The influence of entrepreneurial intentions on causation and effectuation

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Acknowledgements

This thesis is written in order to finalize the study of Business Administration with the specialization in International Management. This study is about the influence of entrepreneurial intentions on causation and effectuation based thinking among students.

This interesting topic is familiar to me. I come from a family where three brothers and one sister are entrepreneurs. Although they all have a master degree, they have chosen the path of self-employment. The question which rises in this economic time period where students more often choose to be self-employed is: Is there a relationship between entrepreneurial intentions, causation and effectuation among students?

I am very grateful to Martin Stienstra and I want to thank him for all his patience and constructive feedback to optimize this thesis. I also want to thank my family and my wife for all their patience and support and of course for their positive mentality, when I was down.
One person in particular is very special to me, she always believed that I could overcome every obstacle in my life and would be very proud to see me graduating, that person is my mother. Although she passed away on the 7th of April 2015, she gave me the strength to finish this thesis and not to give up. Mom this is for you!

Abstract

Entrepreneurial intent is rising among students (Thomas & Mueller, 2000). Audretsch and Thurik (2001) explain this by the shift from a managed economy towards an entrepreneurial economy. The managed economy is stable, has a low turnover in jobs and workers, strong demand of products and product homogeneity. The entrepreneurial economy is characterized as more turbulent, less stable and more diverse.

This shift towards the entrepreneurial economy has not led to changes in which decision model will be taught in business schools. Currently the entrepreneurial model of causation is taught which is the traditional way of planning and prediction, but is it still appropriate in times of instability, flexibility and diversity?

Sarasvathy (2001a) mentions causation and effectuation which are two distinct approaches that lead to the creation of new ventures. Sarasvathy (2001a) describes causation and effectuation as follows: *"Causation: processes take a particular effect as given and focus on selecting between means to create that effect. 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"* (p. 245).

The effect of entrepreneurial intent on effectuation is still unclear, although multiple authors like Van Gelderen (2008) and Carsrud (2009) implied to have found connections between personal characteristics of entrepreneurial intent and effectuation principles, this has not been tested. The main research question in this research is: To what extend do entrepreneurial intentions influence the degree of causation and effectuation based thinking among students in the Netherlands?

An empirical quantitative study has been conducted and data is collected through questionnaires. Sixteen items were subtracted from literature to measure entrepreneurial intent and twenty-five items to measure effectuation and causation, both scales are based on existing literature in the fields of entrepreneurial intent, causation and effectuation. However the internal consistencies within the items are low and the Cronbach's Alpha showed disturbing low values. Factor analysis showed that items loaded higher on different subscales than the subscale for which they are intended. The Shapiro Wilk test showed that the data is not normally distributed and advices a non parametric correlation coefficient (Field, 2009).

The Spearman Rho correlation analysis showed a couple of statistical significant relationships between characteristics of entrepreneurial intent and principles of effectuation. There is a positive, association between risk taking and exploiting contingencies. The same accounts for the characteristic locus of control and the effectuation principle of control. Data showed that there is a statistical significant positive relationship between entrepreneurial intent and its characteristics of self-efficacy, locus of control, risk taking and effectuation. This concludes that when a student uses more entrepreneurial intent, he or she will use more effectuation. The expectation of a negative effect between entrepreneurial intent and causation could not be stated, because the analysis showed no significant statistical value.

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1. INTRODUCTION AND RESEARCH DESIGN

1.1 Background

In the last decades the interest in entrepreneurship has increased, not only the number of journal publications and doctorate programs has increased, but also the interest among business school students is growing steadily (Carree & Thurik, 2003; Duxbury, 2012). Thomas and Mueller (2000) mention that entrepreneurship studies are increasing, because of the development that students from diverse fields of studies are choosing the path of new venture creation and becoming an entrepreneur. Academic research on entrepreneurship often highlights the importance of the economic benefits of entrepreneurship, such as job generation and innovation (Van Praag & Versloot, 2007). European politicians often use the slogan "small businesses have to save us" in which they refer to the fear of a high level of unemployment caused by the endless search for efficiency and cost-reduction measures by large firms (Wennekers & Thurik, 1999). As a reaction to international competition, organizations are going through major cost cutting and restructuring processes. The advantages of salary employment, such as job security and reward of loyalty and stability have lost their attraction. Business college students often find starting a company an attractive alternative to salary employment. The work-values of self-employment such as independence, challenge and self-realization have become more attractive (Lüthje, 2003). The Erasmus Centre for Entrepreneurship (2014) conducted a survey among 9907 students in the Netherlands, which showed that six percent of the students already had a company and six percent wants to start his own company directly after graduating. When the students were asked if they would start a company within 5 years after graduating twenty-seven percent answered yes. When looking at these numbers the importance of entrepreneurship studies makes more sense.

This new mindset to self-employment can be described by a quote of Shane (2003): *"it is often said that a person cannot win a game that they do not play, this statement suggests that success depends on people's willingness to become entrepreneurs"* (p.257). Thompson (2009) defines entrepreneurial intent as follows *"a self-acknowledged conviction by a person that they intend to set up a new business venture and consciously plan to do so at some point in the future. That point in the future might be imminent or indeterminate and may never be reached"* (Thompson, 2009, p. 676). Lüthje (2003), Thompson (2009), Chen et al. (1998), and Hayton et al. (2002), mention personal characteristics of new venture creators.
This research mentions three crucial characteristics of an upcoming entrepreneur, they are self-efficacy, locus of control and risk-taking (Hayton et al., 2002).
Self-efficacy is often mentioned as a distinct characteristic of the entrepreneur. Self-efficacy can be seen as a strong belief of an individual that he or she is competent of

successfully achieving the roles and tasks of an entrepreneur (Chen et al., 1998; Carsrud, 2009). Self efficacy affects the behaviour, goals and aspirations of entrepreneurs (Bandura, 2006).
Locus of control is the belief that outcomes mainly depend on one's own action under uncontrollable factors. There is a distinction between internal and external locus of control. Internal locus of control is concerned with the perception, that rewards are pending on individuals own behaviour. External locus of control is concerned with the perception that rewards are controlled by outside factors (Boyd, 1994). Thomas and Mueller (2000) portrait internal locus of control as a psychological trait that individuals believe, that they have considerable influence over results in their lives, this in contrary to external locus of control where individuals believe that their live is dominated by outside forces such as luck, fate or powerful others.
As last risk taking has played a huge role in entrepreneurial studies. Entrepreneurs are seen as risk-takers, they are attracted to risky ventures, which can provide them above average profits and growth. They often accept the risk of a possible bankruptcy and public embarrassment (Palich, 1995). Krueger (2000) mentions that self-efficacy is associated with risk-taking, because the more an entrepreneur believes in itself, the more he or she is willing to increase the risks.

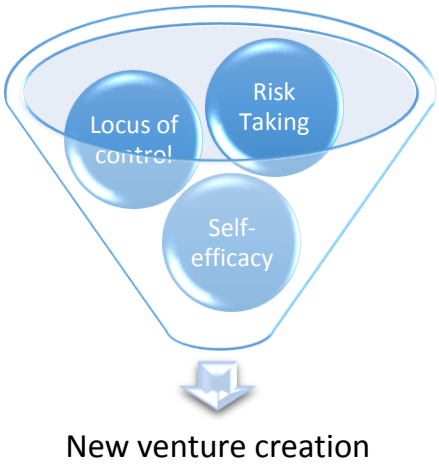

Figure 1 - Personal characteristics of entrepreneurial intent (Hayton, 2002, p.46).

Audretsch and Thurik (2001), and Drucker (2014) describe, that there is a fundamental shift taking place in countries around the world. The shift is from a managed economy towards an entrepreneurial economy. The managed economy could be defined as stable, low turnover in jobs and workers, strong demand of products and product homogeneity. The entrepreneurial economy is characterized as more turbulent, less stable and more diverse. This has also been caused by the massive explosion of growth by Silicon Valley and the new era of technology (Thomas & Mueller, 2000).

The shift towards a more entrepreneurial economy is partially caused by the change in labour contracts. Labour contracts become more targeted towards specific tasks and for a limited period of time, whereas in the managed economy they used to be more general and for an indefinite period of time (Audretsch &Thurik, 2001). As mentioned before by Drucker (2014), the economy is shifting and becoming more dynamic, in many business schools the entrepreneurial decision model of causation is taught, which is deliberate and goal driven (Perry et al., 2011). When making a change to the entrepreneurial economy, which is diverse, flexible and unstable, is it still effective to use the traditional causal way of planning and prediction?
Brinckmann et al. (2010) describes two distinct approaches of business planning: the planning school and the learning school.
The planning school is building on the assumption that planning creates effectiveness and goal achievement and more human action (Ansoff, 1991). This includes predefined goals, evaluation, market research, competitive analysis and prediction.
The learning school is more adaptive and incremental towards new venture creation. Also effective strategies do not have to be a predefined plan but can be emergent patterns, which allow fast responses in an uncertain and unpredictable environment in order to capture opportunities (Brinckman et al., 2010; Mintzberg, 1994).

