Journal of Computer Science and Technology Studies
ISSN: 2709-104X
DOI: 10.32996/jcsts
Journal Homepage: www.al-kindipublisher.com/index.php/jcsts

JCSTS
AL-KINDI CENTER FOR RESEARCH AND DEVELOPMENT

| RESEARCH ARTICLE

Adaptive AI-Powered Decision Support Systems for Strategic Business Management in Uncertain Markets

Fateha Akter Zhinuk[1] ✉ Aitymon Sholomer[2], MD SULTAN AHMED[3] and Shifa Sarkar[4]
[1]*M.S. in Strategic Management, University of the Cumberlands*
[2]*Master of Science & Information System (MSIS), Central Michigan University*
[3]*Master of Business Administration, TRINE UNIVERSITY*
[4]*Master's in Business Analytics, Wilmington University*
Corresponding Author: Fateha Akter Zhinuk, **E-mail**: fzhinuk14646@ucumberlands.edu

| ABSTRACT
In the modern uncertain business environment, organizations are experiencing constant disruption due to changes in technology, economic change and shifting consumer behavior. Such high rates of change evade the response of the traditional complexion of models of decision-making, usually slow, linear and reliant on intuition. This paper examines how Decision Support Systems (DSS) driven by Artificial Intelligence can be adaptive and have a transformative effect in the uncertain environment as a strategic decision tool. Based on the analysis of more than 20 recent academic publications, it offers the systematic overview of the effects of AI-DSS on the speed of decision-making, the reduction of risk, and resource forecasting in a wide range of industries and regions of the world. The A.D.A.P.T. Framework is a five-phase implementation model that has been introduced in the paper, and which will guide any organization to go through the assessment, design, alignment, piloting, and transformation. Comparative analysis brings to the fore unique advantages of AI-DSS in both developed and emerging markets, as well as identifying the limitations, including issues relating to trust, data quality and infrastructure shortages as well. A set of practical recommendations is provided to business leaders, policymakers, and developers to use it responsibly and make it scalable.

| KEYWORDS
Adaptive AI, Decision Support Systems (DSS), Strategic Management, Business Uncertainty, Predictive Analytics.

| ARTICLE INFORMATION
ACCEPTED: 01 July 2025 **PUBLISHED:** 28 July 2025 **DOI:** 10.32996/jcsts.2025.7.8.19

1. Introduction

Market volatility, technological disruptions, policy uncertainty, unpredictable consumer behaviours and other risks are some of the characteristics all businesses are grappling with in the current hypercompetitive and fast-changing global economy. Such uncertainties (strengthened by geopolitical crises, weaker financial markets, fast digitalization and global crisis) have rendered the conventional decision-making models inadequate in the long-term strategic success (Iriani et al., 2024; Alnajem et al., 2024). Organizations now have to work in environments that are complex, ambiguous and are increasingly changing environment where reactive planning and rigid set ups would not be of any help.

A smart and flexible business management in such an environment of uncertainty needs smart and intelligent systems that can crunch a lot of changing data, recognize new patterns and aid well-grounded decision making in time. It is at this point that artificial intelligence (AI) especially adaptive AI-powered decision support systems (AI-DSS) has come to the rescue as a revolutionary option. In contrast to the traditional decision tools, which are static, adaptive AI systems utilize current information, predictive analytics, and machine learning functions to develop their outputs continuously and provide organizations with the possibility to adjust their strategies to market changes (Sakova et al., 2025; Vudugula et al., 2023).

Adaptive AI-DSS not only increase the speed and accuracy of decisions but also allow foresight via simulation of numerous possible scenarios and suggesting the best possible responses. The outlined systems are especially helpful to businesses that have to face the disruption of their operations, including small and medium-sized enterprises (SMEs) in third-world markets and multinational corporations (MNCs) in high-tech industries (MAHABUB et al., 2025; Carayannis et al., 2025). The benefits, however, are rather tremendous, and the issues associated with data quality, system transparency, ethical responsibility, and organizational preparedness provide critical concerns, the integration of which promises to present a challenging task (Xia, 2022; Singh et al., 2025).

The paper discusses the implications of adaptive AI-based decision support systems in improving strategic management of businesses in uncertained situations. It reviews the existing literature and practice to assess whether it is supported by the proposals of how AI-DSS systems are altering the practice of decision-making and contributing to business flexibility and future resilience. This paper provides the roadmap on how to incorporate adaptive AI tools in strategic planning processes by analyzing the theoretical frameworks and existing models and use cases in the specific sector.

1.1 Restrictions of the Classical Decision-Making Models

The fact is that the traditional models of decision-making that are based on rational analysis, past history, and conservative forecasting are becoming more and more inadequate to address the requirements of modern fast-paced business. The models usually make assumptions of stability, predictability and linearity between input and outputs. Nevertheless, the assumptions no longer hold water in the modern fluctuating markets (Ramachandran et al., 2023; Iriani et al., 2024).

The first drawback is a lack of flexibility. Classical models are not reactive in real time; they are based mostly on the periodic revisions and human insights, and this may elicit a slow reaction to the market changes (Buber & Seven, 2025). In addition, they tend to be data-constrained and rely on historical data that can be out of date and do not reveal current circumstances or newly emerging risk (Alshurideh et al., 2024).

The second limitation is the inability of handling exhausting amounts of demorphologic data, including social media sentiment, real-time financial trends, or geopolitical processes. The normal models often demand well-organized and clean inputs and do not have the capability to autonomously learn based on emerging information (Sundaramurthy et al., 2022). Therefore, they tend to drop important weak signals, as well as not to recognize the early-warning trends that the AI systems could detect, based on their superior pattern recognition and machine learning.

