

# The uncertainty and its role in the effectuation theory

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# Abstract

The uncertainty is of great significance to the entrepreneurship. The existence of the contradictory views about the nature of uncertainty makes it an ambiguous construct in the entrepreneurship. The presence of uncertainty proves to be a catalyst in creating innovative products or niche markets or leads to missed opportunities. The choice of entrepreneurial decision-making method is thus crucial. Therefore, it is imperative to investigate if the effectuation decision-making method is an appropriate method to manage under the uncertainty. Effectuation claims to bestow the appropriate tools and guidelines to the entrepreneur to use the uncertainty to create new possibilities from extant realities. Thus, the aim of this thesis is to understand and analyze the role of uncertainty in the effectuation theory and how it aids the entrepreneur to create an economic opportunity. This research study adopts the qualitative and descriptive approach to investigate the research problem. The objective of this study is to provide a complete review of the uncertainty construct as discussed in the entrepreneurship literature and the role of uncertainty in effectuation decision-making process.

*Keywords: Effectuation, Entrepreneurial decision-making method, Uncertainty, Opportunity creation*

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# 1 Introduction

## 1.1 Research Problem and Motivation

Uncertainty has been the subject of interest for entrepreneurship scholars for quite some time. Knight Frank (1921) in his seminal article laid out the careful distinction between the risk and uncertainty. Knight Frank (1921) defined the uncertainty to be fundamental to entrepreneurship and to create innovative artifacts or create new markets. According to him uncertainty is an unmeasurable and insurable knowledge problem. McMullen and Shepherd (2006) reintroduced the uncertainty in the entrepreneurship. It was revealed that the uncertainty is often conflated with risk and other knowledge problems in the entrepreneurship literature. Moreover, uncertainty is considered to be a broad spectrum which involves several definitions and types of uncertainties. Recently, the scholars have agreed in consensus that the uncertainty is indeed important and precondition to entrepreneurship. Even though the uncertainty construct is evolving there remains the debate about the contradictory nature of uncertainties.

Knight Frank (1921) introduced the uncertainty in the entrepreneurship however he did not expand on how to deal with the uncertainty. As the planning based decision making methods were not able to deal with the uncertainty, several authors such as Sarasvathy (2001), Packard et al. (2017), Wiltbank et al. (2006), Baker and Nelson (2005) introduced different decision making methods. Due to the true nature of the uncertainty, the decision-making method has to be flexible and experimental while creating an economic opportunity. The presence of uncertainty can cause the hindrance in the actualization of the profits from the created opportunity. Therefore the decision-making method will need to use the uncertainty in an appropriate way that enables the entrepreneur to create something profitable.

I explored the literature of uncertainty along with entrepreneurial decision-making method, in response to the dilemma of which decision-making method is appropriate to deal with the uncertainty and can aid the entrepreneur to create economic opportunities. The further I explored, it appears that the effectuation decision-making method can be the appropriate method to manage in the uncertain environment. The effectuation theory was, then, ex-

plored and the suitable literature was analyzed to understand how the effectuation dealt with multidimensional uncertainties: goal ambiguity, isotropy, and Knightian uncertainty. The exploration of effectuation revealed that it lacked the representation of the effectual logic and the flow of multidimensional uncertainties during the effectuation process. The impact of the uncertain situations and environment on the entrepreneurs during the effectuation process was also analyzed to understand the inner-workings of the theory. It was discovered that although effectuation theory suffers from the paradox regarding the nature of uncertainty, it helps the entrepreneur to gain some clarity on the outcome probabilities. The literature analysis also revealed that the effectuation yields the tools and guidelines to deal with uncertainties and it offers effectual problem space in which the entrepreneur's creativity and individual freedom is nurtured. The confidence and resilience of the entrepreneur proved to be detrimental for the actualization of the opportunity. The next section will discuss the research questions to investigate the research problem area further.

## **1.2 Research question**

The aim of this thesis is to understand the uncertainty and its role in the effectuation decision-making method.

To understand what is true uncertainty in the entrepreneurship decision-making literature is detrimental. The presence of the uncertainty is considered to be a necessary condition for the entrepreneurship. However, the presence of uncertainty means the uncertain and changing environment for the entrepreneur which can prove to be an obstacle to create a unique artifact or niche market. Thus it is essential to understand which decision-making method is apt under the situations of uncertainty.

**RQ1:** Why the effectuation decision-making method is appropriate to manage under the uncertainty?

As the effectuation seems to be the appropriate decision-making method to use the uncertainty to create something valuable, the role of uncertainty in the effectuation decision-making method was the obvious question to research upon.

**RQ2:** What is the role of uncertainty in the effectuation decision-making method?

Motivated by Perry et al. (2012), it was interesting to understand and analyze the

impact of the present uncertainties on the entrepreneur or firm during the creation process(effectuation) and to understand how the entrepreneur or firm deals with the multidimensional uncertainties to aid the entrepreneur in creating economic opportunities.

**RQ3:** How does the entrepreneur or firm deals with the presence of multidimensional uncertainties?

My motivation to undertake the research mentioned above questions leads me to select the following research method.

## 2 Research Method

In the section, I will discuss the research methodology used to conduct the research and the reason behind using a qualitative research design method of using a 'theoretical discussion.' The nature of this research is descriptive.

As the effectuation theory is an essential step towards the recognition of uncertainty in the entrepreneurship field, I wanted to explore, understand the role of uncertainty and its relation to the creation of opportunities using effectuation process.

### 2.1 Keywords and Literature

The thesis follows a theoretical dissertation method wherein the existing literature is analyzed and reviewed based on the research topic of the interest. Here in the thesis, the 'role of uncertainty in effectuation' was the topic of interest. I with the help of my supervisor selected seminal articles for conducting this research related to the following essential keywords as listed in table 1. The keywords were selected based on the topic of interest.

Table 1: Essential Keywords used to search articles

Keywords	Keywords
Uncertainty	Entrepreneurship
Innovation	decisions under risk/uncertainty
Effectuation	Entrepreneurial action
Strategic planning	Judgment
Creativity	Ambiguity
Opportunity exploitation	Business decision-making
Opportunity creation	Opportunity
isotropy	goal ambiguity
stakeholder	Entrepreneurial decision making
New market creation	behavioral economics
decision-making	market creation
Confidence	Resilience
Intersubjective	objective
network	new venture creation

The topic of interest includes sub-topics such as uncertainty as a construct in entrepreneurship decision-making, Effectuation decision making. Several articles were reviewed and analyzed for understanding uncertainty construct in entrepreneurship and how it affects the entrepreneurial decision-making as well as to understand the effectuation process. The list of articles as shown in table 2 that are used in the thesis to observe and analyze to confer about the uncertainty construct and its role in the effectuation.

Table 2: List of articles used for observation and analysis

<b>Uncertainty construct</b>	<b>Effectuation theory</b>	<b>Others</b>
Knight Frank (1921)	Sarasvathy (2001)	Davidson (2001)
McMullen and Shepherd (2006)	Sarasvathy et al. (2003)	Weick (1969)
McKelvie et al. (2011)	Sarasvathy and Kotha (2001)	Mintzberg et al. (1994)
Alvarez and Barney (2005)	Wiltbank et al. (2006)	March (1976)
Packard et al. (2017)	Read et al. (2009)	Chiles et al. (2008)
Milliken (1987)	Perry et al. (2012)	Penrose (2009)
Korsgaard et al. (2016)	Sarasvathy et al. (2014)	Kor and Mahoney (2004)
Alvarez and Barney (2007)	Sarasvathy and Dew (2008)	Seligman and Csikszentmihalyi (2014)
Langlois and Cosgel (1993)	Sarasvathy (2009)	Dew et al. (2015)
Ramoglou and Tsang (2016)	Reymen et al. (2015)	Zolli and Healy (2013)
LeRoy and Singell Jr (1987)	Tasic and Andreassi (2008)	Busenitz and Barney (1997)
Jalonen (2011)	Welter et al. (2016)	Erikson and Korsgaard (2016)
Bylund and McCaffrey (2017)	Chandler et al. (2011)	Chen et al. (1998)
Petrakis et al. (2016)	Dew et al. (2011)	Baron and Markman (2003)
Tversky and Kahneman (1974)	Dew and Sarasvathy (2016)	Forbes (2005)
Schmitt et al. (2017)	Sarasvathy (2004)	Shepherd et al. (2015)
Townsend (2018)	Dew et al. (2008)	Foss and Klein (2015)
Windschitl and Wells (1996)	Sarasvathy and Dew (2013)	Baker and Nelson (2005)
Hayward et al. (2010)	Read et al. (2010)	

As listed in table 2, the peer-reviewed journal articles, as well as books, were considered as the literature to be reviewed for fulfilling the purpose of the thesis.

## **2.2 Unit of Analysis and Outline of Thesis**

The units of analysis of this thesis are to understand what is the uncertainty as a construct in the entrepreneurship decision-making method and what role does it play in the effectuation theory.

The outline of the thesis can be represented as below. The following represents some themes to make the conducted research distinctive.

- Firstly, the uncertainty as a construct was analyzed regarding its origins, its nature, its presence in entrepreneurship, several types of uncertainty prevalent in entrepreneurship and methods to deal with uncertainty was analyzed.
- The effectuation articles were analyzed based on, what is effectuation theory, its elements, tools, and guidelines of effectuation and what is the effectuation process.
- The findings are based on the central theme of how the dynamic effectuation process deals with the uncertainty, what is the impact of uncertainty on the entrepreneur and why the effectuation decision-making method could be the advanced method to deal with true uncertainty.

The following section will entail the discussion of uncertainty construct by analyzing the uncertainty themed articles.

## **3 Uncertainty**

From last two decades, various scholars such as Alvarez and Barney (2005), Wiltbank et al. (2006), Sarasvathy (2009), Knight Frank (1921), Milliken (1987), and Packard et al. (2017), Ramoglou and Tsang (2016) have attempted to understand uncertainty construct and proposed types of the uncertainty as either perceived or 'objectively experienced by entrepreneurs'. Many methods were also suggested by entrepreneurship scholars to reduce

the uncertainty and manage under the face of the uncertain situation, eventually leading to the creation or discovery of economic opportunities. Uncertainty as widely accepted is a necessary precondition for the entrepreneurial action, thus uncertainty is imperative for entrepreneurship to occur.

This section is further divided into five parts. Firstly, uncertainty and its origins will be discussed, followed by the uncertainty represented in the entrepreneurship. Thirdly, various types of uncertainty proposed by scholars(in entrepreneurship) and the distinction of 'perceived' versus 'objective' uncertainty will be discussed. Lastly, the methods proposed by various scholars to manage under the situations of uncertainty will be explained.

### **3.1 Uncertainty and its Origins**

In two decades, uncertainty has been reintroduced in the entrepreneurship scholarship by several authors. There has been widespread confusion regarding the objective and subjective elements of the uncertainty, which is yet to be sorted out. However, it is evident from articles reviewed for this section, that the conflation of risk with uncertainty is still dominant in the literature. Also there is a heavy influence of Knight Frank (1921)'s seminal work on 'True uncertainty'.

Knight Frank (1921) in his seminal work on 'Risk, Uncertainty and Profit' introduced the uncertainty as a concept arising from the neglect of the role and implications of uncertainty in the economics and is now relevant to the field of entrepreneurship. Knight defined risk and uncertainty in his own terms and he had his own categories of analysis which led to his seminal work (Langlois and Cosgel (1993)). Langlois and Cosgel (1993) encourages the economists to view Knight's seminal work with his categories of terms 'in the stead examining through the lens of modern-day.

Knight Frank (1921) starts off by introducing the risk as a 'measurable uncertainty' and uncertainty as an 'unmeasurable uncertainty'. He restricts the term 'Uncertainty' to the cases of non-quantitative type, deeming 'true uncertainty' to be the valid bases of a theory of profit which separates actual competition from theoretical one. He considers the 'change' a part of the uncertainty, any economic change that results into profit is because of the involved uncertainty. He considers that the uncertainty is imperative because of our

imperfect knowledge about our future and consequence of change, not change as such. Knight lauded the reaction taken based on the present situation perceived by the the organism and taking the action according to his inference. He compares inference with the prediction depending on three factors, first is what things we are dealing with, second, what are the circumstances which condition their action and finally, can they be classified into groups. Expanding on to the classification of things and finite intelligence, Knight proposes three different types of probability situation from classification point of view *a priori* probability, then statistical probability and finally estimates. For his *a priori* and statistical probability can be called as risk while estimate is considered as 'true uncertainty'.

*A priori* or 'risk', as opposed to uncertainty, is a measurable type of uncertainty which is identifiable by the decision maker. The probability of distribution is known, and it is possible to classify them into states, and its outcomes are known, leading to the use of prediction. The 'statistical probability' or 'ambiguity' practically is with the known probability distribution and unknown outcomes and are identifiable. 'Estimates' is what Knight Frank (1921) called a 'true uncertainty' wherein the distribution of probabilities and outcomes are unknowable and are impossible to calculate. This type of uncertainty is sometimes referred as Knightian uncertainty. The true uncertainty is a situation faced by a decision maker wherein there is no valid basis of any kind for classifying instances (Knight Frank (1921)). It is applicable not only to entrepreneurship but every other field.

Following are few scholars who were influenced to interpret uncertainty from their view, due to the persisting conflation of the uncertainty with risk and they discuss the influence of uncertainty on the entrepreneurship venture.

McMullen and Shepherd (2006), considered uncertainty as evolving characteristic that can either be enhanced or reduced by taking entrepreneurial actions. For them, uncertainty is the conceptual cornerstone of most theories of the entrepreneur. They also consider the uncertainty as an obstacle or hindrance to the entrepreneurial action. Ramoglou and Tsang (2016) cites that the conception of uncertainty according to the realist "entails that (1) when looking forward into the future, we know neither whether an opportunity exists nor whether it will actualize, and (2) when looking backward at instances of failure, we cannot typically determine whether an opportunity was absent or simply unactualized." Thus, suggesting



that uncertainty is a state of agnosticism wherein all the questions are unanswerable and unknowable.

Kirzner's interpretation of uncertainty in Kirzner Mark II, is a stand-out from Knight's work and is important to understand the uncertainty construct. According to Korsgaard et al. (2016), Kirzner defined that the uncertainty is more than mental construct faced by the entrepreneurs. He believed that the uncertainty is already present in entrepreneurial activities and processes and evolves as the time goes. He concluded, even if the entrepreneur perceives to be in the uncertain situation or not, there is no denying that there will always be the uncertainty about the futurity of the market and about whom they will be selling their products/services to (Korsgaard et al. (2016)). Thus, it is safe to say that any type of the uncertainty is said to play an essential role in the firm's survival; it can either lead to missed opportunities or the economic growth of the enterprise. The focus on the uncertain aspects of the situation can lead the entrepreneur to exercise options that can lead to innovative solutions or the creation of new economic opportunities.

Regardless of Knight's work acceptance, the scholars have proposed few other types of uncertainties faced by entrepreneurs. One of those is, the uncertainty faced by entrepreneurs is environmental uncertainty, wherein the effects of the decisions made by him/her can affect the environment surrounding the enterprise. The uncertainty mentioned above is categorized into three types, state, effect and response (Milliken (1987)).