In order to identify, evaluate and exploit contingencies, entrepreneurs need to go through the entrepreneurial processes (Shane, 2012). There are various approaches entrepreneurs can take in order to create new ventures. Moroz and Hindle (2012) investigated 32 models of entrepreneurial processes, which entrepreneurs can use when starting a new venture. Moroz and Hindle (2012) discuss entrepreneurial processes which are both generic and distinct. Generic means characteristics which relate to entrepreneurial contexts and distinct means unique entrepreneurial characteristics. According to Moroz and Hindle (2012) out of the 32 investigated models, 4 process models could be seen as both generic and distinct. The models which were selected were: Gartner (1985) new venture emergence, Bruyat and Julien (2000) new value creation, Sarasvathy (2001a, 2006) effectuation theory and Shane (2003) opportunity perspective. The work of Sarasvathy differed from most of the models by not using a causation based approach.

Sarasvathy (2001a, 2008) advanced the understanding of the entrepreneurial processes to new venture creating and describes two distinct approaches: causation and effectuation, which lead to the creation of new ventures that are characterized by a combination of planned (causation) and emergent (effectuation) actions.
Chandler (2011) describes causation to be consistent with planned strategy approaches, which include activities as opportunity recognition and business plan development. Effectuation processes are consistent with emergent strategy and involve alternatives based on loss affordability, flexibility and experimentation. In new venture creation

entrepreneurs who follow an effectuation approach are more likely to begin with a general aspiration and create a new venture, but as they make decisions and observe the results, they can use this information to change course. Therefore entrepreneurs using an effectuation approach may try different approaches before settling on a business model (Chandler, 2011).

1.2 Research objective

Literature showed that Sarasvathy's (2001a) effectuation theory could be linked to the learning school, which appears to be more appropriate with the shift to the entrepreneurial economy. As mentioned before the entrepreneurial economy is more flexible, unstable, diverse and unpredictable. The learning school facilitates the fast responses needed on contingencies in an unpredictable environment. The effectuation theory is appropriate for emergent strategies, flexibility and experimentation.

The shift towards an entrepreneurial economy also led to more entrepreneurial intentions among students, as students choose more often for the path to become self-employed, rather than work for an organization. Is a shift towards the learning school necessary? Entrepreneurship courses in many different study directions are based on causal thinking and planning.

The effect of effectuation on entrepreneurial intent is still unclear, although Van Gelderen (2008) and Carsrud (2009) implied to have found connections between personal characteristics of entrepreneurial intent and effectuation principles.

The research gap which can be created is: To which extend do entrepreneurial intentions influence the degree of effectuation and causation based thinking among students? Will the personal characteristics of entrepreneurial intent be reflected among students in the use of an effectuation approach?

Figure 2 - Shift towards effectuation.

1.3 Research questions

In order to achieve the mentioned research objective. The following central research question is formulated.

To what extend do entrepreneurial intentions influence the degree of causation and effectuation based thinking among students in the Netherlands?

The following sub question has been formulated to answer the central question:

How do specific personal characteristics of entrepreneurial intent relate to causation and effectuation?

1.4 Outline of the thesis

This chapter mentioned my motivation for this thesis and gave a preview on the research that is conducted in this thesis. It also addresses the research objective and the central research question. In chapter 2 the theoretical framework and the hypotheses are shown. This chapter will present the most important concepts of causation, effectuation and entrepreneurial intent. This will lead to the hypotheses which are based on the theoretical framework. Chapter 3 will give insight into the research methodology and includes the research approach, data collection, research measures and the response rates. In Chapter 4 the actual data analysis will be shown, this will indicate if the hypotheses can be accepted or rejected. Chapter 5 will discuss all the theoretical findings and draw a conclusion, also limitations and recommendations for further research will be given.

2. THEORY

This chapter contains a literature review of all main concepts relevant to this master thesis. The concepts of causation and effectuation and their underlying principles are analyzed. Furthermore entrepreneurial intent and its principles of risk taking, locus of control and self efficacy will be explained. Finally a combination of effectuation and entrepreneurial intent will be made to outline this research and the hypotheses will be stated.

2.1. Causation versus Effectuation

2.1.1 Introduction

First of all the definition of causation and effectuation will be defined by the literature of Sarasvathy (2001a) which is as follows, *"Causation: processes take a particular effect as given and focus on selecting between means to create that effect. 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"* (p. 245).

Literature by Sarasvathy (2001a) states that effectuation is the opposite of causation. Causation models start with an effect to be created. They either select between means to achieve the chosen effects or they create new means to achieve preselected effects. Effectuation models start with the given means and search for ways to create new ends and use non-predictive strategies (Sarasvathy, 2008).

Causation and effectuation are both seen as integral parts of human reasoning. Causation and effectuation can occur simultaneously and intertwine over different contexts of action and decision taking (Sarasvathy, 2001b). *"The effectuating entrepreneur vision appears to involve more than the identification and pursuit of an opportunity; it seems to include the very creation of the opportunity as part of the implementation of the entrepreneurial process"* (Sarasvathy, 2001a, p. 249).

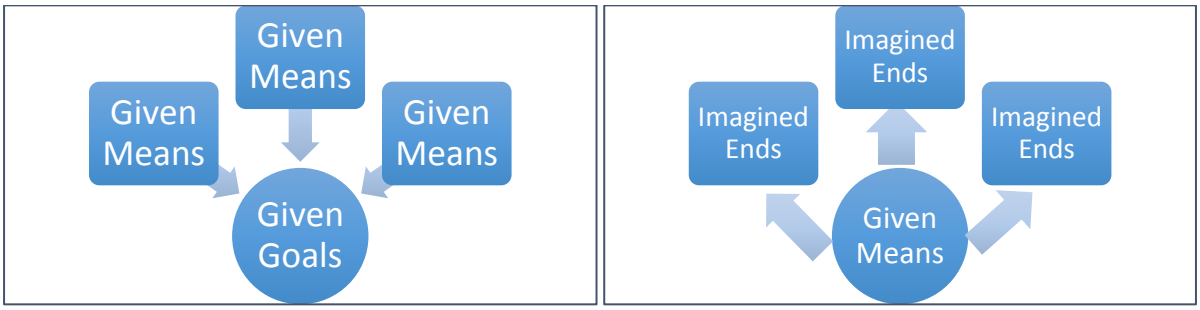

Figure 3 - Causal reasoning vs. effectual reasoning. Based on Sarasvathy (2001a).

Chandler et al. (2011), mentions that causation and effectuation can be seen as two dichotomous approaches, which can be used by entrepreneurs when creating new ventures. Causation is consistent with planned strategy approaches and effectuation is consistent with emergent or non-predictive strategies. Entrepreneurs that use an effectuation approach in new venture creation might start off with general aspirations, but as they make decisions on the way, they use new information to change their course, because the future is unpredictable (Chandler et al., 2011). Sarasvathy (2001a) mentions that the underlying logic is as follows: *"to the extent that we can control the future, we do not need to predict it"* (p. 252).

Sarasvathy (2008) describes the differences between causation and effectuation in different stages of new venture creation. Causal problems are problems of decision and effectual problems are problems of design. Causal logic helps with choosing and effectual logics helps with constructing. Causal strategy is useful when you can predict the future and the goals are clear and the environment is independent of our actions. Effectual strategy is useful when you cannot predict the future and the goals are unclear and the environment is driven by human actions. The causal actor starts off with an effect he wants to create and asks himself, 'what should I do to achieve this effect?' The effectuator starts off by looking at the means and asks, 'what can I do with these means?' And then again, 'what else can I do with them?'

2.1.2 The principles of effectuation

The effectual process is based on five principles as Sarasvathy (2001a, 2001b, 2008) describes:

Principle 1: Goals vs. means:
This principle is based on designing possible outcomes with a particular set of means. What separates causation and effectuation is the choice among means to create a particular effect or designing possible effects using a particular set of means (Sarasvathy, 2001a). Sarasvathy (2008) describes means as the identity, the knowledge and the social network, also: who I am, what I know and whom I know. Knowledge has been examined in prior research, although identity is unexamined and needs more attention. Sarasvathy (2008) mentions, that identity can come from areas in a person's live, such as: religion, political interest, childhood traumas and sports. The effectual entrepreneur will use these three types of means in his process.

Principle 2: Affordable loss rather than expected returns:
Causation models are based on maximizing returns by searching for optimal strategies. Effectuation will commence with a predetermination of how much one is willing to lose and will leverage means that are limited in creative ways to generate new ends as well as

new means. This will lead to experimenting with as many strategies as possible with the given limited means (Sarasvathy, 2001a). For example a person that uses causation will calculate up front how much money they need to start their venture and invests time, effort and energy in raising that money. The effectuator will try to estimate the downside and examines how much money they are willing to lose in order to start their venture. Instead of calculating how much money they need, the effectuator will use the process of venture building to bring other stakeholders on board and creatively leverage inefficient resources. In each stage of the process an option will be chosen that creates more options in the future.
When relying on the principle of affordable loss and using it to make decisions in the process of new venture creation, the effectuator reduces the dependence on future prediction. When calculating expected returns, there is a greater dependence on future prediction, such as the estimation of future sales and possible risks that amount to the cost of capital and raising enough money to build the venture. When calculating affordable loss all there is to know is the current financial condition and a psychological estimate of the commitment to a worst-case scenario (Sarasvathy, 2008).

Principle 3: Strategic alliances rather than competitive analysis:
This principle emphasizes on alliances and pre-commitments from stakeholders in order to reduce and eliminate uncertainty and dismantle entry barriers. When using effectuation, the choice of stakeholders is not based on preselected ventures or venture goals. Effectuators allow stakeholders based on their commitment to participate actively in the creation of the venture. This principle eliminates uncertainty by including certain dimensions for the future and making the network grow. Causal models, such as the Porter model emphasize on competitive analyses (Sarasvathy, 2001a).

