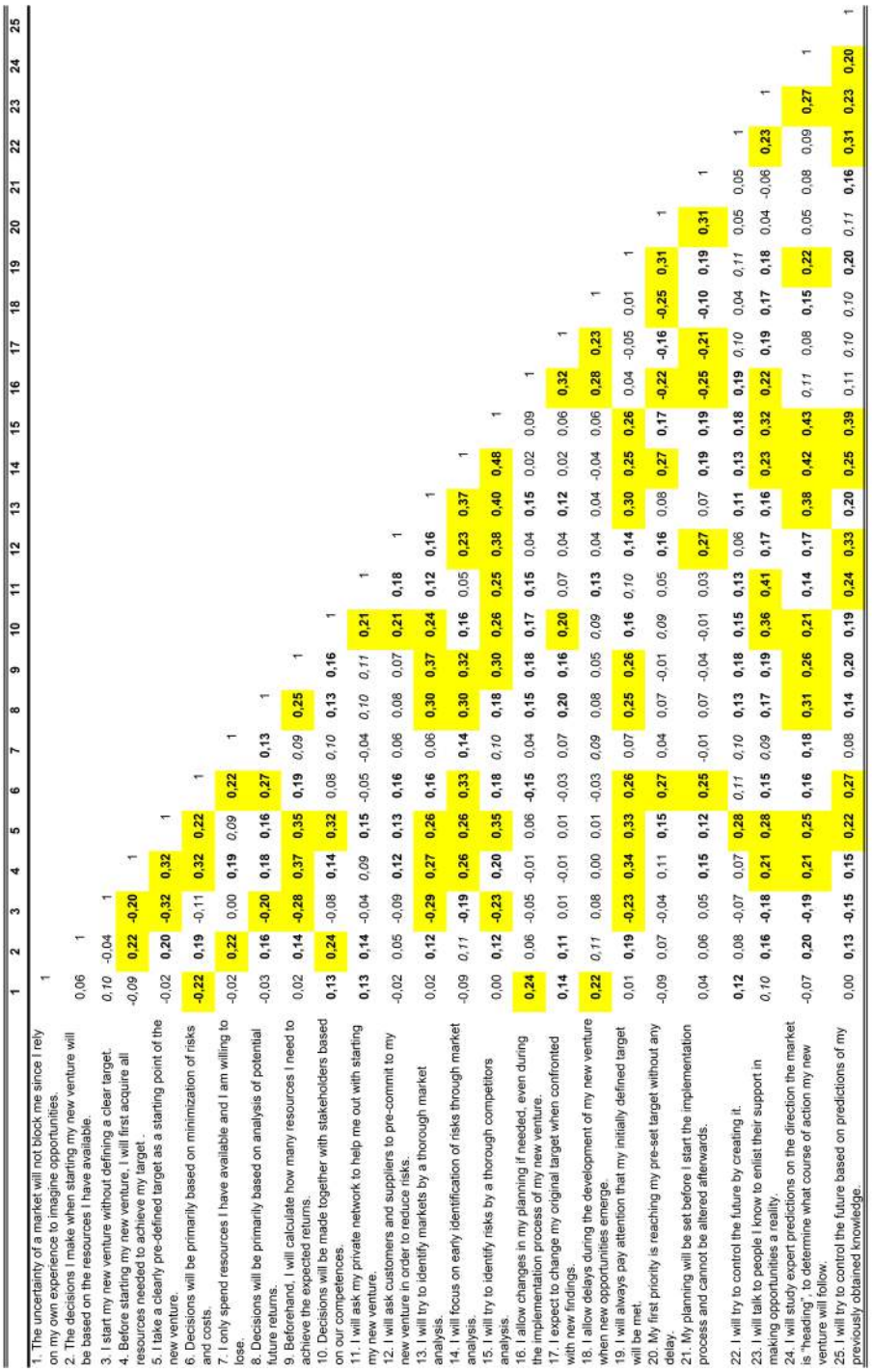
**Correlation matrix** To be able to perform a meaningful factor analysis the inter-correlation between variables was examined. A correlation matrix was arranged to analyse the correlations of all items with each other. Each variable should have correlations with other variables but in contrast should not correlate too highly (multicollinearity). This because each variable should have an unique contribution to the factor solution (Netemeyer et al., 2003). Multicollinearity is examined by the determinant output of

the correlation matrix. This number is .005, which is greater than .00001, so there is no reason to assume multicollinearity occurred (Field, 2009). Each variable should have a multiple item-to-item correlations with other variables (Netemeyer et al., 2003). Table 3.3 shows the Pearson's correlation matrix. The bolded numbers are significant ($p<.05$). The lowest significant score according to this matrix is .11. According to Netemeyer et al. (2003) values above .3 are acceptable and values above .2 are allowed when there is provided evidence based on theory. Therefore, for this exploratory research, values above .2 were used. Item above .2 were highlighted in Table 3.3. The variable 'I only spend resources I have available and I am willing to lose', does not have any significant values (>.2). This variable was deleted for factor analysis. Effectual variables 'decisions will be primarily based on minimization of risks and costs' and 'I will ask customers and suppliers to pre-commit to my new venture in order to reduce risks' correlated multiple times with causal variables. Causal variable 'I take a clearly pre-defined target as a starting point of the new venture' correlated multiple times with effectuation variables. These inconsistent correlations are in line with da Costa & Brettel (2011). They also used the items of Brettel et al. (2012) with minor adaptations to make the scale unipolar. These variables could be problematic during factor analysis. Changing items from bipolar to unipolar could have influenced the results. This problem will be discussed in Chapter 4. 'Control' and 'prediction' variables correlated with each other, which could be problematic. The inconsistent variables were not yet deleted, but it is expected that these variables will load on opposite factors.

### 3.6.1 Options for exploratory factor analysis

There are several options available for factor extraction. The method used for exploratory factor analysis is explained. Other options such as; factor rotation, amount of factors used (dimensionality), what to do with missing values and suppression of factor loadings (the relative contribution of a variable to a factor) are discussed (Netemeyer et al., 2003).

**Methods of exploratory factor analysis** According to Field (2009), several methods exists for unearthing factors from the dataset. The principal component analysis and the principal (axis) factoring analysis are the preferred methods. Principal component analysis is concerned with finding variables that contribute to a common component. It analyses linear components that exist within the data and tries to maximise all the variance in the items, it does not matter if it is common to a component or unique



*N=493-528 (pairwise). Pearson's r correlation. Bolded numbers are significant at the 0,01 level (2-tailed), italicised numbers are significant at the 0,05 level (2-tailed).*

Table 3.3: Correlations matrix for effectuation and causation variables

to an item. The main focus of principal component analysis is reducing the amount of items (Field, 2009; Netemeyer et al., 2003). Principal factoring analysis only analyses the common variance between variables, so it does not uses unique variance (variance specific to that measure). The main goal of Principal factoring analysis is detecting the structure of the data. The difference between the methods arise largely from calculations and in many cases both techniques generate identical results (Netemeyer et al., 2003). The method used by Alsos et al. (2014) and Chandler et al. (2011) is principal component analysis. Wiltbank et al. (2009) and Brettel et al. (2012) did not report their methods used. Principal factoring analysis was more in line with the research goal. This because detecting the structure of the data is preferred over reducing the amount of items. This study tested both approach to see whether differences in the data occurred. The principal component analysis and principal factoring analysis calculated almost identical output. In line with the other effectuation scales, and better comparison of the data between the scales, principal component analysis is reported in this thesis.