The recent publication by Packard et al. (2017) also classifies a typology of uncertainty in which four domains of uncertainty is introduced based on Knight's work and includes four types of uncertainties to be present in the entrepreneurial process. The typology is based on the notion that the uncertainty is reducible. First, 'Risk and Ambiguity', wherein Risk is 'identifiable uncertainty' while ambiguity is like risk wherein the unknown probabilistic relationship exists between the set of options and outcomes. Second is 'Environmental uncertainty' based on Milliken (1987) types of uncertainty, wherein the decision maker is unaware of how one's decision affect the surroundings of the entrepreneur. Third is 'Uncertainty' alternatively known as 'Creative Uncertainty' wherein the the set of options available to decision makers are finite and knowable, but its evolution can lead to unknowable as well as the infinite set of outcomes. Fourth and last type of uncertainty is 'Absolute Uncertainty'

or 'true uncertainty' wherein the set of options as well as outcomes are endless and are unforeseen.

Finally, the recent publication by Townsend (2018) refers to the various knowledge problems involved in the entrepreneurial decision making. Townsend (2018) also clarify the distinction between equivocality, complexity, ambiguity, and uncertainty. They regard all the prior mentioned knowledge problems to serve as both obstacles as well as sources of entrepreneurial opportunities. They define uncertainty to be irreducible and unknowable. According to Townsend (2018) to resolve uncertainty, new information gathered by conducting a systematic search can either increase or decrease the predictability of outcome probabilities, however it is still unclear that if the uncertainty can be resolved and how. The uncertainty is not reducible like a risk or ambiguity, wherein the new information can improve the predictability of outcome preferences. Thus, the gathering of new information may increase or decrease the clarity of available outcome probabilities to the entrepreneur and never the preferences of outcomes.

From the review of the several definitions of uncertainty, it is clear that the uncertainty, in the simplest terms, is an evolving construct that is unmeasurable (Knight Frank (1921)), irreducible knowledge problem (Townsend (2018)) and is more than a mental construct (Korsgaard et al. (2016)) which is present and faced in the entrepreneurial discourse. It can be enhanced or reduced to some level by gathering new addition information however it is still unclear of how to resolve it completely. In itself, uncertainty is not a broad spectrum, but a part of the "knowledge problem spectrum, co-existing with other knowledge problems" (Townsend (2018)).

### **3.2 Uncertainty in Entrepreneurship**

Nearly two centuries ago, Knight Frank (1921) was the one who connected the business managers and their decision making process with the role of uncertainty. This notion has been picked up in the entrepreneurship research stream as well and the role of uncertainty in the entrepreneurship literature has garnered the attention from many scholars. In recent years, McMullen and Shepherd (2006) and McKelvie et al. (2011) were the only ones who linked the entrepreneurship field with the role of uncertainty, further discussing contem-

porary themes, debates, perspectives and important aspects of the entrepreneurial action. This section will entail the rise of recognition and acceptance of uncertainty construct in the entrepreneurship research.

Traditional methods such as causation or statistical methods in the entrepreneurship are something that cannot deal with the uncertain environment and ever-changing world Knight Frank (1921). The uncertainty surrounding the entrepreneurial action should be regarded as a construct that helps the entrepreneur build new artifacts or economic opportunities or new markets. The recognition of uncertainty is also a crucial aspect to understand how the entrepreneurs make decisions. It can also lead to the questions of how entrepreneur's psychological traits as well as studying the cognitive phenomena of decision-making can help the fellow researchers to unlock the black-box of entrepreneurship. Several new methods such as 'Effectuation' proposed by Sarasvathy (2001), Bricolage by Baker and Nelson (2005), 'Dynamic Judgment' process proposed by Packard et al. (2017) are useful for the entrepreneur once they recognize the presence of uncertainty. The above mentioned methods aids the entrepreneurship literature to realize the importance of uncertainty and entrepreneur's psychology as well as the cognitive science behind the entrepreneurial action and opportunities.

Frank H Knight as mentioned by McMullen and Shepherd (2006) seminal article, was the one who regarded the entrepreneurs as the bearers of the uncertainty while considering knowledge and motivation as significant sources in the entrepreneurial action. Their seminal article reinforced the importance of uncertainty in the entrepreneurship scholarship, motivating as well as realizing other scholars the importance of recognition of uncertainty in decision-making. Other following scholars, using Knight's interpretation of uncertainty attempted to define the entrepreneurs in regards to the uncertainty either perceived or objectively experienced.

Recognition of uncertainty in entrepreneurship starts from several scholars such as Foss and Klein (2015), McMullen and Shepherd (2006), Ramoglou and Tsang (2016), Petrakis et al. (2016), Shepherd et al. (2015), McKelvie et al. (2011) and Townsend (2018), their relating theories or interpretations will be discussed and investigated to understand the link of entrepreneurship and the role of uncertainty.

First and Foremost, Knight Frank (1921) strongly believed that the uncertainty is fun-

damental to entrepreneurship (McMullen and Shepherd (2006)). He in his seminal work regards uncertainty to play an important role for the entrepreneur to create profits and make decisions based on his judgment as well as intuition. Knight's distinction of risk from uncertainty gave a clear understanding to the entrepreneurship research about what the 'true uncertainty' actually is. Knight compared the task of meeting the uncertainty in an economic system to the brain of a living organism (Langlois and Cosgel (1993)). For Knight, the presence of uncertainty in the business organization leads to the cephalization with the assignment of certain individuals to leadership positions with respect to their specialization in their respective skills.

Kirzner Mark II defines entrepreneurship as proactive, creative and uncertainty facing as compared to the Kirzner Mark I (Korsgaard et al. (2016)). He considered the passage of time and uncertainty to be essential components of entrepreneurship. Ramoglou and Tsang (2016) agrees to Korsgaard et al. (2016) that the opportunities are not pre-determined in the presence of time and uncertainty. There is a general notion, that the entrepreneurs imagine the opportunities and are considered to be speculators or creators (Korsgaard et al. (2016), Wiltbank et al. (2006)) in the face of changing and uncertain environments (McKelvie et al. (2011), Sarasvathy (2001)).

Based on the works of Mises and Knight, Foss and Klein (2015) proposes 'the judgment based view', wherein they consider the entrepreneurship as judgmental decision-making which takes place in a market setting under uncertainty. Entrepreneurship, for them, is not a meager act of idea generation or creative thinking but the act of taking responsibility for real assets, investing them in anticipation of uncertain future rewards. Showing that they consider the 'true uncertainty' as a part of the entrepreneurship, on which the entrepreneurial action and process is heavily dependent. They also suggest that the entrepreneurs arrange, configure and reconfigure heterogeneous sources under the conditions of 'true uncertainty.' Korsgaard et al. (2016) points out that the level of uncertainty, as well as nature of successful and suitable adopted strategies, plays a vital role in manipulating the duration of entrepreneurial processes. Further, McMullen and Shepherd (2006) regards uncertainty as the primary differentiating factor between the action and entrepreneurial action. Quoting McMullen and Shepherd (2006) on the importance of relationship between entrepreneurial

action and uncertainty, "entrepreneurship theorists have embraced the position that uncertainty is detrimental to entrepreneurial action because properties such as hesitancy, indecisiveness, and procrastination are thought to lead to missed opportunities", helps scholarship to set the foundation that the uncertainty is detrimental and is an important aspect of the entrepreneurship literature. While Townsend (2018) factually states that the presence of *a priori* uncertainty is a pre-condition for the very existence of the entrepreneurial opportunity.

Packard et al. (2017), in their seminal article states that decision making under uncertainty is fundamental in the entrepreneurial process. Packard et al. (2017) unpacks the uncertainty construct and proposes the typology of uncertainty ultimately they apply the classification to entrepreneurial process and explain the various judgments made under individual uncertainties. They established a solid connection of entrepreneurial decision-making and uncertainty by giving the example of the evolution of Netflix. In the example, Netflix switches between causation and effectuation few times during their evolution to the 'Streaming Giant' by leveraging the present uncertainties. They believed that the uncertainty changes throughout the entrepreneurial process, thus affecting the entrepreneur's judgment and finally his decision. They establishes the fact that the entrepreneurship is a reasonable action in the presence of uncertainty. They consider the cognitive mechanisms of the entrepreneurs to influence their judgment in the face of uncertainty to generate entrepreneurial action.

Ramoglou and Tsang (2016) in their seminal article establishes a solid link between entrepreneurial action and the present uncertainty. They discuss the time and uncertainty concepts in relation to the entrepreneurial opportunities in a cautious manner, laying out the importance of uncertainty in the creation of the opportunities. By providing a deep understanding of the uncertainty in the actualization approach, they recognize the importance of uncertainty in the discovery and creation of opportunities approach. Based on the notion that "individuals can only believe(not know) that they have recognized entrepreneurial opportunities under uncertainty" (McMullen and Shepherd (2006)), they argue that one should replace expressions such as "opportunity recognition" and "opportunity identification" with the neutral belief of "opportunity belief." They proposed a nuanced view of uncertainty in the entrepreneurship wherein the consideration of "ontological uncertainty in regarding the

existence of conditions capable of sustaining a venture's profitability" is widely overlooked over the "empirical realization of profits" (Ramoglou and Tsang (2016)). They argued that the existence of opportunities is not defined by the realization of the profits because the presence of uncertainty may hinder the actualization of the profits. Thus they encourage the research scholarship to consider the realist conception of the uncertainty wherein "the state of agnosticism for questions that are unanswerable" (Ramoglou and Tsang (2016)). This is similar to the definition of Knight Frank (1921) 'true uncertainty' where there is no basis of classification of instances.

There is a growing belief in the entrepreneurship that the presence of uncertainty is what differs entrepreneurial decision to non-entrepreneurial decision Alvarez and Barney (2005). Claiming that uncertainty is characteristic which is important during decision process wherein the entrepreneurs are exploiting new, untested technological and market opportunities(Alvarez and Barney (2005)).Alvarez and Barney (2005) consider the firms entrepreneurial if they are organized under the conditions of the uncertainty wherein their primary purpose is to solve unknowable transactions.

Wiltbank et al. (2006) proposes the transformative approach of effectuation that helps expert entrepreneur in the decision-making situation in the presence of various uncertainties. In the transformative approach, the expert entrepreneur uses his creativity and co-creates the goal using an effectual logic without calling for prediction in creating new markets and new environments (Wiltbank et al. (2006)). Wiltbank et al. (2006) explains various strategies such as visionary, planning, adaptive and transformative that can also be used by entrepreneurs in the presence of uncertainty.

Thus it is evident that any degree of uncertainty is said to play an important role in the firm's survival; it can either lead to missed opportunities or the economic growth of the enterprise. The focus on the uncertain aspects of the situation can lead the entrepreneur to exercise options that can lead to either innovative solutions, the creation of new economic opportunities or to the more uncertain environment deeming the recognition of uncertainty as crucial in the entrepreneurship stream. It is evident for the entrepreneurship literature to recognize a decision-making method, that can help the entrepreneur to create profitable opportunities while accepting the true nature of uncertainty. However uncertainty is still an

ambiguous construct.

While, uncertainty is gaining recognition in the entrepreneurship research stream, there is still a debate whether the uncertainty is subjective or objective i.e. is it perceived by entrepreneurs as a mental construct or is it objectively present and is experienced by entrepreneur. Extending this particular debate, there is a widespread confusion in the entrepreneurship research if the uncertainty is reducible or not. Townsend (2018) took one step towards this debate by agreeing that in the entrepreneurship literature whether the uncertainty is perceived or experienced, it is still one of the knowledge problems faced by the entrepreneurs. They consider that the Knightian uncertainty to be irreducible and important for the action to be considered as entrepreneurial action. They also points to the fact that the uncertainty can be resolved to some level by gathering additional information.

From the researchers such as Schumpeter, Kirzner Mark I, Packard et al. (2017) and Miliken (1987) considers the uncertainty to be a perceived uncertainty while other researchers such as Knight Frank (1921), Sarasvathy (2009), Kirzner Mark II(Korsgaard et al. (2016)) and Packard et al. (2017) considers the uncertainty to be the objective state of the world, which is experienced by the entrepreneur. Which implies that entrepreneur will need to bear the uncertainty and try to create and imagine the opportunity. While for the entrepreneurs who perceives the uncertainty, for them the uncertainty is a 'perceptual experience' which can be transformed to the quantifiable risk situation.

Extending on the Knight Frank (1921) work on uncertainty and its presence in business, Packard et al. (2017) provides the novel classification of perceived uncertainties. They propose the typology of uncertainties in terms of their 'true' nature while they outlined the decision processes in terms of 'perceived' nature of uncertainty. For Packard et al. (2017) uncertainties can be considered as true but they are to be considered perceived in the decision processes. The contradictory approach used by Packard et al. (2017) suggests that there is a need to differentiate between objectively experienced and perceived uncertainty. Confusingly, Packard et al. (2017) refers that entrepreneurial outcomes not only dependant on the perceived uncertainty but also on the presence of true uncertainty. Moreover, they consider their version of uncertainty that can be transformed into another and is reducible to probabilities or can be resolved or managed by using dynamic judgment. Their belief that

the type of perceived uncertainty along with the entrepreneur's associated judgment transforms into another type of perceived uncertainty is itself a contradictory approach. These confusing arguments of perceived and objectively experienced uncertainty by Packard et al. (2017) implies that they consider the uncertainty to be reducible, thus suggesting that they are conflating the 'objective' and 'perceived' uncertainties concepts.

At the same time it is important to note that, Knight Frank (1921) indicates that the uncertainty is irreducible and managers can use their judgment and intuition as well as their specialization skills to navigate through the uncertain environments or markets. Agreeing to Knight Frank (1921), Ramoglou and Tsang (2016) renewed understanding that the opportunities exists objectively indicates that their version of realist uncertainty is the uncertainty experienced objectively rather than subjectively. Also Townsend (2018) establishes that the uncertainty is indeed irreducible and is a construct that cannot be formulated as represented by Packard et al. (2017).

The aforementioned inconsistent approaches to the uncertainty is a testament that the uncertainty as a construct is yet to be fully understood. -the confusion can also be seen in the portrayal of environment uncertainty defined by Milliken (1987) and used by Packard et al. (2017) where they mention that the environmental uncertainty is true in nature and cannot be reduced to probabilities. While Milliken (1987) specifically states that environmental uncertainties are perceived by entrepreneur.

Famously Kirzner Mark II points out that, "the entrepreneur will need to bear uncertainty as well as make decisions and take actions in the face of uncertainty" (Korsgaard et al. (2016)). Korsgaard et al. (2016) points to the suggestion made by McMullen and Shepherd (2006) that 'the perceived uncertainty and the motivation to bear the uncertainty are decisive components in separating the entrepreneurial action and non-entrepreneurial action', thus implying that for McMullen and Shepherd (2006) the uncertainty is a mental construct related to a sense of doubt leading to hesitation. Further Korsgaard et al. (2016) points that in Kirzner Mark II, the uncertainty is considered to be as more than a mental construct. Stating that even if the entrepreneurs perceive the uncertainty or the uncertainty manifests itself during the entrepreneurial process, they do rather face and experience the actual uncertainty caused by the futurity of markets in which they will be selling. Sarasvathy (2009) also



states that the effectuation is the decision-making process that helps the entrepreneurs to manage under the varying types of uncertainties including 'true uncertainty.' Commenting on Packard et al. (2017) approach of defining uncertainties, Townsend (2018) argues that "such a textured typology of uncertainty runs the risk of conflating the decision rules, logic, and inherent problems posed by different states of unknowingness. That is because there is not a "spectrum of uncertainty," but rather a "spectrum of unknowingness" – ranging from ignorance to certitude – some portion of which involves the problem of uncertainty."