Moreover, such models are not predictive and prescriptive in general. They can inform decision-makers on what happened and why, but rarely can they provide dynamic predictions nor practical courses of action using real-time data flows. This weakness is also a major deterrent to strategic foresight and proactive planning, particularly in a crisis or a disturbance (Alnajem et al., 2024; Sakova et al., 2025).

Lastly, traditional systems are usually biased and silo in their approaches, especially in the hierarchical organizations. The decision-making process is usually inefficient, unconstructive, and biased, which can lead to judgment errors and prevent interdepartmental collaboration (Xia, 2022; MAHABUB et al., 2025).

These drawbacks highlight the increasingly widespread need for adaptive AI-driven decision support systems, systems that could anticipate intricate data ecosystems, learn on-the-fly, and provide up-to-the-minute, tactical suggestions concerning vagueness and fluctuation.

1.2 The Emergence and Evolution of AI-Powered Decision Support Systems

The idea of decision support systems (DSS) has changed a lot during the last decades: It started as simple data-processing tools assisting in routine analysis, then became a highly sophisticated and capable system, entailing adaptive and predictive thinking powered by AI. The original DSS functioned with static algorithms that enabled sequential decision-making with the help of information about the past, and deterministic data. Though being effective under fairly stable settings, such systems failed in handling dynamic and complex business dynamics (Vudugula et al., 2023).

Combining artificial intelligence (AI) with DSS has become one of the breakthroughs in improving the functionality and strategic importance of the systems. The development of AI-DSS to a large extent is driven by the increasing arduousness, diversity, and Complexity of business data, and the need to generate real-time intuition and automatic flow of decisions (Sakova et al., 2025). Today, these systems apply machine learning, natural language processing and advanced analytics, allowing businesses to learn, identify patterns and keep improving their recommendations even amid uncertainty (Ramachandran et al., 2023; Singh et al., 2025).

Early AI-augmented DSS were small scoped-rule-based systems aimed to help a narrow area, typically finance, operations or logistic. Nevertheless, due to the exponentially increasing computational capacity, cloud computing, and big data environments,

the current AI-DSS can be comprehensive and integrative to aid in strategic, operational, and tactical decisions at the same time (Guruprasad et al., 2024). These systems now are not "supporting" decisions but are more and more becoming part of the decisions themselves with predictive capabilities and prescriptive capabilities that allow establishing what courses of action can be most ideally taken, with answers stated based on real-time data and scenario modeling (Subrahmanyam et al., 2024).

Furthermore, modern AI-DSS have become dynamic, that is, they can self-adapt according to new information and situations as they appear. The flexibility is essential in unpredictable business conditions where dynamics and vision should prevail (MAHABUB et al., 2025). As an example, companies using AI-DSS may react differently to disruptions in the supply chain, an emergency change of regulatory policy, or a surprise in consumer conduct, where the flexibility of response is beyond the capabilities of traditional systems (Funda & Francke, 2024).

1.3 Research Aim

The paper will attempt to understand how strategic business decisions can be improved with the aid of an adaptive AI-powered decision support system (AI-DSS) in an uncertain and volatile business environment. In particular, it examines how adaptive AI-DSS can subsequently help organizations not only analyze complex data, but likewise predict upcoming situations and introduce receptive measures that foster responsiveness, adaptability, and competitive edge. This paper aims to achieve the development of a conceptual grasp of AI-DSS as a groundbreaking AI tool that can be used to carry out a strategic foresight of sustainable enterprise functionality through a synthesis of existing literature and an application of this research.

1.4 Thesis Statement and Structure of the Article

The uncanny nature of doing business is reimagining the conventional elements of business strategy and decision-making in an era whereby market uncertainty is on the rise. In this paper, the author will demonstrate that decision support systems incorporating adaptive AI (AI-DSS) represent more than just a means of reconciling operational efficiency with but also the key means of achieving strategic agility, which enables organizations to succeed despite unpredictability due to foresight, responsiveness, and resilience. The paper reviews the current literature and models on the integration, use, and effect of adaptive AI-DSS in the business strategy development and outlines the framework for comprehending the same.

Table 1: Comparison of Traditional vs. Adaptive AI-Powered Decision-Making Models

Aspect	Traditional Decision-Making	Adaptive AI-DSS
Speed	Slow, manual processes	Real-time, automated analysis
Basis of Decision	Intuition, past experience	Data-driven, predictive algorithms
Response to Change	Static and reactive	Dynamic and proactive
Risk Assessment	Based on historical data and assumptions	Real-time simulations and scenario forecasting
Scalability	Limited to human capacity	Scales across departments and data streams
Human Involvement	High, centralized control	Augmented decision-making with human-AI collaboration
Transparency	Clear but limited analytics	Often opaque ("black-box") but explainable AI is evolving

2. Literature Review

Decision support systems (DSS) have seen a drastic shift in the last few decades, moving on a scale where a DSS used to be easy-to-use rule-based applications towards a complex AI-based decision-making support system. The origin of DSS dates back to the 1960s and 1970s when they were developed, serving mainly to guide managers through routine decisions based on structural data. They were the kind of systems where results depended on the permanent algorithms, past information and pre-determined logic. Although they worked well in unchanging and certain situations, they were not flexible enough in changing or unpredictable situations.

