

---

## CHAPTER 1

### INTRODUCTION

#### 1.1 Overview

Understanding the nature and sources of uncertainty that underlie entrepreneurial decision making have been a primary focus of entrepreneurship research. The infusion of data analysis techniques (i.e., inspecting, transforming, and modeling data with the goal of supporting decision-making) and technologies (e.g., data analytics) in entrepreneurship has generated new ways of dealing with uncertainty. For example, the constant flow of “big data” acquired through social media apps (e.g., Twitter) has been analyzed to overcome opportunity-related uncertainties in healthcare. A growing number of venture capitalists have employed automated data analysis techniques to evaluate business investments. We refer to the trend of data-driven techniques and technologies in shaping activities of the entrepreneurial process (i.e., opportunity recognition, development, and evaluation) as “data driven entrepreneurship.”

#### 1.2 Objective

we study the business opportunity evaluation from the data-driven perspective of entrepreneurship, and ask: How could the entrepreneur analyze imperfect market information in order to evaluate the business opportunity? Furthermore, when the entrepreneur’s resources are lacking, routines are nonexistent, reputation has not been established, or operating regulations are inadequate these shortages of resources, routines, reputation, and regulations pose operational constraints—we refer to as operational shortages of the 4Rs—on overcoming market uncertainty. In addition, the entrepreneur, in general, evaluates an opportunity based on his/her individual risk preferences. From the data-driven perspective of entrepreneurship, entrepreneurs with different risk preferences and operational shortages could better deal with imperfect market information, so long as they could continuously monitor sources of uncertainty and analyze accumulated data to obtain

---

insights for decision making. Importantly, data-driven entrepreneurship demands dynamic and algorithmic data analysis techniques to evaluate the business opportunity. In this paper, we explore how to analyze real-time and imperfect data (e.g., data or statistics from external factors forming an observable process) in order to make an optimal portfolio of investments

### 1.3 Motivation for the Project:

High market uncertainty impedes an entrepreneur's Ability to evaluate the state of the market for a business opportunity. For many entrepreneurial ventures, data collection and analysis techniques and technologies are becoming an important source to manage uncertainty. This trend is often referred to as "data driven entrepreneurship".

We consider a dynamic approach using data to overcome market uncertainty for business opportunity related evaluations. In particular, we examine the entrepreneur's investment portfolio in which each investment generates expected returns and some information about a specific aspect of the market for a single business opportunity. We develop a model that analyzes imperfect market data (e.g., financial, social, regulatory), while factoring in the entrepreneur's risk preference and operational shortages of resources, routines, reputation, and regulations. Our numerical findings show that, rather than pursuing the highest expected returns, an entrepreneur may choose perfect information, risk hedging, or market-controlling investments based on his/her cash level and risk preference. Hence, the entrepreneur, fueled by the availability of data analysis, could overcome uncertainties and obtain better insights for business opportunity decisions.

---

## CHAPTER 2

### LITERATURE SURVEY

Opportunity evaluation is the core of entrepreneurial decision making. Entrepreneurship scholars have extensively investigated how entrepreneurs make opportunity evaluation decisions based on individual factors (e.g., cognition and aspirations) combined with external factors (e.g., valuation of the market) found that an increase in uncertainty decreases the entrepreneur's willingness to act on an opportunity in the face of uncertain environmental conditions. Entrepreneurs must manage entrepreneurial risk, rationality, and high levels of uncertainty about markets when evaluating opportunities. Entrepreneurs are also advised to develop strategies to hedge adverse outcomes according to their risk preferences. While research on operations management (OM) has studied the exploitation process of opportunities, subject to operational shortages of 4Rs, OM scholars have not yet explored "a deeper strategic understanding of evaluations of a recognized opportunity to determine if it represents an opportunity for the specific entrepreneur". In the evaluation stage, entrepreneurs operate under significant uncertainty about the true value of an opportunity, and information is needed to assess that value. Shepherd and Patzelt note this issue in emerging operational entrepreneurship research, and call for processes to effectively capture and utilize information and improve entrepreneurs' ability to refine the potential opportunities and to act upon subsequent potential opportunities. Prior studies on innovation and entrepreneurship have mainly recognized a stable and fixed entrepreneurial process for evaluating a new product/service idea that underlies a market opportunity.