As Knight mentioned that in this ever changing world, the presence of uncertainty is indisputable and its implications unavoidable, it is now upon researchers and entrepreneurs to either accept the uncertainty in its 'true' sense and create something innovative or perceive it and try to reduce it to the quantifiable risk. The exploration of persistent conflation and paradox of true vs. perceived uncertainty should be the focus of the research scholarship.

It is evident that even-though the uncertainty is not a broad spectrum there are two contradictory types of uncertainties prevalent in the entrepreneurship. One is a reducible uncertainty i.e., perceived uncertainty that can be resolved by conducting systematic search and another is irreducible uncertainty i.e., true uncertainty which is not possible to resolve and is unanswerable. In the reducible uncertainty, one can reduce the uncertainty to increase the predictability of outcome preferences while in the presence of irreducible uncertainty, one can only imagine or create new economic opportunities and can gain some clarity on outcome probabilities by gathering new information.

In the following section different types of uncertainties as explained by few entrepreneurship scholars. The uncertainties explained below are either perceived or are objectively present during the entrepreneurship process.

### **3.3 Different Types of Uncertainty**

As discussed previously, uncertainty is considered to be the essential part of the entrepreneurship. Its presence in the decision process helps the individual to act entrepreneurial. However, many scholars have the different understanding of the types of uncertainties. In this section, the different types of uncertainties that are widely accepted by scholars and their definitions will be discussed. Some of them are based on the Knight Frank (1921)'s notion

of uncertainty like Sarasvathy (2009) and Packard et al. (2017) while others are completely different, such as Milliken (1987) and Jalonon (2011).

### **Knight Frank (1921) three types of uncertainties**

Knight Frank (1921) in his seminal work, discusses a clear distinction between risk and uncertainty. Uncertainty, according to Knight is raised by the absence of the knowledge, i.e., partial knowledge and due to the impossible classification of states. Knight Frank (1921) proposed the following definitions of the uncertainty and risk by stating three types of the probability situations based on the classification of states or instances.

- *A priori* probability as defined by Knight Frank (1921) is an absolute homogeneous classification of instances along with the indeterminate factors, as interpreted by LeRoy and Singell Jr (1987), the probabilities which can be derived deductively as in rolling dice. As Wiltbank et al. (2006) puts it, this state consists of known distributions and unknown draws.
- Statistic probabilities as defined by Knight Frank (1921) depends on the empirical evaluation of the frequencies between predicates and its relating alternatives such as in life insurance. Interpreted as another type of uncertainty by Wiltbank et al. (2006) wherein there are unknown distributions and unknown draws.
- Estimates as defined by Knight Frank (1921) has 'no valid basis of any kind of classifying instances,' simply put this type of uncertainty 'consists of non-existing distributions where the very instances are unclassifiable' (Wiltbank et al. (2006))

Using three definitions, Knight identifies *A priori* and statistic probability as type of risk and ambiguity (Townsend (2018)) faced by managers. The third type, i.e., estimates is the one he identifies as the 'true uncertainty' also known as 'Knightian Uncertainty.' He attributes the presence of 'true uncertainty' to help entrepreneur not only to beat the perfect competition but a reason to 'account for the peculiar income' (Knight Frank (1921)). According to Knight Frank (1921), decision-makers in businesses face a far too unique situation which makes it impossible to define or apply any statistical probability or chance to that situation. For him, the intuition and judgment helps the entrepreneur to manage under the 'true uncertainty'

### **Milliken (1987) types of uncertainty**

In response to the confusion of what exactly is environmental uncertainty, Milliken (1987), in his seminal article, discusses the perceived environmental uncertainty. Milliken (1987) defined uncertainty as perceived state of decision-maker where he/she can not predict accurately. He defines environmental uncertainty to be the state wherein the entrepreneur locates the external environment of the organization or firm as the source of uncertainty. He introduced three types of environmental uncertainties experienced by entrepreneurs. He proposes a multidimensional view of uncertainty construct wherein he defines distinct types of uncertainty: State uncertainty, Effect uncertainty and Response Uncertainty.

- 'State Uncertainty' or 'Perceived Environmental Uncertainty' is the only type of uncertainty that can be perceived and is not an objective state of the world. State uncertainty is the perceived state wherein individuals are unable to predict about the external environment of the organization and a particular component/s of that environment (actions taken by competitors, suppliers, consumers, socio-cultural trends, demographic shifts, major new development trends, etc.)
- Effect uncertainty involves the inability of an entrepreneur to predict the impact of the environmental events, or changes will affect his/her firm in future (For e.g., will your house be left standing in the case of the forest fire?).
- Response uncertainty is defined as a lack of knowledge of response options and the inability of the entrepreneur to predict likely consequences of response options in the event of environmental changes(for e.g., inability to predict the consequences of the firm launching new technology). Milliken (1987) also mentions that all the types of environmental uncertainties lack some information for entrepreneurs to consider while making any decision.

### **Packard et al. (2017) types of uncertainties**

Recently, Packard et al. (2017) proposed the formalized model of uncertainty by defining the following four types of uncertainties involved in the entrepreneurial action.

- Packard et al. (2017) details the risk as the 'identifiable uncertainty' which is statistically measurable. Extending Knight's notion, risk is defined as the ergodic stochastic context wherein set of options and outcomes are closed, and the relationship between them is probabilistic. Ambiguity, like, risk has an open set of options and outcomes but with the unknown probabilistic relationship between them (Knight Frank (1921), Packard et al. (2017)).
- Second type of uncertainty is environmental uncertainty wherein decision maker is unaware of how one's decision can affect the surroundings of the entrepreneur. It is defined as the state uncertainty wherein the set of options is closed, and the set of outcomes are open, leading entrepreneurs different possible scenarios and populating the set of possible outcomes by themselves (Packard et al. (2017)).
- Third type of uncertainty is creative uncertainty wherein the entrepreneurs have unidentified options or decisions to choose from which results in finite innovative solutions. This type of uncertainty leads the entrepreneur to the situation, wherein he/she can choose from the infinite number of possible options that can lead to the closed set of outcomes (Packard et al. (2017))
- Lastly, the fourth type of uncertainty is the absolute uncertainty which can be defined as 'true uncertainty,' wherein the extreme uncertainty is present. The decision maker is faced with endless options and outcomes as nothing can be foreseen and is unpredictable (Packard et al. (2017)).

### **Uncertainties in innovation process**

Uncertainty in the innovation process is apparent because of the lack of knowledge as well as the unpredictable nature of future events. Jalonen (2011) suggests that the uncertainty is 'a necessary condition of innovation.' After conducting a systematic review, Jalonen (2011) proposed eight factors that are involved in the innovation process which creates the uncertainty.

- Technology uncertainty, arises from the lack of knowledge about new technology and/or due to the lack of knowledge to use the technology.

- Market uncertainty arises from the unpredictable changes in the relationship between the firm and its customers as well as competitors as the new market emerges.
- Regulatory/Institutional uncertainty, as defined by Bylund and McCaffrey (2017) exists when entrepreneurs are doubtful about the future compatibility of institutions at different levels. "The level of uncertainty is directly proportional to the ambiguity of regulations imposed by institutions" (Bylund and McCaffrey (2017)).
- Social/ Political uncertainty, stems from the diverse interests of stakeholders as well as their power struggle. The source of this uncertainty is when the innovation threatens individual's values and/or organizations norms.
- Acceptance/legitimacy uncertainty occurs when the individual's existing knowledge and skills are in contradiction to necessary skills, creating a cognitive dissonance for individuals within the organization.
- Managerial uncertainty appears from the lack of knowledge as well as tools, manifesting the fear of failure within the decision-maker's mind.
- Timing uncertainty looms over the innovation process from the early phases of the innovation project to the last phases due to the lack of information and due to the involvement of additional individuals.
- Consequence uncertainty manifests when the innovation process involves the direct as well as indirect unexpected, undesirable and unanticipated consequences.

### **Uncertainties in effectual process**

Effectuation is one of the decision-making processes that helps an entrepreneur to decide under uncertainty. Sarasvathy (2009) entails that the entrepreneur can follow the effectual process to navigate through the uncertainty and can create new economic opportunities or artifacts by eschewing the prediction and taking control. Sarasvathy (2009) mentions the following present and evolving uncertainties in the effectual process.

- Goal ambiguity – Goal set by the entrepreneurs and his network of self-selected stakeholders is ambiguous, no preferences are either given or are in good order.

- Knightian uncertainty – the situation wherein the probabilities to know future consequences is impossible to calculate i.e., unknowable
- Isotropy – the state wherein it is unclear for the entrepreneur of what elements of the environment to focus on and what to ignore

Above types of the uncertainties implies that there persists a confusion in the entrepreneurship literature and conflicting definitions do exist. However, it should be noted that 'Knightian Uncertainty' is considered to be the uncertainty in its true sense and his distinction of risk with uncertainty is considered to be the foundation of most of theories. Townsend (2018) addressed the problem by arguing that the uncertainty is not a broad spectrum in itself but it is a part of the knowledge problem spectrum, co-existing with ambiguity, complexity and equivocality.

It is apparent that the uncertainty is present and fundamental to the entrepreneurial process, thus it is imperative to understand about how an entrepreneur can manage the firm under the situation of uncertainty and which decision-making method is suitable for him.

### **3.4 Methods of Meeting Uncertainty**

Several following methods were proposed of how an entrepreneur can manage the firm in the situation of uncertainty and how one can decide create or discover entrepreneurial opportunities under the presence of uncertainty.

One of the methods for entrepreneurs to manage under uncertainty is to leverage entrepreneurial heuristics and its biases. As deduced by McKelvie et al. (2011) in their seminal article that the tolerance of environmental uncertainty is attributed to entrepreneurs particular attitudes and their patterns of reasoning i.e., their reliance on their cognition as well as heuristics. As Tversky and Kahneman (1974) put it in his article, entrepreneurs use three types of heuristics principles such as representativeness, availability and finally adjustment and anchoring which can lead to the number of biases. Representativeness heuristic is the principle wherein the probabilities are assessed based on the degree to which an outcome is representative of choice. The judgment of the entrepreneur is then influenced by the representativeness between the outcome and the choice, making him/her prone to the bias of

insensitivity to sample size, use of worthless evidence, local representativeness, insensitivity to predictability, the illusion of validity and misconceptions of regression (Tversky and Kahneman (1974)). The Availability heuristic is the principle wherein the decision-maker assesses the frequencies of the outcomes or probabilities by the ease with which instances or occurrences that come to mind. Availability heuristics can lead to various biases that originate due to retrievability, the effectiveness of a search set, biases of imaginability and illusory correlation. Adjustment and anchoring is yet another heuristic used by entrepreneurs in the face of uncertainty wherein the starting point of the solution is suggested based on the formulation of the problem or based on the partial computations. Also different initial points can yield to different estimates or solutions based on the individual biases. Biases that originate from above mentioned heuristics are insufficient adjustment, biases in the evaluation of conjunctive and disjunctive events and anchoring in the assessment of subjective probability distribution Tversky and Kahneman (1974). Thus, decision-maker should take heed of the mentioned cognitive biases while using the respective judgmental heuristics. Tversky and Kahneman (1974) believes that the judgment based on the complete set of individual beliefs can help the decision-maker to manage under the uncertainty although there is no simple formula or method to ensure if the judgment is based on the complete set of beliefs. Implying that, the better understanding of the heuristics and biases involved in the decision-making approach can lead the entrepreneurs to improved judgments and decisions in the situations of uncertainty. Heuristics and biases method, mostly serves as a compliment to the entrepreneurial decision-making process to manage under uncertainty to help entrepreneur in deciding under the presence of uncertainty.

In the entrepreneurship literature, entrepreneur's personal characteristics are considered to be the most important thing to help them in the situation of uncertainty. Sarasvathy (2001) suggests that expert entrepreneurs who practice pragmatism can surpass in the situation of the 'true uncertainty' while novice entrepreneur may take time to develop their expertise in a certain domain or domains. McKelvie et al. (2011) claims that the entrepreneur's expertise helps in reducing his/her behavioral bias in the face of decision-making uncertainty. Entrepreneurial self-efficacy can also be proved as useful to transform increasing perceptions of uncertainty into exploration and opportunity identification (Schmitt et al.

(2017)). Personality characteristics, creativity and cultural integration can also influence the entrepreneur's judgment and how they act under the high level of the uncertainty. Petrakis et al. (2016) strongly suggests that the 'Creative Strategic Scenario Thinking' wherein the strategic thinking, scenario analysis, and creativity, while taking into account the knowledge, cultural background, and personality traits of the managers and the entrepreneurs, are taken into the account to identify and realize the economic opportunities in the face of uncertainty. As pointed out by McMullen and Shepherd (2006), "Uncertainty with regard to the consequences of one's own actions, however, cuts to the core of extant theory in terms of the psychology of the entrepreneur. For example, the literature suggests that entrepreneurs maintain high levels of confidence (Busenitz and Barney (1997); Forbes (2005)) and self-efficacy (Baron and Markman (2003), Chen et al. (1998)) and that they are driven by a belief in their own ability to "create" in the face of changing and uncertain environments (Sarasvathy (2001))." It is clear that the psychology and personal traits of the entrepreneur plays a vital role on how they act, how they perceive uncertainties or how they experience uncertainties and how their judgment is influenced while making decisions in the low to high levels of uncertainties. However, this method, is partly responsible of helping entrepreneur in managing under uncertainty. The reason being, personal characteristic may encourage entrepreneurs, but it won't give them tools to manage acute decisions of firm.

Another method, discussed by Alvarez and Barney (2005), is that entrepreneurs organize the firms in the uncertain settings. They focus on the decision rights, and residual claims problem can be solved and thus help the entrepreneur to organize a firm to ensure the exploitation of presented opportunity. They believe that clan-based, expert-based, and charisma based entrepreneurial firms can help the firm to organize under the situation of the uncertainty. The decision making method is still ambiguous and can be considered as a complimentary method to judgment based decision.

Another method that is proposed by Packard et al. (2017) entails the use of 'Dynamic judgment' throughout the entrepreneurial process when faced with any fundamental uncertainty. Dynamic judgment is a continuous process of making judgments, evaluating them and re-making them over the period of time. The desired goal set by the firm can also influence the change in the judgment. They also support and encourage using effectual decision-making



strategy for the entrepreneur in the face of the uncertainty. Packard et al. (2017) also warn the entrepreneur about reducing or increasing the uncertainty while using the above methods. This method, although developed, still has a weak point of confusing 'true uncertainty' with 'perceived uncertainty'.