With the increased computing power and more data being created within organizations, the conventional DSS systems would incorporate the business intelligence (BI) features, whereby the user is able to create dashboards, graphical reports, and trend analyses. Nevertheless, such systems were still not able to learn or to change. They would tell a story of what took place but not anticipate what could take place or what should happen next.

The introduction of artificial intelligence (AI) became one of the turning points in the design and functioning of DSS. Through AI, decision systems could implement the processes of machine learning, natural language processing and predictive modelling to enable them to identify patterns, unstructured information and make future-oriented decisions (Prorok & Takács, 2024). Such AI-augmented systems would not just make recommendation decisions but might become dynamic in nature as they learned new information and alter outputs depending on the learning.

This shift in rule based DSS to adaptive AI-DSS has caused the sphere of decision systems to change in terms of shifting its importance over the need for rule-based systems, to a sense of strategic amplification. The current AI-enabled systems are able to work on the tremendous amounts of real-time data, model the future, and provide prescriptive suggestions that are

specifically relevant to the rapidly changing systems. With the development of these systems, businesses became even more agile, effectively represented reduced sources of risk, and were in a position to capture emerging opportunities more than ever (Sakova et al., 2025; MAHABUB et al., 2025).

2.1 The Use of Adaptive AI in Business Strategy

In an environment where the business environment changes as soon as you wake up the next morning, businesses cannot afford only the past data, they require systems that will learn, update and perform in real time. Here adaptive artificial intelligence (AI) becomes a very influential tool in the development of modern business strategy. In contrast to the standard systems that operate on certain logic, AI technologies adjust perpetually depending on each new piece of information and market variability (Sakova et al., 2025).

Adaptive AI is built on the principles of machine learning algorithms that enable the identification of patterns by systems and help improve the accuracy of decisions with time. With these algorithms, there is no need to reprogram them every time something goes wrong- they keep learning and correcting and doing this enables businesses to make quicker and wiser decisions. To take an example, an intelligent retailer environment can recognize an abrupt change in customer purchases and make inventory and pricing decisions virtually in the blink of an eye (Vudugula et al., 2023).

The introduction of another important feature is the real-time analysis. The conventional decision-making tools tend to be based on out-dated or fixed reports. Adaptive AI processes, on the contrary, take the live data feeds of sales to social media trends and turn them into workable insights. Such real-time responsiveness is particularly desirable in risk-prone or dynamically paced businesses where real-time reaction can spell the difference between missed gains or extraordinarily incurred losses (MAHABUB et al., 2025).

The strategic flexibility of adaptive AI is perhaps the most powerful thing about this AI. Such systems do not only give the answers, they accompany the whole process of decision-making. They give situations of comparison, simulated scenarios of possible results and advise the way forward in various circumstances. This allows companies to get ahead, rather than respond to molestation.

Besides, adaptive AI enables long-lasting agility. With such systems in place, businesses are more equipped to deal with crises, changes of consumer behaviour, or supply chain shocks. They are also able to make a more favorable shift in their strategies, invest more accurately and remain on track with their overall objectives throughout uncertain environments.

In other words, adaptive AI replaces the business strategy roadmap as something fixed with a dynamic GPS, which re-routes and recalculates in real time as new information becomes available. It also enables leaders to make smart decisions not only on what has already happened, but also by what might happen and as such it becomes a point of regular and strategic smart enterprise strategy.

In addition, adaptive AI promotes long-term flexibility. When companies use such systems, they are more ready to deal with emergencies, changes in consumer behavior, or disruptions to the supply chain. They are able to swing their approaches, deploy their resources better, and remain on track to their overall objectives even in ambiguous settings.

2.1.1 Strategic Foresight and Modeling Predictions

As businesses are finding themselves in an environment of uncertainty and fast change, strategic foresight has proved crucial to organizational resilience in the long- run. Predictive foresight tools enabled by AI, rather than reacting to what happened after it happened now enable forward-looking companies to plan more robust strategies, anticipate trends, and prepare in advance to avoid them or to instead take advantage of emerging conditions and developments (Alnajem et al., 2024).

Strategic foresight is the act of visualizing and analyzing the probable situations in the future and their impacts on the business. It is not only about planning in advance; it is making sense of the signals in the environment that are emerging and converting ambiguity into insight. Foresight is even more potent when it works with adaptive AI. Its systems can analyze huge and dissimilar datasets-such as global economic indicators, or even social media sentiment-and draw patterns that the human mind would not notice (Iriani et al., 2024). The insights help the decision-makers to notice what lies ahead even before the competitors do.

Predictive modeling is one of the significant parts of the process. Using the machine learning algorithms, AI can model hypothetical possibilities that could occur in future infinite times depending on the present information. As an example, a company may look at predictive models to project potential effects of the new policy or market change on demand, supply chain logistics and customer behavior. It enables the leaders to understand the strategic options that they have and how to compare and test them beforehand hence better equipped to address risks and opportunities as well (Alnajem et al., 2024).

Among the best sides of AI driven foresight is that it can assist in real time strategy revision. The markets are not as they were before where what is being done today may not be effective tomorrow. The historical methods of forecasting, which are developed primarily on past data, are not flexible to change with the current situation. Conversely, adaptive AI can make new predictions when presented with new information and keep a business on par with a continuously changing landscape (Iriani et al., 2024).

What is more, the AI- based foresight tools enable organizations to deal with risk better. Rather than being caught unprepared by such unforeseen events as failures of a supply chain, regulatory shifts, or technological surprises, businesses can create early detection systems of potential problems before they become serious. Such hollowed out thinking provides a strategic advantage to companies so they can divert resources, reengineer operations or change marketing approaches before loss is incurred.