**Dimensionality** The dimensionality refers to the amount of dimensions (factors) that need to be extracted. There a no solid steps to determine the exact amount of factors. The approaches of Netemeyer et al. (2003) were used to make the decision:

Kaiser's criterion states that only factors with eigenvalues (amount of variance explained by the factor) higher than one are supposed to be extracted. The amount of factors should account for at least as much variance as can be generated by one single variable. Both principal component and principal factoring analysis for all variables of causation and effectuation, extracted seven factors with eigenvalues above one.

For one factor to be meaningful at least 5% of all variance explained should be attributable to that factor. Only four factors were found in line with this criterion. All extracted factors together should account for at least 50% of the variance (Field, 2009). Four factor explained 42% of the variance, three factors explained 36% and two factors explained 30%. For either two, three or four factors the proportion of explained variance were on the low side.

Another methods for determining the amount of factors, is a scree plot with a parallel analysis to plot the eigenvalues against the number of dimensions. The parallel analysis calculates a cut-off point, the amount of factors above this point can used to determine the dimensionality. The plot represents

the eigenvalues when there would have not been any common factors in the data. Parallel analysis takes the biasing influence of sampling error into account (Chandler et al., 2011). O'Connor (2000) developed a SPSS syntax to perform parallel analysis. This syntax was executed for the dataset and the parallel analysis can be found in Appendix B.1. A maximum of four factors can be extracted based on the parallel analysis.

Extracting ten separate dimensions in line with theory was not an option for this data set. According to Netemeyer et al. (2003), when the amount of factors is hard to determine, the amount of factors extracted can be based on theory (Netemeyer et al., 2003). Alsos et al. (2014) used two dimensions for their measurement scale, this based on theoretical backing that causation and effectuation are two underlying separate dimensions. Similar to Alsos et al. (2014), a two-factor solution was chosen.

**Missing values** When respondents skipped questions, the dataset presented missing values. There are a few options how to deal with missing data points. The first option is listwise removal. If a respondent has a missing value for any variable in the dataset, these respondents are removed. The second option is pairwise. Unlike listwise deletion, only missing data is removed, not entire cases. Pairwise deletion only removes specific missing values from the dataset. The respondents non-missing data is used for other calculations. Pairwise deletion could lead to a ranging sample size. The final approach is replacing the missing value with an average score (Field, 2009), 2009). The last option was not chosen because it averages questions of causation and effectuation. The average score would have been a very bad representative for the actual number. To include all available data, pairwise is chosen. To compare the differences in outcomes, listwise calculation were performed to check the data. Listwise and pairwise solutions were almost identical. Pairwise solutions are reported in this thesis.

**Suppression of factor loadings** By default SPSS suppresses the factor loadings lower than .4. To explore the data, at first the suppression of data was disabled. The rule of thumb clarifies to only keep items with loadings greater than .4 Field, 2009. Loadings were suppressed below .4, if not stated otherwise.

**Factor rotation** Factor rotation maximises the loadings of items based on their corresponding factor while minimising the loadings on all other factors. Rotation optimises the factor structure and improves the inter-

pretability of the factor solution. Rotation makes the analysis for item retention and deletion more meaningful. Two types of factor rotation can be used, orthogonal and oblique rotation. Orthogonal keeps the factors unrelated while oblique rotation allows correlations between factors. In line with Perry et al. (2012), effectuation and causation can be viewed as orthogonal constructs. Therefore only orthogonal rotation will be discussed. Three types of orthogonal rotation can be distinguished. Quartimax attempts to maximise the dispersion of factor loadings for variables across all factors. Varimax attempts to maximise the dispersion of loadings within factors (Field, 2009). Chandler et al. (2011) used orthogonal and oblique rotations. They found that both methods provided identical factor loadings. Alsos et al. (2014) used orthogonal (varimax) rotation. In line with Alsos et al. (2014), varimax was chosen as rotation method. Other rotation methods were used to check the differences between the outcomes. All three solutions were almost identical. Factor solutions with varimax rolation are reported in this thesis.

### 3.6.2 Exploratory factor analysis

The goal of exploratory factor analysis is to find the maximum amount of common variance by using the lowest amount of variables. This paragraph investigates which variables can be used to measure effectual and causal decision-making. Multiple factor analyses are performed to explore which variables can be retained and which should be deleted.

**Factor analysis 1: Separate factor analyses for effectuation and causation** First two separate factor analyses were performed for causation and effectuation. Each factor analysis included its own principles. The goal was to identify items that did not load highly on one factor. Factor loading suppression was set to .3, this to include lower cross-loadings. The amount of factors extracted was set to explain 50% of the variance, a three-factor solution was calculated for causation. Most question loaded on the first factor with loading above .4. Variable 'my first priority is reaching my pre-set target without any delay' scored below .4 on factor one and cross-loaded highly on factor two. The same applies for variable 'my planning will be set before I start the implementation process and cannot be altered afterwards'. Variables 'before starting my new venture I will first acquire all resources needed to achieve my target' loaded above .4 on factor one, but cross-loaded sufficiently on factor three. These question were not yet removed from further measurement, but they were seen as problematic items. This factor analyses is presented in Table 3.4.

A four-factor solution was calculation for effectuation to explain 50% of the variance (see Table 3.4). Variable 'I allow changes in my planning if needed, even during the implementation process of my new venture' cross-loaded slightly above .4 on factor two. Variable 'I will ask my private network to help me out with starting my new venture' loaded above .4 on factor one, it also cross-loaded negatively sufficient on factor three. High negative loadings could indicate that respondents interpreted the question in reverse. This could mean that respondents do not ask their private network to help out. Variables with high negative cross-loadings are problematic and are eligible for deletion (Field, 2009). Variable 'Decisions will be primarily based on minimisation of risks and costs' loaded above .4 on factor three and natively sufficient on factor two. Variable 'the uncertainty of a market will not block me since I rely on my own experience to imagine opportunities' loaded only sufficiently on factor two. Variable 'I will ask customers and suppliers to pre-commit to my new venture in order to reduce risks' did not have any sufficient loadings. Variable 'the decisions I make when starting my new venture will be based on the resources I have available' loaded above .4 on factor three. Variable 'I start my new venture without defining a clear target' loaded sufficiently on factor two and four. Overall, the loadings of effectuation were mediocre, especially the variables that did not load sufficiently on factor one were concerns.

**Factor analysis 2: corresponding principles of causation and effectuation** For further analyses, five factor analyses were executed for each effectuation principle and the corresponding causation principle (see Table 3.5). This analysis was conducted to check if all variables loaded on their own factor (dimension). Factor analysis 'means' versus 'goals' showed two difficulties. Variable 'I start my new venture without defining a clear target' loaded negatively sufficient on factor one. Variable 'I take a clearly pre-defined target as a starting point of the new venture' loaded above .4 on both factors. 'Affordable loss' versus 'expected returns' had one cross-loading factor. Variable 'decisions will be primarily based on analysis of potential future returns' loaded on both factors. 'Partnerships' versus 'competitive analysis' and 'leveraging contingencies' versus 'avoiding contingencies' did not have loading problems, all variables loaded on their corresponding factor. Factor analysis 'control' versus 'prediction' was hard to interpretive. Both constructs had one item that cross-loaded on the other construct. These variables were not yet dropped, but they were taken into consideration for item deletion.