One of the popular methods to manage under uncertainty is to use the judgment of the decision maker to resolve the present uncertainty (Knight Frank (1921) Packard et al. (2017)). According to Knight Frank (1921), "The entrepreneurs in the face of uncertainty, judge, discern and plan the steps and make adjustments necessary to meet the anticipate generalized future goal or situation." This notion is accepted by most of the scholars commenting that the judgment of an entrepreneur, influenced by his either means available, expertise or their skills, can be used to resolve the uncertainty and manage in the face of the uncertainty. Judgment and intuition are what Knight Frank (1921) proposed can help entrepreneurs to estimate the probabilities of occurrence of each outcome as opposed to any calculation. The judgment and the managerial capacity of the said entrepreneur plays a vital role rather than the risk aversion. The judgment by the entrepreneur is based on his expertise, opinions and by judging other people's capabilities. Extending his method, Knight Frank (1921) believed that the function of judgment is non-contractible, it is not something that can be precisely defined making the contract incomplete, thus implying, that one should look for the contractual incompleteness and use the judgment to combat the moral hazards or holdup costs. Knight Frank (1921) cites that the judgment and intuition based decision making may involve small samples and high levels of overconfidence which can lead to either risky or uncertain decision (Knight Frank (1921)). This method if seen through modern-day lens, will feel incomplete and thus we need a method which not only will complement Knight Frank (1921)'s method but also is developed based on modern-day decision making theory, leading us to effectuation method proposed by Sarasvathy and Kotha (2001).

Effectuation claims to be one of the methods that can help the entrepreneur in the face of true uncertainty and is the most developed method to manage uncertainty. Effectuation is the decision-making process wherein the uncertainty is regarded as irreducible uncertainty, wherein it is unmeasurable, unlike risk. In the process, Sarasvathy (2009) mentions that it recognizes the importance of uncertainty in its true sense during the creation of the venture

or any economic opportunity. The process, lets the expert entrepreneurs use their control to manage under the uncertainty while eschewing the prediction. In the effectuation process, entrepreneurs faces three types of uncertainties namely 1) Goal Ambiguity 2) Knightian Uncertainty and 3) Isotropy. The personal characteristics of entrepreneur uses their creativity and the imagination of the entrepreneurs to resolve uncertainties. Using her immediate networks, the entrepreneur then interacts with self-appointed stakeholders to co-create economic opportunities. The presence of goal ambiguity, Knightian uncertainty and the isotropy can be an overwhelming situation for the entrepreneurs, thus the effectuation set-forth the following five principles and heuristics to manage under multidimensional uncertainties. Effectuation principles help the entrepreneur to recognize the present uncertainties and encourages the entrepreneur to leverage contingencies caused by its presence. Also, the self-selection of the stakeholders based on their commitments and it helps the firm to restrict their goal as well as grow their available means. Effectuation theory urges entrepreneurs to open themselves for unexpected surprises that can be turned into opportunities, urging them to use the effectual logic based on their experience and a strong sense of identity while facing the uncertain future. Finally, effectuation urges the entrepreneur to focus on the controllable aspects of the environment and use minimum available means to create something valuable. Thus, the effectuation helps the entrepreneur to stay in control of the manageable aspects of the entrepreneurship initiative in the face of uncertainty.

The effectuation, in summary, uses the heuristics as suggested by Tversky and Kahneman (1974) and McMullen and Shepherd (2006), personal characteristics of the entrepreneur as suggested above, the identity of entrepreneur as suggested by Alvarez and Barney (2005), and provides effectual logic as a tool to be used with or without judgment while staying true to the nature of uncertainty. Therefore, Effectuation seems to be the developed method to manage under the situation of uncertainty and the further discussion of the effectuation and its components will be discussed in detail in the following section.

## 4 Effectuation

There is no better way to understand effectuation in one sentence than this, “Effectuation posits a theoretical framework describing how expert entrepreneurs utilize resources within their control in conjunction with commitments and constraints from self-selected stakeholders to fabricate new artifacts such as ventures, products, opportunities, and markets” (Sarasvathy et al. (2014)). The following section will entail the effectuation decision-method in detail.

### 4.1 Effectuation and its Origins

Effectual entrepreneurship does not identify itself in social science, but in the science of artificial wherein the effectuators see the markets and firms as human-made artifacts(Sarasvathy (2009)). Effectuators (entrepreneurs who are decision-makers) embraces the failure and in addition to creating opportunities, also discovers and recognize opportunities throughout the effectuation process. As opposed to the neo-classical economic approach for rational decision-making models, Sarasvathy (2001) argues that entrepreneurs also use effectuation process while pursuing entrepreneurial opportunities. Effectuation, as opposed to the causation, represents the paradigmatic shift in the way the entrepreneurship literature we see. Effectuation is the inversion of causation(Sarasvathy (2001)). By challenging the classical rational strategy decision-making models employed by neoclassical economics, Sarasvathy (2009) introduces the ‘Effectuation’. Effectuation is a decision-making process which is usually seen in the initial stage of venture creation constituting the use of existing means which they can afford to lose, building partnerships with self-selected stakeholders and leveraging environment contingencies. Sarasvathy (2009) regards the success of entrepreneurs rather than firms’ wherein they achieve successes through failure management instead of solely focusing on the firm’s performance, .

Based on the works of March (1976); Knight Frank (1921); Weick (1969)), and examining as well as considering other existing theories and empirical evidence, Sarasvathy (2001) created the space for the effectuation literature in the economics and management. The effectuation theory uses the Davidson view of knowledge, a Penrosian view of resources with

the Lachmanian view of institutions as its basis. It is said to be Lachmanian, dubbed as 'optimistic however without illusions'(Sarasvathy and Dew (2008)). Sarasvathy and Dew (2008) discusses how the effectuation has the overlap of concepts from the Lachmanian view regarding institutions and not considering the knowledge as well as resources concepts.

Sarasvathy and Dew (2008) agrees with the view of the Lachmanian institution, wherein the entrepreneur uses the human actions to either change the existing institutions or create new institutions. This argument coincides with the notion that Lachmanian entrepreneurs create new institutions by acting in their self-interest, thus creating unintended consequences. However Chiles et al. (2008) disagrees with Sarasvathy and Dew (2008) arguing that the Lachmanian subjectivism is more relevant than the Davidson view of knowledge which is used in the effectuation. Leading to Sarasvathy and Dew (2008)'s arguement that the "Lachmann's eloquent articulation of means and ends as 'riveted by choice' is an apt description of the entrepreneurs's starting point, not only with regard to resources, but also in reference to knowledge and institutions". Thus,leading us to the construction or the evolution of the institutions from the choice taken by entrepreneur. Sarasvathy and Dew (2008) then finally quotes how the effectuation uses Lachmanian views by saying that "effectual logic allows entrepreneurs to live and thrive in a Lachmannian world of divergent expectations, constructible capital assets, and evolving institutions without having to become Leibnizian nomads of radical subjectivism".

Penrose (2009) is considered to be the source of the inspiration for the resources view of the effectuation theory (Sarasvathy and Dew (2008)). Penrose (2009) urges the entrepreneur to create economic opportunity by effectively managing the available resources to the firm. According to Penrose (2009) the experienced managers can imagine the unique opportunity and are the stimulants who can and are able to convert the firm's available resources into the economic opportunity. In the effectuation, expert entrepreneurs similarly create economic opportunity with the help of the available resources and skills (Kor and Mahoney (2004)).

As mentioned by Erikson and Korsgaard (2016), Davidson's view of knowledge is of three varieties consisting of objective, intersubjective and subjective.The objective variety refers to the representation of the external world through entrepreneurs mind. The intersubjective variety of Davidson knowledge refers to the 'explicit and tacit knowledge' between the

entrepreneur and potentially stakeholders (people who are involved in the entrepreneurial process). The subjective variety points to the entrepreneur's knowledge of himself. The process of creating effectual network during the effectual process seems to use the Davidson's view of knowledge wherein entrepreneurs use knowledge of the world, of others and the world. Intersubjective interactions, i.e., knowledge of others wherein the entrepreneur discusses, negotiates, bargain or persuade stakeholders or potential ones, can lead to the constructive approach to overcome the impossibility of creating a new market (Sarasvathy (2009)). The effectuation provides the effectual network coupled with specific design principles leading the entrepreneurs and committed stakeholders to create and then employ the constructive approach to create a new market (Sarasvathy (2009)). It is imperative to note that all three of the knowledge varieties helps the entrepreneur in navigating through the uncertain, ambiguous and isotropic riddled situation. The objectivity and the subjectivity of the entrepreneur help him to be creative of how he leverages unexpected surprises. It also helps him to become the pilot of the whole entrepreneurial initiative. It also helps him to decide on how much he can afford to lose and how much resources as well as means he has at his hand. The effectuation thus uses pragmatic Davidson (2001)'s three-legged view of knowledge to create a possibility of creating a new market by an effectual entrepreneur.

Sarasvathy (2001) challenges the conventional wisdom of predominant entrepreneurial decision-making models, by proposing the non-predictive logic of decision making under situations of uncertainty. In the deliberate decision-making model referred as causation, the process involves the entrepreneurs making decisions towards a clear goal, based on prediction wherein the environment influences the entrepreneur's actions. However, in the effectuation, the entrepreneurs work towards an ambiguous goal using non-predictive control logic wherein the environment is independent of entrepreneur's actions (Perry et al. (2012), Sarasvathy (2009)).

The entrepreneur by looking at her available means and her generalized aspiration, the effectual process starts with entrepreneur asking herself three central questions, first 'Who am I?', second, 'What they know?' and finally, 'Whom they know?' The overall objective is not clearly defined at the beginning, and the entrepreneur remains flexible towards the unpredictable future and uses effectual logic to control and leverages environmental contin-

gencies and learn as she goes forward (Perry et al. (2012)). Due to the initial ambiguity, and present uncertainty, the entrepreneur starts the process with their identity, their knowledge, and their social networks. They use their identity and knowledge to define their available means and what they can afford to lose, and they use social networks to co-create with possible self-selected stakeholders to create new firms, artifacts or markets (Sarasvathy (2009)). In the process of creating a new economic opportunity (Sarasvathy et al. (2003)), venture or new market or product, the self-selection of stakeholders helps the entrepreneur to gather further means and consecutively help the whole initiative in constraining their goals thus reducing the uncertainties (Sarasvathy et al. (2014)).

In simpler terms, effectuation is at the heart of the theory of design. Effectual problem space consists of Knightian uncertainty (Knight Frank (1921)), Marchian goal ambiguity (March (1976)) and Weickian enactment (Weick (1969)) (Sarasvathy (2004)). Effectual logic helps entrepreneurs create new economic artifacts or markets. Effectual strategies are useful in the event of ambiguous goals, unpredictable and unknowable future combined with the environment driven by human action. In sum, effectuation process consists of the effectual logic that helps to transform the problem space and reconstituting extant realities into new futures in the face of uncertainty (Sarasvathy (2009)).

Effectuation decision-making process can be used by cognitively bounded creatures and it also invokes the relevance of uncertainty in the entrepreneurship decision-making process which has been neglected for a long time. Effectuation consists of critical elements such as effectual logic, effectuation principles, effectual problem space and its process. Effectuation sometimes leads entrepreneurs to the innovative artifacts or an entirely new market.

Effectuation lets the entrepreneur create an environment and set of relationships to create a desired future which is much closer to what he aspires to be. Effectuation process can help entrepreneur create many companies in entirely distinct industries, implying that the process helps the entrepreneur to explore and create many effects in the face of goal ambiguity. According to Tasic and Andreassi (2008), effectual logic is 'player-dependent', wherein entrepreneurs can forge their new companies based on the exploration of contingencies.

Effectuation is a decision-making approach that captures the heuristics of expert entrepreneurs wherein the goal is not defined at the beginning, and the results are based on

the enactment by entrepreneurs (Welter et al. (2016)). Effectuation leads the entrepreneur to use exaptive strategies under uncertainty instead of adaptive and other types of reactive strategies. Effectuation implies exaptation strategy instead of adaptation which is generally followed in other strategic decision making process such as bricolage Baker and Nelson (2005). Citing Dew et al. (2011), Dew and Sarasvathy (2016) says that "Exaptation is one of several types of transformations that entrepreneurs produce when employing effectual heuristics".

Effectuation is mostly used in the early stages of the venture, and the planning based model in the later stages of the venture. Suggesting that the firm or entrepreneur switch the logic alternatively switch from effectuation to causation based on the resource position and stakeholder pressures (Reymen et al. (2015)). To better understand the effectuation following components such as critical elements of effectuation, effectual logic, effectual principles, types of uncertainties involved in the effectual process and the effectual process of creating economic opportunity will be discussed in the next sub-section.

## **4.2 Uncertainties in Effectuation**

Sarasvathy (2009) stresses the importance of uncertainties present in the creation of new economic opportunities. In effectuation the true uncertainty is recognized, and entrepreneurs are encouraged to leverage the unknowable and unpredictable situations to lead them to new possibilities towards their long-term aspiration. Goal ambiguity, Knightian uncertainty, and isotropy create the effectual problem space for decision makers which enable them to create their path independent of the environment in the unpredictable future. If we see the effectuation in terms of uncertainties, the definition of effectuation will look like this: "Effectuation is a creative process wherein the entrepreneur uses the effectual logic to reach their ambiguous goal/s along with the network of self-selected stakeholders, co-creating economic opportunities in the isotropic environment and leveraging the contingencies caused by encased multidimensional uncertainties" (Sarasvathy (2001)). Even Lester Lave in his foreword, mentions that entrepreneur or any person who creates an artifact or opportunities faces the following three types of uncertainties ((Sarasvathy (2009)).

- Goal ambiguity – Goal set by the entrepreneurs and his network of self-selected stakeholders is ambiguous, no preferences are either given or are in good order. It goes on

until the creation of the market or economic opportunity. The ambiguous goal can be constricted after exercising continuous interactions with stakeholders.

- Isotropy, as it is an altogether new and undefined space, the environment surrounding the firm will be radioactive, i.e., filled with the number of uncertainties. Here, the entrepreneur is unable to choose to what to focus on and what to ignore.
- Knightian uncertainty known as 'true uncertainty'. It is the situation wherein the probabilities to know future consequences is impossible to calculate.

The entrepreneurs facing the effectual problem space characterized by uncertainties mentioned above are traditionally advised to take the best guess about future events, have faith in their vision or trust their intuition about their imagined opportunity and use their leadership skills to attract other talents and people to join him to make it successful. Moreover, Sarasvathy (2009) argues, that one does not need to be rational or deviate from rational behavior. Instead, a decision-maker can tackle the problem space by using few critical elements of a logic that directly tackles with all three uncertainties, suggesting the necessity of a logic that is non-predictive, non-teleological and non-adaptive. Effectual logic will now be discussed following.

### **4.3 The Effectual Logic**

After conducting an empirical study using think-aloud protocols on 27 expert entrepreneurs, Sarasvathy (2001) introduces the effectuation theory. The main tool and guidelines provided by the effectuation is the use of a non-predictive, non-teleological and non-adaptive logic called effectual logic. The logic of controlling the uncertain future using the non-predictive strategies by an entrepreneur to transform existing realities into new markets is thus said to be an effectual logic. "Non-predictive control is an even-if principle; it claims that even if the future is uncertain, unknowable and unpredictable, it is still possible to design the artifacts we desire." (Sarasvathy (2009)). The effectual logic is at the core of the five effectual principles followed by decision-maker/s throughout the effectual process. Expert entrepreneurs use effectual logic significantly in decision-making or entrepreneurial process (Sarasvathy and Dew (2013)). The effectual logic can help entrepreneurs to navigate through



the uncertainty ridden effectual problem space to create new artifacts or new markets with the self-selected stakeholders using the available means and leveraging contingencies. As argued by Sarasvathy and Dew (2013), "This procedural logic is teachable and learnable; it minimizes the use of prediction; it leverages surprises and inherent heterogeneities in means and capabilities; it is strongly antithetical to central planning and practically (not merely ideologically) nurturing of individual freedom and creativity. And in the final analysis, it is definitely not tautological." According to Sarasvathy and Dew (2013), entrepreneurial judgment is a form of expertise which can be leveraged by the effectual logic. The effectual logic, unlike judgment, can be taught and exercised without knowing judgment ex-ante or in the absence of it.