With the infusion of data-driven technologies, the entrepreneurial process has become less bounded (predefined) by structural boundaries of product scope and market search and temporal boundaries of entrepreneurial activities.

The data-driven framework of Miller and Mork constitutes a process for data collection, transformation, and application of analysis techniques that underlie insights required for decision making. Two notable research streams in entrepreneurship, opportunity creation and effectuation perspective of entrepreneurship, have studied the continuous re-evaluation and evolution of opportunity in less bounded entrepreneurial processes, as well as the accompanying uncertainty. However, owing to the complex and interrelated nature of

---

bounded processes, conventional research methods have been of limited use in capturing the dynamics of this phenomenon. Hence, there is a gap in the literature on operational and data-driven perspectives of entrepreneurship for novel data-driven techniques and technologies that shape the entrepreneurial process, including opportunity evaluation. Studies on decision making under uncertainty have identified methods to address situations when the outcome probabilities are not, or cannot, be known precisely. Specifying mathematically tractable risky choice problems develop precise rules for rational decision-making Expected utility theory provides the backdrop for the normative

---

## CHAPTER 3

### EXISTING AND PROPOSED SYSTEM

#### 3.1 Existing system:

Consider an entrepreneur who is evaluating a business opportunity for a market in a multiperiod setting. The state of the market—whether the market has a positive or negative outlook for the entrepreneur’s opportunity—depends on a variety of external market factors such as economic, governmental, social, and regulatory that may not be directly observable and may change over time. Furthermore, the entrepreneur’s risk preference and operational shortages of one or more of 4Rs (i.e., internal constraints) influence the entrepreneur’s ability to observe the state of the market and take control over market changes. To exemplify the impact of an external factor on opportunity assessment, we offer a simulated example of an entrepreneurial venture in a developing industry (e.g., clean energy). The entrepreneur may not have established know-how of external market regulations and lobbying practices for the technology (i.e., shortage of external regulations). Although the new venture’s investors may provide some policy and regulatory assistance, the regulations for an emerging technology may be transient, which is likely to result in a hidden market. Therefore, he or she might not be able to fully evaluate the true economic outlook—positive or negative—without understanding the regulatory conditions, particularly among the rapidly changing laws surrounding energy. Information about the state of regulations and policy is needed to evaluate the valuation of the market for the clean energy innovation through hiring legal services, lobbying practices and active participation in discussions about pending regulations the entrepreneur in our model gathers information about the market by allocating her/his total funds  $X$  across a portfolio of investments in  $f$  independent external market factors over  $T$  Periods. To maximize potential returns of a business opportunity, a resource-constrained entrepreneur could invest small amounts of his/her resources, while minimizing risk exposure. For example, prior to Turkey’s passage of a renewable energy law in 2005, most clean energy entrepreneurs made relatively marginal investments to reflect the market’s appetite for solar. The level of information, as denoted by  $v_{jk} \in [0, 1]$ , about the market factor  $j \in \{1, \dots, f\}$  depends on investment  $k \in \{1, \dots, m\}$ , whose return provides information about factor  $j$ . Subsequently, the investment returns form the state values of an observable process as characterized by the observed market factors.

### 3.1.1 Disadvantages

- More are less being probability based
- In this process is not secured for the data analyzing system
- 100 percentages is not successful

## 3.2 Proposed System

Although our model has enabled us to examine a new method of evaluating a hidden market process, several assumptions, limitations, and related extensions to this research need to be acknowledged. First, our key assumptions pose inherent limitations on our model. For example, although our assumption about an exogenous and independent change in the valuation of investments does not necessarily change our insights, the relaxation of this assumption could lead to more profound insights into the market. Second, a DP allows for nonlinearity, path- dependence, and unpredictability.

