

Artificial Intelligence as a Strategic Decision-Maker in Modern Business

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ABSTRACT

The advent of artificial intelligence (AI) has ushered in a new era for strategic decision-making in business, presenting unprecedented opportunities and challenges. This paper explores the evolving role of AI, not merely as a support tool but as an autonomous decision-maker in strategic business contexts. By examining AI's capabilities in data compilation, outcome forecasting, and strategic evaluation, this study highlights how AI can transform business model decision-making. Through a detailed analysis of AI's potential and current applications in various industries, this paper provides insights into the profound implications of AI-driven strategic decisions. Ethical considerations and future trends in the integration of AI in strategic management are also discussed.

Keywords: Artificial Intelligence, Strategic Decision-Making, Business Strategy, Machine Learning, Data Analysis, Business Model, Ethical Considerations, Future Trends

INTRODUCTION

In today's fast-paced and uncertain business environment, firms are increasingly turning to artificial intelligence (AI) to enhance their strategic decision-making capabilities [1]. The ability to harness AI for strategic decisions offers companies a substantial competitive advantage, making it a subject of immense relevance to the academic and business communities alike. While most prior research has focused on using AI to create strategic directions and improve operational decision-making, there is a growing need to explore AI's role as an autonomous decision-maker in strategic contexts [2]. AI's integration into strategic decision-making marks a significant shift from its traditional role as a tool for data analysis and operational efficiency. Advanced AI systems now have the potential to compile vast amounts of data, forecast possible outcomes, and evaluate the strategic implications of various business decisions [3]. This evolution raises important questions about the capabilities and reliability of AI in making high-stakes strategic decisions, as well as the ethical considerations and challenges associated with its use [4]. This paper examined the profound repercussions for business model decision-making, highlighting a two-fold influence: selecting a strategic model that aligns with organizational goals and reallocating resources to optimize strategic outcomes [5]. By exploring these dimensions, this study aims to provide a comprehensive understanding of AI's transformative potential in the realm of strategic management.

Foundations of Artificial Intelligence

Artificial intelligence (AI) represents the convergence of enabling technologies, algorithms, and networking, all of which are contributing to provide global advantages as it is applied in society and the economy [6]. Because of its synergistic character, AI is rooted in the intersection of disciplines, technological capabilities, and scientific theories. It involves computer science, operations research, management, statistics, mathematics, and psychology. It encompasses techniques and technologies for operations research, distributed and parallel computations, neural nets, connectionist models, deep learning, and reasoning [7]. It also includes supervised or unsupervised learning, data mining, machine statistics, and game theory. Moreover, it supports knowledge-based systems, acquisition and representation of knowledge, inferential mechanisms, search methods, problem-solving, and is used for text classification, information retrieval, and natural language processing [8]. Therefore, AI operates at the crossroads between software development, business intelligence, engineering, and psychology [5, 6, 7]. Artificial intelligence (AI) is technology that appears to emulate human performance, typically by

learning from human data. AI has already demonstrated impressive capabilities to help people select commercial products, make business decisions, understand information, and operate machines [8]. However, AI roles and abilities are likely to continue to evolve. In particular, artificial intelligence is now framing and informing strategic decision-making at the company and national level. This is happening in two ways [9]. First, the technology uses big data from diverse sources to provide insights, track business trends, and evaluate options. AI tools and the knowledge that organizations gain must enter decision-making channels for the technology to be effective [9]. Second, intelligence community analysis on potential foreign investment in technology and assets may evolve to include evaluations of AI capabilities and ramifications. Artificial intelligence can aid and inform national security and national strategy. AI is also tremendously important as a job source and as a university research area [10].

Machine Learning

Machine learning (ML) is a part of artificial intelligence that holds great promise [6]. It has the potential to revolutionize how organizations make decisions and compete across many different industries. It is based on the development of algorithms and techniques that aim to allow machines to learn from data. It allows predictive analytical models to be created and trained [7]. These models can then be used to make predictions, create insights, and identify patterns based on the data. Machine learning models are developed using many different mathematical algorithms, such as decision trees, Naïve Bayes, support vector machines, deep learning, boosted decision trees, and many others [8]. The choice of algorithm to be used is largely dependent on the structure and type of data in question, along with the problem to be solved. The end goal of developing a machine learning model is to create a mechanism that allows the algorithm to automate decision making; for example, machines are taught to make decisions based on specific classification problems [9]. For example, in the near future, it is likely that machines will be trained to predict from scans or look at radiology images only to indicate which cancer tumor is benign or malignant. Machine learning is particularly relevant in the field of strategic decision making, as it can assist humans in making evidence-based decisions by learning from data [10]. The focus of this field is solving classification and prediction problems. A classification problem represents those cases where a machine learning model predicts a choice, selection, or group membership on the basis of input data from new or future observations, meaning a decision boundary is established by using the training dataset. In contrast, prediction in machine learning involves predicting numeric values or quantities.

