

Predictive Modeling of Strategic Decision-Making Patterns in the Presence of Competitor's Decisions Using Machine Learning Techniques

YOUSEF SALAH BURAYKAH

2021204699

Supervisor: Dr. Mona Mostafa Al-Ashry

Faculty Member - College of Management - MidOcean University

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Strategic decision-making is a central concept in the business world, with the power to make or ruin a company. The Oxford Dictionary defines "Strategic Decision" as "carefully planned and executed actions and approaches that are designed to achieve specific goals"¹. These plans and actions usually are resource efficient and seek to have a long-term impact. There are different types of decision-making, programmed and non-programmed decisions, routine and strategic decisions, and organizational and individual decisions. Programmed decisions are routine and repetitive, while non-programmed decisions require creative thinking, routine decisions are short-term, while strategic decisions have long-term impacts, and organizational decisions are made by teams or managers, while individual decisions are based on available information and one's point of view².

In the era of globalization, where competition has become global, we now see, for example, European companies competing with Chinese companies for customers in America or worldwide. This has made strategic decision-making crucial, as organizations are now competing with minds and rivals from all around the world. Despite the importance and effectiveness of making strategic decisions, it can be a challenging task due to the complexities and uncertainties that organizations may face. The actions and reactions of competitors can also increase the difficulty and make it more complex. Therefore, it is important to have a sufficient understanding of the market, consumer preferences, and global economic conditions.

For example, one of the greatest decisions in the field of automotive manufacturing that changed the scales and turned the industry upside down is Elon Musk's decision when he decided to produce electric cars in 2004 at affordable and desirable prices, which created a revolution in the field of cars. Based on a report by CNN Business in 2020³, Tesla, in 16 years, has achieved a market value of \$600 billion in market capitalization. Creative and strategic understanding were

¹ Definition of strategic adjective from the Oxford Advanced Learner's Dictionary.

² GeeksforGeeks. (2023, November 30). Types of Decision making.

<https://www.geeksforgeeks.org/types-of-decision-making/>

³ Tesla's market value tops \$500 billion for the first time. (2020, November 24). CNN.

<https://www.cnn.com/2020/11/24/cars/tesla-worth-500-billion/index.html>

important factors in Tesla's ability to achieve this accomplishment when Tesla decided to develop electric cars that could match and maybe overcome the performance, range, and efficiency of gasoline cars while maintaining as low a cost as possible. The company accomplished in just 16 years what other companies had not been able to accomplish in 500 years of combined effort. The combination of a calculated move and an inspiring vision was what made Tesla successful, with a market capitalization greater than the sum of the market capitalizations of the next seven most valuable automakers, Figure 1.1 demonstrates that Tesla is, by far, the most valuable automotive manufacturer in the world⁴.

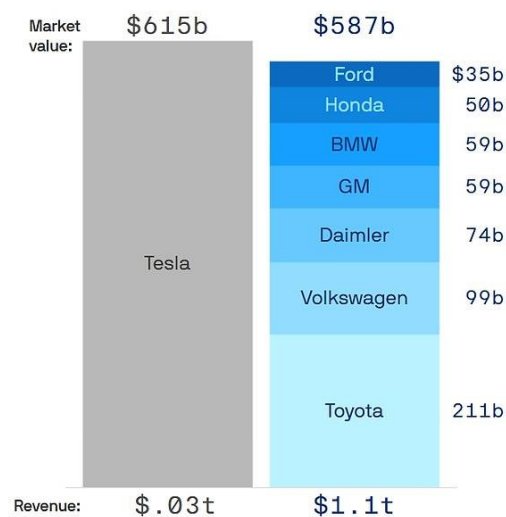


Figure 1.1 The top 8 car companies by market capitalization (2020) ³.

Many cases demonstrate strategic decision effects, like Apple opting to join the smartphone industry, Walmart deciding to participate in online retail, and Netflix selecting to shift toward streaming live events. All of these were risky paths that paid off in the end. Brave moves based on understanding, anticipating, and knowing others, allow organizations to adapt to their respective industries and stay competitive by understanding new patterns and weighing risks against opportunities for progress.

In today's evolving marketplace, businesses must take into account the strategies of their competitors and use these insights to inform their own strategic choices. The decision-making

⁴ (Ausick, P., & Ausick, P. (2020, December 22). Tesla is worth more than all big car companies in the world combined. <https://247wallst.com/autos/2020/12/22/tesla-is-worth-more-than-all-big-car-companies-in-the-world-combined/>

process against competitors can take either a reactive or proactive approach as described by Robert M. Porter (2004)⁵. Reacting involves responding to a competitor's moves with opportunistic actions. While this approach allows for quick adaptation to shifts in the marketplace, it also risks less innovation as one fails to envision impending changes.