These properties are important, assuming that a Markov model is a close representation of decision-making in real-world entrepreneurial contexts. Third, we did not account for dependence between market factors (i.e., spill-over effects within the entrepreneur's accumulated information) and selection bias for market factors. Nor did we check the validity of the received information, which raises the question of how an entrepreneur can ensure that he/she is inputting the right information. It would be fruitful for researchers to examine both the selection and validation of market factors (e.g., financial) that we investigated, as well as factors that we overlooked (e.g., political and regulatory). Finally, it would be helpful to examine how entrepreneurs adapt to market realities while their internal processes and technologies evolve. These areas, if explored, could provide important insights for the fields of strategy, OM, and entrepreneurship.

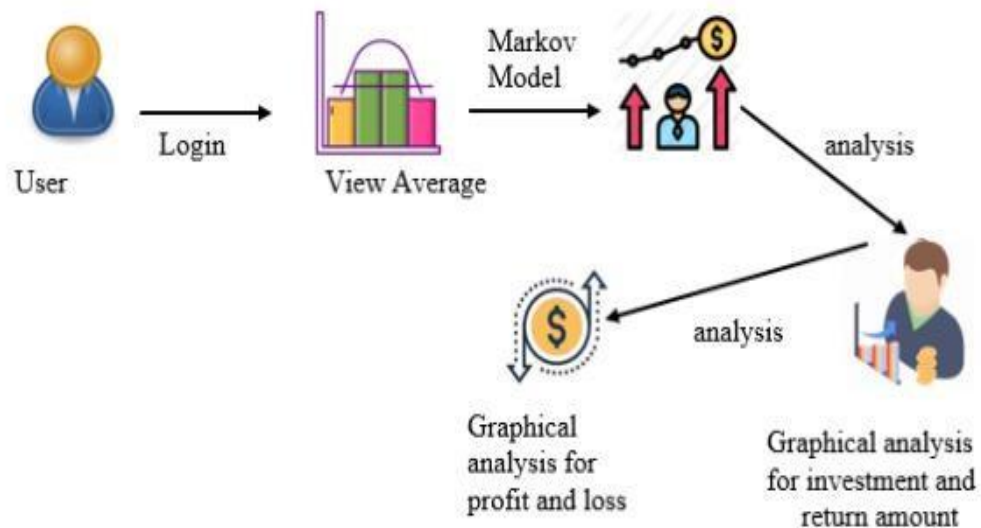
### 3.2.1 Advantages

- Business opportunity calculated is easily
- Time is save for this process
- Money is not waste in this analysis ,Most secured process

---

## CHAPTER 4

### SYSTEM ARCHITECTURE



#### Explanation:

**Step 1:** First we collect data set in different fields (generic) like Investment, Return Amount, Profit, Loss in Last 6 years

**Step 2:** Analysis for Investment Average, Return Amount, Profit & Loss Average

**Step 3:** Markov Chain Model: A Markov Chain Model is “a stochastic model describing a sequence of possible events in which the probability of each event depends only on the state attained in the previous event”.

**Step 4:** Graphical analysis For Investment Average.

**Step 5:** Graphical analysis For Return Amount Average.

**Step 6 :** Graphical analysis For Profit Average.

**Step 7:** Graphical analysis For Loss Average.

---

## 4.1 Modules included:

### Agriculture

Agriculture-related enterprises face complicated risks and broad, rapidly evolving challenges. Agribusiness intelligence supports strategic planning and the management of commodity related risk and speculative opportunities with quality agriculture market data, forecasts and expert analysis.

### Industries:

Industry Analysis is used in order to map out the external environment of a business. It is a component of Situational Analysis, [CICD Analysis](#) and External Analysis. The output from the Industry Analysis serves as input for SWOT Analysis. Conducting an Industry Analysis enables a business to respond to opportunities and threats that the industry entails.