Natural Language Processing

Artificial intelligence is a subfield of computer science, dealing with the theoretical and practical issues related to programming computers to do things normally requiring human intelligence. A key technology within AI is machine learning, particularly deep learning wherein networks of software programs simulate the structure and processing of human brains, learning from large volumes of data with little human guidance. The key challenge and breakthrough that make all of these technologies possible is natural language processing, which enables AI to understand human language [8]. Over many years, natural language processing scientists have invented mathematical and computational tools, mostly centered on statistics that have finally enabled robots to understand and interpret human language signals. Examples of exciting applications in the business world are growing exponentially. Interestingly, while NLP has always been seen as an enabling technology, recent advancements have linked natural language to improved business decision-making, either to support decisions in a variety of domains or to create a foundation for more fine-grained and effective strategic decision-making [11].

Computer Vision

Computer vision is one of the most interesting fields in AI. It is mainly concerned with enabling machines to interpret and understand the visual world the way humans do [12]. While humans need to use their visual computing abilities to understand their surroundings, interpret shape, size, and texture, ascertain depth and distance, instantly label and classify objects, people, scenes, or positions, interpret human motion, predict a future event, and locate and differentiate between objects, machines require a tool-based approach and technologies that can go beyond human capabilities to really "see" and "analyze" their environment [13]. Most importantly, precise visual analysis capabilities can resolve straightforward or complex strategic decision-making scenarios and, therefore, streamline businesses in the modern era [10, 12]. Even though machine learning is empowering strategic decision-making, machine intelligence is not the native mode of decision-making for corporate companies [13, 14]. Instead, industry personnel follow evidence-based, data-centric, or information-system and human reasoning-based approaches. Indeed, most business organizations do not have structured and substantial data to harness learning- and reasoning-based intelligence for decision-making [14]. So much faith has been placed in the concept of business intelligence. In order to boost traditional human reasoning and intelligence, it is challenging to combine the three (machine intelligence, deep learning paradigms, and business intelligence).

Strategic Decision-Making in Business

Businesses face diverse and complex problems. To achieve their goals in this complex and uncertain environment, they must be able to make decisions and decide on the strategies that will guide their course of action [5]. Strategy, particularly as it relates to strategic decisions, can be the single most essential dimension of the effective functioning of an organization. Broadly defined, a strategy is a framework that guides those choices that determine the nature and direction of an organization. The strategic decision-making process, therefore, develops a strategy for an organization that determines the nature and direction of the organization's choice [6]. To make an effective strategic decision, the organization should develop decision-making techniques that allow it to follow a systematic pattern. Making decisions is the process of forming a judgment for one course of action or an alternative amongst others. Decisions are at times made regarding a single course of action, but can also be made when a variety of alternatives of action are available. There have been numerous changes in the required specifics, tools, and quantitative and management analyses; however, there is little change in the basic form and character of how cases of this type are approached [9]. Specific strategic decisions facing an organization include product positioning and timing, marketing policy, human force development, financing, and research programs for the development and conversion of line and product into one or more forms. Strategic decisions cover certain business units of the firm. However, they typically have strategic importance and require top-level management [10].

Applications of AI in Strategic Decision-Making

Applications of AI in strategic decision-making. In recent years, there has been growing awareness of the potential offered by AI systems to improve strategic decision-making, especially in a business context. Following the original investment of corporations in the 1950s and 1960s, AI can now deliver practical support for performance in specialized problem-solving domains. In particular, AI is finding opportunities in corporate strategy in a number of critical areas, including [8].

Forecast and Sensitivity Analysis: Business managers must make decisions under uncertainty. AI can be used to help analyze the impact of different degrees of uncertainty on business strategies and inform recommendations on the lines of business and time frames deemed to have a reasonable expected growth rate [10].

Risk Management: Managers are often faced with the constraints of both cost and time in the choice of promotion strategies. Given that there may be several strategic promotion alternatives, strategic mapping can be used for portfolio analysis in order to represent a number of strategies according to cost, the degree of risk associated with these strategies, and the associated projected impact in terms of increasing sales [11].

The intelligence provided in an expert system can build on the trend analysis, forecast, sensitivity analysis, risk analysis, and competitive intelligence aspects of the strategy discussion to provide in-depth strategic marketing and market recommendation information and to synthesize the insights [12].