On the other hand, being proactive means planning and taking action before your competitors do, which is about staying ahead of the game. As Porter noted, taking this approach means staying ahead of others, but being proactive also requires significant time and financial investments in prediction. Therefore, a combination of being proactive and reactive is the wisest strategy, the organization can proactively guide market developments while still monitoring competitors to react seamlessly. Being able to anticipate changes while also being adaptable to unexpected situations allows for greater flexibility.

Strategic decisions in competitive industries rely on careful consideration of many factors. This includes a deep understanding of market dynamics, competition, internal resources, risk assessment, technological advancements, economic conditions, globalization, sustainability, scenario planning, and many other factors that are interconnected in one way or another.

Recently, Machine Learning (ML) has been found to be quite convenient for businesses in their strategic decision-making processes. Machine learning algorithms possess the ability to detect patterns, trends, and even minute insights that humans may overlook when dealing with large volumes of data. Take the automotive industry as an example, where machine learning algorithms can be applied to assess information regarding consumer preferences and market trends.

Organizations can also gain advantages from machine learning by discovering the connections between various factors and the extent to which these connections can influence decision-making processes. By recognizing patterns and trends that may influence their operations, companies can aid in making proactive choices to maintain a competitive edge.

As shown in Figure 1.2, external investment in AI-focused companies was distributed by technology category in 2016, with machine learning receiving the highest investment amount.

⁵ Robert M. Porter (2004), Proactive vs Reactive: Which Management Style Is Best?

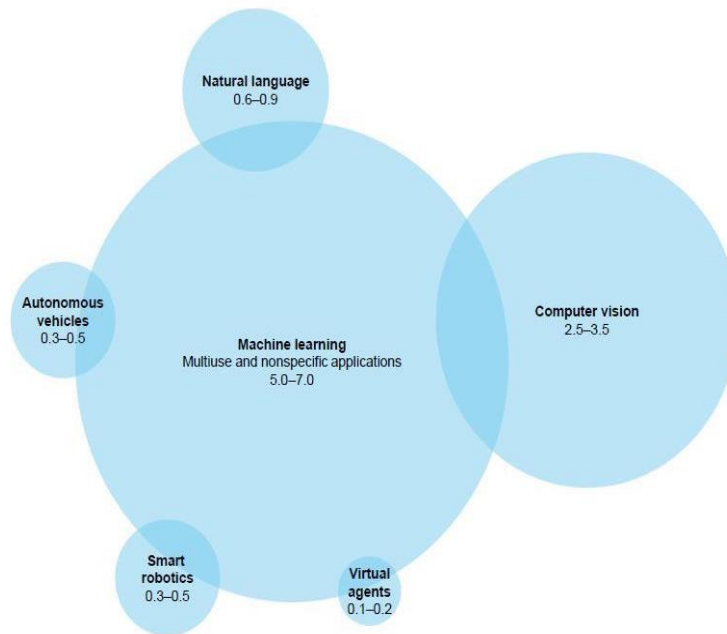


Figure 1.2. External Investment in Machine learning companies by technology category⁶.

Using predictive modeling statistics and machine learning to predict outcomes, provides companies with a competitive advantage and long-term success. By analyzing data, it identifies patterns of new insights and helps identify risks and opportunities to make better decisions. Machine learning also provides a more accurate understanding of a company's competitive environment and identifies areas of weakness and opportunities that can be exploited.

However, it is important to note that while algorithms analyze statistics, human judgment is also important to make the final decision. A balanced approach applying both machine computation and human perspectives leads to well-informed action in uncertain commercial environments. The strengths of humans and machines in decision-making can be combined to take advantage of the advantages that they offer to help organizations make the most well-informed decisions.

⁶ (Source: Capital IQ, Pitchbook, Dealogic, McKinsey Global Institute analysis)

1.2 Problem Statement

Companies face many difficulties in the ever-changing manufacturing and industry sectors to remain competitive. One major problem for most of the manufacturing companies in rivalry industrial markets is the difficulties that companies usually face when determining how to respond strategically to the actions of their competitors. As markets become more complex and competitive, companies need to continue to make wise decisions to maintain or improve their competitive advantage. Companies face complex decisions that require considering various factors. Understanding how businesses respond to competitive challenges and predict strategic decision-making patterns can provide a significant advantage.

This research, by addressing the aforementioned problem, seeks to study how organizations respond to competitors' decisions and create predictive models to assist decision-makers. Creating a more competitive and agile business approach is the goal, to enabling firms to predict their rivals' actions, react swiftly, and make calculated choices that will lead to long-term success. This research proposes a machine learning-based methodology to help organizations in strategic decision processes.

The present thesis centers on the difficulties organizations meet when deciding how to respond strategically to the acts of competitors. To stay ahead of the competition, organizations must be able to make wise decisions as they become more complex and fiercer. To accomplish this, they must anticipate an organization's patterns of strategic decision-making and comprehend how it reacts to demands from the competition. To help businesses make better strategic decisions in the face of competition and stay ahead of their rivals, an innovative methodology employing machine learning techniques will be proposed. Decision-makers will then be more prepared to make effective decisions.