### Cooperate environment:

The environment is always changing, and this is just as true for the business environment as it is for the physical world around us. Managers try to avoid being “taken by surprise” by unexpected events that would impact their organizations through an ongoing process called **environmental scanning**. Environmental scanning is a high-level, broad-based process of gathering, analyzing, and dispensing information for purpose of developing strategies or tactics. The process entails getting both factual data and qualitative opinions. Organizations also scan when they are considering whether to enter a particular industry.



---

## CHAPTER 5

### SYSTEM DESIGN AND IMPLEMENTATION

#### 5.1 Design:

To exemplify the impact of an external factor on opportunity assessment, we offer a simulated example of an entrepreneurial venture in a developing industry (e.g., clean energy). The entrepreneur may not have established know-how of external market regulations and lobbying practices for the technology (i.e., shortage of external regulations). Although the new venture's investors may provide some policy and regulatory assistance, the regulations for an emerging technology maybe transient, which is likely to result in a hidden market. Therefore, he or she might not be able to fully evaluate the true economic outlook—positive or negative—without understanding the regulatory conditions, particularly among the rapidly changing laws surrounding energy. Information about the state of regulations and policy is needed to evaluate the valuation of the market for the clean energy innovation through hiring legal services, lobbying practices and active participation in discussions about pending regulations . The entrepreneur in our model gathers information about the market by allocating her/his total funds  $X$  across a portfolio of investment's in  $f$  independent external market factors over  $Periods$ . To maximize potential returns of a business opportunity, a resource-constrained entrepreneur could invest small amounts of his/her resources, while minimizing risk exposure For example, prior to Turkey's passage of a renewable energy law in 2005, most clean energy entrepreneurs made relatively marginal investments to reflect the market's appetite for solar. The level of information, as denoted by  $v_j$   $k \in [0, 1]$ , about the market factor  $j \in \{1, \dots, f\}$  depends on investment  $k \in \{1, \dots, m\}$ , whose return provides information about factor  $j$ . Subsequently, the investment returns form the state values of an observable process as characterized by the observed market factors.

#### 5.2 Implementation

**1) Base Scenario:** We start our numerical analysis with a base scenario [see Fig. 1(a)] that focuses on the portfolio with two investments ( $m=2$ ): Investment 1 with NI and Investment 2 with FI. Fig. 1(a) represents higher expected returns with Investment 1 in the portfolio and shows that expected returns is a greater concern when the entrepreneur has low risk aversion.

---

Furthermore, when  $X_0$  is high, the well-funded entrepreneur with low risk aversion considers Investment 2 in his/her portfolio to obtain FI. However, this is not the case as the shortage of funds becomes significant (i.e.,  $X_0$  is reduced). The limited-funded or cash-strapped entrepreneur with low risk aversion could generate higher returns with Investment 1, reducing the proportion of Investment 2 in the portfolio, because the information gain is dependent on the investment dollar amount.

## **2) Market Observability:**

In the base scenario, we found numerical evidence demonstrating the tradeoff between expected

returns and market information, while considering the entrepreneur's cash level and risk preference. This insight is also valid with a larger portfolio of four investments ( $m = 4$ ) including POMDP-infused Investments 3 and 4. Each investment facilitates the flow of relatively high level of information about a single and different market factor, while generating returns. Fig. 1(b) (left figure) shows that the well-funded entrepreneur would consider information over return .