2.2 Gaps in Current Practice

Although the integration of adaptive AI-powered decision support systems into the business strategy can provide a range of benefits, it is important to note that this area is fraught with many important gaps and limitations that undermine its overall adoption on a large scale and in the most effective capacity. These issues are not just technical, but the ethical risks, the readiness of the organization to these changes and the human aspect of AI integration have to be mentioned.

Algorithmic bias is one of the most burning issues. The AI learns based on data and when such data comprises historical biases or inaccuracies there are high chances that it might even be more biased in decision-making than the AI might have become (Xia, 2022). As an illustration, biased training data may result in fraudulent credit scoring, discriminating hiring, or unequal resource allocation which would harm the image and legal position of a company. AI systems may also act as black boxes, where it is hard to check which decisions were arrived at and whether they were fair or not, because of the inability to hold the decision-makers accountable, as in the case with human beings.

Ethical transparency, another key gap, is also there. People implement AI types of tools in many organizations, not realizing how they work and the ethical consequences of automating significant decisions. Such questions concerning privacy, consent, accountability, and human control towards data are not always answered (Singh et al., 2025). In the absence of transparent ethical principles and AI responsible governance, companies expose themselves to the threat of poor decision-making, as well as the loss of trust of stakeholders, customers, and regulators.

A serious barrier is implementation issues, as well. Although large companies might have the technical background and the required capacity to implement the adaptive AI system, there is a problem of cost, technical sophistication, and the possible burden on the existing working processes among many smaller and medium-sized businesses (SMEs), particularly developing markets (Xia, 2022). Even after implementing AI tools, business tends to neglect their alignment with strategic objectives, which undermines their performance and resources.

2.3 Lapses in practice nowadays

Although adaptive artificial intelligence-based decision support systems have considerable potential in terms of strategic business management, there exist critical gaps and limitations that do not allow the practical application of the concept of such systems in a vast majority of cases. They are not technical alone, they are ethical risks, organizational readiness and human factors to AI integration as well.

Algorithmic bias appears to be one of the most burning issues. The systems that employ AI learn using data, and when there are biases or inaccuracies in the past data therefore, the AI system may even enhance these biases in its operations unknowingly (Xia, 2022). To illustrate the point, biased training data may cause unfair credit scoring, discriminatory hiring practice, or unequal distribution which can ruin the standing and reputation of a company in a court. In contrast to its human counterparts, AI systems are prone to becoming black boxes where decisions could not be traced back and whether those decisions were ethical or not, it was a chance game.

Ethical transparency is the other key gap. A lot of organizations are implementing AI technologies without appropriate knowledge on their functionality and the ethical concerns of using a machine to make important decisions. The privacy of data, patient consent, responsibility, and human supervision are other issues that remain unanswered (Singh et al., 2025). Lacking straightforward on ethical principles and AI governance structures, a company will risk not only making erroneous decisions but also losing the trust of stakeholders, customers, and authorities.

Implementation issues pose a great obstacle as well. Although a large-scale company might possess the technical infrastructure and the personnel skills to implement adaptive AI systems, most small and medium-sized businesses (SMEs) in both developed and developing markets cannot afford it and find it too difficult technically, with many encountering integration issues on current systems (Xia, 2022). In cases where businesses switch to the use of AI tools, the tools are not usually aligned with the company's strategy, causing poor performance and the wastage of resources.

3. Methodology

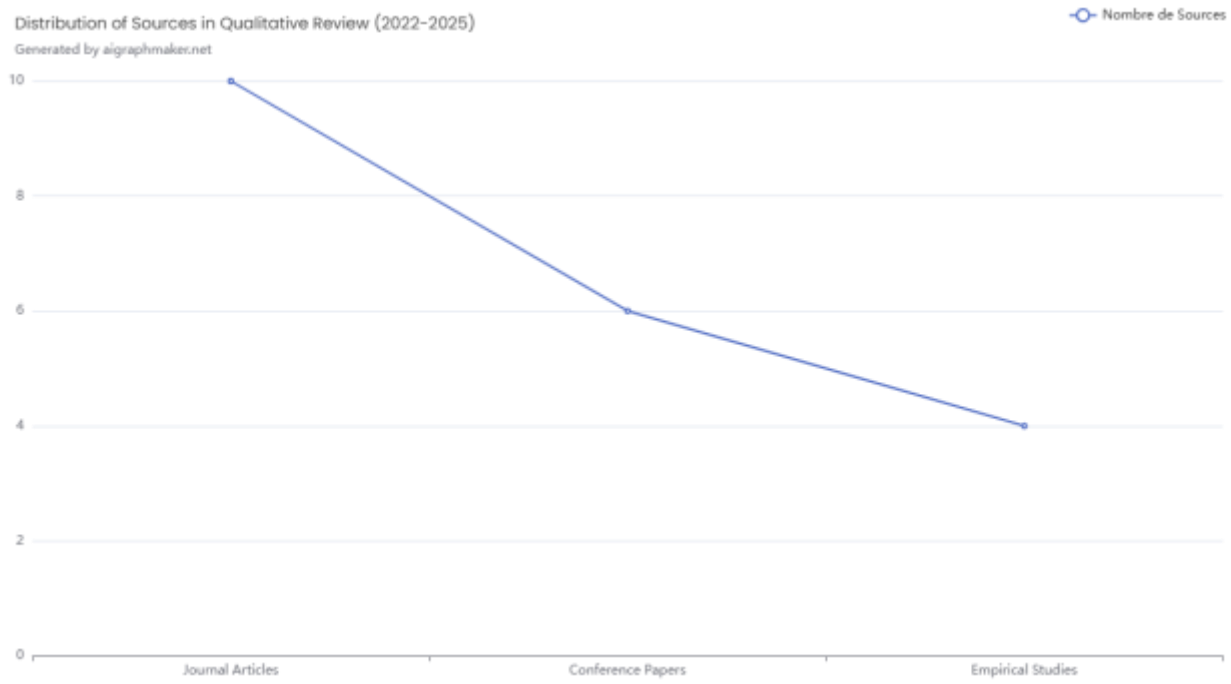
The qualitative review process of this research is based on a mixture of the case study synthesis and comparative model analysis elements adoption. It will aim at addressing the extent to which adaptive AI-driven decision support systems (AI-DSS) are driving strategic business decision-making in the uncertain market environment based on insights received in literature, industry briefs, and practical case studies.