| | Component | | | |
|---|---|---|---|---|
| | Causation | 2 | | 3 |
| I will try to identify risks by a thorough competitors analysis. | 0,70 | | | -0,40 |
| I will focus on early identification of risks through market analysis. | 0,69 | | | |
| I will try to identify markets by a thorough market analysis. | 0,63 | | | |
| I will study expert predictions on the direction the market is "heading", to determine what course of action my new venture will follow. | 0,61 | | | -0,30 |
| I will always pay attention that my initially defined target will be met. | 0,58 | | | 0,40 |
| I take a clearly pre-defined target as a starting point of the new venture. | 0,57 | | | |
| Beforehand, I will calculate how many resources I need to achieve the expected returns. | 0,56 | -0,40 | | |
| Decisions will be primarily based on analysis of potential future returns. | 0,50 | | | |
| I will try to control the future based on predictions of my previously obtained knowledge. | 0,48 | | | -0,36 |
| My first priority is reaching my pre-set target without any delay. | 0,33 | 0,71 | | |
| My planning will be set before I start the implementation process and cannot be altered afterwards. | 0,30 | 0,68 | | |
| Before starting my new venture, I will first acquire all resources needed to achieve my target . | 0,53 | | | 0,55 |
| | Effectuation | 2 | 3 | 4 |
| I will talk to people I know to enlist their support in making opportunities a reality. | 0,68 | | | |
| Decisions will be made together with stakeholders based on our competences. | 0,60 | | | |
| I allow changes in my planning if needed, even during the implementation process of my new venture. | 0,56 | 0,40 | | -0,34 |
| I will ask my private network to help me out with starting my new venture. | 0,54 | | -0,44 | 0,40 |
| I expect to change my original target when confronted with new findings. | 0,48 | 0,30 | 0,38 | |
| I allow delays during the development of my new venture when new opportunities emerge. | 0,44 | 0,37 | 0,33 | |
| I will try to control the future by creating it. | 0,42 | | | -0,33 |
| Decisions will be primarily based on minimization of risks and costs. | | -0,66 | 0,45 | |
| The uncertainty of a market will not block me since I rely on my own experience to imagine opportunities. | 0,36 | 0,52 | | |
| I will ask customers and suppliers to pre-commit to my new venture in order to reduce risks. | 0,32 | -0,38 | | |
| The decisions I make when starting my new venture will be based on the resources I have available. | 0,35 | | 0,51 | |
| I start my new venture without defining a clear target. | | 0,42 | | 0,62 |

*N=493-528 (pairwise). Extraction method: principal component analysis.*

Table 3.4: Separate factor analyses for effectuation and causation

| | Component | |
|---|---|---|
| **Factor analysis 1: means and goals** | **Means** | **Goals** |
| The uncertainty of a market will not block me since I rely on my own experience to imagine opportunities. | 0,75 | |
| The decisions I make when starting my new venture will be based on the resources I have available. | 0,70 | |
| I start my new venture without defining a clear target. | -0,62 | |
| Before starting my new venture, I will first acquire all resources needed to achieve my target. | | 0,77 |
| I take a clearly pre-defined target as a starting point of the new venture. | 0,43 | 0,62 |
| *Cumulative variance explained* | 55% | |
| **Factor analysis 2: affordable loss and expected return** | **Loss** | **Return** |
| Decisions will be primarily based on minimization of risks and costs. | 0,90 | |
| Decisions will be primarily based on analysis of potential future returns. | 0,62 | 0,42 |
| Beforehand, I will calculate how many resources I need to achieve the expected returns. | | 0,95 |
| *Cumulative variance explained* | 76% | |
| **Factor analysis 3: partnerships and competitive analysis** | **Partnerships** | **Analysis** |
| Decisions will be made together with stakeholders based on our competences. | 0,83 | |
| I will ask my private network to help me out with starting my new venture. | 0,71 | |
| I will ask customers and suppliers to pre-commit to my new venture in order to reduce risks. | 0,71 | |
| I will try to identify markets by a thorough market analysis. | | 0,82 |
| I will focus on early identification of risks through market analysis. | | 0,61 |
| I will try to identify risks by a thorough competitors analysis. | | 0,50 |
| *Cumulative variance explained* | 55% | |
| **Factor analysis 4: leveraging contingencies and avoiding contingencies** | **Leveraging** | **Avoiding** |
| I allow changes in my planning if needed, even during the implementation process of my new venture. | 0,76 | |
| I expect to change my original target when confronted with new findings. | 0,66 | |
| I allow delays during the development of my new venture when new opportunities emerge. | 0,66 | |
| I will always pay attention that my initially defined target will be met. | | 0,81 |
| My first priority is reaching my pre-set target without any delay. | | 0,71 |
| My planning will be set before I start the implementation process and cannot be altered afterwards. | | 0,59 |
| *Cumulative variance explained* | 53% | |
| **Factor analysis 5: control and prediction** | **Control** | **Prediction** |
| I will try to control the future by creating it. | 0,86 | |
| I will talk to people I know to enlist their support in making opportunities a | | 0,65 |
| I will study expert predictions on the direction the market is "heading", to determine what course of action my new venture will follow. | | 0,88 |
| I will try to control the future based on predictions of my previously obtained knowledge. | 0,70 | |
| *Cumulative variance explained* | 65% | |

*Extraction Method: Principal Component Analysis.*
*Rotation method: Varimax with Kaiser Normalisation.*

Table 3.5: Factor analysis corresponding principles of causation and effectuation

| | Component | |
|---|---|---|
| | Causation | Effectuation |
| The uncertainty of a market will not block me since I rely on my own experience to imagine opportunities. | | 0,45 |
| The decisions I make when starting my new venture will be based on the resources I have available. | 0,35 | |
| I start my new venture without defining a clear target. | -0,41 | |
| Before starting my new venture, I will first acquire all resources needed to achieve my target. | 0,52 | |
| I take a clearly pre-defined target as a starting point of the new venture. | 0,60 | |
| Decisions will be primarily based on minimization of risks and costs. | -0,47 | 0,39 |
| Decisions will be primarily based on analysis of potential future returns. R | 0,47 | |
| Beforehand, I will calculate how many resources I need to achieve the expected returns. | 0,55 | |
| Decisions will be made together with stakeholders based on our competences. | 0,45 | |
| I will ask my private network to help me out with starting my new venture. | 0,33 | 0,30 |
| I will ask customers and suppliers to pre-commit to my new venture in order to reduce risks. | 0,41 | |
| I will try to identify markets by a thorough market analysis. | 0,59 | |
| I will focus on early identification of risks through market analysis. | 0,63 | |
| I will try to identify risks by a thorough competitors analysis. | 0,68 | |
| I allow changes in my planning if needed, even during the implementation process of my new venture. | | 0,67 |
| I expect to change my original target when confronted with new findings. | | 0,57 |
| I allow delays during the development of my new venture when new opportunities emerge. | | 0,54 |
| I will always pay attention that my initially defined target will be met. | 0,55 | |
| My first priority is reaching my pre-set target without any delay. | | -0,53 |
| My planning will be set before I start the implementation process and cannot be altered afterwards. | | -0,50 |
| I will try to control the future by creating it. | 0,34 | |
| I will talk to people I know to enlist their support in making opportunities a reality. | 0,51 | 0,35 |
| I will study expert predictions on the direction the market is "heading", to determine what course of action my new venture will follow. | 0,58 | |
| I will try to control the future based on predictions of my previously obtained knowledge. | 0,52 | |

*Extraction Method: Principal Component Analysis.*
*Rotation method: Varimax with Kaiser Normalisation.*

Table 3.6: Factor analysis two factor solution for causation and effectuation

**Factor analysis 3: two factor solution for causation and effectuation** A two-factor solution for effectuation and causation is extracted (see Table 3.6). Based on this analysis and before mentioned analyses decisions for item deletion are described.