The main five effectuation principles that define the dynamics of the effectuation process those principles will be discussed in the next sub-section.

#### **4.4 Effectuation principles**

The five effectuation principles together are called as "Principles of Entrepreneurial expertise." Each of five principles embodies techniques of non-predictive control eschewing the prediction in the process, and these principles together point to an (effectual)logic of action called effectuation.

**4.4.1 The bird-in-hand principle** At its core, this principle emphasizes the use of available means to create something new as opposed to discovering new ways to achieve goals. Effectuation begins with the entrepreneur who has three non-mutual exclusive and independent categories of the available means: their identity (Who I am?), their knowledge base (What do I know?) and their social networks (Whom I know?). Thus, the entrepreneurial question to be asked during effectuation process is "What can I do" as opposed to "what should I do" which uses the predictive analysis. The knowledge base and social networks help entrepreneurs to create new firms and markets. The other means category: Identity, as examined by Sarasvathy (2009), allows entrepreneurs to take a decisive action based on their own identity, without having to order the preferences for the consequences of choice. Expert entrepreneurs take identity-based decision freeing them of the situation to order their

preferences for particular outcomes and allow them to take the decision then action in the face of knightian uncertainty, implying that expert entrepreneurs usually have a strong sense of identity and process. Even though not mutually-exclusive, the identity of an entrepreneur depends on the entrepreneur's knowledge and his networks. Thus these primitive categories of who I am, what I know and whom I know will help the entrepreneur to decide in the face of knightian uncertainty without using prediction and can help her to exercise control over the controllable elements(Sarasvathy (2009)).

**4.4.2      *The affordable-loss principle:*** This principle embodies entrepreneur's willingness to lose rather than investing in calculations about expected returns on the project. Instead of focusing on the available means, the risk is the primary factor the principle influences. Thus the entrepreneur's decision to create something new is influenced by the risk involved. In the effectuation process, entrepreneurs accept a certain amount of risk to lose the affordable estimated value rather than calculating the future estimates eliminating the use of prediction in the process. Therefore, expert entrepreneurs use the affordable loss to reduce risk by focusing on controlling downside scenarios and finding ways to reach the market with a minimum expenditure of such resources as time, effort, and money(Sarasvathy (2009)). The principle also encourages the effectuator to be creative of how she can leverage the lack of resources and make them available by seeking stakeholders in their immediate vicinity thus increasing their means and leading to new goals. The affordable loss is based on the entrepreneur's time loss, financial condition and the psychological estimate of their commitment as the worst-case scenario. Thus having the estimate of the affordable loss as a basis for all the decisions, effectuator eliminates the use of prediction and also reduces the uncertainties in the early stage of funding related decisions. Affordable loss principle in a sense helps the entrepreneur to make a 'plunge' into starting or ending the venture (Read et al. (2010)). Finally, effectuation combines the affordable loss with self-selected stakeholders and their ability to mold and construct new economic opportunities with affordable estimates of time, effort and money.Expert entrepreneurs, according to Sarasvathy (2009) has mastered the affordable loss principle and can convert zero resources to new market.

**4.4.3      *The crazy-quilt-principle:*** This principle focuses on the stakeholder alliances aspect of effectuation. Strategic alliances instead of the competitive analyses are supposed to help the entrepreneur reduce and/or eliminate the uncertainties (Sarasvathy (2001)). The alliances and pre-commitments from the self-selected stakeholders also help to erect entry barriers and a way to constrain the ambiguous goals during the creation process. This principle dovetails the affordable principle very well, as it coincides with the entrepreneur affordable loss with the self-selection or selection of any stakeholders for the creation of the economic opportunities. The on-boarding of stakeholders with their actual commitments without worrying about the opportunity cost will eventually determine the goals of the enterprise (Sarasvathy (2009)). Stakeholders self-selects, after interacting with the entrepreneur and commit, thus gathering new means and new goals for the venture. As the resources accumulates with the growing number of stakeholders, the constraints on the goals start to restrict. The restrictions of goal also reduce possible changes in the goal and also restricts the admission in the stakeholder network (Sarasvathy (2009)). As mentioned by Sarasvathy (2009), if the stakeholder accumulation process continues and is not dead prematurely, created new goals and network concurrently converge into a new market and a new firm. The crazy-quilt principle along with the affordable loss principle is vital in effectuation and affects the creation of new markets and firm in significant ways. As the entrepreneur uses a small amount of investment that they afford to lose, they interact with any or all the self-selected stakeholders. Eventually, these interactions with stakeholders converge into the new markets or new firms in a particular market.

**4.4.4      *The lemonade principle:*** This principle has a basis on the famous phrase ‘When life gives you lemons, make lemonade.’ This principle urges entrepreneurs and stakeholders to acknowledge and leverage contingencies rather than avoiding or adapt them. It also points to the radical change in the relationship between planning, contingencies, and uncertainty within the effectual logic. Effectuation posits that under the uncertainty, effectuators may benefit from embracing the unexpected outcomes rather than following a well-planned, goal-oriented process to avoid any contingencies during the process. This principle encourages the entrepreneur to turn the unexpected into something valuable and possibly

profitable. It can also lead to one of the effects of the effectuation process, wherein the entrepreneurs' decisions and actions can lead to one of the serendipitous events of creating new markets. The way entrepreneurs leverage the oncoming contingencies, forms the core of the effectual logic used during the process. Entrepreneurs, as they continue in the process, they make a plan by utilizing the uncertainty of unexpected surprises and unanticipated information as a resource for their goals. The effectuators use uncertainty as a resource rather than an error. This principle highlights the entrepreneurs' actions and his imaginations of how he/she can creatively leverage the upcoming surprises, seizing upon it and combining them with the extant inputs to create new possibilities(Sarasvathy (2009)).

**4.4.5      *The pilot-in-the plane principle*** , in this principle, instead of relying on the current market, technological or socioeconomic trends, it urges effectuators to rely on the human agency to create the economic opportunity. This principle helps us to understand the wholeness of the effectual logic of non-predictive control, wherein the human action controls the uncertain future rather than focusing on the predictable aspects of the uncertain future. Pilot-in-plane offers the entrepreneur the window to the unexpected opportunities and the key to survive disasters in the presence of the Knightian uncertainty, ambiguous goals, and isotropy, i.e., effectual problem space. Here the entrepreneur is a pilot. Instead of planning ahead and then acting, entrepreneurs rely on their experience and on the interactions with self-selected stakeholders to work on what seems to be reasonable(Sarasvathy (2009)).

In conclusion, the above effectuation principles correspond to the following dynamics of effectuation process:

1. Recognizing the risk involved, effectuators commits to only what he or she can afford to lose and not based on the expected returns on the investment.
2. The self-selection of stakeholders is based on which stakeholder make the actual commitments and what do they negotiate. As the network grows, the available means grows as well and reduces the uncertainty and constraining firm's goal over time.
3. Leveraging the contingencies rather than avoiding them can open effectuators to unexpected opportunities and the key to outliving disaster under uncertainty. Thus helping

effectuators to exercise the effectual logic based on their strong sense of identity while facing uncertain future.

4. It focuses on the controllable aspects of the unpredictable environment and uncertain future, and abstain from using any predictability.
5. Finally, the key to the process is creating new possibilities from extant realities.

#### **4.5 Effectual heuristics**

The principles leads us to the effectuation heuristics. The entrepreneurs encourages the entrepreneur to use the following effectuation heuristics during the entire effectual entrepreneurial decision-making process. They are considered to be the tools that help navigate the entrepreneur in the presence of multidimensional uncertainty(Dew and Sarasvathy (2016), Dew et al. (2008)).

- Means-driven action: The action taken based on the available means and its orientation
- Centrality of stakeholders interactions: Intersubjective interactions and agreement regarding the ambiguous goals.
- Affordable loss heuristic: Using the affordable loss principle as the basis of any decision and action
- Leveraging contingencies: Using the occurrence of unexpected events caused by the presence of multidimensional uncertainties

The effectuation principles along with heuristics form the core of the effectuation, i.e., the effectual logic which in turn is used in the effectual problem space and for the creation of new markets by following the effectual process. The effectual process in itself is dynamic, involving multiple key elements and guidelines. The effectuation process will be discussed as following.

## 4.6 Effectuation process

The effectuation process starts with the entrepreneur and her available means such as her identity, her knowledge, and her networks, i.e., her basic primitives. Her actions constitute of what can she do and her belief that it's worth doing it. She then interacts with the people who are in her immediate vicinity, may be physiological or demographically and in her network. These interactions lead to the entry of few self-selected stakeholders to commit their available means and themselves. With each commitment, two concurrent cycles of expanding and converging sets in the motion. The converging artifact or new market is developed at the end of the process(Sarasvathy (2009)). This dynamic process of effectuation is depicted in the figure 1 adopted from the book by Sarasvathy (2009).

Effectuation process enables the realization of the several effects, for example, one entrepreneur starting from a generalized aspiration can build a number of different types of firms in entirely disparate industries. Leading us to the role of entrepreneur's actions during the process while construction something new in the face of uncertain future. Effectuation process, as opposed to causation, allows decision makers to shape their goals or change them and construct them over time by interacting with self-selected stakeholders as well as leveraging the upcoming contingencies. The effectual network which is a set of commitment from the stakeholders involves the agreements to participate in the transformation of goals and increase of available means instead of predicting the future estimates from the generation of a unique artifact.The interaction of the stakeholders is based on the content and the shape of the 'pie' rather than its size and division of who gets to keep what (Sarasvathy (2009)). Effectual stakeholder, like an effectual entrepreneur, commits what they can afford to lose, and their means are their knowledge, identity, and networks.At the beginning of the effectual network, effectuators do not care about the external world, but only aspirations and abilities. However as the network of stakeholders grows over the time and includes more of the external world, the effectual network tends to become more organized as it merges into a new market or new artifact. The transformation of the new market created by an effectual network is dialectic between the inner members of the effectual network and the non-members, i.e., the outer world. Eventually, the new market is the result of how the effectual network deals

with the embodiment of the interactions in the actual commitment, those interactions that are not embodied in the actual commitment and events entirely exogenous for the process (Sarasvathy (2009)).

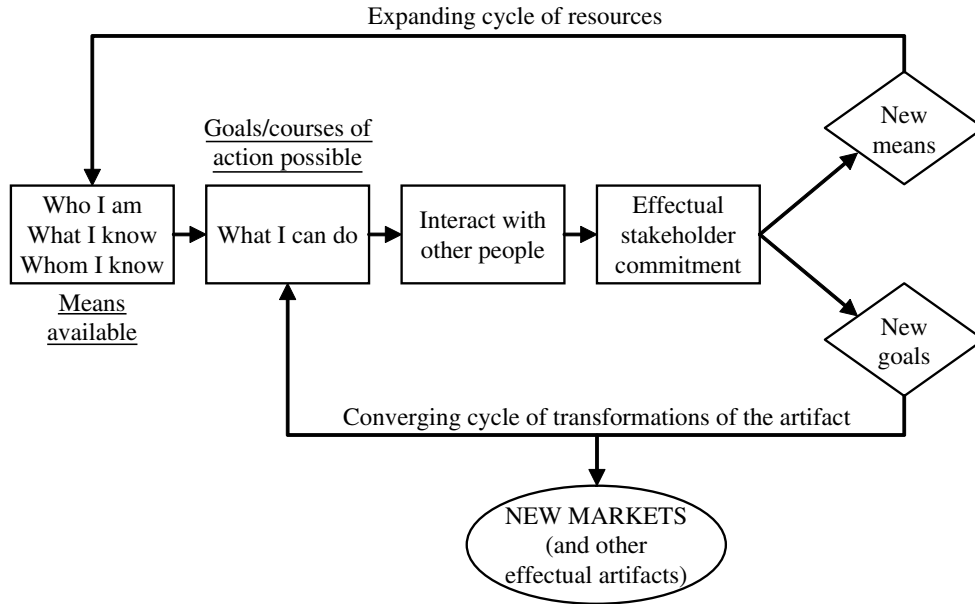


Figure 1: Dynamic model of effectuation, adopted from Sarasvathy (2009)

The stakeholders have an option to either transform or explore or exploit with each new commitment from the new stakeholder. However there comes a time at the transformation process, when the effectual network is merged into a new market, i.e., the entry barriers are erected around the key components, and the effectual transformation cycle is diminished. There is a possibility of facing new contingencies after the creation of the market or artifact, and it is up to the effectuators to leverage those unexpected surprises to either transform the artifact or explore the artifact until the transformation is stable enough to exploit if they withstand those contingencies(Sarasvathy (2009)).

The effectuation process rejects the use of prediction and rejects the use of adaptive or any other reactive strategies and embraces the use of exaptive strategies (Dew et al. (2008)). As mentioned by Dew and Sarasvathy (2016), "exaptation is one of the several types of transformations that entrepreneurs produce when they use the effectual heuristics." Effectuation creates a permissive local context using the four effectual heuristics for the exaptations to arise which can lead to the creation of niche markets. It has been pointed

out by Dew and Sarasvathy (2016) that the effectual approach can help the entrepreneurs to create the exaptations which can lead to the creation of niche markets or unique artifacts.

Thus, in a summary, the individual entrepreneur-stakeholders uses the clear effectual logic with precise principles and guidelines throughout their entrepreneurial decision-making process leading to the creation of unique firms and/or markets (Sarasvathy and Dew (2013), Sarasvathy (2009)). It is evident that the figure 1 does not constitute the effectual logic properly. Moreover, It is obvious that the effectuation process does not paint a complete picture regarding the role of multidimensional uncertainties and how the effectuation helps the entrepreneur or firm deal with the presence of multidimensional uncertainties.

## 5 Discussion

The effectuation process and the uncertainty construct as discussed above has a significant place in the entrepreneurship field. The effectuation process as depicted in the figure 1 shows the process of how entrepreneur along with stakeholders create a new market or artifact by using the available means and following their desires. The effectuation is considered to be the most advanced decision-making method under the presence of multidimensional uncertainties. As discussed the effectuation process spells out tools such as five principles, four heuristics and effectual logic for an entrepreneur to use in the face of multidimensional uncertainties to create something valuable. Above mentioned tools reduce the uncertainties and help the entrepreneur to create new opportunity. Wiltbank et al. (2006) proposes the dynamic effectuation diagram 1 as previously discussed in the section 4. The figure 1 shows the dynamic and cyclic nature of the effectuation process, and it also lays out the intricate relationship between the entrepreneur, her available means, self-selected stakeholders, ambiguous goals and creation of the new opportunity. The human action along with the effectual heuristics forms the core of an effectual logic. The effectuation as discussed above aids the entrepreneur to create and capitalize on the opportunities occurred due to the unexpected events triggered by the presence of uncertainties. Elements of the effectuation, i.e., principles along with its heuristics helps the entrepreneur to reduce the present multidimensional uncertainties. The multidimensional uncertainties are reduced with each



means-driven action as the entrepreneur undertakes.