Since strategic intelligence by means of AI is an evolving concept, a qualitative method is suitable insofar as complex themes like adaptability, foresight and organizational behavior, which are not easily quantified along a few parameters of quantitative information, are concerned. Such an approach can result in an effective study of the functions, uses and restrictions of AI-DSS in various industries and geographical environments.

Primary research and secondary sources of data are also taken into consideration to some degree; however, the given research can be characterized by the overreliance on secondary research based on 20 peer-reviewed articles and conference proceedings published in 2022-2025. The choice of these sources was made according to their relevance to the topics of AI, strategic management, foresight, and business adaptability. It was done with the help of thematic analysis by identifying the recurrent trends and revelations and classifying them into the major categories, including system evolution, business value, and implementation gaps, and ethical concerns.

Also, the methodology includes the comparative analysis of AI-DSS models presented in the chosen studies, their composition, flexibility, and decision-making influence. Mini case examples are pulled off the literature in certain situations to demonstrate how the knowledge can be applied in real life settings such as the sectors of finance, ICT and SMEs.

Chart: the below chart illustrate the Distribution of Sources in Qualitative Review (2022- 2025)



3.1 Simplified and Visualized Data Sources (Simplified and Visualized Data Sources (Simplified and Visualized Data Sources

It is conducted on the basis of the critical evaluation of 20 scholarly and scientific articles that present an abundance of information on how adaptive AI-based decision support systems are redefining strategic business decision-making in uncertain markets.

To have a balanced and credible coverage there was a division of sources into three broad categories:

- **10 Journal Articles**

These are reviewed publications that present theoretical theories, case studies and general reviews on AI as a business strategy. They are the primary pillar of the research offering quality academic source.

- **Conference Papers (6 sources)**

Recent developments, models, and experimental results were collected through the papers of international meetings (e. g. IEEE and AIP). These are the newest trends and advancements in the systems using AI.

- **4 sources: Empirical Studies (4 sources)**

They are case-based studies in the real world, which demonstrate the employment and experience of AI decision systems by the business particularly by SMEs and technology companies. They provide effective confirmation and background.

3.2 Rationale of the research approach

This decision of qualitative review method is satisfactorily indicated due to the context-and-evolving and complex aspect of adaptive AI-powered decision support systems (AI-DSS). Instead of viewing such systems as tools, they are really dynamic structures that include machine learning, real-time analytics, and strategic modeling, all of which cannot be easily quantified in a purely statistical or experimental design.

To begin with, AI-DSS is an emergent field and there is a lot of trial and error in existence and hence a lot of models and frameworks are in development and improvement. Qualitative methodologies enable the research to extract conceptual depth and technological variety, both of which are necessary in the context of research that examines systems that differ greatly with regard to industry (Vudugula et al., 2023), use case and geographical locations (Vudugula et al., 2023).

Second, AI-DSS is associated with multi-dimensional decision making processes- it is a combination of technical design, organization behavior, ethical issues as well as strategic considerations and foresight. These are in nature, complex and are best researched by descriptive, thematic analysis but not numerical figures. With the help of a survey of the available academic information, insights identified during the conference, as well as some empirical case reports, the research can discover the subtler images of how AI-DSS are used and, in fact, operate in various business settings (Prorok & Takács, 2024).

4. Results

The review of 20 scholarly papers identified a few common trends related to the evolutions in adaptive AI-powered decision support systems (AI-DSS) and their ability to influence strategic business management dealing with precarious market situations. These revelations produce the magnitude of the rising power, possibilities, and constraints of these technologies in various corporations.

4.1. Change of Static to Adaptive Decision-Making

Most sources focus on abandoning the old models of decision-making based on the rules in favor of new, more adaptive, and flexible models incorporating AI. Firms are no longer using AI to analyse past information, but functioning as a method of learning on actual-time inputs and altering the plans promptly (Prorok & Takacs, 2024; Sakova et al., 2025). The latter is particularly significant in markets that change and run rapidly which requires agility.

4.2 AI-DSS Pimps Strategic Foresight

All the assessed research expresses the same idea that AI-DSS reinforces the capability of anticipating future events, simulating alternative situations, and making proactive decisions in an organization (Alnajem et al., 2024). Both capabilities of predictive modeling and forecasting were consistently mentioned as the key strengths of adaptive AI (Subrahmanyam et al., 2024; Carayannis et al., 2025).

4.3. It is a Competitive Advantage to Bridge the Real-Time Responsiveness Gap

The first evident trend is that firms adopting AI-DSS to make real-time decisions and analyses are in a better position to act more promptly to disruptions, whether the supply chain, market volatility, or shifts in customer behavior (Vudugula et al., 2023). There was a connection between real-time responsiveness and higher operational resilience as well as more solid strategic positioning (Sundaramurthy et al., 2022).