All 'means' items had low Cronbach alphas and item-to-total scores. This

does not necessary mean that all questions were bad for factor analysis, it only indicates that the combination of them together is bad. The three factors were further analysed. Variable 'the uncertainty of a market will not block me since I rely on my own experience to imagine opportunities' was the only 'means' variable that loaded on the effectuation factor. The loading was above .4 and therefore sufficient. The cross-loading mentioned in analysis one disappeared when both effectuation and causation are combined in one factor analysis. This variable is kept during future analyses. Variable 'the decisions I make when starting my new venture will be based on the resources I have available' loaded below .4 on the wrong factor. It showed low correlations in the correlation matrix, a low loading in analysis one and a cross-loading in analysis one. This variable was removed. Variable 'I start my new venture without defining a clear target' loaded negatively sufficient on the causation factor. Factor analysis one and two showed the same problem. The correlation matrix provides negative low correlations with causation variables. This question was deleted.

Both 'goal' questions loaded on the causation factor, this is in agreement with analysis one. Variable 'I take a clearly pre-defined target as a starting point of the new venture' did have some correlations with effectuation in the correlation matrix and it did cross-loaded in analysis two. Both items were retained, with preference for 'before starting my new venture, I will first acquire all resources needed to achieve my target'.

The 'affordable loss' principle only has one question left. The variable 'decisions will be primarily based on minimization of risks and costs' is based on the original question from Brettel et al. (2012), 'the selection of the R&D-option was mostly based on a minimization of risks and costs'. They used a bipolar scale to make the respondent chose between two opposing opposites. The opposite item was 'the selection of the R&D-option was mostly based on analyses of future returns'. Without using the opposing item, this effectual question can be interpreted as causal. Which could be a threat to content validity. This variable is reverse coded to be a better fit with effectuation. Keep in mind that this variable does not measure the 'affordable loss' principle very well. The chapter limits and future research will explain possibilities for improving this principle. If better questions were available this items would have been dropped. At this moment this is the only variable left that is able to capture the 'affordable loss' principle to some extent. Therefore the variable is retained.

The principle 'expected returns' showed two sufficient causal loadings. How-

ever, variable 'decisions will be primarily based on analysis of potential future returns' did load on both factors in analysis two. Both items were retained.

The 'partnership' principle contained three variables. Variable 'decisions will be made together with stakeholders based on our competences' loaded on the causation factor. The correlation matrix showed low correlations with causation items. Based on these criteria the items was deleted. Variable 'I will ask my private network to help me out with starting my new venture' loaded on both causation and effectuation. This is similar to the findings of Chandler et al. (2011). The principal 'partnerships' could be shared by both effectuation and causation. Alsos et al. (2014) found similar results. The loading was above .3, which is moderate. This item was retained. Variable 'I will ask customers and suppliers to pre-commit to my new venture in order to reduce risks' loaded causally. Factor analysis one showed low factor loadings for the variable. The correlation matrix showed many correlations with causal variables. This items was removed from the dataset.

'Competitive analysis' showed three sufficient loadings on causation. A few low strengthened correlations with effectual variables were found in the correlation matrix. Analysis one and two provide support that these load on causation. These variables were retained.

All three variables of the 'leveraging contingencies' principle loaded on their associated effectual factor. The correlation matrix showed no sufficient correlations with causation. Variable 'I allow changes in my planning if needed, even during the implementation process of my new venture' cross-loaded slightly above .4 in factor analysis one. After the causal variables were added, this cross-loading disappeared. All three variables were kept.

'Avoiding contingencies' contains three variables. Variable 'I will always pay attention that my initially defined target will be met' loaded above .4 on the causal factor. The other analyses support this finding so this variable is retained. The other two questions 'my first priority is reaching my pre-set target without any delay' and 'my planning will be set before I start the implementation process and cannot be altered afterwards' loaded negatively sufficient on the wrong factor. This is in line with the cross-loading found in analysis one. Both variables were removed.

'Control' can be seen as an overarching principle, in which the other princi-

ples of effectuation are rooted within this non-predictive logic (Sarasvathy, 2008a). To be able to measure this overarching aspect within one question the variable 'I will try to control the future by creating it' was created. Unfortunately, this variable did not load on the effectual factor. It could have been that, some respondents faced problems interpreting this question, 'creating the future' can be comprehended in multiple ways. Therefore, face validity could be threatened. Threats of various types of validity are discussed in the next paragraph. Duo to limited space, only one question of the Wiltbank et al. (2009) scale was added to measure 'control'. Variable 'I will talk to people I know to enlist their support in making opportunities a reality' loaded on both factors. Wiltbank et al. (2009) used aspects of the other principles to compose their questions based on this overarching aspect. This question could be interpreted as a 'partnership' question. Maybe this question does not cover the whole principle of 'control' but only the 'partnership' aspect. This question loaded on both factors, the same argument holds that the principal 'partnerships' could be shared by both effectuation and causation. Developing reliable 'control' variables requires further research. For this research this variable is retained, but it should be noted that this variables possibly does not cover the whole 'control' principle.

'Prediction' is measured with two variables. Both variables load on the causal factor which is in line with factor analysis one. Same as 'control' one overarching question was added and one question was based on the measurement scale of Wiltbank et al. (2009). Both variables scored above .4 and can be retained.

**Factor analysis 4: revised two factor solution for causation and effectuation** After the deletion of problematic items, seven effectuation and ten causation items remained. 'Means, 'affordable loss,'partnership, 'avoiding contingencies and 'control only have one question left. For further research, all remaining questions can be used to capture effectual and causal decision-making. Effectuation research did not yet establish the proportion that each dimension brings to the construct. At this moment it is only possible to assume that all principles should be covered by the same amount of questions. This to provide an equal distribution to the constructs effectuation and causation. All principles should be evenly captured by one item. Alsos et al. (2014) provided a parsimonious scale to measure effectuation and causation with five items each. They argued that both constructs can be captured with only a few items. In line with Alsos et al. (2014), choices were made to delete items and only keep one item for each principle.

For effectuation, only principle 'leveraging contingencies' has more than one remaining variable. Variable 'I allow changes in my planning if needed, even during the implementation process of my new venture' shows the highest factor loadings in all three factor analyses. Therefore, this variable is chosen to represent the 'leveraging contingencies' principle.

'Goals' variable 'I take a clearly pre-defined target as a starting point of the new venture' did have some correlations with effectuation in the correlation matrix and it did cross-loaded in analysis two. Therefore, variable 'Before starting my new venture, I will first acquire all resources needed to achieve my target' is used to represent the 'goals' principle.

'Expected returns' variable 'decisions will be primarily based on analysis of potential future returns' cross-loaded on factor analysis two. Variable 'Beforehand, I will calculate how many resources I need to achieve the expected returns' loaded better on all three factor analyses. Therefore this question was be retained.

All three 'competitive analysis' variable have decent factor loadings. Variable 'I will try to identify risks by a thorough competitors analysis' has overall the best loadings. This variable also explicitly mentions 'competitors analysis'. Based on theory, it could be argued that this questions best captures the essence of this principle (Alsos et al., 2014). Therefore this items remains.

For deciding which 'prediction' variable to retain factor analysis two is excluded. Based on this factor analysis, it impossible to determine which items load on which factor. Variable 'I will study expert predictions on the direction the market is heading, to determine what course of action my new venture will follow' has slightly better loadings in factor analyses one and three. Therefore this items is chosen to represent the 'prediction' principle.

Based on these selections, a ten items factor analyses is performed. This factor analysis is displayed in Table 3.7.