The effectual logic is still unclear from the figure of effectuation process, leading us to the introduction of the new figure 3 with few alterations. To understand the role of uncertainty, another figure 4 is proposed showcasing the flow of multidimensional uncertainties during the creation process. The figure 3 and 4 leads us to the understanding of how the entrepreneur or firm can manage under uncertainty.

Below the effectuation process is described using the effectual principles, heuristics and effectual logic, i.e., every stage of the creation of opportunity by using effectuation decision-making method is explained and the figure of effectual logic is introduced.

## 5.1 Effectual Logic and Multidimensional Uncertainties

The initial stage of the starting an entrepreneurship venture is riddled with the high level of uncertainties especially true uncertainty which engenders contingencies (Townsend (2018)). In the uncertain and unknowable environment, *the bird-in-the-hand principle* would be the first step for an entrepreneur which will serve as the initial stage of creating a new venture. The principle helps the entrepreneur to recognize her primitive means such as her knowledge base, her networks and her identity as a human being. Once, the entrepreneur recognizes her available-primitive means, she uses her knowledge base and identity to form her ambiguous goals or aspirations. The entrepreneur uses her knowledge to create an ambiguous goal or vision of an artifact.

As mentioned before, the isotropic environment uncertainty is originated from the lack of knowledge of what to focus and what not to focus on, the recognition of entrepreneur's available means will give her definite things to focus on during the whole decision-making process. There is a high level of ambiguity surrounding the goal as the environment surrounding the entrepreneur in undefined, and the presence of Knightian uncertainty can increase the uncertainty about the probability of future consequences. The presence of goal ambiguity, isotropy, and Knightian uncertainty creates the fitting effectual problem space for the entrepreneur. Thus, propelling the entrepreneur to depend on the identity-based action to act in the face of the high level of uncertainties. The strong identity of an entrepreneur will allow them to take creative action on their identity-based decision and thus eliminating the

need for ordering the preferences for any particular outcomes. The identity-based decision requires the entrepreneur to be creative and imaginative. The identity-based action is also called as human action, which is an entrepreneurial action. The *means-driven* action will enable the entrepreneur to create a new or innovative product, thus implying that the entrepreneur should have a strong sense of identity. In the effectual problem space one can expect the occurrences of unexpected events or surprises. To face the upcoming surprises, it is apparent that the entrepreneur should be able to manage the failure caused by it and is better in the failure management as well as learning from it (Sarasvathy (2009)). At the same time, the entrepreneur should be able to leverage those surprises and create possibilities to reach the ambiguous goal. After creating an ambiguous goal, the entrepreneur exercises the means-driven action to interact with people from her network who are in her immediate vicinity. The interactions with her network include intersubjective agreement. These intersubjective interactions with possible stakeholders will decide if the stakeholder/s commits and self-selects themselves for the venture. In this initial stage, the entrepreneurs and stakeholders do not care about the external world but only aspirations and abilities. The intersubjective agreement between stakeholders and the entrepreneur reduces the goal ambiguity (Townsend (2018)).

As argued by Hayward et al. (2010) the confident and expert entrepreneur proves to be an excellent resource for starting the new venture or create an innovative product. Hayward et al. (2010) also mentions that the confident entrepreneur can 'bounce back' (Zolli and Healy (2013)) from previous failed ventures and shows resilience regarding financial, social, cognitive and emotional aspects of starting or sustaining a venture. Hayward et al. (2010) aptly mentions that the "More confident entrepreneurs accept greater uncertainty and risk, leading them to perform more exploratory and creative work." Thus for the entrepreneur to start a new venture, they will need the confidence and resilience to face the high level of uncertainties during the creation process using effectuation. To reach the ambiguous goal, the entrepreneur thus will need to be confident in what she aspires (Hayward et al. (2010)) and she will have to exercise the entrepreneur resilience to survive the effectual problem space (Hayward et al. (2010)). For any entrepreneur whether expert or not, she needs to be confident and resilient to start the entrepreneurial venture and create an economic opportu-

nity.

As the isotropy uncertainty is at the higher level, it is essential for the entrepreneur to exercise control over key elements of the environment. *The affordable loss principle* provides the controllable elements to the entrepreneur regarding time, finance and effort. The decision of affordable loss is influenced by the risk involved in creating the opportunity, regarding the entrepreneur to be a risk-taker as opposed to risk-averse. In principle, the entrepreneur defines how much time she would want to invest on the opportunity, how much finances she wants to spend on it and how much effort she wants to invest in it based on her worst-case scenario. The entrepreneur, then, can control her available means once the affordable loss is decided. The affordable loss allows the entrepreneur to focus on two crucial things: her control over available means and the limit of how much she can afford to lose while trying to create what she aspires. The affordable loss is used as the basis of all the means-driven action, i.e., human action exercised by the entrepreneur to reduce uncertainties in the early stage of funding related decisions. As the principle employs the systematic search of defining the affordable loss, it reduces the isotropic environment, and it provides the entrepreneur which elements to focus on as well as reduces the risk of starting a new venture. The decision of the entrepreneur's affordable loss also influences the change in her ambiguous goals as there is a limit of how much time, effort and money she can use, however, the limitation will encourage the entrepreneur to be more creative and imaginative. The entrepreneur *leverages the risk* to control the downside scenarios and finding creative ways to reach the ambiguous goal while exercising *affordable loss heuristic* i.e., minimum expenditure of available resources (Sarasvathy (2009)). The affordable loss principle along with the resilience and confidence of the entrepreneur in the initial stage helps the entrepreneur to make a 'plunge' into starting the venture (Read et al. (2010)) with minimum resources.

The *crazy-quilt principle* is another effectual principle that helps in reducing present uncertainties. The crazy-quilt principle perfectly dovetails with the affordable loss as it coincides with the selection of stakeholder and with the affordable loss defined by the entrepreneur. The principle allows the entrepreneur to process the intersubjective agreement with the potential stakeholders. The confident and socially resilient entrepreneur will be able to attract motivated and hard-working founding team members and stakeholders (Hay-

ward et al. (2010)). The interactions between the entrepreneur and potential stakeholders may include discussion, negotiation, bargaining or persuasion, leading to an intersubjective agreement of the different version of an ambiguous goal. The stakeholders self-select themselves in the effectual network, and they arrive with their means and fixed affordable loss. These interactions and the admittance cycle of self-selected stakeholders goes on until there is no more room for the change of ambiguous goal. The confident and socially resilient entrepreneur is able to build a loyal and long-term relationship with team members and stakeholders throughout the creation process. The goal ambiguity decreases as the effectual network matures. Due to the accumulation of resources from the self-appointed stakeholders, the entrepreneur eliminates the risks and is able to create something new by using their collective resources. In addition to entrepreneur’s subjective knowledge, she will have access to the explicit and tacit knowledge from the stakeholders. The intersubjective interactions coupled with the human actions will facilitate the transformation cycle of the artifact. During the transformation cycle, the entrepreneur arranges, configure and reconfigure heterogeneous available means to create versions of an artifact based on his effectual logic. The transformation cycle of the artifact goes on until it converges into a new market or new artifact. The *centrality of stakeholders* helps the entrepreneur to overcome the impossibility of the creation of new market (Sarasvathy (2009)). The intersubjective interactions with the stakeholders can be represented through the following figure 2.

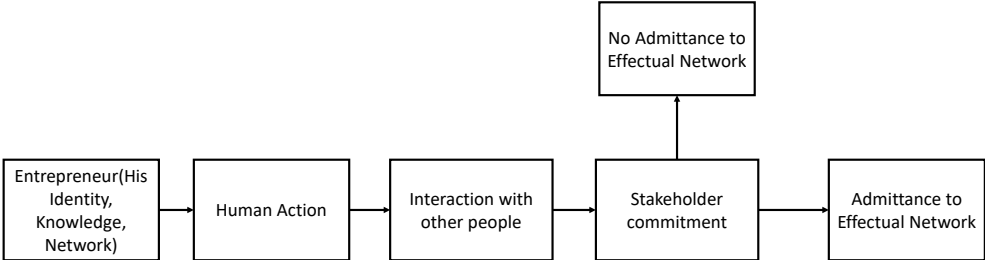


Figure 2: Creation of Effectual Network

The growth of the effectual network erects the entry barriers and constraint the scope of the ambiguous goal. Due to the presence of Knightian uncertainty, they may face unexpected events such as the departure of a key stakeholder or the disbandment of the effectual

network at the premature stage. While facing contingencies, the entrepreneur's confidence and resilience are nurtured and tested. It is imperative that at this stage the entrepreneur is socially resilient to maintain the relationship with the stakeholders and be confident in his aspiration to sustain the effectual network. The contingencies caused by the presence of Knightian uncertainty can create chaos for the firm, however, by accessing the intersubjective interactions (explicit and tacit knowledge of the effectual network) with the committed stakeholders can help the entrepreneur to find creative ways to reach their ambiguous goals. In conclusion, the effectual network, i.e., the centrality of stakeholders mold and constrain the ambiguous goal by adapting the exaptive strategies during the creation process. The entrepreneur takes a means-driven action and acts on the constrained goal to create something innovative. Eventually, the transformation cycle consisting of intersubjective interactions, human (entrepreneurial) action converges into the new market or new artifact.

*Lemonade principle* is a guideline for the entrepreneur to embrace the thrown surprises and unexpected events or contingencies and use them to find creative ways to reach their ambiguous goals. The principle, not only encourages the entrepreneur to be creative but use the uncertainty as means. The occurrence of unexpected events influences the dynamics of transformation cycle which affects everyone involved in the decision-making process. It could also influence the change in the ambiguous goals and the action of the entrepreneur. The uncertain situation suggests the entrepreneur be confident and undertake the exploratory and creative approach to find possible ways by using minimum available resources. The occurrence of contingencies can come with the hidden opportunities that can aid the entrepreneur to create something valuable and possibly profitable. It can also lead to one of the serendipitous events of creating an entirely new market. The contingencies occur due to the presence of Knightian uncertainty; however, it can also provide additional information to the entrepreneur to enhance or reduce the Knightian uncertainty to some level. The principle also coincides with one of the effectual heuristics of *leveraging the contingencies*.

The effectuation encourages the entrepreneur to be vigilant and leverage the contingencies throughout the creation process. However, as mentioned by Hayward et al. (2010) the "greater confidence confers stronger conviction that actors can enact a desired future, heightening a sense of expectation, excitement and aspiration, amongst other forms of inter-

est and motivation. Additionally, "greater confidence can increase one's feelings of safety and security" (Seligman and Csikszentmihalyi (2014)); thus the confidence of entrepreneur coupled with the emotional and cognitive resilience will motivate the entrepreneur to organize, configure or reconfigure the means to find creative ways by using the additional new information provided by the occurrence of the contingency. The lemonade principle is the gist of the effectuation decision-making process because it uses the present uncertainties and the occurrence of contingencies as the prized resources. There is a possibility that the principle can aid the entrepreneur to reduce other perceived uncertainties, involved risks, and ambiguity. It can also help the entrepreneur in enhancing or reducing the true uncertainty. The principle perfectly dovetails with the pilot-in-plane principle wherein the firm is advised to rely on the human agency, i.e., entrepreneur.

The entrepreneur thus should exercise the explicit and tacit knowledge and use their experience, evolved judgment and interactions with stakeholders to leverage contingencies. The entrepreneur and stakeholders are in their own world until they create a new artifact or new market. Once they create a new artifact, the effectual network comes in contact with the outer world and will precipitate them to transform the artifact according to the received feedback. As the effectuation is context-dependent, once the new market or the unique artifact is created the entrepreneur in the pressure of stakeholders and as they become more organized switch the logic of decision-making method resulting to adapt causal or adaptive logic to sustain the created entrepreneurial firm (Wiltbank et al. (2006); Reymen et al. (2015)). In summary, the effectual principles bird-in-the-hand, affordable loss, and crazy-quilt principles aid the entrepreneur in reducing the uncertainties present during the opportunity creation process. These principles are essential to use for the entrepreneurial firm which is in the highly uncertain environment such as new technology ventures or firms creating an innovative product as the innovation process can include number of uncertainties (Jalonen (2011)).

The effectuation definitely encourages the entrepreneur to use the effectual logic with or without using his judgment to create new economic properties. It is evident from the above-described effectuation process that the entrepreneur should use the effectual logic to reduce the uncertainties and to use the minimum-available resources to create new oppor-

tunities. The effectual logic indeed is teachable and learnable, and it minimizes the use of prediction. It also nurtures the confidence, resilience, individual freedom and the creativity of the entrepreneur.

From the above discussion, it is evident that the effectual heuristics: affordable loss, human action i.e., means-driven action, leveraging the contingencies and interaction with stakeholders are an essential part of the effectuation process and plays an important role in reducing uncertainty. The effectual heuristics enables the entrepreneur to use the exaptive strategies to create several types of transformation which can lead to the creation of niche markets. By reviewing the previous figure 1, it is imperative that the figure of dynamic effectuation process should include the effectual heuristics. The following figure 3 represents the effectual logic and dynamic effectuation process.

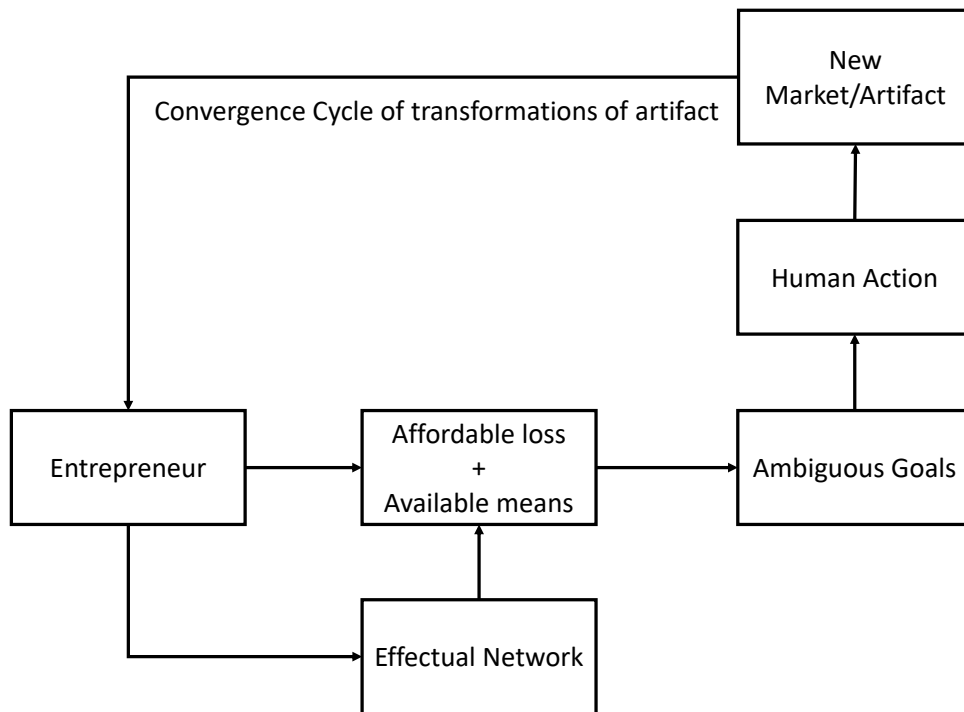


Figure 3: Effectual logic adopted from Wiltbank et al. (2006)

The reason for including the human action in the figure 3 is that the human action, i.e., means-driven action is used by the entrepreneur at every stage of the decision-making method. Human action is the action taken by the entrepreneur using his unique identity, his

knowledge and the network. Due to the vital role of the human action in the effectuation process, the inclusion of the human action in the figure is apparent. The affordable loss principle is used as the basis of every other decision taken by entrepreneur; thus, it was imperative to add the affordable loss along with the available means to showcase the use of principle in the decision-making method. The effectual network helps the entrepreneur to reduce the uncertainty and constrains the ambiguous goals, therefore to show the importance of the centrality of stakeholder interaction, admittance cycle and the construction of the effectual network, the zoomed-in version of the figure 2 was used. The last effectual heuristic, i.e., leveraging the contingencies caused by the presence of uncertainties, can only be shown by the inclusion of uncertainties associated with every entrepreneurial action box of the effectuation process figure 3. The representation of uncertainties along with the action boxes will shed some light on the role of uncertainty in the effectuation. It will also contribute to the complete picture of how the effectuation deals with the uncertainty especially Knightian uncertainty and leverages the contingencies to create a niche market or a unique artifact.