4.4 Implementation Inhibitors abide

Regardless of the advantages, high-costs, insufficient knowledge, ethical issues and integration problems were regularly observed as common drop-downs of the receptive of the AI-DSS in many researches (Xia, 2022; Singh et al., 2025). To a certain extent, especially regarding small and medium-sized enterprises (SMEs), implementation has proved to be a challenge because of insufficient resources and infrastructure (Funda & Francke, 2024).

Figure: The below diagram Describe the AI-DSS in strategic Business Management

5. Discussion:

5.1 Findings Dependencies in the Strategic Management Context :

The evidence of the research implies that adaptive AI-powered Decision Support Systems (AI-DSS) are not mere technical devices but a paradigm change in strategic management. Due to the rising uncertain and volatile markets, time, data, and flexible decision-making capabilities have become an increasingly important source of competitive advantage. Adaptive AI-DSS meets this need by improving the decision making process, risk management process, as well as the allocation of resources.

- Strategy, Agility, and Intelligence The same approach should be applied to strategy and agility and intelligence. Alignment in the context of strategy refers to the alignment of different aspects of strategy, e.g., different strategy parts. Strategy Strategy is often discussed in the context of strategy formulation or strategy implementation. Strategy formulation Strategy formulation is the definition of strategy. Strategy formulation is closely related to strategic planning. Strategic planning Strategic planning is a planning process that offers a strategic view of the future.

The traditional strategic management tended to be long-term-planning relative in which assumptions were relatively stable. But that is no longer true in contemporary rapidly changing conditions where plans are soon outdated. Adaptive AI-DSS enables businesses to shift their strategy to a dynamic one and make adjustments in real-time according to the changing customer behavior, supply chain indicators, or geopolitical shocks.

It is consistent with the increasing interest in strategic management in the area of being flexible, life-long learners and resilient. AI-DSS does not only facilitate decision-making; it increases strategic flexibility, which ensures organizations are proactive, but not reactive.

5.2 The Facilitation of Evidence-Based Leadership

Making strategic decisions were highly reliant on the intuition or the experience that was previously gained. Although leadership wisdom is useful, increasing complexity in global business means that the decision-making process must be evidence based. With a predictive ability, scenario simulations, and forecasting trends, the adaptive AI systems will enable the leaders to make the strategy less biased and more accurate.

This consolidates the strategic aspect of data in making direction, particularly in a situation that has found difficult to tolerate uncertainty, complexity and ambiguity (Iriani et al., 2024). AI allows translating strategic vision into operational reality and establishing a smarter decision culture at all levels of management.

5.3 Thinkering Risk as a Strategic asset

Risk has always been regarded as a matter to avoid or minimize. But through adaptive AI-DSS organizations are able to forecast and they are able to plan against risk better. This enables them to be able to make judicious risks and exploit uncertainty, and transform these supposed threats into opportunities.

Example: Coming into a new market or modifying product line at a faster time than others: Firms utilizing AI to monitor market volatility or policy modifications possess the ability to gain entry to a new market or alter the product line quicker than competitors (Alnajem et al., 2024). This makes risk a strategic input- not an entirely risk that needs to be mitigated.

5.4 Reforming the Resources Strategy and Operation Perspective

Strategic management also involves the determination of the location and mode of allocation of the resources. With adaptive AI-DSS, it will be possible to predict more accurately what resources are needed and this will help companies not to over-invest, minimize inefficiencies and swiftly react to changes in demand.

This transforms the traditional budgeting and planning schemes in that data driven, real-time forecasting is incorporated. It establishes more nimble operational schemes that are able to change with strategic ambitions at hand, particularly suited to supply chain, financial and HR planning (Sundaramurthy et al., 2022).

Table 2: Strategic Benefits of AI-DSS Across Different Regions

Region	Key Use Cases	Primary Benefit
Developed Markets	Portfolio optimization, precision logistics, smart cities	Competitive advantage through efficiency
Emerging Markets	SME growth, agri-fintech, public infrastructure planning	Operational leapfrogging and digital inclusion
Global Enterprises	Multi-market risk forecasting, global supply chain AI	Resilience and integrated strategy

5.5 Strategic Implications: Igniting Agility, Resilience and Innovation

Decision Support Systems powered with Adaptive Artificial Intelligence (AI-DSS) are not optimizing decisions- they are transforming the way enterprises operate to their very core. Their implementation reflects the ultimate change in the behavior of the organization, the state of mind, and ability. The fact that AI-DSS has wide-ranging strategic implications well beyond efficiency overlaps with the core of enterprise agility, resilience, and innovation.

5.6 Comparative analysis: Geographical and Industry advantages of Adaptive AI-DSS

Depending on industry conditions and geographic positions, the strategic value of adaptive AI-DSS is different. Although all the core benefits like speed in decision-making, reduction of risks, and predictive information are widespread, the way that such benefits appear varies greatly depending on the requirements of a particular sector, and the current technological maturity of a given region.

5.7 Comparative Insights: The Outreach of AI-DSS on Various Industries and Regions

The strength of adaptive AI-DSS is experienced in industries and on continents, but its application and usefulness differ significantly. The payoffs can be as different in advanced economies, emerging markets, and in finance or manufacturing as they are locally dependent, digitally determined, and dependent on strategic aspirations.