---

## CHAPTER 6

### FESIBILITY STUDY

This study contributes to the operational and data-driven perspectives of entrepreneurship by refining decision making using a data-driven technique for the opportunity evaluation in a dynamic entrepreneurial process. Furthermore, we contribute to entrepreneurial decision making under uncertainty by identifying the tradeoff between expected returns and market information, and providing insights into how data-driven investment portfolio can be used to manage this tradeoff, while accounting for the entrepreneur's risk preference and operational shortages of the 4Rs. In particular, we consider a Markovian model to address the changes in business opportunity-related evaluations in uncertain and complex environments, such as in a hidden market, where the decision maker cannot directly estimate the outcome probabilities. Modeling the highly uncertain nature of the market using a Markovian model has long been recognized as a reasonable approach and Markov models have been used primarily to describe the dynamic behavior of financial markets. Although POMDPs are used in various fields, including financial analysis and engineering, they have not been used extensively in entrepreneurial decision making. We analyze a POMDP in an optimal stopping problem, which requires “the consideration of not only the decision maker's uncertainty about the viability of the opportunity, but also the environmental conditions that influence the context in which the opportunity assessment is made”. They obtain probability thresholds based on the information cost, the payoff structure, and information quality. Their results indicate the ideal time for the decision maker to stop accumulating information and to either accept or reject an opportunity.

---

## CHAPTER 7

### REQUIREMENT SPECIFICATION

#### 7.1 Software Requirements

For developing the application, the following are the Software Requirements:

- 1: Python
- 2: MySQL
- 3: Django
- 4: WampServer

Operating Systems supported:

1. Windows 7
2. Windows XP
3. Windows 8

Technologies and Languages used to Develop:

Python

#### 7.2 Hardware Requirements

For developing the application, the following are the Hardware Requirements:

- ☐ Processor: Pentium IV or higher
- ☐ RAM: 2GB
- ☐ Space on Hard Disk: minimum 512MB

## CONCLUSION

The entrepreneurial environment is characterized by high levels of uncertainty about the markets that entrepreneurs wish to enter. We develop a dynamic data analysis technique based on a POMDP model to answer our research question about how to analyze imperfect market data for business opportunity evaluation, while accounting for the entrepreneur's individual risk preference and operational shortages. Specifically, we obtain a probabilistic information measure in the form of an emission matrix. That measure enables insights from an observable process related to external factors, which, in turn, helps assess the state of the hidden market. Owing to Markovian modulation of the POMDP model, the findings of our dynamic model are more realistic than standard static models. Whereas one can derive a closed-form solution for certain probabilistic measures using a POMDP, closed-form analytical expressions cannot be obtained for certain cases, such as situations where the investment dollar amount determines the level of Information gain. Therefore, our algorithm numerically mimics the POMDP-based model. We offer insights from our numerical analysis in response to our research question on the impact of the entrepreneur's risk preference and operational shortages on the data-driven investment portfolio. Rather than pursuing the highest expected returns, an entrepreneur may choose perfect information, risk hedging, or market controlling investments, based on his/her cash level and risk preference, in order to maximize the venture's prospects.

## REFERENCES

- [1] F.H.Knight, *Risk, Uncertainty and Profit*. New York, NY, USA: Moughton Mifflin, 1921.
- [2] A. McKelvie, J. M. Haynie, and V. Gustavsson, "Unpacking the uncertainty construct: Implications for entrepreneurial action," *J. Bus. Venturing*, vol. 26, pp. 273–292, 2011.
- [3] S. Nambisan, "Digital entrepreneurship: Toward a digital technology perspective of entrepreneurship," *Entrepreneurship Theory Pract* no. 6, pp. 1029–1055, 2017.
- [4] Y. Yoo, O. Henfridsson, and K. Lyytinen, "The new organizing logic of digital innovation: An agenda for information systems research," *Inf. Syst. Res.*, vol. 21, no. 4, pp. 724–735, 2010.
- [5] G. Manogaran, D. Lopez, C. Thota, K. M. Abbas, S. Pyne, and R. Sundarasekar, *Big Data Analytics in Healthcare Internet of Things*. New York, NY, USA: Springer, 2017.
- [6] A. Davis, "Venture capital firms use big data," *Wall Street J.*, Apr. 25, 2017.
- [7] V. Wu, "A machine-learning approach to venture capital," *McKinsey Quart.*, Jun. 27, 2017.
- [8] D. A. Shepherd, T. A. Williams, and H. Patzelt, "Thinking about entrepreneurial decision making: Review and research agenda," *J. Manage.*, vol. 41, no. 1, pp. 11–46, 2015.