## **5.2 Role of Multidimensional Uncertainties**

As effectuation is the only decision-making method that regards the present uncertainties in the opportunity creation process, it is palpable to show the dynamic effectuation process figure 1 along with the flow of uncertainties with every human action taken by the entrepreneur. Following figure of the dynamic effectuation process accompanying the flow of uncertainties will aid the better understanding of the role of uncertainty in the effectuation decision making method.

The idea of adding human action in two places into the figure 1 came from the review of Packard et al. (2017)'s formal model of uncertainty. The idea came from their use of 'entrepreneurial action.' The use of human action showcases the use of means-driven action at specific stages of the creation process. The figure 4 uses the color scale to represent the level of uncertainty. The reason for using the ambiguous color scale was because the subjective uncertainty is immeasurable by using the numbers as they might "misrepresent how individuals think about uncertainty in those situations" (Windschitl and Wells (1996)) and as for the objective uncertainty, it can be measured by using the degree of unknowingness



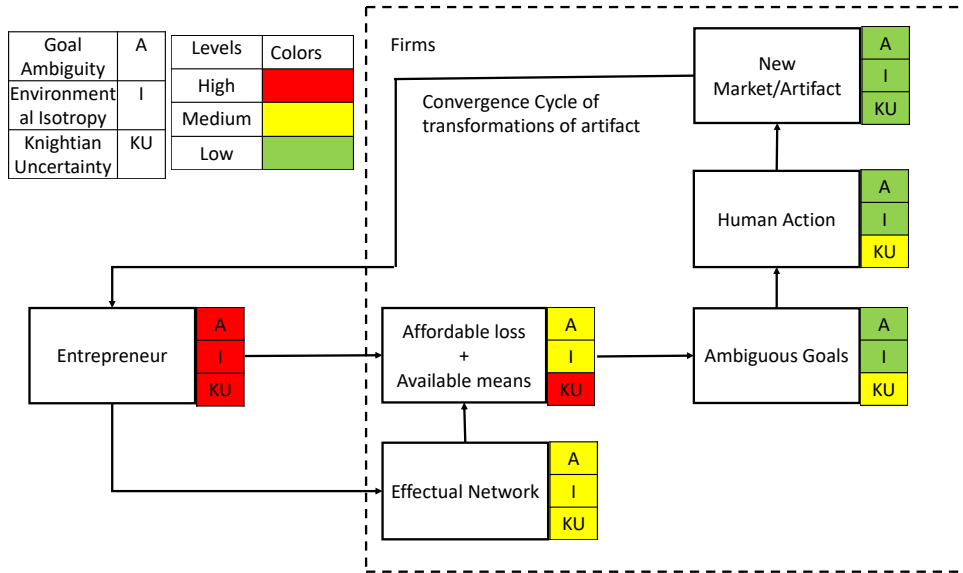


Figure 4: Dynamic Effectuation process with representation of uncertainties adopted from Wiltbank et al. (2006)

but not by the numbers.

*Red color* represents the high level of uncertainties present during and after the accompanied action (box) is taken by the entrepreneur. The example will assist to understand the representation of the uncertainty by colors better. The red color of ambiguity, isotropy, and Knightian uncertainty suggests the presence of high level of uncertainties when the entrepreneur aspires to start an entrepreneurial venture and once she takes a plunge of starting a venture, she still faces the high level of uncertainty until she exercise another consequent action of defining her available means along with her affordable loss. It is important to note that as the Knightian uncertainty is at the highest level here, the entrepreneur may face the contingencies which can influence her ambiguous goals or her available means/affordable loss or it may dissuade her from pursuing the opportunity altogether.

The *yellow color* represents the medium level of uncertainties once the action is exercised resulting in the decrease of uncertainty or uncertainties. For example, once the entrepreneur defines her available means along with his affordable loss, she reduces the goal ambiguity (by defining her available means) and isotropy (by defining controllable means in the undefined environment). Again, due to the presence of the Knightian uncertainty, the entrepreneur may face unexpected events, which will trigger them to exercise the 'leveraging the contingencies'

heuristics and find the creative ways to reach their aspirations by believing in her abilities.

*Green color* represents the low level of uncertainties once the action further resolves the uncertainty to a manageable level. For example, once the admittance cycle of the effectual network stops, the involved intersubjective interaction helps in constraining the ambiguous goal and helps the entrepreneur erecting entry barriers to create a new environment resulting into the low level of goal ambiguity, low level of environmental isotropy and reduction in the Knightian uncertainty.

Here in the figure 4 the use of the systematic search and the intersubjective interactions with the stakeholders leads to the gathering of new information resulting in the reduction of the Knightian Uncertainty. The entrepreneur will be able to figure out the probabilities of the outcomes of ambiguous goals; however, there will still be uncertainty about the preferences of the outcomes. Consequently, as the effectual network grows the available means or resources will grow which can increase Knightian uncertainty about the probabilities of the outcomes. At that time, the entrepreneur as a human agency exercises her identity, leverages any unexpected contingencies and takes human action to create new possibilities of creating the artifact she aspires and tries to capitalize it (Dew et al. (2015), Sarasvathy (2009)). The entrepreneur depends on her creativity and imagination whenever he faces surprises. Once the transformation cycle converges into the market or new artifact, the Knightian uncertainty along with other uncertainties is reduced to low level. The Knightian uncertainty also enhanced when the effectual network comes in contact with the outer world as they receive feedback. The received feedback propels the entrepreneur to explore and be creative to transform the artifact so that they can capitalize on it.

The effectuation aptly uses the uncertainties as one of their means at every action of the creation process. The uncertainty creates unexpected events due to the lack of unknowable or unanswerable information, resulting the entrepreneur to use the contingencies to conduct exploratory and creative work to gather information to find ways to reach her ambiguous goals. Thus, the uncertainty pushes the entrepreneur to uncover creative and imaginative ways which can lead to innovative opportunities. The effectuation gives the control to the entrepreneur of how she can be creative and imaginative to use those probabilities to create something profitable. Thus, in the changing and uncertain environment, the entrepreneur

uses the few controllable elements and uses the uncertainty as a yet another resource in addition to his available resources. The effectuation does not give the entrepreneurs a way to discover their preferences of which outcomes they should act on; instead, it uses the uncertainties to create new possibilities and to gather the possible probabilities of outcomes of intersubjectively agreed goals. It is quite apparent that the goal ambiguity and isotropy is reduced by the intersubjective interactions and agreement between entrepreneur along with stakeholders which coincides with Townsend (2018) that the intersubjective agreement can resolve the ambiguity. The effectuation uses the Knightian uncertainty which is also known as true uncertainty and encourages the entrepreneur to leverage it to create new possibilities. The Knightian uncertainty can be reduced by the intersubjective interactions between the entrepreneur and stakeholders, as well as by the information gathered by leveraging the contingencies. The Knightian uncertainty is enhanced once the effectual network faces the uncertainty caused by the futurity of the newly created market and regarding the people who they will be selling to.

As mentioned in section 3 the reduction of Knightian uncertainty coincides with the concept of the perceived uncertainty, wherein the uncertainty is a mental construct and objective and is reducible by using the systematic approach of finding the additional information. The reduction of the Knightian uncertainty and its presence certainly appears to be a catalyst that makes it possible for the entrepreneur to create something innovative. Unlike Townsend (2018) argument wherein the Knightian uncertainty is irreducible and unknowable, the effectuation outlines the Knightian uncertainty as a reducible knowledge problem. As discussed by the Knight Frank (1921) the change is a part of the uncertainty, in the effectuation the uncertainties certainly changes and creates possible opportunities for the entrepreneur to leverage it. The effectuation either suffers from the paradox of the perceived vs. real uncertainty or it actually reduces the irreducible *a priori* uncertainty (Knightian uncertainty) (Townsend (2018)) by using effectual logic. One explanation for the uncertainty paradox in the effectuation could be (using the interpretation of the figure 4) similar to Packard et al. (2017), effectuation describes uncertainties regarding its 'true' nature however they outline the effectuation process regarding 'perceived' uncertainties. As mentioned by Korsgaard et al. (2016) in Kirzner Mark II, the entrepreneurs nevertheless do experience the

uncertainty(perceived or not) about the futurity of the market in which they will be selling. In effectuation, the notion of the experiencing uncertainty about the futurity of the market is explained and is undoubtedly tackled by using the effectual logic especially leveraging the contingencies heuristic. However, it seems that the effectuation does not resolve but reduce or enhance it to some level ,using it as an essential resource for creating unique artifacts or niche markets leading us to another explanation.

Another explanation of the uncertainty paradox could be if the Knightian uncertainty is considered to be an irreducible uncertainty in the effectuation in both theory and in outline of the process, it will still prove to be a resource to the effectuation process as it will be a continuous source of contingencies or unexpected events. Being irreducible, it could prove an obstruction or hindrance in actualizing the opportunity; however, it will exhibit its nature of being unmeasurable and is a real object that is fundamental to the entrepreneurship.As the effectuation reduces and enhances the 'true uncertainty' then it definitely applies with McMullen and Shepherd (2006)'s argument in which the uncertainty is an evolving construct where it can be enhanced or reduced by taking the entrepreneurial action, a human action in this case. The uncertainties in the effectuation coincides with the Ramoglou and Tsang (2016)'s conception of the uncertainty per the realist that the entrepreneur does not know if in the future whether the opportunity exists or whether it will actualize and he indeed cannot determine whether an opportunity was absent or merely unactualized in the instances of failure And, it certainly follows the Kirzner Mark II that the uncertainty of the futurity of the market is experienced by the entrepreneur. The dealing of uncertainty in the effectuation also coincides with Townsend (2018)'s argument that the gathering of new information in the presence of irreducible uncertainty may increase the clarity of available outcome probabilities to the entrepreneur but not the preference;and the effectuation yields the same clarity and leave it to entrepreneurs of how they can find ways to the profitable opportunity. Thus, the above coinciding arguments from aforementioned scholars with the effectuation theory suggests that the effectuation decision-making method deals with the true nature of evolving uncertainty and uses it as a resource rather than obstacle. It also suggests that the effectuation is indeed an advanced method to deal with the true uncertainty and reduces the unknowable and irreducible Knightian uncertainty to

create innovative firms or unique artifacts.

From the overview of the figure 4 and the dealing of uncertainties, it was apparent that the expert entrepreneur has to be confident and resilient to bear uncertainties as well as risks which will give him (emotional, cognitive and social ) strength and motivation to start a new venture. Hayward et al. (2010) argues that the creative and exploratory work conducted by the expert entrepreneur signals the stakeholders of the higher expectancy of failure, making all of them socially and emotionally resilient to the failure and creating better relationship among themselves. Thus, the over-confidence, emotional and social resilience of everyone involved in the creation of effectual network helps the venture to sustain. The socially, emotionally and cognitively resilient entrepreneur will work creatively in the face of unexpected events and/or contingencies, he will be able to 'bounce back'(Zolli and Healy (2013)) from the mishaps conferring to his positive attitude towards the desired opportunity. Thus, not only the presence of uncertainties motivate the entrepreneur to be creative but also pushes them to evolve themselves as a resilient entrepreneur to develop new markets or products. Therefore, the effectuation uses the presence of true uncertainty as a resource to create new opportunity and by nurturing confidence, resilience, individual freedom and creativity, it ensures that the entrepreneur can actualize the profits from the created opportunities, making it profitable.

It is evident that the effectuation yields the fitting tools such as effectual heuristics, nurturing entrepreneur's confidence, using human action and effectual logic to design artifacts or markets he desires in the uncertain and unknowable future.

## 6 Conclusion

The complete review of the uncertainty as a construct yielded findings of the construct itself along with the effectuation decision-making method. Nearly two centuries ago, Knight Frank (1921) separated the uncertainty from risk and spelled out the role of uncertainty within the entrepreneurship decision-making. The uncertainty construct is now evolved and is considered to be fundamental to the entrepreneurship. The true uncertainty according to the entrepreneurship scholarship, is an evolving construct that is unmeasurable

Knight Frank (1921), irreducible knowledge problem Townsend (2018) and is more than a mental construct Korsgaard et al. (2016) which is present and faced in the entrepreneurial discourse. It is also quite evident that the uncertainty has a significant impact on the psyche of the entrepreneur and it profoundly influences him. The review of the uncertainty uncovered the persisting paradox of the real vs. perceived uncertainty. It also suffers from the conflation of risk and other knowledge problems. It is still unclear if uncertainty can be resolved and how. The statistical or planning based decision-making methods cannot deal with the uncertainty and the ever-changing environment caused by the presence of uncertainty which uncovered the need for the flexible and experimental decision-making method that can successfully deal with the true nature of the uncertainty (Reymen et al. (2015)). The uncertainty, until the publication of Sarasvathy (2001) article, was dealt with entrepreneurial judgment and other less developed decision-making methods. Two developed decision-making method theories were proposed for the entrepreneur in the face of the uncertainty, i.e., Effectuation and Dynamic judgment process. Packard et al. (2017) proposed the ‘dynamic judgment’ theory along with the one weakness that they outlined the uncertainty as perceived and reducible in the entrepreneurial process while defining them in their true nature. Effectuation, as proposed by Sarasvathy (2001) used the Knightian uncertainty, i.e., true uncertainty along with goal ambiguity and isotropy to create the effectual problem space and seemed like advanced method to deal with the present uncertainties leading to the exploration of effectuation literature.