An interesting development occurred. The cross-loading of the 'partnership' item disappeared. This could be due to that other variables distorted the loadings. Variable 'I will ask customers and suppliers to pre-commit to my new venture in order to reduce risks' loads sufficiently on the effectuation factor. All causation items load sufficiently (>.5) on the causation factor. Four effectuation principles, 'means', 'partnerships', 'leveraging contingencies' and 'control' loaded sufficiently (>.5) on the effectuation factor.

| | Component | |
|---|---|---|
| | Causation | Effectuation |
| The uncertainty of a market will not block me since I rely on my own experience to imagine opportunities. | | 0,61 |
| Decisions will be primarily based on minimization of risks and costs. R | -0,57 | 0,43 |
| I will ask my private network to help me out with starting my new venture. | | 0,59 |
| I allow changes in my planning if needed, even during the implementation process of my new venture. | | 0,65 |
| I will talk to people I know to enlist their support in making opportunities a reality. | 0,48 | 0,50 |
| Before starting my new venture, I will first acquire all resources needed to achieve my target . | 0,66 | |
| Beforehand, I will calculate how many resources I need to achieve the expected returns. | 0,60 | |
| I will try to identify risks by a thorough competitors analysis. | 0,62 | |
| I will always pay attention that my initially defined target will be met. | 0,60 | |
| I will study expert predictions on the direction the market is "heading", to determine what course of action my new venture will follow. | 0,59 | |

*Extraction Method: Principal Component Analysis.*
*Rotation method: Varimax with Kaiser Normalisation.*

Table 3.7: Revised factor analysis two factor solution for causation and effectuation

'Affordable loss' score only .43 with a sufficient negative cross-loading on causation. 'Control' scored next to the sufficient loading on effectuation, also a positive cross-loading of 0.48 on causation. Both problems of these two variables were already discussed before. These two principles require further research.

New Cronbach's alpha scores and item-to-total correlation scores are presented in Table 3.8. Alphas of .7 are usually required to be deemed reliable (Werhahn & Brettel, 2012). Causation scores .66 and effectuation .44. Effectuation was expected to be lower because of the mediocre 'affordable loss' and 'control' variables. The item-to-total scores support this with low scores of .13 for 'affordable loss' and .20 for 'control'. Item-to-total scores of causation are higher than .35. Which is decent. All effectuation item-to-total scores are below .35. This could be due to the mediocre 'affordable loss' and 'control' variables.

The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, KMO = .73 (good according to Field (2009)), and all KMO values for individual items on the anti-image matrix all above the acceptable limit of .5. The computed Bartlett's test is significant (chi-square 699,83

| | Cronbachs Alpha (case selection) | Item to total (construct) correlation |
|---|---|---|
| Causation | 0,66 | |
| **Goal** | | |
| Before starting my new venture, I will first acquire all resources needed to achieve my target . | | 0,41 |
| **Expected returns** | | |
| Beforehand, I will calculate how many resources I need to achieve the expected returns. | | 0,42 |
| **Competitive analysis** | | |
| I will try to identify risks by a thorough competitors analysis. | | 0,43 |
| **Avoiding contingencies** | | |
| I will always pay attention that my initially defined target will be met. | | 0,39 |
| **Prediction** | | |
| I will study expert predictions on the direction the market is "heading", to determine what course of action my new venture will follow. | | 0,40 |
| | | |
| Effectuation | 0,44 | |
| **Means** | | |
| The uncertainty of a market will not block me since I rely on my own experience to imagine opportunities. | | 0,29 |
| **Affordable loss** | | |
| Decisions will be primarily based on minimization of risks and costs. | | 0,13 |
| **Partnership** | | |
| I will ask my private network to help me out with starting my new venture. | | 0,27 |
| **Leveraging contingencies** | | |
| I allow changes in my planning if needed, even during the implementation process of my new venture. | | 0,31 |
| **Control** | | |
| I will talk to people I know to enlist their support in making opportunities a reality. | | 0,20 |

*n = 492-493*

Table 3.8: Revised Cronbach's alphas & item-to-total correlations

df=45, p<.000). A new parallel analysis based on the ten items scale was performed, which showed that a two-factor solution was appropriate. This parallel analysis can be found in Appendix B.2. Both factors explained each more than 5% of the variance, which is good. All extracted factors together should account for at least 50% of the variance (Field, 2009). The factor analysis explained only 43% of the variance. This could be due to the two mediocre variables.

The measurement scale is still in the development phase. The variables 'affordable loss' and 'control' require further development. This ten item scale was used to test whether the investigated students use a higher proportion of causal decision-making principles or a higher proportion of effectual decision-making principles.

**Decision-making of students** A paired sample t-test (Field, 2009) was conducted to compare the mean of the combined five items of effectuation

with the mean of the combined five items of causation. Causation had a mean of 5.2 and effectuation a mean of 4.9. The significance was tested by the paired sample t-test. The results (paired sample t-test(528)=-8.5, p=.00) were significant (p<.05). The difference is small, but it could be stated that student use a higher degree of causal decision-making heuristics compared to effectual decision-making heuristics.

**Control variables** Student entrepreneurs with own ventures could differentiate from non-entrepreneurial students. Two paired-sample t-tests were performed to investigate the differences between both groups. Student entrepreneurs score higher on effectuation compared to causation. A Mean of 5.2 opposed to a mean of 4.9. The results (paired sample t-test(69)=2.13, p=.04) were significant (p<.05). Non-entrepreneurial students score higher on causation, with means of 5.3 compared to 4.8. The results (paired sample t-test(455)=-10.63, p=.00) were also significant (p<.05). This indicates that student entrepreneurs prefer effectual decision-making while non-entrepreneurial students prefer causal decision-making.

Familiarity of the effectuation construct could influence the decision-making of students. Students who are familiar with the effectuation construct were compared to students those who are not familiar. Two paired-sample t-tests were performed to investigate the differences between both groups. Both group preferred causation. The results are for familiar students (paired sample t-test(19)=-1.62, p=.12) were not significant (p<.05). This due the small sample size. The results for unfamiliar students (paired sample t-test(102)=-5.82, p=.00) were significant (p<.05). Based on these results it could be stated that students without familiarity of effectuation prefer causal decision-making.

### 3.6.3 Threats to validity

It is very important to assess the various types of validity. Problems related to several types of validity were analysed.

**Face validity** In contrast with content validity, face validity is analysed post hoc after the development of the measurement scale. Face validity refers to what respondents may assume about what the items are intended to measure. Face validity could be threatened when respondents interpreter items differently as intended (Netemeyer et al., 2003). This study tried to develop questions with high wording clarity. Item writing was checked during the pilot phase. Even though these pilot respondents only had minor

remarks concerning the questions, it is possible that not all students comprehended the questions the same as intended. Some degree of jargon is necessary to measure causation and effectuation. Dew et al. (2009) only used MBA students within their sample, this to ensure a common baseline of knowledge in business fundamentals. Results may be confounded due to lack of familiarity with business in general or insufficient interpretations of terminology and concepts used in the survey.

To control if the level of education or familiarity with business fundamentals influence the outcomes, two new factor analyses were conducted. The first analysis removes student of applied science from the dataset. This to ensure that every respondent meets the same level of education. The second analysis only selected students which followed business courses during their study program. 39 students of applied sciences were removes in the first factor analysis (sample size of 454-489 pairwise). The second analysis removed more than 300 respondents (sample size of 151-152 pairwise). Both analyses provided similar factor solutions. Similar factor solutions do not necessary indicate that all students understood the questions as intended. The interpretation of each question could still deviate from the theoretical understanding (Alsos et al., 2014). It only provides the same dimensions for causation and effectuation for all students of the sample. Quantitative assessments can be used to analyse face validity more extensively. Chapter limits and future research will discuss this.