Principle 4: Exploitation of contingencies rather than exploitation of pre-existing knowledge:
Sarasvathy (2001a) describes that effectuation is better in exploitation of contingencies, because effectuators leverage uncertainty and see contingencies as a chance to exercise control on an unforeseen event. Causal models always try to avoid uncertainty and focus more on the achievement of predetermined goals, in spite of emerging situations. Surprises are often related to error terms in formal models. In effectual logic, surprises can be seen as a source for opportunities to create more value (Sarasvathy, 2008).

Principle 5: Controlling an unpredictable future rather than predicting an uncertain one: Causal and effectual logics both search for control over the future, but effectuation emphasizes on the controllable parts of an unpredictable future, "*to the extent that we can control the future, we do not need to predict it"* (Sarasvathy, 2001a, p. 252). Causation however puts emphasis on the predictable aspects of an uncertain future, "*tothe extent that we can predict the future, we can control it"* (Sarasvathy, 2001a, p. 252). This principle of control is very useful in areas where human action is a predominant factor in shaping the future (Sarasvathy, 2001a).

Sarasvathy (2001a) embodied the five dimensions of effectuation, "*which can be seen as the core of the rudimentary theory of effectuation*" (p.252). The differences between causation and effectuation are graphically shown in Table 1.

Categories of differentiation	Causation processes	Effectuation processes
Givens	Effect is given	Only some means or tools are given
Decision-making selection criteria	Help choose between means to achieve the given effect Selection criteria based on expected returns Effect dependent: Choice of means is driven by characteristics of the effect the decision maker wants to create and his or her knowledge of possible means	Help choose between possible effects that can be created with given means Selection criteria based on affordable loss or acceptable risk Actor dependent: Given specific means, choice of effect is driven by characteristics of the actor and his or her ability to discover and use contingencies
Competencies employed	Excellent at exploiting contingencies	Excellent at exploiting contingencies
Context of relevance	More ubiquitous in nature More useful in static, linear, and independent environments	More ubiquitous in human action Explicit assumption of dynamic nonlinear, and ecological environments
Nature of unknowns	Focus on the predictable aspects of an uncertain future	Focus on the controllable aspects of an unpredictable future
Underlying logic	To the extent we can predict the future, we can control it	To the extent we can control the future, we do not need to predict it
Outcomes	Market share in existent markets through competitive strategies	New markets created through alliances and other cooperative strategies

Table 1 - Contrasting causation and effectuation (Sarasvathy, 2001a, p.251)

2.2 Entrepreneurial intent

This chapter will go in depth on entrepreneurial intentions and the personal characteristics, risk taking, locus of control and self-efficacy.

2.2.1 Introduction.

As mentioned before, Lüthje (2003) concludes that students and graduates often see the founding of a company as an attractive alternative to wage or salary employment. The work values connected with self-employment such as independence, challenge and self-realization have become increasingly more attractive, this from the fact that there is more disappointment among employees in companies. One of the prominent reasons for disappointment is that companies are going through major cost cutting and restructuring processes. Advantages of being an employee, such as job security, reward of loyalty and stability are losing their attraction.

Thompson (2009) described a clearer definition of the term entrepreneurial intent and used multiple researches to come to a new definition. Thompson defines entrepreneurial intent as *"a self-acknowledged conviction by a person that they intend to set up a new business venture and consciously plan to do so at some point in the future. That point in the future might be imminent or indeterminate and may never be reached."* (Thompson, 2009, p. 676). Individuals could have entrepreneurial intent but they actually do not need to set up a new venture, because of various personal circumstances and environmental factors that may conflict with this (Thompson, 2009).

Thompson (2009) mentions that when individuals stumble upon newly discovered opportunities, the exploitation of these new discovered opportunities will start with firm intentions that will lead to action. Krueger (2007) highlights that behind entrepreneurial actions, there are entrepreneurial intentions and not every individual will have those intentions.

Lüthje (2003) includes in his research of entrepreneurial intentions, risk taking propensity and locus of control as two personal characteristics. Both constructs have been proven to be important as characteristics of new venture creators. Chen et al. (2001) include the characteristic of self efficacy to entrepreneurial intentions, as explained in 2.2.2.

2.2.2 Self-efficacy

Chen et al. (2001) research showed that entrepreneurs have a higher self-efficacy in innovation and in risk taking than non-entrepreneurs, also that self-efficacy could be seen as a distinct characteristic of the entrepreneur. There are many individuals that avoid entrepreneurial activities, because they believe that they do not have the necessary skills. Entrepreneurial self-efficacy is a strong belief of an individual that he or she is competent of successfully achieving the roles and tasks of an entrepreneur (Chen et al., 1998).

Self-efficacy can be defined as "*one's capability to mobilize the motivation, cognitive resources, and courses of action needed to meet given situational demands"* (Chen et al., 2001, p. 62). Research has shown that self-efficacy is important on the fields of job performance, training proficiency and job attitudes. Bandura (2006) mentions that self-efficacy is concerned with people's beliefs in their capabilities to produce given acquirements. Self-efficacy should not been confused with self-esteem or locus of control, they are completely different phenomena. Self-esteem is an opinion of self worth, while self-efficacy is a judgement of capabilities.

Locus of control states the belief about outcome of contingencies and is not concerned with perceived capability, whether the results are determined by your own actions or by forces outside your control. Bandura (2006), explains this by an example of students that may believe that high grades are strongly dependent on their own performance (high locus of control), but feel hopeless because they think they lack the efficacy to produce superior grades. The difference between self-efficacy and outcome expectations is that self-efficacy is a belief of capability to execute given performances. Outcome expectations are a judgement on the outcomes that are likely to come out of those performances (Bandura, 2006).

Efficacy plays a big role in human functioning, because it affects behaviour, goals and aspirations. Efficacy influences whether people think erratically or strategically, optimistically or pessimistically. Efficacy actually influences the path of actions people choose and pursue, which goals and challenges they set and how committed they are to achieve their goals, how much time and effort they put in projects and which outcomes they think their efforts will produce and how long they will continue when facing difficulties. The influences of self-efficacy also determine which choices they make and which achievements get realized, self-efficacy has a huge role in self development, adaptation and change (Bandura, 2006).

Chen et al. (1998) confirm the statements made by Bandura (2006) and add that people with high self efficacy have more interest in tasks and are more willing to put more effort when facing difficulties, this results in a more effective performance. Self-efficacy and performance can be seen as a cycle in which they reinforce each other. Self-efficacy will affect performance through interest, motivation and persistence, whereas performance gives feedback on which self-efficacy can be appraised and altered.

2.2.3 Locus of control

Lüthje (2003) mentions that numerate literature acknowledge locus of control as a personal characteristic of new venture creators, locus of control has proven to be important in influencing the level of aspiration to become an entrepreneur. Brockhaus and Horwitz (1986), mention that individuals with a high level of internal locus of control are moderate risk takers and students with entrepreneurial intentions have a higher locus of control than students who do not have entrepreneurial intentions. Mueller and Thomas (2001) mention that locus of control can be described as a personal characteristic which motivates entrepreneurial behaviour. Locus of control has been one of the most researched psychological traits in entrepreneurship research.

There is distinction between internal and external locus of control. Internal locus of control is concerned with the perception that rewards are depending on individuals own behaviour. External locus of control is concerned with the perception that rewards are controlled by outside factors (Boyd, 1994). Thomas and Mueller (2000) portrait internal locus of control as a psychological trait that individuals believe that they have considerable influence over results in their lives, this in contrary to external locus of control where individuals believe that their live is dominated by outside forces such as luck, fate or powerful others. It is expected that entrepreneurs are more likely to use internal locus of control than external locus of control. Internal locus of control is more used, because of the perception that the achievements of a new venture are highly influenced by personal effort (Chen et al., 1998; Mueller & Thomas, 2001).

2.2.4 Risk taking

There is one common subject in entrepreneurial studies and it revolves around predisposition towards risk-taking (Palich, 1995). Brockhaus and Horwitz (1986) mention that the first formal theory about entrepreneurship dates from 1755 and is written by Cantillion. Cantillion described entrepreneurs as self-employed individuals who can adjust themselves to risk, in situations where the return is uncertain. Although entrepreneurship has a lot of definitions, in literature it is widely considered that entrepreneurs are attracted to risky ventures which promise above average profits and growth. Studies about entrepreneurship also show that entrepreneurs are seen as more optimistic in their assessments of new venture creation (Palich, 1995).

When creating a new venture, the entrepreneur has the risk of financial failure (bankruptcy) and public embarrassment. When creating a successful venture, the entrepreneur gains wealth, independence and the feeling of accomplishment. Based on the above, there is a certain risk involved in new venture creating, it is reasonable to assume that tolerance for risk is more found among individuals that choose to become entrepreneurs (De Pillis, 2007). Finally Brockhaus (1980) defines risk taking in new venture creation as "*the perceived probability of receiving the rewards associated with success of a proposed situation, which is required by an individual before he will subject himself to the consequences associated with failure, the alternative situation proving less reward as well as less severe consequences than the proposed situation*" (p. 513).