The complete review of effectuation was discussed regarding what is the effectuation process and how the effectuation deal with the uncertainty. I found that the Lachmanian, Davidson and Penrosian view used in the effectuation theory played an important role in dealing with true uncertainty. It is apparent that the effectuation process is useful and helpful in the early stages of the venture and when the firm aspires to create an innovative or unique artifact. Moreover, the effectuation relies on the human agency, i.e. entrepreneur (effectuator) using her characteristics to make decisions. Effectual logic encourages the entrepreneur to actively engage uncertainty, by being forthcoming with the information and react along with the consideration of available means to her and network that can change (Reymen et al. (2015)). The effectuation recognizes the uncertainty for its true nature and dispenses tools

as well as guidelines for an entrepreneur to leverage the uncertainty caused contingencies. Effectuation bestows the effectual principles and heuristics that help the entrepreneur in reducing present goal ambiguity, isotropy, and Knightian uncertainty. The effectual logic is a tool that can be used by the entrepreneur to create new artifact or market. The effectual logic, although important was under-represented in the effectuation theory. Also, the decision-making method did not serve the justice of how the uncertainty is dealt with and how the effectual logic aid the entrepreneur in dealing with multidimensional uncertainties while creating economic opportunities.

Thus, the effectual logic in the figure 3 was introduced, and the introduction makes it understandable, teachable and learnable to other entrepreneurs. As the effectuation also lacked the representation of the flow of uncertainties and how it impacts the entrepreneur throughout the creation process, the figure 4 was introduced to showcase the representation of the flow of uncertainties and to explain how uncertainties are managed with every human action. Through the interpretation of the figure 4 it was evident that the effectuation suffered from the paradox of reducible vs. irreducible uncertainty. In the effectuation, the Knightian uncertainty is reducible while the scholars' consensus was that the Knightian uncertainty is irreducible.

It was apparent from the discussion of the dynamic effectuation process and the flow of uncertainties that the intersubjective interactions and agreement between entrepreneur and stakeholders reduce the goal ambiguity and the isotropy. The Knightian uncertainty proved to be a catalyst due to its evolving nature of reducing and enhancing during the creation process, prompting the entrepreneur to be creative with their approach. Unlike other decision-making methods, the effectuation helps the entrepreneur with the probabilities of the outcomes of the intersubjectively agreed goals. Effectuation stays true to the nature of the uncertainty and leaves it to the entrepreneur to find creative yet imaginative ways to reach their aspirations by leveraging the presence of uncertainties. The figure 4 interpretation revealed and coincided with several authors to reveal that the effectuation considers the uncertainty to be an evolving construct and the effectuation uses the true uncertainty as an essential resource and a process to create the economic opportunity. Effectuation indeed uses the change and time aspect of the uncertainty in a fitting way.

The presence of uncertainties in the effectuation process, engender the number of unforeseen events and throws surprises towards the effectual network. Moreover, the effectual network 'bounces back' every time and searches for the unexpected opportunity hidden in those surprises, pointing us to the belief that the expert entrepreneur described by Sarasvathy (2009) shows the signs of being emotional, financial, cognitive and socially resilient. Thus suggesting, that the effectuation indeed nurtures the confidence, resilience, creativity as well as individual freedom within the entrepreneur. It also suggests that the effectuation decision-making method demands the entrepreneur to be confident enough to embrace the uncertainty and resilient enough to tolerate the uncertain environment while creating and sustaining the entrepreneurial venture. To answer Welter et al. (2016)'s question about the boundary conditions of the effectuation and when to use of all or some of the principles are used in the decision-making process, the resilience and confidence in the entrepreneur appear to be one of the boundary condition in the effectuation process which also distinguishes effectuator from the entrepreneur. Moreover, it is imperative to use all four effectual heuristics and coinciding principles (bird-in-the-hand, affordable loss, crazy-quilt and lemonade principles) in the uncertain and changing environment. The effectuator, in summary, is the entrepreneur who is resilient, confident and uses his expertise, evolved judgment while being creative to create new economic opportunities. The entrepreneur resilience and confidence motivates the entrepreneur throughout the effectuation process. Furthermore, effectuation is a general logic of action under Knightian uncertainty, and as such can be used in any domain in which human action primarily drives outcomes.

The exploration of the effectuation decision-making method and the role of uncertainty provides a simple understanding that the effectuation bestows tools and well-suited problem space for the ever confident and resilient effectuator. Thus, it is apt to consider effectuation decision-making to be that decision-making process which can help the entrepreneur in navigating through the unique situations of uncertainty.



## 7 Limitation and Future Work

The thesis is limited to the entrepreneurship decision making under uncertainty. Its focus is to understand how the effectuation process helps the expert entrepreneur or cognitively bounded entrepreneur under the multidimensional uncertainties. The thesis is limited to inspect the role and the importance of uncertainty as a resource in the effectuation theory and how it elevates the effectuation to be a developed decision-making method in the face of Knightian uncertainty. The literature about the effectuation and uncertainty (in creating opportunities in entrepreneurship literature) were considered for the thesis, which can prove to be a limitation. The limited study of cognitive and psychology literature can also contribute the nascent stage of concepts in the thesis, and I welcome the entrepreneurship scholars to explore in much detail. The use of limited literature articles can prove to be a limitation, and other researchers are welcome to contribute for the same.

The research work presented in the thesis can be expanded by conducting qualitative studies to understand if the innovative and creative firms experience the evolution of uncertainty during the use of effectuation process. The conducting of interviews with the decision-makers and the self-selected stakeholders will help them to explore the phenomena of the evolution of multidimensional uncertainties further. Also, the case study research method may help with the further understanding of how effectively the effectuation uses the contingencies caused by the presence of uncertainties. The further investigation of the entrepreneurial resilience and the effectuation might help the further understanding of its role in creating profitable opportunities. The further investigation of the persisting paradox of reducible vs. irreducible uncertainty in the entrepreneurship stream should be of the utmost importance forthwith.

## References

Alvarez, S. A. and Barney, J. B. 2005. How do entrepreneurs organize firms under conditions of uncertainty? *Journal of management*, 31(5): 776–793.

- Alvarez, S. A. and Barney, J. B. 2007. Discovery and creation: Alternative theories of entrepreneurial action. *Strategic entrepreneurship journal*, 1(1-2): 11–26.
- Baker, T. and Nelson, R. E. 2005. Creating something from nothing: Resource construction through entrepreneurial bricolage. *Administrative science quarterly*, 50(3): 329–366.
- Baron, R. A. and Markman, G. D. 2003. Beyond social capital: The role of entrepreneurs' social competence in their financial success. *Journal of business venturing*, 18(1): 41–60.
- Busenitz, L. W. and Barney, J. B. 1997. Differences between entrepreneurs and managers in large organizations: Biases and heuristics in strategic decision-making. *Journal of business venturing*, 12(1): 9–30.
- Bylund, P. L. and McCaffrey, M. 2017. A theory of entrepreneurship and institutional uncertainty. *Journal of Business Venturing*, 32(5): 461–475.
- Chandler, G. N., DeTienne, D. R., McKelvie, A., and Mumford, T. V. 2011. Causation and effectuation processes: A validation study. *Journal of business venturing*, 26(3): 375–390.
- Chen, C. C., Greene, P. G., and Crick, A. 1998. Does entrepreneurial self-efficacy distinguish entrepreneurs from managers? *Journal of business venturing*, 13(4): 295–316.
- Chiles, T. H., Gupta, V. K., and Bluedorn, A. C. 2008. On lachmannian and effectual entrepreneurship: A rejoinder to sarasvathy and dew (2008). *Organization Studies*, 29(2): 247–253.
- Davidson, D. 2001. *Subjective, intersubjective, objective*, volume 3. Oxford University Press.
- Dew, N., Grichnik, D., Mayer-Haug, K., Read, S., and Brinckmann, J. 2015. Situated entrepreneurial cognition. *International Journal of Management Reviews*, 17(2): 143–164.
- Dew, N., Read, S., Sarasvathy, S. D., and Wiltbank, R. 2008. Outlines of a behavioral theory of the entrepreneurial firm. *Journal of Economic Behavior & Organization*, 66(1): 37–59.
- Dew, N., Read, S., Sarasvathy, S. D., and Wiltbank, R. 2011. On the entrepreneurial genesis of new markets: effectual transformations versus causal search and selection. *Journal of Evolutionary Economics*, 21(2): 231–253.
- Dew, N. and Sarasvathy, S. D. 2016. Exaptation and niche construction: behavioral insights for an evolutionary theory. *Industrial and Corporate Change*, 25(1): 167–179.
- Erikson, T. and Korsgaard, S. 2016. Knowledge as the source of opportunity. *Journal of Business Venturing Insights*, 6: 47–50.

- Forbes, D. P. 2005. Are some entrepreneurs more overconfident than others? *Journal of business venturing*, 20(5): 623–640.
- Foss, N. J. and Klein, P. G. 2015. Introduction to a forum on the judgment-based approach to entrepreneurship: accomplishments, challenges, new directions. *Journal of Institutional Economics*, 11(3): 585–599.
- Hayward, M. L., Forster, W. R., Sarasvathy, S. D., and Fredrickson, B. L. 2010. Beyond hubris: How highly confident entrepreneurs rebound to venture again. *Journal of Business Venturing*, 25(6): 569–578.
- Jalonen, H. 2011. The uncertainty of innovation: a systematic review of the literature. *Journal of Management Research*, 4(1).
- Knight Frank, H. 1921. Risk, uncertainty and profit.
- Kor, Y. Y. and Mahoney, J. T. 2004. Edith penrose’s (1959) contributions to the resource-based view of strategic management. *Journal of management studies*, 41(1): 183–191.
- Korsgaard, S., Berglund, H., Thrane, C., and Blenker, P. 2016. A tale of two kirzners: Time, uncertainty, and the “nature” of opportunities. *Entrepreneurship Theory and Practice*, 40(4): 867–889.
- Langlois, R. N. and Cosgel, M. M. 1993. Frank knight on risk, uncertainty, and the firm: a new interpretation. *Economic inquiry*, 31(3): 456–465.
- LeRoy, S. F. and Singell Jr, L. D. 1987. Knight on risk and uncertainty. *Journal of political economy*, 95(2): 394–406.
- March, J. G. 1976. The technology of foolishness. *Ambiguity and choice in organizations*, 69: 81.
- McKelvie, A., Haynie, J. M., and Gustavsson, V. 2011. Unpacking the uncertainty construct: Implications for entrepreneurial action. *Journal of Business Venturing*, 26(3): 273–292.
- McMullen, J. S. and Shepherd, D. A. 2006. Entrepreneurial action and the role of uncertainty in the theory of the entrepreneur. *Academy of Management review*, 31(1): 132–152.
- Milliken, F. J. 1987. Three types of perceived uncertainty about the environment: State, effect, and response uncertainty. *Academy of Management review*, 12(1): 133–143.
- Mintzberg, H. et al. 1994. The fall and rise of strategic planning. *Harvard business review*, 72(1): 107–114.
- Packard, M., Clark, B. B., and Klein, P. G. 2017. Uncertainty types and transitions in the entrepreneurial process.
- Penrose, E. T. 2009. *The Theory of the Growth of the Firm*. Oxford university press.

- Perry, J. T., Chandler, G. N., and Markova, G. 2012. Entrepreneurial effectuation: a review and suggestions for future research. *Entrepreneurship Theory and Practice*, 36(4): 837–861.
- Petrakis, P. E., Kostis, P. C., and Kafka, K. I. 2016. Secular stagnation, faltering innovation, and high uncertainty: New-era entrepreneurship appraisal using knowledge-based thinking. *Journal of Business Research*, 69(5): 1909–1913.
- Ramoglou, S. and Tsang, E. W. 2016. A realist perspective of entrepreneurship: Opportunities as propensities. *Academy of Management Review*, 41(3): 410–434.
- Read, S., Dew, N., Sarasvathy, S. D., Song, M., and Wiltbank, R. 2009. Marketing under uncertainty: The logic of an effectual approach. *Journal of marketing*, 73(3): 1–18.
- Read, S., Sarasvathy, S., Dew, N., Wiltbank, R., and Ohlsson, A.-V. 2010. *Effectual entrepreneurship*. Routledge.
- Reymen, I. M., Andries, P., Berends, H., Mauer, R., Stephan, U., and Burg, E. 2015. Understanding dynamics of strategic decision making in venture creation: a process study of effectuation and causation. *Strategic entrepreneurship journal*, 9(4): 351–379.
- Sarasvathy, S. and Kotha, S. 2001. Effectuation in the management of knightian uncertainty: evidence from the realnetwork case. Technical report, UW Business School Working Paper.
- Sarasvathy, S., Kumar, K., York, J. G., and Bhagavatula, S. 2014. An effectual approach to international entrepreneurship: Overlaps, challenges, and provocative possibilities. *Entrepreneurship Theory and Practice*, 38(1): 71–93.
- Sarasvathy, S. D. 2001. Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. *Academy of management Review*, 26(2): 243–263.
- Sarasvathy, S. D. 2004. Making it happen: Beyond theories of the firm to theories of firm design. *Entrepreneurship Theory and practice*, 28(6): 519–531.
- Sarasvathy, S. D. 2009. *Effectuation: Elements of entrepreneurial expertise*. Edward Elgar Publishing.
- Sarasvathy, S. D. and Dew, N. 2008. Is effectuation lachmannian? a response to chiles, bluedorn, and gupta (2007). *Organization Studies*, 29(2): 239–245.
- Sarasvathy, S. D. and Dew, N. 2013. Without judgment: An empirically-based entrepreneurial theory of the firm. *The Review of Austrian Economics*, 26(3): 277–296.
- Sarasvathy, S. D., Dew, N., Velamuri, S. R., and Venkataraman, S. 2003. Three views of entrepreneurial opportunity. In *Handbook of entrepreneurship research*, 141–160. Springer.

- Schmitt, A., Rosing, K., Zhang, S. X., and Leatherbee, M. 2017. A dynamic model of entrepreneurial uncertainty and business opportunity identification: Exploration as a mediator and entrepreneurial self-efficacy as a moderator. *Entrepreneurship Theory and Practice*, 1042258717721482.
- Seligman, M. E. and Csikszentmihalyi, M. 2014. Positive psychology: An introduction. In *Flow and the foundations of positive psychology*, 279–298. Springer.
- Shepherd, D. A., Williams, T. A., and Patzelt, H. 2015. Thinking about entrepreneurial decision making: Review and research agenda. *Journal of management*, 41(1): 11–46.
- Tasic, I. and Andreassi, T. 2008. Strategy and entrepreneurship: Decision and creation under uncertainty 1. *Journal of Operations and Supply Chain Management*, 1(1): 12–23.
- Townsend, D.M., H. R. M. J. S. S. 2018. Uncertainty, knowledge problems, and entrepreneurial action. *The Academy of Management Annals, Forthcoming*.
- Tversky, A. and Kahneman, D. 1974. Judgment under uncertainty: Heuristics and biases. *science*, 185(4157): 1124–1131.
- Weick, K. E. K. E. 1969. The social psychology of organizing. Technical report.
- Welter, C., Mauer, R., and Wuebker, R. J. 2016. Bridging behavioral models and theoretical concepts: effectuation and bricolage in the opportunity creation framework. *Strategic Entrepreneurship Journal*, 10(1): 5–20.
- Wiltbank, R., Dew, N., Read, S., and Sarasvathy, S. D. 2006. What to do next? the case for non-predictive strategy. *Strategic management journal*, 27(10): 981–998.
- Windschitl, P. D. and Wells, G. L. 1996. Measuring psychological uncertainty: Verbal versus numeric methods. *Journal of Experimental Psychology: Applied*, 2(4): 343.
- Zolli, A. and Healy, A. M. 2013. *Resilience: Why things bounce back*. Simon and Schuster.