5.7 Developed Markets: Making them mist-free and Competitive

The use of AI-DSS can usually be found in an already developed market such as the U.S., Western Europe, or Japan, and is an attempt to tune complex systems and support large-scale data management and competitive edge/competitiveness. These markets do not lack a good digital backbone, and what is important is:

- Automated instant decision-making in the financial, medical and supply systems.
- System enhancements in diagnosis/therapy/treatment, services, and retail.
- Global operation intelligence.

5.8 The Emergent Markets: A Growth of Leapfrogging Operations

On the contrary, companies in emerging economies, like Nigeria, India, or Indonesia, are opting out of AI-DSS as a means to address their structural issues: the lack of resources, market volatility, and massive growth. These systems are beneficial in assisting:

- Smart automation in agricultural processes is the solution to fill in talent and data gaps,
- Do smarter planning with MSMEs (micro, small and medium enterprises),
- Enhance the availability of financial services, agricultural forecasting and infrastructure management.

5.9 Constraints of AI Adoption: Tragedies of the Propositions

Even though adaptive Artificial Intelligence-driven Decision Support Systems have revolutionary potential, their effective use does not come free of challenges. Three putative limitations constantly appear across the industries and regions, and they are trust, data quality, and technological infrastructure. These are factors that usually make or break the definition of AI as a game-changer or as a technical experiment.

6. Conclusion

The time of volatility, disruption, and dynamics of technological changes is long gone; nowadays, the ideas of stabilized systematic approaches to strategic decision-making are insufficient. This paper has shown how adaptive AI-driven Decision Support Systems (AI-DSS) are increasingly becoming less means-oriented-but strategic allies in the process of navigating uncertainty.

Naturally, the main idea behind adaptive AI-DSS is that it reframe the uncertainty as passable terrain. They become aware of changes in the environment in real-time, they are constantly learning based on data, and they are dynamically suggesting the outcomes that enable the business to react to changing circumstances present and correct. In the developed economies which have streamlined and maximised their intricate systems, or in the emerging economies which have leapfrogged through infrastructure constraints, AI-DSS is demonstrating itself to be a powerful source of transformations. In order to properly incorporate adaptive AI-DSS in strategic business management, one has more than technology to offer: a defined, but not rigid, roadmap is what organizations require. The A.D.A.P.T. Framework provides an action plan, that allows the deployment of AI-DSS in different business sectors and at different maturity levels.

Adaptive AI-DSS adoption offers huge potential but it is only possible when several stakeholders work together. The following action plans identified by each group can be taken to see to it that AI-DSS becomes a strategic enabler rather than a technical feature.

Funding: This research received no external funding
Conflicts of Interest: The author declare no conflict of interest.
Publisher's Note: All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers

References

[1] Ahmed, F., Ahmed, M. R., Kabir, M. A., & Islam, M. M. (2025). Revolutionizing Business Analytics: The Impact of Artificial Intelligence and Machine Learning. *American Journal of Advanced Technology and Engineering Solutions*, *1*(01), 147-173. https://doi.org/10.63125/f7yjxw69

[2] Alnajem, A. A. Q. I., Ibrahim, A., Abdulrahman, M. M., Al-Kubaisi, A. A. A., Tawfeq, J. F., Khishe, M., & Saeed, A. (2024, December). AI-Driven Strategic Foresight: Anticipating Future Trends and Modelling Business Strategies. In *2024 International Conference on Decision Aid Sciences and Applications (DASA)* (pp. 1-6). IEEE. https://doi.org/10.1109/DASA63652.2024.10836619

[3] Alshurideh, M. T., Zakarneh, B., Hamadneh, S., Ahmed, G., Paramaiah, C., & Alzoubi, H. M. (2024, February). Artificial intelligence in identifying market opportunities: Revolutionizing entrepreneurial strategy and innovation. In *2024 2nd International Conference on Cyber Resilience (ICCR)* (pp. 1-6). IEEE. https://doi.org/10.1109/ICCR61006.2024.10532918

[4] Büber, H., & Seven, E. (2025). Strategic Decision-Making in the AI Era: An Integrated Approach Classical, Adaptive, Resource-Based, and Processual Views. *International Journal of Management and Administration*, *9*(17), 67-97. https://doi.org/10.29064/ijma.1637935

[5] Carayannis, E. G., Dumitrescu, R., Falkowski, T., Papamichail, G., & Zota, N. R. (2025). Enhancing SME Resilience through Artificial Intelligence and Strategic Foresight: A Framework for Sustainable Competitiveness. *Technology in Society*, 102835. https://doi.org/10.1016/j.techsoc.2025.102835

[6] Funda, V., & Francke, E. (2024). Artificial intelligence-powered decision support system for operational decision-making in the ICT department of a selected African university. *African Journal of Science, Technology, Innovation and Development*, *16*(5), 689-701. https://doi.org/10.1080/20421338.2024.2376916

[7] Guruprasad, R., Abood, B. S. Z., Al-Khalidi, A., Abdulhasan, M. M., Thomas, S., & Naqvi, S. R. (2024, May). Corporate Agility and AI: Enhancing Adaptive Strategies for a Dynamic Technological Landscape. In *2024 4th International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE)* (pp. 1090-1094). IEEE. https://doi.org/10.1109/ICACITE60783.2024.10617073

[8] Hossain, K. S., Kabir, J. U. Z., Shakil, F. I., Joy, M. I. K., & Nabil, A. R. (2025). Implementing Explainable AI for Early Detection of Chronic Kidney Disease: Strategic Insights for Health Information Systems Management. *Journal of Computer Science and Technology Studies*, 7(5), 140-153. https://doi.org/10.32996/jcsts.2025.7.5.19