2.3 Combining entrepreneurial intent and causation and effectuation

In this chapter the hypotheses are formulated based on the combination of the personal characteristics of entrepreneurial intent and the principles of causation and effectuation. Table 2 gives an overview of the characteristics of entrepreneurial intent and the principles of causation and effectuation. Based on literature review the best fit has been chosen between the characteristics of entrepreneurial intent and the causation and effectuation principles, these matches are formulated in the hypotheses below and will be statistically analyzed in this research. The hypotheses are formed in a positive and negative direction. Entrepreneurial intent and effectuation are positive formulated and entrepreneurial intent and causation are negative formulated. These hypotheses are in line with Brettel et al. (2012), who formed a bipolar dichotomous questionnaire in order to investigate if causation and effectuation are polar opposites. The hypotheses are created to test the association between personal characteristics of entrepreneurial intent and the causation and effectuation principles, this in order to investigate the strength of the relationship and the direction in which they are associated, positive or negative.

The first combination made is the personal characteristic of self efficacy and the effectuation principle means driven.

As mentioned before by Bandura (2006) efficacy affects behaviour, goals and aspirations, self-efficacy is a judgement of the entrepreneur's capabilities. Capabilities of an entrepreneur can be seen as: their identity and roles, their knowledge and their ability to cooperate with key stakeholders (Philip & Tracey, 2007). This can be linked to the means: who I am, what I know and whom I know, which comprehend with the effectuation principle of means driven. This combination of self-efficacy and the effectuation principle choosing between possible effects with given means (means driven), should give upcoming entrepreneurs some confidence that although their resources may be limited, there are other ways to achieve or adjust your goals (Van Gelderen, 2008). Carsrud (2009) mentions that entrepreneurs who believe that they are able to succeed will pro-actively create their environment, this implies that entrepreneurs will change the chances and adjust the world to be successful. The expected effect is that self-efficacy and the effectuation principle of means driven will be positively associated and self-efficacy and the causation principle of goals driven will have a negative association.

Based on these findings the following hypotheses are formulated:
H1a: There is a positive association between self-efficacy and the principle of means driven.
H1b: There is a negative association between self-efficacy and the principle of goals driven.

The second combination made is the personal characteristic of risk taking and the effectuation principle of exploiting contingencies.

Examining the principle of risk taking in entrepreneurial intent literature, there can be concluded that an individual with a high risk taking propensity would not avoid contingencies, rather it would exploit, adapt or dominate them. Zahra and Covin (1995) mention that risk taking and innovation are key elements of entrepreneurship. Risk taking is an important element in terms of uncertainty and when facing contingencies. According to Brockhaus and Horwitz (1986) the principle of risk taking is based on adjusting to risk in situations where the returns are uncertain and avoiding contingencies would not be adjusting to situations. The expected effect is that risk taking and the effectuation principle of exploiting contingencies will be positively associated and risk taking and the causation principle of avoiding contingencies will have a negative association.

Based on these findings the following hypotheses are formulated:
H2a: There is a positive association between risk taking and the principle of exploiting contingencies.
H2b: There is a negative association between risk taking and the principle of avoiding contingencies.

The final combination made is the personal characteristic of locus of control and the effectuation principle of controlling an unpredictable future.

Chen et al. (1998) and Mueller and Thomas (2001) mention that locus of control is based on the principle that individuals are in control of their own life and outcomes are influenced by their own efforts. For this reason it fits well with the principle of effectuation, focussing on the controllable aspects of the future and not trying to predict it. Prediction and analysis of the uncertain future is opposing to the principle of locus of control. Therefore the expected effect is that locus of control and the effectuation principle of controlling an unpredictable future are positively associated and locus of control and the causation principle of predicting the future will have a negative association.

Based on these finding the following hypotheses are formulated:
H3a: There is a positive association between locus of control and the principle of control.
H3b: There is a negative association between locus of control and the principle of prediction.

The combination of the personal characteristics of entrepreneurial intent and the principles of causation and effectuation literature will be made in the table below. The dark blue principles will be linked together and further examined.

Personal characteristics entrepreneurial Intent	**Principles causation effectuation Sarasvathy**	**Causation Principles**	**Effectuation principles**
Self-efficacy is a strong belief of an individual that he or she is competent of successfully achieving the roles and tasks of an entrepreneur.	Means vs. Goals	Choose between means to achieve the given effect (Goals driven).	**Choose between possible effects that can be created with given means. (means driven)** **Who am I** **What I know** **Whom I know**
	Selection criteria based on expected returns	Selection criteria for strategies are based on expected returns. Calculating future sales and possible risks.	Strategy selection is based on affordable loss or acceptable risk.
	Partnerships vs. competitive analysis	Research on the market and competition and estimate the potential risk and returns of the venture.	Partnering with committed stakeholders. Creating alliances. Do not worry about cost or competitive analysis.
Risk taking is adjusting to risk in situations where the return is uncertain.	Leveraging contingencies vs. avoiding contingencies	Avoid contingencies and focus on a pre-set goal.	**Exploit contingencies, rather than avoiding.**
Locus of control is that individuals believe that they have considerable influence over results in their lives.	Control vs. prediction (pilot in the plane)	Focus on predicting an uncertain future through analysis and forecasts.	**Avoiding prediction and analysis of the uncertain future. Focus on the controllable aspects of the future.**

Table 2 - Combining personal characteristics with effectuation

3. RESEARCH METHODOLOGY

This chapter will clarify the empirical quantitative study that has been performed. It will explain the establishment of the questionnaire, the sample, the data collection method and the reliability. Multiple analyses are performed.

3.1 Sample

The sample of this research primarily consists of students. The sample frame that is constructed consists of students who are currently studying or have graduated not longer than a year ago. Student samples have been widely used by many researchers. Dew et al. (2007) used MBA students to compare them with expert entrepreneurs in using effectual logic in decision making. Lüthje (2003) explored entrepreneurial intent researching 512 students at the MIT School in Cambridge. Sagie and Elizur (1999) researched entrepreneurial orientations among different studies and used a student sample from two studies. Thompson (2009) used a student sample of an English based University in East Asia, in order to create a new entrepreneurial intent scale. Wang and Wong (2004) explored the interest in entrepreneurship among university students in Singapore.

The students are selected on their level of education and in this study only students of applied sciences and academic studies are allowed, this to ensure that the respondents understand the terminology which is used in the questionnaire. Dew et al. (2009) mention that when having a student sample, among students with the same degree of education, an assumption can be made, that their knowledge will ensure a common baseline. When creating a sample of students and non-students, there cannot be assumed that each individual will understand and interpret the same question as the others, they will probably lack the basic business knowledge.

Thomas and Mueller (2000) mention that entrepreneurship studies have shifted, because of the development that students from diverse fields of studies are choosing the path of new venture creation and becoming an entrepreneur. For that reason this research will not exclude any studies. Not only business school students come across causation and effectuation terminology, since many other studies also have entrepreneurship classes. For example dentistry and physiotherapy studies have a program called business management, which includes writing your own business plan.

3.2 Data collection

The collection of the data has been done by multiple master students. Each master student was researching different subjects and research questions. The decision was made to bundle all our questions to one large questionnaire. This would have some advantages as getting more respondents, because of the multiple efforts of each master student.

Starting point of the data collection was the University of Twente. The main reason for this starting point is that all the data collectors and I have a high accessibility to respondents at the University. The data collection started with accessing our networks at the University and asking fellow students to help out by filling in the questionnaire. Through multiple channels approximately 5000 students were asked to fill in the questionnaire. This resulted in 755 respondents that filled in the entrepreneurial intent questions and 530 (70%) respondents that filled in the effectuation and causation questions.
82% of the respondents that filled in the complete questionnaire are students at the University of Twente.

An application to digitally fill in the questionnaire was used. It was chosen, because of the options which it delivered. It gave a clear view of all the questions on each page for the respondents, it also provided options to collect all the data in SPSS and gave clear views of the respondents' answers. Lüthje (2003) mentions that response rates for electronic questionnaires are generally reported lower than physically distributed questionnaires. After developing the questionnaire, we send an online link to the questionnaire to all our contacts. The following data collection methods were used:

1. Students' personal emails were obtained through the public database of the University of Twente. Emails were then send which informed students to fill in the questionnaire. The email contained a brief explanation about the subject and objective of the questionnaire, this enhancing the subject awareness.
2. The data collectors used their personal networks to ask students to fill in the questionnaire. These could be friends, colleagues, classmates, neighbours, acquaintances etc. In this part of the data collection the sampling technique of snowballing was used to obtain as much data as possible. Babbie (2015) mentions snowball sampling as asking respondents to locate other individuals to fill in the questionnaire.
3. Hard-copies were distributed in the library and in other work/study places in the University buildings.
4. Linkedin, Twitter and Facebook were used to send out the online link to fill in the questionnaire.

In order to increase the respond rate, contacts would get reminder emails to fill in the online questionnaire. Also the hard-copy distribution method was very effective, because students could see the data collectors they were helping by filling in the questionnaire and when forgetting to fill in questions they could be reminded on the spot.

3.3 Scale development

3.3.1 Scale development entrepreneurial intent.

Entrepreneurial intent and its characteristics have been measured using literature of Thompson (2009), Chen et al. (1998, 2001) and Lüthje (2003). This gives the advantage that measurement items are checked for validity and reliability, also the same scales as in the literature have been used, for entrepreneurial intent and the characteristics. As an instruction to this topic in the questionnaire, the importance of self-assessment and honesty was emphasized in order to reduce social desirability. Clear instructions were given to keep the amount of questions low in order to avoid a long questionnaire. Long questionnaires are associated with lower response rates and often the questions near the end are filled in differently than in the beginning, this leading to higher rates of "don't knows" (Galesic & Bosnjak, 2009). The research of Galesic and Bosnjak (2009) indicates that short questionnaires of 8-10 minutes have a higher response rate than questionnaires of 20 minutes.