**Construct validity** Construct validity assesses the degree to which the measure actually measures the constructs it intended to measure (Netemeyer et al., 2003). Alsos et al. (2014) investigated the validity problems of existing effectuation scales. The found that some question are hard to disagree with. To control the construct validity, the comments of respondents were analysed. A few remarks mentioned that the respondent was inclined to always agree with some statements. An example was, 'the decisions I make when starting my new venture will be based on the resources I have available. The mean of this question was 5.28. This item was dropped due to bad factor loadings. The agreement problem could be the reason that this item loaded badly. The final ten items scale does not include questions which were addressed as problematic by the respondents.

**Discriminant validity** The relationship between two conceptual different measures was analysed to check for discriminant validity. When causation and effectuation have a negative to moderate correlation, then discriminant validity can be confirmed (Netemeyer et al., 2003). Two new variables

were computed. One combined five items of effectuation and one combined five questions of causation. These two means are compared with a pearson correlation, the correlation was .07, which is not significant. This low correlation confirms that the constructs were not mutually exclusive and can be seen as different strategies (Alsos et al., 2014). Based on this correlation, discriminant validity can be confirmed. Besides the low correlation between the summated constructs, both constructs load on other factors based on factor analysis four. With the exception of two effectuation items. These two items require some improvements which could improve discriminant validity further. Chapter limits and future research will address this.

**Known-group validity** This type of validity can be accounted for when two groups are compared with known attributes (Netemeyer et al., 2003). Stewart, Wayne H. & Roth (2001) mentions that MBA programs across the world are taught causal or predictive reasoning during their studies in different functions areas of business. MBA students learn during their studies to calculate risks and expected returns (Dew et al., 2009). Based on think aloud sessions of Dew et al. (2009), they found that MBA students mainly follow textbook procedures make decisions based on predictive information given to them. This indicates a causal approach. MBA students are expected to score high on causation and low on effectuation. A selection of 36 MBA students was analysed. The mean score of five items for both constructs where used. Causation had a mean of 5.1 and effectuation a mean of 5.3. The significance was tested by the paired sample t-test. The results (paired sample t-test(35)=1.32, p=.19) were not significant (p<.05). This does not confirm the known-group validity. To analyse a bigger sample size, the same calculation has been performed for all students which followed business courses during their study. Causation scored a mean of 5.2 and effectuation a 5.0. Causation is a bit higher than effectuation, in line with what was expected. The difference is not significant (paired sample t-test(152)=-1.84, p=.07), so known-group validity was not confirmed.

## 3.7 Finalising the scale

A ten item scale has been developed to measure the causal and effectual decision-making of students. At this moment, the scale needs further analysis to create better 'mean' and 'control' variables. The results obtained from the exploratory factor analysis are restricted to the student sample. After new items are created, confirmatory factor analysis should be performed. This in order to confirm the factors found in the dataset and to generalise

the findings from the sample to the population. The downside of confirmatory factor analysis is that it requires a new dataset (Netemeyer et al., 2003). Before gathering new data, a partial confirmatory factor analysis could be performed (Gignac, 2009). This in order to check if confirmatory factor analysis is even an option. When partial confirmatory factor analysis computes negative results, then no time should be wasted gathering new data, this because confirmatory factor analysis will be useless. After confirmatory factor analysis, to further generalise the results other samples need to be analysed. If these samples reveal the same factor structures than the factor solution can be generalised (Netemeyer et al., 2003).

Chapter 4

# Discussion & conclusion

This chapter addresses the contributions made to effectuation literature and entrepreneurship literature in general. The goal was to develop a measurement tool which can be used to measure effectual and causation decision-making of students. First the discussion will be addressed and afterwards the conclusion is given.

## 4.1 Discussion

As mentioned in the previous section, effectuation research did not yet establish the proportion that each dimension brings to the construct. By example, the principles 'means' contains three aspects; who they are, what they know and who they know Sarasvathy (2001). Should 'means' have a higher proportion to the construct effectuation compared to the other principles? Can the 'means' principle even be measured by only one item? Furthermore, the principle of 'control' is an overarching principle of the other four principles with regard to the future. Should this principle be excluded in line with Brettel et al. (2012)? Without this knowledge the assumption was made to provide an equal distribution of each dimension to the effectuation construct. By assuming that all principles add equal value to the construct of effectuation, incorrect conclusions can be drawn.

Most measurement scales developed and validated in social sciences measure reflective constructs (Perry et al., 2012). Chandler et al. (2011) propose that effectuation is a formative construct. Perry et al. (2012) state that it might be argued that the effectuation principles have no reason to highly correlate with each other. This because effectuation can be seen as a forma-

tive construct. Lower correlations would suggest that the variables would load on different factors. Alsos et al. (2014) developed a ten item scale to measure effectuation and causation as one-dimensional constructs. In line with Alsos et al. (2014), the principles of effectuation correlated significantly with other principles. Further, the principles of effectuation loaded on the same factor. This would suggest that effectuation can be seen as a reflective construct. To further investigate if effectuation should be measured as a formative construct, a mixed measurement model can be used (Perry et al., 2012). The sub-dimensions of effectuation might be measured as individual reflective constructs, but the together these dimensions can be aggregated and validated formatively.

Cronbach's alpha can be a weak indicator of reliability when only a few items are included (Politis et al., 2012) or when the interrelated questions are quite similar (Netemeyer et al., 2003). The cronbach's alpha and the item-to-total scores in table three for 'competitive analysis' are quite high. The 'competitive analysis' items can be argued to similar to each other. It would be expected that these items would correlate highly with each other. Researches should be careful when using the cronbach's alpha scores for item deletion and retention. High cronbach's alphas do not immediately suggest that items should be retained and low cronbach's alphas should not be discarded immediately. The correlation matrix and factor loadings can help to decide which items to retain. The extreme low alphas of the 'means' principle could be due to multiple reasons. First, as mentioned before the questions could be stated incorrectly, or the respondents did not interpretative the questions the intended way. Another reason could be that the principle 'means' is a separate and formative construct. Maybe this principle should be divided in multiple constructs before it becomes measurable. The methodology chapter assumes that the questions are insufficiently stated. But further research could be performed to focus on the 'means' principle and investigate whether this principle is a formative or reflective construct.

Students entrepreneurs prefer a higher degree of effectual decision-making logics, while non-entrepreneurial students prefer higher degree of causal decision-making logics. This finding is interesting for research regarding student entrepreneurs. According to Dew et al. (2009) MBA students can be defined as novice entrepreneurs. Students entrepreneurs and non-entrepreneurial students both lack expertise of expert entrepreneurs. Based on this criteria, both these groups can defined as novice entrepreneurs. It could be argued that not all novice entrepreneurs use the same degree

of causal decision-making. Combining all novice entrepreneurs together, could lead to insufficient measurement of the decision-making of novice entrepreneurs. The classification between novices and expert could be further investigated. Maybe multiple types of novice entrepreneurs or expert entrepreneurs exist. This would indicate that entrepreneurs are not either a novice or an expert. It could be investigated if the degree of being a novice or expert can be ranged ordinal in different categories.

Face validity could be threatened when respondents interpreted items differently as intended (Netemeyer et al., 2003). When the results differ from the expectations, a dilemma occurs. Do you really measure what you intent to measure or is the reliability of the scales items threatened. As stated before, results may be confounded due to lack of familiarity with business in general or insufficient interpretations of terminology and concepts used in the survey. It should not be intermediately assumed that the scale items are incorrect. It could be that the results are correct and the expectations were wrong. Maybe the results are affected by other variables outside the scope of this research.