Traditional competitive intelligence gathering techniques, which might include monitoring competitors' strategies, continually scanning relevant trade and business publications, and cultivating a network of contacts both within and external to the organization, are considered to be time-consuming, costly, and often potentially difficult to implement due to an embargo on information presentation and forced disclosure at D.C.'s discretion. Thus, along with traditional sources, data is being exploited from new and evolving non-traditional sources, such as blogs, wikis, social networking sites, social bookmarking services, podcasts, and videocasts. Because of the open source concept behind some of these systems, it is seen that data are often updated instantaneously, as events happen, and as decisions potentially harmful to the competition are discussed or made. This increased access to data, plus the use of more confirmed expert systems, allows the analysis of evolving and complex data explicitly to filter signals from mere noise [13].

Market and Consumer Analysis: AI can be used to monitor changing public perceptions and analyze competitive marketing performance. Artificial neural networks have been developed in developing strategic marketing models to answer the following questions [14]. One technique uses Boolean operators to evaluate data that permits a construction of a proposal model for company alliances based on the means and standard deviations of acquisition size of comparable companies. Another AI tool, decision trees, is able to generate a set of classification rules that are logical in nature and can be used to classify data into beneficial and non-beneficial areas for a specific business decision [8]. Using decision analysis we can find scenarios that offer the most future value for a new alliance. The software system Model N can make strategic financial recommendations through the use of data warehousing and business intelligence reports. Evolutionary algorithms, to name a few, appear to have potential for predictive processes and marketing mix implications in the area of modeling competitor behavior and decision

making. Gain and loss potential could be analyzed by letting the AI system make financial index forecasts for stock markets on the basis of decision(s) of competitor(s) [10].

Risk Management

The research supports the requirement identified by an international cybersecurity practice that an organization should identify and assess its potential risks to protect itself against an impending incident, while upholding other strategic imperatives [11]. Within the domain of business decision-making and considering the potential failed strategic decisions managers are embracing Artificial Intelligence technologies to assist with this process, since the potential outcomes are organized in a best-to-worst scenario algorithm that supports the business with risk mitigation [12].

Application of AI Technologies in Risk Management

Davenport lists companies in various industries – which include: insurance, automotive, financial services, cybersecurity, legal and pharmaceutical – and details how they utilize four forms of AI-based technology to manage the risks inherent in or associated with their business operations [9]. Under the heading 'Technology used', the identified AI technology tools are: predictive analytics, machine learning, natural language processing and predictive analytics, conversational computing and GPU-powered deep learning to build a screening tool. Recursive risk estimation is an advanced AI-based prediction tool that can handle complex risk scenarios. It uses historical business environmental data and calculates every possible outcome for a given strategic choice made in response to the natural environmental scenario presented in a business intelligence dataset [5]. Purely, a risk assessment tool, it collates an array of estimates drawn from previous scenario outcomes using various mathematical techniques, such as Markov chains, text-aware predictors, and black-box machine learning classifiers [9].

Market Analysis

Market analysis is part of the strategic decision-making process at micro and macro levels. It is harmonized with the diversification decision [10]. In the competitive business environment, inputs include experience, data, judgment, and foresight. Given the abundance of data and information, traditional inputs are often supplemented by attributing a given proportion of the market forecast to quantitatively based techniques [11, 12].

Market analysis can be carried out on various questions arising in strategic decision-making: the identification of the target market and its size and construction; the bifurcation and targeting of the market; the price determination and demand forecasting. The sufficient data and the potential for prediction reveal the potential for the use of neuro-fuzzy tools for data analysis and strategic decision-making like market forecasting [13].

The potential use of AI is allowing enterprises to gain differentiation and obvious strategic advantages that can result in gaining or losing the competitive edge. Some of the AI tools and techniques can be used in market forecasting to enable a firm to take an optimal decision in real-life conditions [14]. Therefore, the AI field is able to predict the infinite challenges and problems faced by corporate organizations today. In an era of digital transformation, AI is capable enough not only in predicting a wider range of things that might happen in the future but also in revealing what action one should take in response to an analysis of his position in respect of what is to come.