Thompson (2009) created a new entrepreneurial intent scale with a 6 point likert scale from very untrue (1) to very true (6). He mentions that the scale is reliable and internationally applicable. Although his original measurement scale contained ten items, four items were used as distracter items. These items are deleted to keep the questionnaire short. Thompson (2009) also used three reverse coded items, which are recoded in the analysis.

Chen et al. (1998) measured locus of control with a 5 point likert scale from completely unsure to completely sure. The items with the highest factor loadings are used in this research. Their measure is strongly based on Levenson (1973), Chen et al. (1998) adjusted it in order to increase the reliability and validity.

Chen et al. (2001), created a new self-efficacy scale. They mention that the new scale is short but a more valid tool for collecting the benefits of self-efficacy for research. A 5 point likert scale was used from strongly disagree (1) to strongly agree (5). Chen et al. mention that their self-efficacy scale has higher validity than previous scales and has a higher reliability. The self-efficacy scale of Chen et al. can predict self-efficacy and has been tested in multiple countries.

Lüthje (2003) developed a measurement scale for multiple items including risk taking, which is used in this research. The measure is created by explorative interviews and using relevant literature. A 5 point likert scale has been used from not at all accurate (1) to very accurate (5). All questions can be found in appendix A.

3.3.2 Scale development causation and effectuation

The measurement items for causation and effectuation are strongly based on the literature of Wiltbank (2009), Chandler et al. (2011), and Brettel et al. (2012). A broad measurement scale has been chosen based on research of Alsos et al. (2014). The scale for all items is based on a 7 point likert scale from strongly disagree (1) to strongly agree (7).

The research of Brettel et al. (2012) is used to describe the first four principles of effectuation and causation. The last items (control and prediction) have been established using literature of Wiltbank et al. (2009). All questions, dimensions and sources, can be found in appendix B.

A couple of questions of Brettel et al. (2012) could not be used, because they were specific for the R&D context. These items were removed. Brettel et al. (2012) used a dichotomous scale to measure causation and effectuation and the scale forced students to choose between statements. This measure is not replicated during this study.
Perry et al. (2012) mentions, that causation and effectuation are not direct opposites and students can choose between different strategies. For that reason a 7 point unipolar likert scale has been used provided by the literature of Wiltbank et al. (2009).

In order to get feedback on the measurement items both used for entrepreneurial intent and causation and effectuation, a small group of students were asked to give feedback on the questionnaire. The feedback received by the pilot mentioned that a negative 7 point likert scale was too confusing. These questions were removed and only positive questions were used to prevent confusion. Students that participated in the pilot were interviewed and asked questions about the understandability, reading easiness and difficulty of the questions. This led to the correction of English grammar and poor wording of items.

3.4 Reliability

Field (2009) mentions, that in order to test the reliability of the data, the Cronbach Alpha could be measured. The Cronbach Alpha should be higher than .7 to indicate a satisfying level of internal consistency for the scale and specific sample (Field, 2009).

All the Cronbach's Alpha's are shown in table 3. Entrepreneurial intent, causation and self-efficacy are the only three items above the minimum 0.7 Cronbach's Alpha. Although Field (2009) already warned that this could happen, when there are variables with a low amount of items. When a variable is large, it is more probably to have a higher Cronbach's Alpha, than when a variable is small and only consists of for example 3 items. It is of concern that effectuation does not hit the 0.7 mark, because it is a large variable with 13 items. Effectuation has a low internal consistency for the scale and could not be called reliable.

Variable	Cronbach's Alpha	Number of Items
Entrepreneurial Intent	.847	6
Effectuation	.614	13
Causation	.783	12
Self-efficacy	.715	4
Locus of control	.542	3
Risk Taking	.527	3
Means	.107	3
Leveriging contingencies	.534	3
Control	.432	2
Goals	.492	2
Avoiding contingencies	.500	3
Prediction	.352	2

Table 3 - The Cronbach's Alpha for all variables.

Furthermore factor analysis is used to research the subscales in causation and effectuation. Factor analysis explores the underlying dimensionality of the items (Chandler, 2011). Kaiser's criteria of eigenvalues are used to describe the amount of variation explained by a factor. Before starting with the correlation analysis, the distribution of the sample is examined. The Kolmogorov-Smirnov test and the Shapiro-Wilk test explain the distribution of the sample. When the tests are significant, the sample is not normally distributed and a non-parametric correlation coefficient is required. Furthermore a bivariate correlation analysis measures the relationship between the variables.
A regression analysis is used in order to measure the relationship among variables. Self-efficacy, locus of control and risk taking will be linked as predictors of entrepreneurial intent. Goals driven, avoiding contingencies and using prediction are linked to causation. Means driven, exploiting contingencies and control are linked to effectuation.

The regression analysis shows how well the variables contribute to the models of entrepreneurial intent, causation and effectuation.

The questionnaire mentioned multiple control variables at the end of the questionnaire. Questions relating to: gender, nationality, study, family, entrepreneurial intentions, and effectuation literature. It is interesting to check the association between the interest in starting a business and knowing about the concept of effectuation. Preliminary testing of an association between knowledge about effectuation and intent to start an own business a Chi^2-Test is conducted. The test turns out statistically not significant ($\chi^2_{(4)}$= 5.67; p = .23). It seems safe to assume that there is no association between knowledge of the concept of effectuation and the intention to start an own business.

4. RESULTS

This chapter describes how the data has been analyzed and which results the data revealed. This chapter starts with a factor analysis, followed by the correlation analysis and as last the regression analysis. This chapter will answer the hypotheses and bring new insight to this research.

4.1 Dimensionality

Dimensionality refers to factor selection. Field (2009) mentions the Kaiser criterion which recommended retaining all factors with eigenvalues above 1. "*This criterion is based on the idea that the eigenvalues represent the amount of variation explained by a factor and that an eigenvalue of 1 represents a substantial amount of variation*" (Field, 2009, p.640). According to Kaiser's criterion of eigenvalues above one, six factors of causation and effectuation are identified. Eigenvalue above 1 = 1.07; cumulative percentage = 50.72 this does not comprehend with the causation and effectuation scale.

In order to force two factors on the causation and effectuation scale, the use of the varimax rotation method is selected. Chandler et al. (2011) recommend orthogonal rotation, which keeps the factors unrelated in contrary to oblique rotation which correlates between factors. Varimax is recommended by Field (2009) because: "it is a good general approach which simplifies the interpretation of factors" (p. 644). If two factors are forced on the causation and effectuation scale, the varimax rotated factor loadings do confirm the causation and effectuation scale (Eigenvalue = 3.30; cumulative percentage. 30.01), this is accepted by Kaiser's criteria.

Table 4 shows the factor loading for the items when forced in two factors. Only two items of causation, which belong in the principle of avoiding contingencies, have higher factor loadings on the effectuation side. For both items the difference is 0.1. From this the assumption can be made that the items of causation do comprehend with the causation scale.

Table 4 also shows the factor loadings for the effectuation items. This shows that nine items of effectuation score higher in the causation component. This is worrying, because it seems that the effectuation items are not measuring where they are intended for. This will be investigated further by doing a factor analysis on causation and effectuation and both their subscales.

Questions	Causation	Effectuation
Decisions will be primarily based on analysis of potential future returns.	0.51	
I will always pay attention that my initially defined target will be met.	0.59	
I will try to identify markets by a thorough market analysis.	0.56	
Before starting my new venture, I will first acquire all resources needed to achieve my target.	0.54	
Beforehand, I will calculate how many resources I need to achieve the expected returns.	0.55	
I take a clearly pre-defined target as a starting point of the new venture.	0.59	
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	
My first priority is reaching my pre-set target without any delay.	0.35	-0.45
I will focus on early identification of risks through market analysis.	0.64	
My planning will be set before I start the implementation process and cannot be altered afterwards.	0.32	-0.42
I will try to identify risks by a thorough competitors analysis.	0.66	
I will try to control the future based on predictions of my previously obtained knowledge.	0.52	
I allow changes in my planning if needed, even during the implementation process of my new venture.		0.69
I expect to change my original target when confronted with new findings.		0.58
The uncertainty of a market will not block me since I rely on my own experience to imagine opportunities.		0.46
The decisions I make when starting my new venture will be based on the resources I have available.	0.38	0.17
I allow delays during the development of my new venture when new opportunities emerge.		0.57
Decisions will be made together with stakeholders based on our competences.	0.44	0.29
I will try to control the future by creating it.	0.33	0.28
Decisions will be primarily based on minimization of risks and costs.	0.51	-0.27
I will talk to people I know to enlist their support in making opportunities a reality.	0.52	0.40
I only spend resources I have available and I am willing to lose.	0.31	0.11
I start my new venture without defining a clear target.	-0.31	0.06
I will ask my private network to help me out with starting my new venture.	0.32	0.31
I will ask customers and suppliers to pre-commit to my new venture in order to reduce risks.	0.46	0.00

Table 4 - Varimax rotation factor analysis effectuation and causation scale.