## 4.2 Conclusion

Twenty-five items were created based on previous measurement scales of effectuation and causation. The steps of Netemeyer et al. (2003) were used to develop and analyse the scale. After the deletion of problematic items, seventeen items remained. Seven effectuation and ten causation items can be used to measure the entrepreneurial decision-making of students. Based on the factor loadings and theory the best five effectuation and five causation items were selected. These items are combined to form a parsimonious scale (Alsos et al., 2014). The ten items measure all principles of effectuation and causation. The five items of causation each loaded together on one factor. The five effectuation items loaded on the effectuation factor. Unfortunately, two items of effectuation, 'means' and 'control' also positively or negatively cross-loaded on the causation factor. Face validity was controlled by comparing the total student sample with two other samples (MBA students and business students). These factor solutions provided identical results. Construct and discriminant validity were confirmed and known-group validity was not. Quantitative assessments could be used to analyse the threats validity more extensively.

The research question was: 'to what extent can the entrepreneurial decision-

making process of students be measured by a new measurement scale of causation and effectuation?'. The construct of causation can be measured by five scale items as an uni-dimensional construct. These questions require further testing and a confirmatory factor analysis should be performed to check the validity of the question more extensively. The effectuation items require first some refinement. More specificity, the principles 'means' and 'control' could benefit from new items. Momentarily, conclusions based on this measurement model can only be related to the collected sample. The scale requires further analyses to be generalised in other contexts. The developed measurement scale is still highly exploratory.

In order to answer the sub research question, the means scores of both constructs are compared with a paired sample t-test. Causation had a mean of 5.2 and effectuation a mean of 4.9. This small but significant results indicates that students use a higher proportion of causal decision-making compared to effectual decision-making. Dew et al. (2009) found that MBA students (novice entrepreneurs) tend to prefer causal strategies. Further research could investigate whether a sample of non-MBA students could be used to present as novice entrepreneurs.

Chapter 5

# Limitations & future research

This chapter will address the limitations and suggestions for future research. This chapter is divided in categories. Each category discusses a limit and an opportunity for future research.

## 5.1 Mediocre scale items

The items of 'control' and 'affordable loss' loaded insufficient. Further development of scale items is required. The scale items of Alsos et al. (2014) could be used to develop items for the student context. After the development of new scale items, the new measurement tool should be validated.

## 5.2 Scenario based business case

Only 6% of the students started their own company (Karali et al., 2014). To be able to investigate all types of students, the measurement tool was based on a scenario. Scenarios are based on the perceptions of respondents. The scenario outlined a situation in which the respondent needed to imagine themselves starting a new venture. The case explained that the respondent only had limited resources at their disposal. Making business decisions on hypothetical and fictional resources could distort the data. It would be expected that in hypothetical situation, respondents are more eager to use resources than they would in real type situations. When respondents are required to spend their own personal resources, risk taking could be lower than in hypothetical situations.

The coffee case scenario is quite general. Does the scenario influence the decision-making of entrepreneurs? It could be argued that the scenario provides a situation in which uncertainty can be perceived as low. When the scenario influences the level of uncertainty, the decision-making outcomes can be distorted.

The scenario could distort the findings. It could also create opportunities. The level of uncertainty may be controlled by the scenario approach. Multiple scenarios could be developed both with low and high levels of uncertainty. Respondents can be asked to fill-out the survey for both situations. Differences between these scenarios could be analysed. Additionally, more personalised scenarios could be drafted to increase the respondent's familiarity with the situation.

## 5.3 Survey length

The data collection was a group effort of multiple master students. A total of 105 questions are asked. Too many questions could ensure non-cooperation and distortion of data (Netemeyer et al., 2003). Multiple methods were used to lower the response bias. The data could be unreliable due to inaccurate and dishonest answers. Due to limited space, only two to three items could be used to measure each principle. This limitation resulted in lower Cronbach alphas and item-to-total scores. Four to five items for each principles would have been preferred (Netemeyer et al., 2003).

The new scale only uses ten scale items. This lowers the non-cooperation immensely. This creates opportunities to add some additional questions. Questions regarding antecedents and consequences (Alsos et al., 2014) of effectual and causal strategies could be added. By example, the a measurement of uncertainty could be added in future research.

## 5.4 Unipolar items

The bipolar items of Brettel et al. (2012) are used to create unipolar items for the student context. As mentioned in chapter three, only using one side of the bipolar questions could have distorted the data. To further investigate this issue, qualitative think-aloud protocols can be used to analyse the interpretation of students. Based on qualitative studies, the questions can be redefined.

## 5.5 Additional research opportunities

The development of a measurement tool to investigate the decision-making logics of student would stimulate other research opportunities. A few opportunities are listed:

- To investigate if a relationship exists between the decision-making strategies of students and their willingness to start new ventures.
- To examine whether decision-making logics might be teachable (Dew et al., 2009).
- To explore whether the student's cognitive style (Grégoire, Corbett & McMullen, 2011) influence their decision-making strategy.
- To examine if the student's entrepreneurial intent (risk taking, locus of control and self-efficacy) (Hayton et al., 2002) influence their decision-making strategy.
- To investigate if cultural values influence the decision-making strategies of students (Hayton et al., 2002).

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Appendix A

# Questionnaire

After reading the following scenario, please use your imagination, put yourself in the context of the scenario, and answer each question following the scenario as if you were creating a new venture yourself.

> For a while, I have been thinking of starting my own coffee-corner. When I looked at what existing franchising coffee-corners offered, I felt the price-quality ratio was unbalanced. I think, it should be possible to start my own successful coffee-corner with a better price-quality ratio. In several reports in newspapers and magazines I read that there is an increasing demand for drinking coffee in my home country.

The few resources or means that I have at my disposal are: limited financial capital, a few close business relations, and knowledge of the coffee industry, since I have been working at a coffee corner for five years.

Below you can find statements designed to identify your own approach in starting a coffee-corner. Please indicate to what extend you agree or disagree with each statement.

# A.1 Questionnaire

| | Statements | Strongly disagree | Disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Agree | Strongly agree |
|---|---|---|---|---|---|---|---|---|
| 1 | Decisions will be primarily based on analysis of potential future returns. | | | | | | | |
| 2 | I will always pay attention that my initially defined target will be met. | | | | | | | |
| 3 | I will try to identify markets by a thorough market analysis. | | | | | | | |
| 4 | I allow changes in my planning if needed, even during the implementation process of my new venture. | | | | | | | |
| 5 | Before starting my new venture, I will first acquire all resources needed to achieve my target. | | | | | | | |
| 6 | Beforehand, I will calculate how many resources I need to achieve the expected returns. | | | | | | | |
| 7 | I expect to change my original target when confronted with new findings. | | | | | | | |
| 8 | The uncertainty of a market will not block me since I rely on my own experience to imagine opportunities. | | | | | | | |
| 9 | The decisions I make when starting my new venture will be based on the resources I have available. | | | | | | | |
| 10 | I allow delays during the development of my new venture when new opportunities emerge. | | | | | | | |
| 11 | Decisions will be made together with stakeholders based on our competences. | | | | | | | |
| 12 | I take a clearly pre-defined target as a starting point of the new venture. | | | | | | | |
| 13 | I will try to control the future by creating it. | | | | | | | |
| 14 | Decisions will be primarily based on minimization of risks and costs. | | | | | | | |
| 15 | I will talk to people I know to enlist their support in making opportunities a reality. | | | | | | | |
| 16 | I only spend resources I have available and I am willing to lose. | | | | | | | |
| 17 | I will study expert predictions on the direction the market is "heading", to determine what course of action my new venture will follow. | | | | | | | |
| 18 | I start my new venture without defining a clear target. | | | | | | | |
| 19 | My first priority is reaching my pre-set target without any delay. | | | | | | | |
| 20 | I will focus on early identification of risks through market analysis. | | | | | | | |
| 21 | I will ask my private network to help me out with starting my new venture. | | | | | | | |
| 22 | My planning will be set before I start the implementation process and cannot be altered afterwards. | | | | | | | |
| 23 | I will try to identify risks by a thorough competitors analysis. | | | | | | | |
| 24 | I will ask customers and suppliers to pre-commit to my new venture in order to reduce risks. | | | | | | | |
| 25 | I will try to control the future based on predictions of my previously obtained knowledge. | | | | | | | |