1.3 Importance of the Research

It is impossible to overestimate the significance of research on the strategic decision-making that works, especially in the manufacturing and industrial sectors, which are the scope of research. These industries' organizations must contend with fierce competition, which makes it difficult to formulate wise and sensible strategic decisions. Organizations can improve their awareness of the competitive landscape and create predictive models to predict and react to rival actions by

undertaking research and investigating novel ways. This may result in less risk and uncertainty, more responsiveness and agility, and a stronger competitive edge. In the end, reaching corporate goals and objectives depends on making good strategic decisions, and studying in this field can assist organizations in staying ahead of the curve in the quickly evolving business environment of today. In this regard, firms can benefit from the application of promising approaches such as machine learning, game theory, and Multi-Criteria Decision-Making (MCDM) to make better informed and successful strategic decisions when facing competition. In the following sections, details will be provided on how these approaches could be utilized to address the research problem and improve strategic decision-making in the manufacturing and industrial sectors.

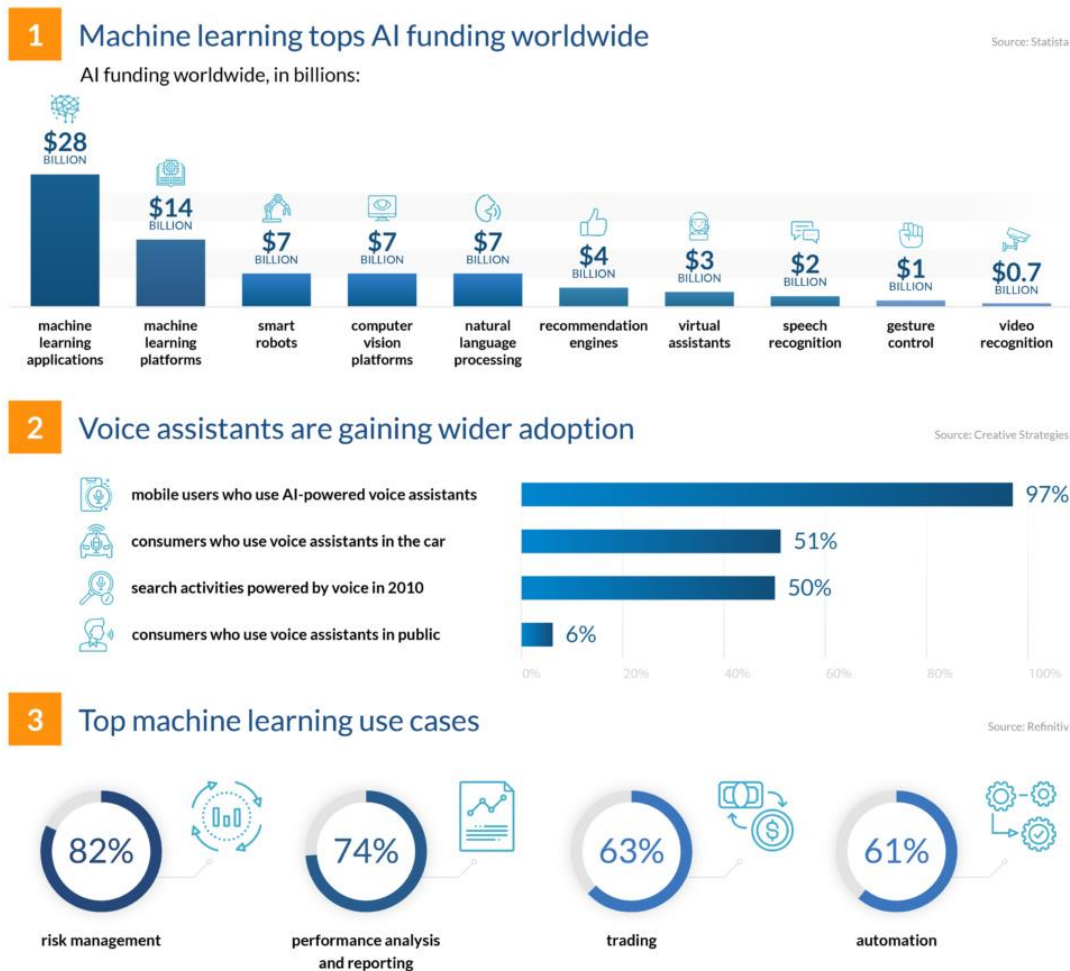


Figure 1.3 Tops AI Funding Worldwide:

As can be seen from the chart, machine learning applications receive the highest funding globally, amounting to \$28 billion. This is double the amount allocated to machine learning platforms (\$14 billion) and significantly more than other AI categories like smart robots, computer vision platforms, and natural language processing, each receiving \$7 billion. The infographic effectively demonstrates the importance of machine learning through its leading position in AI funding, widespread adoption in voice assistants, and diverse applications in critical areas such as risk management, performance analysis, trading, and automation. These factors collectively emphasize the transformative impact of ML on modern technology and its potential to drive future innovations.

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