Factor analysis for effectuation show that through Kaiser's criterion of eigenvalues, three factors are identified (eigenvalue above 1 = 1.24; cumulative percentage = 42.45) this does not agree with the effectuation sub scales. If five factors are forced, the varimax rotated factor loadings do not quite confirm the effectuation subscales (eigenvalue = 0.94; cumulative percentage. 57.17). The items of leveraging contingencies all fit one subscale and have good ratings above .45. Field (2009) mentions that factor loadings below .45 can be seen as poor. The items of partnerships also fit one subscale and have acceptable factor loadings, the same accounts for the items of affordable loss. The items of control are divided between two subscales one item has a high factor loading on the subscale of partnerships. The question "I will talk to people I know to enlist their support in making opportunities a reality" appears to fit with the subscale of partnerships. The items of means are strongly divided into three subscales, this is of concern and it could be that these questions are not well formulated to match their subscale of means.

Effectuation Items	**1**	**2**	**3**	**4**	**5**
I allow changes in my planning if needed, even during the implementation process of my new venture.(lev cont)	0.74				
I expect to change my original target when confronted with new findings. (lev cont)	0.65				
The uncertainty of a market will not block me since I rely on my own experience to imagine opportunities.(means)	0.46		-0.38		0.27
The decisions I make when starting my new venture will be based on the resources I have available.(means)				0.75	-0.02
I allow delays during the development of my new venture when new opportunities emerge.(lev cont)	0.61				
Decisions will be made together with stakeholders based on our competences.(partnerships)		0.47		0.48	
I will try to control the future by creating it.(control)				-0.42	
Decisions will be primarily based on minimization of risks and costs.(affordable loss)			0.76		
I will talk to people I know to enlist their support in making opportunities a reality.(control)		0.65		0.11	-
I only spend resources I have available and I am willing to lose. (affordable loss)			0.57		
I start my new venture without defining a clear target. (means)					0.93
I will ask my private network to help me out with starting my new venture.(partnerships)		0.77			
I will ask customers and suppliers to pre-commit to my new venture in order to reduce risks.(partnerships)		0.59			

Table 5 - Factor analysis effectuation

Factor 1: Leveraging contingencies
Factor 2: Partnerships
Factor 3: Affordable loss
Factor 4: Control
Factor 5: Means

Factor analysis for causation show that through Kaiser's criterion of eigenvalues three factors are identified (eigenvalue above 1 = 1.04; cumulative percentage = 51.15) this does not agree with the causation subscales. If five factors are forced, the varimax rotated factor loadings do not quite confirm the causation subscales (eigenvalue = 0.75; cumulative percentage. 65.43). There are multiple instances where items display higher factor loadings for a subscale that they do not belong to. First of all one item of expected returns has a higher factor loading with factor two goals driven. The same accounts for goals in which also one item has a high factor loading with competitive analysis. One item of competitive analysis has a high factor loading with expected returns. For the factor avoiding contingencies there is one item, which has a high factor loading with goals driven. Prediction has one item which has a high factor loading with expected returns. It is of concern that these questions not fit their own subscale and they could be formulated in a way in which they fit another subscale better although they are intended to measure a different subscale.

Causation Items	**1**	**2**	**3**	**4**	**5**
Decisions will be primarily based on analysis of potential future returns. Expected returns	0.76				
I will always pay attention that my initially defined target will be met. Avoid cont		0.62		0.33	
I will try to identify markets by a thorough market analysis. Comp analysis	0.62		0.21		
Before starting my new venture, I will first acquire all resources needed to achieve my target .Goals		0.81			
Beforehand, I will calculate how many resources I need to achieve the expected returns. Expected returns	0.37	0.56			
I take a clearly pre-defined target as a starting point of the new venture. Goals		0.43	0.72		
I will study expert predictions on the direction the market is "heading", to determine what course of action my new venture will follow. Prediction	0.70				
My first priority is reaching my pre-set target without any delay. Avoid cont				0.85	
I will focus on early identification of risks through market analysis. Comp analysis	0.51		0.50		
My planning will be set before I start the implementation process and cannot be altered afterwards. Avoid cont	-			0.64	0.49
I will try to identify risks by a thorough competitors analysis. Comp analysis			0.70		
I will try to control the future based on predictions of my previously obtained knowledge. Prediction					0.86

Table 6 - Factor analysis causation

Factor 1: Expected returns
Factor 2: Goals driven
Factor 3: Competitive analysis
Factor 4: Avoiding contingencies
Factor 5: Prediction

Factor analysis for entrepreneurial intent show that through Kaiser's criterion of eigenvalues one factor is identified (eigenvalues above 1 = 3.416; cumulative percentage = 56.93). This confirms the entrepreneurial intent scale.

Item	Component
I Intend to set up a company in the future	.805
I never search for business start-up opportunities	.752
I am saving money to start a business.	.679
I do not read books on how to set up a firm.	.679
I've no plans to launch my own business.	.850
I do spend time learning about starting a firm.	.747

Table 7 - Factor loadings entrepreneurial intent.

4.2 Correlation analysis

Before starting with the correlation analysis the data is checked to see whether the distribution deviates from a normal distribution. In order to check this, the Kolmogorov-Smirnov test and the Shapiro-Wilk test are used. Both tests compare the sample with a normally distributed set of scores with the same standard deviation and mean (Field, 2009).

When the test shows a non-significant outcome (p >. 05) then the distribution of the sample is non-significantly different from a normal distribution. If the test is significant then the distribution is significantly different from a normal distribution.

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Entrepr_Intent	.079	530	.000	.981	530	.000
Effectuation	.063	530	.000	.956	530	.000
Causation	.045	530	.012	.979	530	.000
Self_Eff	.166	530	.000	.957	530	.000
Means	.107	530	.000	.974	530	.000
Goals	.138	530	.000	.954	530	.000
Risk_taking	.119	530	.000	.967	530	.000
Leveraging_Con	.155	530	.000	.956	530	.000
Avoiding_Cont	.087	530	.000	.986	530	.000
Locus_ctrl	.146	530	.000	.959	530	.000
Control	.177	530	.000	.937	530	.000
Prediction	.126	530	.000	.959	530	.000

Table 8 - Test of normality (Lilliefors) Kolmogorov-Smirnov and Shapiro-Wilk

Kolmogorov-Smirnov and Shapiro-Wilk both plead that all variables are not normally distributed. Both tests show a significant value for all variables (p <.05), this shows that the distribution is significantly different than a normal distribution. Therefore, non-parametric correlation coefficient will be used to display the association between the variables (Field, 2009).

A bivariate correlation analysis is used to measure the relationship between twelve variables. The variables analyzed are: entrepreneurial intent, effectuation, causation, self-efficacy, locus of control, risk taking, means, goals, leveraging contingencies, avoiding contingencies, control and prediction. The correlation coefficient represents the effect size between two variables and tells in which degree they correlate in a straight line. The correlation coefficient can range from +1, which is a perfect positive relationship between two variables, till -1 which is a perfect negative relationship. A coefficient of zero means, that there is no relationship between two variables. Field (2009) mentions, that the measure of Cohen (1988, 1992) can be used as a guideline when measuring the correlation coefficient. Table 9 indicates the measurement scale for the correlation coefficient.

Correlation coefficient	Effect	Explanation
ρ = .10	Small	The effect explains 1% of the total variance
ρ = .30	Medium	The effect explains 9% of the total variance.
ρ = .50	Large	The effect explains 25% of the total variance.

Table 9 - Correlation coefficient measurement scale (Cohen 1988, 1992)

The correlation coefficient that will be used is the Spearman's correlation coefficient, this is a non-parametric statistic and will be used, because the data has violated parametric assumptions, such as non normally distributed data (Field, 2009).

In order to research the hypotheses table 10 is created to show the correlation between variables.

		Items	Mean	SD	N	1	2	3	4	5	6	7	8	9	10	11	12
1	Entrepreneurial Intent	6	3.06	1.15	755	1.00											
2	Effectuation	13	4.94	0.54	564	.17**	1.00										
3	Causation	12	4.94	0.70	564	.03	.38**	1.00									
4	Self-Efficacy	4	3.83	0.50	755	.23**	.11**	.13**	1.00								
5	Locus of Control	3	3.72	0.59	755	.16**	.14**	.17**	.39**	1.00							
6	Risk taking	3	3.71	0.72	755	.24**	.11**	.02	.25**	.14**	1.00						
7	Means	3	4.15	0.84	564	.18**	.52**	-.02	.08	.05	.15**	1.00					
8	Goals	2	5.16	1.01	564	-.03	.28**	.66**	.05	.05	0.01	-.06	1.00				
9	Leveraging Cont.	3	5.37	0.84	564	.14**	.62**	.08	.07	.10*	.12**	.21**	.06	1.00			
10	Avoiding Cont.	3	4.29	1.02	564	.03	.11**	.64**	.07	.10*	-.04	.09*	.28**	-.24**	1.00		
11	Control	2	5.37	0.93	564	.17**	.56**	.36**	.20**	.20**	.15**	.06	.32**	.27**	.12*	1.00	
12	Prediction	2	5.09	0.88	530	.03	.40**	.66**	.10*	.12**	.02	-.02	.32**	.21**	.23**	.38**	1.00

Table 10 – Spearman's Rho correlation analysis. Note ** Correlation is significant at the .01 level; * Correlation is significant at the .05 level.

H1a: There is a positive association between self-efficacy and the principle means.
The non parametrical correlation test shows that there is no statistical significant correlation between self-efficacy and means driven decision making (N = 564., ρ = .08; p > .05). Additionally, the correlation coefficient is not statistical significant p > .05, table 5 also indicates that the effect of below 0.1 is also negligible.