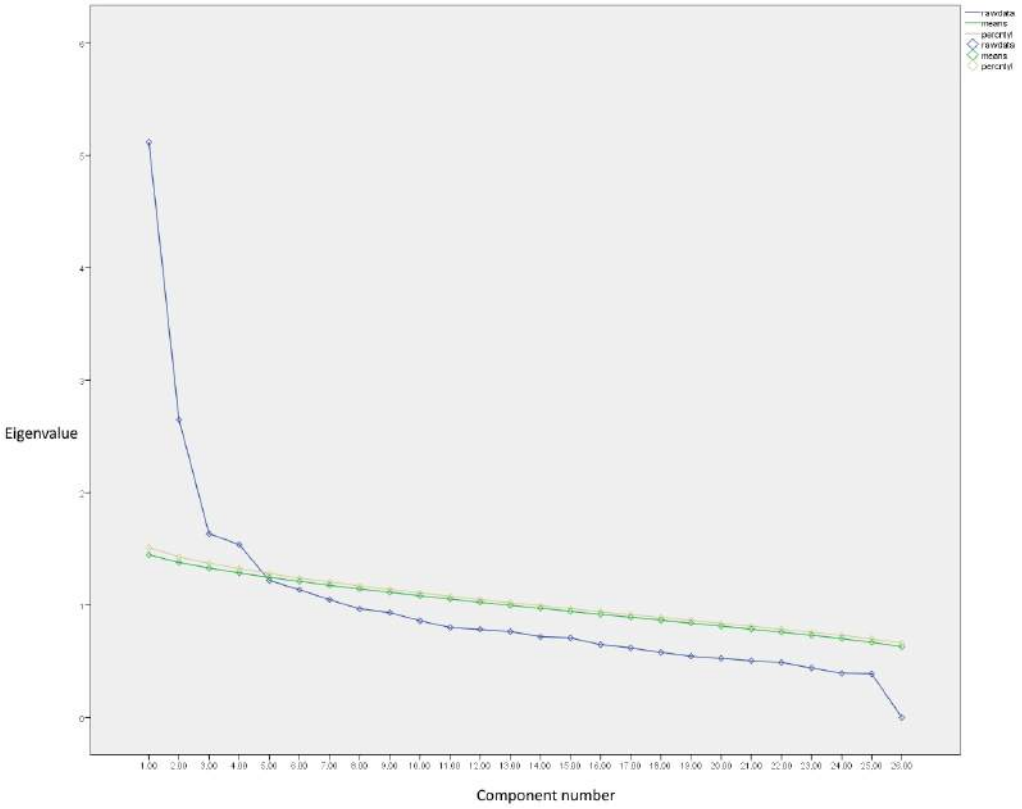
# A.2 Additional Questions

| | Questions | |
|---|---|---|
| 1 | Is one of your parents or legal guardians a self-employed entrepreneur? | (yes/no) |
| 2 | Is one of your parents or legal guardians employed in a private company? | (yes/no) |
| 3 | Did you follow any courses on entrepreneurship during your study program? | (yes/no) |
| 4 | Have you ever started your own company? | (yes/no) |
| | *If your answered question 4 with 'No', skip question 5, 6,7 and 8* | |
| 5 | How many years of experience do you have as self-employed entrepreneur? | (years) |
| 6 | Till what degree did you start your own venture because you had no other option for work? | Strongly disagree - strongly agree |
| 7 | Till what degree did you start your own venture because you wanted to become independent? | Strongly disagree - strongly agree |
| 8 | Till what degree did you start your own venture because you wanted to increase your income? | Strongly disagree - strongly agree |
| 9 | Are you interested in starting your own business? | (yes/no) |
| 10 | What is your gender? | (male/female) |
| 11 | What is your current level of education? | |
| 12 | Which university do/did you attend? | |
| 13 | What is/was your study program? | |

Appendix B

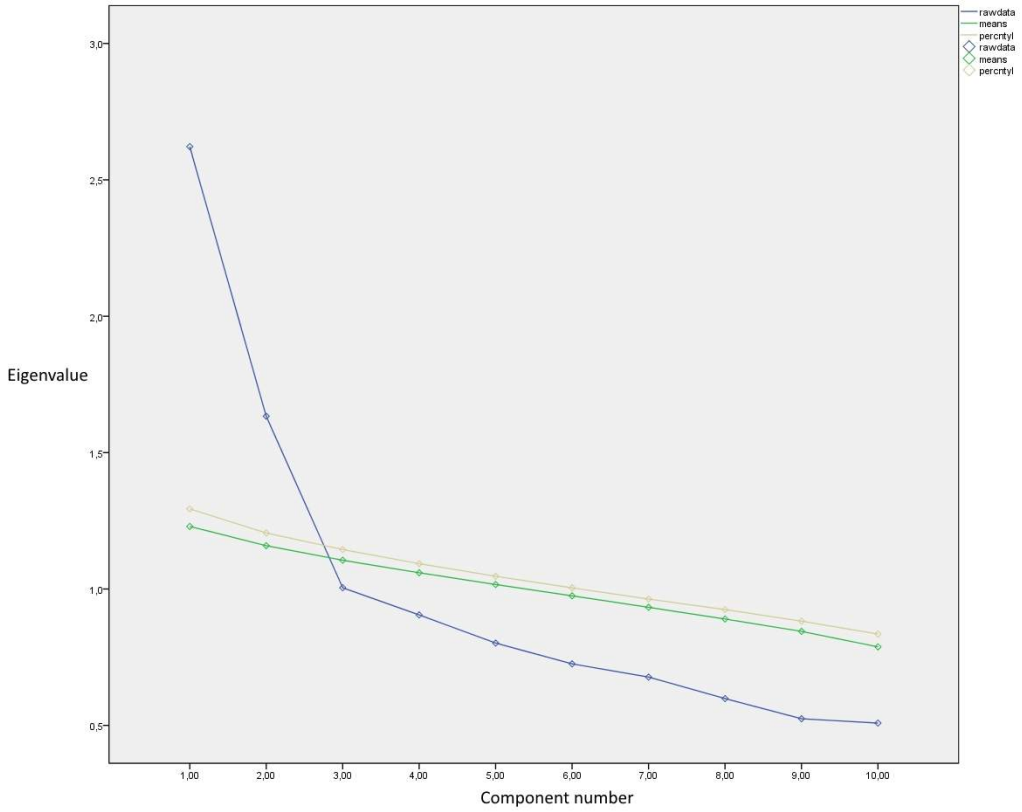
# Parallel analysis

## B.1 All items




*N= 493*

## B.2 10 items




*N= 491*