[9] Iriani, N., Agustianti, A., Sucianti, R., Rahman, A., & Putera, W. (2024). Understanding Risk and Uncertainty Management: A Qualitative Inquiry into Developing Business Strategies Amidst Global Economic Shifts, Government Policies, and Market Volatility. *Golden Ratio of Finance Management*, *4*(2), 62-77. https://doi.org/10.52970/grfm.v4i2.444

[10] Jamalpur, B., Sarkar, P., Krishna, M. H., Lourens, M., Lakshmi, K. S., & Singh, N. (2024, May). Strategic Decision Making in the AI Age: Examining Neural Network Models in Business Management. In *2024 International Conference on Communication, Computer Sciences and Engineering (IC3SE)* (pp. 1496-1501). IEEE. https://doi.org/10.1109/IC3SE62002.2024.10593321

[11] Kabir, J. U. Z., Nabil, A. R., & Ahmed, R. (2025). Developing AI-Powered Chatbots for Mental Health Support in Rural America. *Journal of Computer Science and Technology Studies*,7(2), 23-35. https://doi.org/10.32996/jcsts.2025.7.2.3

[12] Khan, Z., & Ambadekar, S. (2024, June). AI-Powered Collective Decision-Making Systems and the Future Trends. In *2024 15th International Conference on Computing Communication and Networking Technologies (ICCCNT)* (pp. 1-10). IEEE. https://doi.org/10.1109/ICCCNT61001.2024.10725853

[13] MAHABUB, S., Hossain, M. R., & Snigdha, E. Z. (2025). Data-Driven Decision-Making and Strategic Leadership: AI-Powered Business Operations for Competitive Advantage and Sustainable Growth. *Journal of Computer Science and Technology Studies*, *7*(1), 326-336. https://doi.org/10.32996/jcsts.2025.7.1.24

[14] Nabil, A. R., Sultan, M., Amin, M. R., Akther, M. N., & Rayhan, R. U. (2025). Ethical and Legal Considerations of AI in IT Project Management: Addressing AI Biases, Data Privacy, and Governance. *Journal of Computer Science and Technology Studies, 7*(2), 102-113. https://doi.org/10.32996/jcsts.2025.7.2.9

[15] Ponnuviji, N. P., Murugan, P., Esakkiammal, S., Kumar, S., Vishal, K. S., & Meenakshi, S. (2024, March). AI-Powered Business Intelligence for Transforming Finance and Education. In *2024 2nd International Conference on Disruptive Technologies (ICDT)* (pp. 1287-1291). IEEE. https://doi.org/10.1109/ICDT61202.2024.10489124

[16] Prorok, M., & Takács, I. (2024, May). The Impacts of Artificial Intelligence and Knowledge-Based Systems on Corporate Decision Support. In *2024 IEEE 18th International Symposium on Applied Computational Intelligence and Informatics (SACI)* (pp. 000065-000070). IEEE. https://doi.org/10.1109/SACI60582.2024.10619820

[17] Ramachandran, K. K., Semwal, A., Singh, S. P., Al-Hilali, A. A., & Alazzam, M. B. (2023, May). AI-powered decision making in management: a review and future directions. In *2023 3rd International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE)* (pp. 82-86). IEEE. https://doi.org/10.1109/ICACITE57410.2023.10182386

[18] Sakova, M., Rahayu, A., Wibowo, L. A., & Dirgantari, P. D. (2025). AI-Powered Decision Support Systems for MSMEs Growth Strategies in Emerging Markets. *International Journal of Artificial Intelligence Research*, *8*(1.1). https://doi.org/10.29099/ijair.v8i1.1.1366

[19] Singh, K. B., Aggarwal, N., & Devbrath, D. (2025, January). Revolutionizing financial analysis and decision-making with AI-powered insights. In *AIP Conference Proceedings* (Vol. 3253, No. 1). AIP Publishing. https://doi.org/10.1063/5.0248356

[20] Subrahmanyam, S., Azoury, N., & Sarkis, N. (2024, May). AI and Business Planning: Revolutionizing Forecasting and Resource Allocation. In *2024 International Conference on Advances in Computing, Communication and Applied Informatics (ACCAI)* (pp. 1-6). IEEE. https://doi.org/10.1109/ACCAI61061.2024.10601728

[21] Sundaramurthy, S. K., Ravichandran, N., Inaganti, A. C., & Muppalaneni, R. (2022). AI-powered operational resilience: Building secure, scalable, and intelligent enterprises. *Artificial Intelligence and Machine Learning Review*, *3*(1), 1-10. https://doi.org/10.69987/

[22] Vivian, M., Ashrafur, R. N., Tusher, M. T., Akther, M. N., & Rayhan, R. U. (2025). Ethical Implications Of AI-Powered Predictive Policing: Balancing Public Safety With Privacy Concerns. *Innovatech Engineering Journal*, 2(01), 47-58 https://doi.org/10.70937/itej.v2i01.54

[23] Vudugula, S., Chebrolu, S. K., Bhuiyan, M., & Rozony, F. Z. (2023). Integrating artificial intelligence in strategic business decision-making: A systematic review of predictive models. *International Journal of Scientific Interdisciplinary Research*, *4*(1), 01-26. https://doi.org/10.63125/s5skge53

[24] Xia, L. (2022). Group decision making under uncertain preferences: powered by AI, empowered by AI. *Annals of the New York Academy of Sciences*, *1511*(1), 22-39. https://doi.org/10.1111/nyas.14734