H1b: There is a negative association between self-efficacy and the principle goals.
The non parametrical correlation test shows that there is no statistical significant correlation between self-efficacy and goals driven decision making (N = 564., ρ = .05; p > .05). The correlation coefficient is below 0.1, and p > 05 not significant which makes the outcome negligible (Cohen, 1988, 1992).

H2a: There is a positive association between risk taking and exploiting contingencies.
The non parametrical correlation test shows that there is a statistical significant positive correlation between risk taking and leveraging contingencies (N = 564., ρ = .12; p < .05). Although the correlation is statistical significant, table 4 mentions that the effect is small. In other words this effect shows that there is positive, if small, association between risk taking and exploiting contingencies.

H2b: There is a negative association between risk taking and avoiding contingencies.
The non parametrical correlation test shows that there is no statistical significant correlation between risk taking and avoiding contingencies (N = 564., ρ = -.04; p > .05). The correlation is negative, but it is not significant p > .05 and Cohen (1988, 1992) mentions that this score is negligible, because it is between .1 and -.1.

H3a: There is a positive association between locus of control and the principle of control.
The non parametrical correlation test shows that there is a statistical significant positive correlation between locus of control and the principle of control (N = 564., ρ = .20; p < .05). Although the correlation is statistical significant, table 4 mentions that the effect is small. This effect shows that when a student uses more locus of control, the more he or she will use the principle of control.

H3b: There is a negative association between locus of control and the principle of prediction.
The non parametrical correlation test shows that there is a statistical significant positive correlation between locus of control and the principle of prediction
(N = 530., ρ = .12; p < .05). Although the correlation is statistical significant, table 4 mentions that the effect is small. This effect contradicts the hypothesis, because the more a student uses locus of control, the more he or she uses the principle of prediction. The hypothesis states that there would be a negative effect between these variables.

There is a positive association between entrepreneurial intent and effectuation.

The non-parametrical correlation test shows that there is a statistical significant positive correlation between entrepreneurial intent and effectuation (N = 564; ρ = .17; $p < .05$). Also the characteristics of entrepreneurial intent show a statistical significant positive correlation. Self-efficacy and effectuation (N = 564., ρ = .11; $p < .05$). Locus of control and effectuation (N = 564., ρ = .14; $p < .05$). Risk taking and effectuation (N = 564; ρ = .11; $p < .05$). Although the correlation is statistical significant, table 10 mentions that the effect is small. This correlation shows that when a student uses more entrepreneurial intent, self-efficacy, locus of control and risk taking, he or she will use more effectuation.

There is a negative association between entrepreneurial intent and causation.

The non-parametrical correlation test shows that there is no statistical significant correlation between entrepreneurial intent and causation (N = 564., ρ = .03; $p > .05$). Also two characteristics of entrepreneurial intent show a statistical significant positive relation with causation. Self-efficacy and causation (N = 564., ρ = .13; $p < .05$). Locus of control and causation (N = 564., ρ = .17; $p < .05$). Risk taking shows no statistical significant correlation with causation (N = 564., ρ = .02; $p > .05$). Although the correlation effects are small, the data states that self-efficacy and locus of control correlate with causation. Entrepreneurial intent and risk taking show no statistical significant correlation ($p > .05$).

4.3 Regression analysis

A regression analysis is used to evaluate whether more goals driven, avoiding contingencies and using prediction is associated with more causation. Another regression analysis is used to evaluate whether more means driven, exploiting contingencies and control is associated with more effectuation.

	Causation			
	B	SE_B	t	p
Goals minus Means	0.23**	0.02	13.15	0.00
Avoiding contingencies minus Exploiting	0.13**	0.02	8.15	0.00
Prediction minus Control	0.13**	0.02	5.43	0.00
	F	Df1	Df2	
	117.26**	3	256	0.00
	Effectuation			
	B	SE_B	t	p
Means minus Goals	0.01	0.02	0.87	0.38
Exploiting Contingencies minus Avoiding	0.09**	0.02	5.98	0.00
Control minus Prediction	0.08**	0.02	3.51	0.00
	F	Df1	Df2	
	19.90**	3	526	0.00

Table 11 - Regression analysis ** Correlation is significant at the .01 level; * Correlation is significant at the .05 level.

The model explaining causation consists of three variables, tendency towards goals driven over means driven, tendency towards avoiding over exploiting contingencies, and tendency towards predicting over controlling the future, is statistically significant ($F_{(3; 256)} = 117.26$; $p < .01$). All variables within the model add statistically significant contribution to the explanatory value of the model (tendency towards goals driven over means driven, $t = 13.15$, $p < .01$; tendency towards avoiding over exploiting contingencies, $t = 8.15$, $p < .01$; and tendency towards predicting over controlling the future, $t = 5.43$, $p < .01$). The directions of variables within the model are all positive (tendency towards goals driven over means driven: $B = 0.23$; $SE_B = 0.02$; tendency towards avoiding over exploiting contingencies: $B = 0.13$; $SE_B = 0.02$; tendency towards predicting over controlling the future: $B = 0.13$; $SE_B = 0.02$). Therefore the model for causation agrees that the more goals driven, avoiding contingencies and prediction the more causation.

The model explaining effectuation consists of three variables, tendency towards means driven over goals driven, tendency towards exploiting over avoiding contingencies, and tendency towards controlling over predicting the future, is statistically significant ($F_{(3; 526)} = 19.90$; $p < .01$). Tendency towards means driven over goals driven does not add explanatory value to the model, $t = 0.87$; $p = .38$, while the other variables do (tendency

towards exploiting over avoiding contingencies, t = 5.98; *p* < .01; and tendency towards controlling over predicting the future, t = 3.51; p < .01). The directions of tendency towards exploiting over avoiding contingencies and tendency towards controlling over predicting the future within the model are all positive (tendency towards avoiding over exploiting contingencies: B = 0.09; SE_B = 0.02; tendency towards predicting over controlling the future: B = 0.08; SE_B = 0.02). The data on the model for effectuation do not totally agree with the assumption that the effectuation variables will contribute to the explanatory value of the model.

4.3.1 Hierarchical regression analysis

Whether the description of entrepreneurial intent can be improved by adding variables used to describe effectuation and causation is not yet known, therefore a hierarchical regression analysis is conducted to evaluate whether adding variables used to describe effectuation and causation also add explanatory value to entrepreneurial intent, this is shown in table 12. Model 1 explains entrepreneurial intent by its own three variables: self-efficacy, locus of control and risk taking; model 2 explains entrepreneurial intent by self-efficacy, locus of control and risk taking, means driven, goals driven, leveraging contingencies, avoiding contingencies, controlling the future, and predicting the future. Model 1 explains 9% of the total variance within the sample ($F\Delta_{(3;\ 526)}$ = 16.64; p < .01). Self-efficacy (B = 0.33, p < .05) and risk taking (B = 0.34, *p* < .05) are both statistical significant and have a positive association on entrepreneurial intent, locus of control is not statistical significant. Model 2 adds statistically significant 4% explanatory value to model 1 ($F\Delta_{(6;\ 520)}$ = 3.71; p < .01). Within model 2 self-efficacy, risk-taking, means driven, goals driven, and controlling the future add statistically significant explanatory value (t = 2.63, p < .01; t = 4.35; p < .01 t = 2.13; p < .05; t = -2.57; p < .01; t = 2.42; p < .05, respectively). The variables self-efficacy, risk-taking, means driven, and controlling the future are positively associated with entrepreneurial intent (B = 0.29, B_{SE} = 0.11; B = 0.30, B_{SE} = 0.07; B = 0.13, B_{SE} = 0.06; B = 0.15, B_{SE} = 0.06, respectively), while goals driven is negatively associated with entrepreneurial intent (B = -0.14, B_{SE} = 0.05). The other variables, locus of control, leveraging contingencies, avoiding contingencies, and predicting the future do not add statistically significant explanatory value to the model. In conclusion, entrepreneurial intent can be better explained by self-efficacy, risk-taking, means driven, controlling the future, and goals driven than by the original model of self-efficacy, locus of control and risk-taking.

	Model 1					Model 2				
	B	SEB	t		p	B	SEB	t		p
Self_Eff	0.33**	0.11	2.98		0.00	0.29**	0.11	2.63		0.01
Locus_ctrl	0.07	0.09	0.76		0.44	0.03	0.09	0.34		0.73
Risk_taking	0.34**	0.07	4.92		0.00	0.30**	0.07	4.35		0.00
Means						0.13*	0.06	2.13		0.03
Goals						-0.14**	0.05	-2.57		0.01
Leveraging_Cont						0.06	0.06	1.00		0.32
Avoiding_Cont						0.09	0.05	1.63		0.10
Control						0.15*	0.06	2.42		0.02
Prediction						-0.04	0.06	-0.66		0.51
	ΔR^2	FΔ	Df1	Df2	P	ΔR^2	FΔ	Df1	Df2	P
	0.09**	16.64	3	526	0.00	0.04**	3.71	6	520	0.00

Table 12 - Hierarchical regression analysis ** Correlation is significant at the .01 level; * Correlation is significant at the .05 level.

4.4 Hypotheses overview

Table 13 gives an overview of the tested hypotheses and whether they are accepted or rejected.