Competitive Intelligence

Given the importance of knowledge about the activities of the competition, many companies use various tools to gather data about their competitors. To efficiently assess company practices, it is essential to have good knowledge of and a high level of involvement in the entire competitive environment [10]. This observation is the basis of a separate approach to intelligence activities, aimed at collecting and processing information about direct competitors, rivals, and rivals. So let's move to the systematic response of the methods suggested in the analyzed approaches with a review of "the specific tools" concerning the market player element [11]. In general, the application of systems based on artificial intelligence techniques that help solve data processing and interpretation problems can be considered a breakthrough in terms of real support for the process of strategic decision-making. This results not only from ensuring the effective performance of given tasks but also, most of all, in accelerating the time of their implementation [10]. Thus, the importance of AI systems for companies is significant not so much for the novelty of an algorithm or a tool, but primarily for the effectiveness of the decision-making process it provides. What's more, it is noted, like Georgeff, that AI belongs to a special area of strategic management. By pointing out that information is the basic input of data and AI, it may be assumed that data and AI offer significant support in the implementation of the principles of strategic management, including competitive intelligence [11].

Challenges and Ethical Considerations

The implementation of AI in strategic planning is expected to bring about numerous benefits. To be sure, these worths are merited [13]. Yet, it is also important to consider the issues with using AI in these ways. Although AI can provide nuanced predictions, this is not always the case. When utilizing AI within the decision-making process, several potential difficulties must be addressed. Additionally, the implementation of AI should be handled cautiously [12]. Management appears to be eminently confident in using forecasts and AI systems and is prone to become overreliant on these systems. Decision-makers, therefore, may be contriving a rather imagined degree of understanding. Ethically, decisions that may have long-term effects must also be managed with caution [11]. Furthermore, Lukas's earlier elements regarding the correct delineation of a good or bad issue with AI/machine learning software are applicable in this instance. Many of these concerns mirror those recorded previously, since the two are fairly related. Nevertheless, the long-term consequences of a choice may not acquire the same weightage. This is not because it is more acceptable for an organization to promote a specific outcome but rather because some decisions may have more far-reaching consequences and may not easily be countered once they have been made [10]. According to Doorn, the use of such AI systems should require caution and deliberation. Ethical speculation engages in the model of deliberation, where social risks and benefits are debated and actions with potential long-term consequences are taken with care. Significant decisions are therefore often linked to exceedingly difficult ethical analyses as to whether the resolution of a dilemma via AI analyses amends a firm's overall objectives of establishing quality organizational relations and operating in a trustworthy manner [13].

Future Trends and Implications

The increased complexity of the competitive and business environments, together with the rise of digital technologies, datafication, and the increasing amount of data, have reshaped the approaches to strategic analysis and strategic decision-making [11]. The evolution of artificial intelligence applications (from handcrafted rule-based systems to machine learning and deep learning) and the deployment of big data techniques appears destined to play a significant role in providing new tools and algorithms for spurring managers' strategic thinking and supporting decision-making processes in the near future. However, in order to further develop AI in strategic management and identify relevant direct and indirect effects on strategic decision-making, it is important to note the following aspects [10]. Although handcrafted expert systems were subsequently replaced by machine and deep learning-based AI, representing a shift from programming to learning, to date, the focus has been on the development of platforms for the analysis and management of structured data (big data). Scenario planning and strategic thinking processes have not yet been deeply investigated and, in the future, algorithms fed with big data in order to convey strategic implications and support insights through both structured and unstructured data and researches may evolve. Moreover, the creation of hybrid AI that combines both the inductive and deductive schools of thought is more than likely [11]. Obviously, even though the role and usage of AI in strategic management and decision-making are in progress, the usage of AI tools has been broader than ever in the industry and is affecting a number of applications and processes [9]. Concerning strategic management, when looking upstream and innovatively, AI tools will affect the way participants in a strategic discussion will act, interact, and make decisions. At present, AI is still being used as an instrument to support strategic processes; in the future, it may become deeply involved in meetings and Wi-Fi networks. Also, AI applications will impact strategic diagnostics (both internal and external factors): managers will get rapidly a cognitive map of reality, based on structured and unstructured big data, and big data analysis through AI will create a number of macro-trends and talk about a vast number of topics and issues impacting the present and future of strategies.

CONCLUSION

As businesses navigate a fast-paced and uncertain environment, the integration of artificial intelligence into strategic decision-making processes emerges as a critical factor for gaining a competitive edge. This paper underscores AI's transformative potential, from data compilation and outcome forecasting to the profound implications on business model decisions. AI's capabilities in strategic decision-making extend beyond operational support, positioning it as an autonomous decision-maker. However, the implementation of AI necessitates careful consideration of ethical implications and potential overreliance on AI systems. The future of AI in strategic management points toward more sophisticated applications and deeper integration into strategic processes. As AI continues to evolve, businesses must develop robust frameworks to harness its potential while mitigating risks. This includes fostering an environment where AI complements human judgment, ensuring decisions are well-informed and ethically sound. The ongoing evolution of AI presents a promising frontier for strategic management, with the potential to redefine how businesses approach decision-making in an increasingly complex and data-driven world.

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