Hypothesis	Description	Accepted/ Rejected
H1a	There is a positive association between self-efficacy and the principle means	Rejected
H1b	There is a negative association between self-efficacy and the principle goals	Rejected
H2a	There is a positive association between risk taking and exploiting contingencies	Accepted
H2b	There is a negative association between risk taking and avoiding contingencies	Rejected
H3a	There is a positive association between locus of control and the principle of control	Accepted
H3b	There is a negative association between locus of control and the principle of prediction	Rejected
There is a positive association between entrepreneurial intent and effectuation		Accepted
There is a negative association between entrepreneurial intent and causation		Rejected

Table 13 – Summarizing table of accepted and rejected hypotheses

5 CONCLUSION AND DISCUSSION

This chapter mentions the main findings and contributions to entrepreneurial intent and effectuation research. Furthermore the limitations and future research recommendation are given.

5.1 Conclusion

The logic behind this research is that literature has shown that the economy is shifting and is not stable anymore. As Friedman (2005) states that the world has become flat, with that he explains that nowadays we are all connected by multiple devices and work can easily be outsourced to any place in the world, this has led to labour contracts that are often not indefinite anymore and job turnover has grown rapidly. Research has shown that entrepreneurship has become more interesting than ever among students. This new entrepreneurial economy is flexible, unstable and innovative. One could expect that causal thinking would not be appropriate for upcoming entrepreneurs in this new economy. It seems that effectuation would be more appropriate in order to capture innovation and allowing fast responses to opportunities. This brings us to the goal of this research which was to analyse to what extend entrepreneurial intent is related to causation and effectuation, among students. Based on literature review the main research objective was made and it was expected that entrepreneurial intent would have a positive association with effectuation and entrepreneurial intent would have a negative association with causation. This has been extensively researched using literature and a questionnaire distributed among students.

This research found new evidence in order to partially accept the main research question: To what extend do entrepreneurial intentions influence the degree of causation and effectuation based thinking among students in the Netherlands? Evidence has been found that entrepreneurial intent has a positive influence on effectuation. Although no evidence is found that entrepreneurial intent would have a negative influence on causation. Two characteristics of entrepreneurial intent were found to positive correlate with effectuation. Risk taking and exploiting contingencies and locus of control and the principle of control were found to positive correlate and therefore these two hypothesises could be accepted. Although this research has found evidence to state that there is a positive association between entrepreneurial intent and effectuation, it remains difficult to state a clear conclusion. Furthermore there is not enough statically significant evidence to state about the relationship between entrepreneurial intent and causation. Therefore the contribution of this research to the field of entrepreneurial intent and causation and effectuation is not complete. However the evidence found in this research makes it interesting to discover more about the relationship between entrepreneurial intent and causation and effectuation.

5.2 Discussion

This research could not confirm the hypotheses made for means and goals. In my opinion this has more to do with the fact that, Sarasvathy (2001a, 2008) subscales effectuation and causation each in five sub dimensions. Factor analysis shows that this did not comprehend with the analysis conducted in this research. It could be that the methods of sub scaling in many sub dimensions, only works with think-aloud protocols, in which the interpreted data is carefully examined, instead of a likert point scale. Also means is scattered around other sub dimensions, which raises the question: how well can means be examined. For example questions about “whom I know” can very easily be interpreted as partnership questions.

Another discussion point is that this research could not find statistical significant evidence in order to accept the opposite hypothesis. Brettel et al. (2012) developed a dichotomous bipolar scale, which is converted for this research to a unipolar scale. It seems that a bipolar dichotomous scale would fit the hypotheses better, because it forces the students to choose between causation and effectuation. This could lead to higher correlations between entrepreneurial intent and causation and effectuation dimensions. The questions conducted from Brettel et al. (2012) are transformed to an unipolar setting, which seem to leave students in the middle of causation and effectuation, instead of showing data going in a clear direction.

This research needs more testing before it can state that effectuation theory should be taught in schools instead of causal theory. Moreover in the next paragraph.

5.3 Limitations and future research

Thompson (2009) mentions that the entrepreneurial intent scale, which is used in this study is not tested on generality. The scale has only been used for well educated cosmopolitan areas among wealthy individuals. It could be that the students in this research react in another way than expected. Thompson (2009) mentions that, the entrepreneurial intent scale has to be tested in different kind of settings throughout the world, before it can be seen as a general test.

As a limitation to this research Chen et al. (2001) mention that the general self-efficacy scale should be tested on the relationships between self-efficacy and other constructs such as locus of control. The fact that the relationship between constructs such as self-efficacy and locus of control are not tested, could provide questions of different scales, such as self-efficacy and locus of control, which could have the probability that they cannot be combined to measure entrepreneurial intent as a whole.

Lüthje (2003) mentions, that external factors, such as market, society and university could be of great importance and influence on entrepreneurial intentions. This could be further investigated in combination with effectuation and causation literature. Which external factors are of influence on the degree of effectual thinking?

Means and prediction had poor Cronbach Alpha's this effects the reliability.
Factor analysis showed that there are too many items which do not fit their subscale and do not measure the dimension which is intended to measure. Further development of the scale of causation and effectuation is needed to increase the reliability and factor loadings. This new scale should be validated.

The change from bipolar items of Brettel et al. (2012) to unipolar items, could have distorted the data. Factor analysis showed that items had high loadings in different subscales. This could be an effect of distorted data and it could be that the questions of Brettel et al. (2012) are not appropriate to this change. This can be further investigated by think-aloud protocols in which the interpretations of students on the questions can be narrowly investigated.

Shortening of the questionnaire regarding items of entrepreneurial intent and causation and effectuation, resulted in lower Cronbach Alpha's and correlation between items. For example means has a Cronbach's Alpha of .107, is this due to the lack of items? Can means only be measured by three items? This should be further investigated.

The survey consisted of 105 questions, this could obviously lead to losing concentration, filling in random answers just to get it done, quitting half way. When I distributed the questionnaire in the library of the University of Twente, you could see the frustration on students' faces when they saw the length of the questionnaire. This could distort the data by students filling in random answers on the hardcopies, because of lack of time or willingness. In order to investigate the data, the same questionnaire but only including the items of entrepreneurial intent, causation and effectuation could be done. This questionnaire would be half the length of the original and would provide proof that the data is not distorted.

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APPENDICES

Appendix A Question entrepreneurial intent

Entrepreneurial intent scale
Intend to set up a company in the future
Never search for business start-up opportunities
Are saving money to start a business
Do not read books on how to set up a firm
Have no plans to launch your own business
Spend time learning about starting a firm
Locus of control
My life is determined by my own actions.
I can pretty much determine what will happen in my life.
When I get what I want, it's usually because I worked hard for it.
Self-efficacy
I will be able to achieve most of the goals that I have set for myself.
When facing difficult tasks, I am certain that I will accomplish them.
I am confident that I can perform effectively on many different tasks.
Compared to other people, I can do most tasks very well.
Risk Taking
When I travel I tend to use new routes.
I like to try new things (by example: exotic food or going to new places).
I have taken a risk in the last six months.

Appendix B questions causation and effectuation

	Statements	Dimension	Source
14	Decisions will be primarily based on minimization of risks and costs.	Affordable loss	Brettel & Mauer
16	I only spend resources I have available and I am willing to lose.	Affordable loss	Chandler
2	I will always pay attention that my initially defined target will be met.	Avoid contingencies	Brettel & Mauer
19	My first priority is reaching my pre-set target without any delay.	Avoid contingencies	Brettel & Mauer
22	My planning will be set before I start the implementation process and cannot be altered afterwards.	Avoid contingencies	Brettel & Mauer
3	I will try to identify markets by a thorough market analysis.	Competitive analysis	Brettel & Mauer
20	I will focus on early identification of risks through market analysis.	Competitive analysis	Brettel & Mauer
23	I will try to identify risks by a thorough competitors analysis.	Competitive analysis	Brettel & Mauer
13	I will try to control the future by creating it.	Control	Wiltbank
15	I will talk to people I know to enlist their support in making opportunities a reality.	Control	Wiltbank
1	Decisions will be primarily based on analysis of potential future returns.	Expected returns	Brettel & Mauer
6	Beforehand, I will calculate how many resources I need to achieve the expected returns.	Expected returns	Brettel & Mauer
5	Before starting my new venture, I will first acquire all resources needed to achieve my target.	Goal	Brettel & Mauer
12	I take a clearly pre-defined target as a starting point of the new venture.	Goal	Brettel & Mauer
4	I allow changes in my planning if needed, even during the implementation process of my new venture.	Leveraging contingencies	Brettel & Mauer
7	I expect to change my original target when confronted with new findings.	Leveraging contingencies	Brettel & Mauer
10	I allow delays during the development of my new venture when new opportunities emerge.	Leveraging contingencies	Brettel & Mauer
8	The uncertainty of a market will not block me since I rely on my own experience to imagine opportunities.	Means	Brettel & Mauer

9	The decisions I make when starting my new venture will be based on the resources I have available.	Means	Brettel & Mauer
18	I start my new venture without defining a clear target.	Means	Brettel & Mauer
11	Decisions will be made together with stakeholders based on our competences.	Partnerships	Brettel & Mauer
21	I will ask my private network to help me out with starting my new venture.	Partnerships	Brettel & Mauer
24	I will ask customers and suppliers to pre-commit to my new venture in order to reduce risks.	Partnerships	Brettel & Mauer
17	I will study expert predictions on the direction the market is “heading”, to determine what course of action my new venture will follow.	Prediction	Wiltbank
25	I will try to control the future based on predictions of my previously obtained knowledge.	Prediction	Brettel & Mauer