ISSN: 4387 - 5468
Volume 11, Number 2, 2026
American Journal of Entrepreneurship, Economics and Management

SMART DATA MANAGEMENT AND DECISION-MAKING EFFICIENCY OF AIRLINE OPERATORS IN RIVERS STATE

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ABSTRACT

The study investigated the relationship between smart data management and decision-making efficiency of airline operators in Rivers State. The objective of the study was to empirically determine the relationship between smart data management and decision-making efficiency of airline operators in Rivers State, especially in terms of operational response time and resource utilization effectiveness. The study made use of cross-sectional explanatory survey research design. The population of the study consisted of eleven (11) airline operators in Rivers State. The entire population of eleven (11) airline operators in Rivers State were used for the study without sampling. Therefore, the sample size of the study comprised eleven (11) airline operators in Rivers State. As pertaining to respondents, six managers (airline operations manager, fleet manager, crew manager, safety manager, and finance manager customer service manager) were chosen from each of the airline operators, which gave a total of 66 respondents. Structured questionnaire was used as instrument for data collection. The validation of the instrument was done by some experts in Office and Information Management, Ignatius Ajuru University of Education, Port Harcourt. Cronbach Alpha was used to ascertain the reliability of the instrument. A total of sixty-six (66) copies of the questionnaire was administered and 58 copies were retrieved. The primary data obtained from the field were analyzed using Pearson Product Moment Correlation in SPSS version 27.0 for the bivariate analysis. The result of the analyses showed that there is a very strong positive relationship between smart data management and decision-making effectiveness of airline operators in Rivers State, especially in terms of operational response time and resource utilization effectiveness. The study concluded that airline operators that fail to adopt smart data management risk being left behind, as efficiency in decision-making has become the new currency for survival and growth. It was recommended, among others, that airline operators should deploy centralized smart data platforms that integrate real-time data from operations, customer service, and logistics to support faster and evidence-based decisions, thereby reducing delays and in efficiencies.

Keywords: Smart Data Management, Decision-Making Efficiency, Operational Response Time, Resource Utilization Effectiveness.

Background to the Study

Airline operations decision-making is not an administrative routine but a high stakes game, which determines efficiency, safety and competitiveness in an industry where millions are decided by minutes. Decision-making efficiency has been defined as the capacity of companies to make proper, timely and resource-optimal decisions that can improve operational results (Ertuğrul and Ozdarak, 2025). When applied to airline operators, this efficiency is spread to aspects like flight scheduling, resource use, and service provision where delays or poor decisions can soon result in reputational and financial losses (Tonye et al., 2025). Nevertheless, irrespective of its significance, most airline operators in Rivers State are still struggling with the issue of poor decision-making processes, which is reflected in a slow response time, poor coordination of the staff, and poor operational performance (Iroanwusi, 2025). It is against this backdrop that smart data management is a critical enabler,

which promises to improve efficiency of decision-making by converting raw data into action-able information to improve operational reactions and better use of limited resources.

Based on this, the concept of smart data management can be defined as the strategic management, integration, and analysis of structured and unstructured data to inform decision-making and operational efficiency (Sharma, 2024). The concept of smart data management focuses on relevance, timeliness and actionable insights as opposed to high volume as traditional big data methods (Pfirsching, 2024). Smart data management is used to provide real-time analytics to optimize routes, predictive maintenance, passenger flow management, and risk mitigation, where precision and flexibility are crucial in airline operations (Gonzalo, 2025). It has been demonstrated that data-driven systems have enhanced agility and performance of organizations in areas of critical real-time response, such as transport and logistics (Osman et al., 2022; Gustafsson and Östlund, 2024). To airline operators working in Rivers State, the integration of smart data management into their business model may be the difference between responsive and proactive crisis management and the deployment of decisions that are in line with the international aviation standards.

Although there has been an increase in research on the topic of data-driven decision-making, the number of studies that specifically examine the relationship between smart data management and decision-making efficiency among airline operators in the Nigerian context (specifically, in Rivers State) is still minimal. The related constructs that have been studied previously are the adoption of technology in civil aviation (Opuala-Charles, 2025), the use of big data in operational outcomes (Gonzalo, 2025; Torre et al., 2022), and the strategy of flight dispatch in the performance improvement (Tonye et al., 2025). Although these contributions are meritorious, they do not go to the crossroad of smart data management and key decision-making performance like in operational response time and effectiveness of resource utilization, which are core to the airline competitiveness. This paper thus breaks the already established precedence by considering the relationship between smart data management and decision-making efficiency of airline operators in Rivers State. The study has bridged this gap by offering new perspectives on how airlines can use smart data practices to make their decision-making processes more robust, minimize inefficiencies, and address the international aviation standards.

Statement of Problem

Poor decision-making efficiency remains a major concern to airline operators in Rivers State as evidenced by lagging responsiveness to operations, low resource utilization efficiency, and unstable service delivery to customers that undermine their competitiveness and customer satisfaction. These issues exist despite the fact that timely and accurate decisions are strategically important in the aviation industry where even small inefficiencies will transform into large losses in both operational and financial terms (Tonye et al., 2025). It has been indicated that poor clarity of roles and use of outdated practices are contributing factors to the inefficiency of the local airline operations (Iroanwusi, 2025), and the low rate of the adoption of the modern digital practices only exacerbates the issue (Opuala-Charles, 2025). It is against this background that smart data management, which focuses on converting raw data into meaningful and actionable insights has a high potential of mitigating these inefficiencies through improved operational response time and resource utilization effectiveness. It is against this backdrop that the current study is required, which aims at exploring how smart data management can be used as a tool to address the decision making dilemma of airline operators in Rivers State.

Also, another concern spurs this study, and it is the seeming dearth of empirical evidence on the relationship between smart data management and decision-making efficiency of airline operators in Rivers State. By way of evidence, study such as Gonzalo (2025) carried out a systematic review of big data analytics in aviation operations and decision-making. Iroanwusi (2025) studied the role clarification and employee adaptive performance in airline operators in Rivers State. Similarly, Opuala-Charles (2025) investigated the relationship between technology adoption and digital

transformation of Nigerian Civil Aviation Authority (Moderating strategic orientation).And also, Gustafsson and Östlund (2024) studied managing data-driven decision-making: Managerial practices: A qualitative multiple case study about managerial practices when utilizing data-driven decisions. From these studied, it is very obvious that none of these studies investigatedthe relationship between smart data management and decision-making efficiency of airline operators in Rivers State. Here lies the gap the study intends to close, which gives it essence.

Conceptual Framework

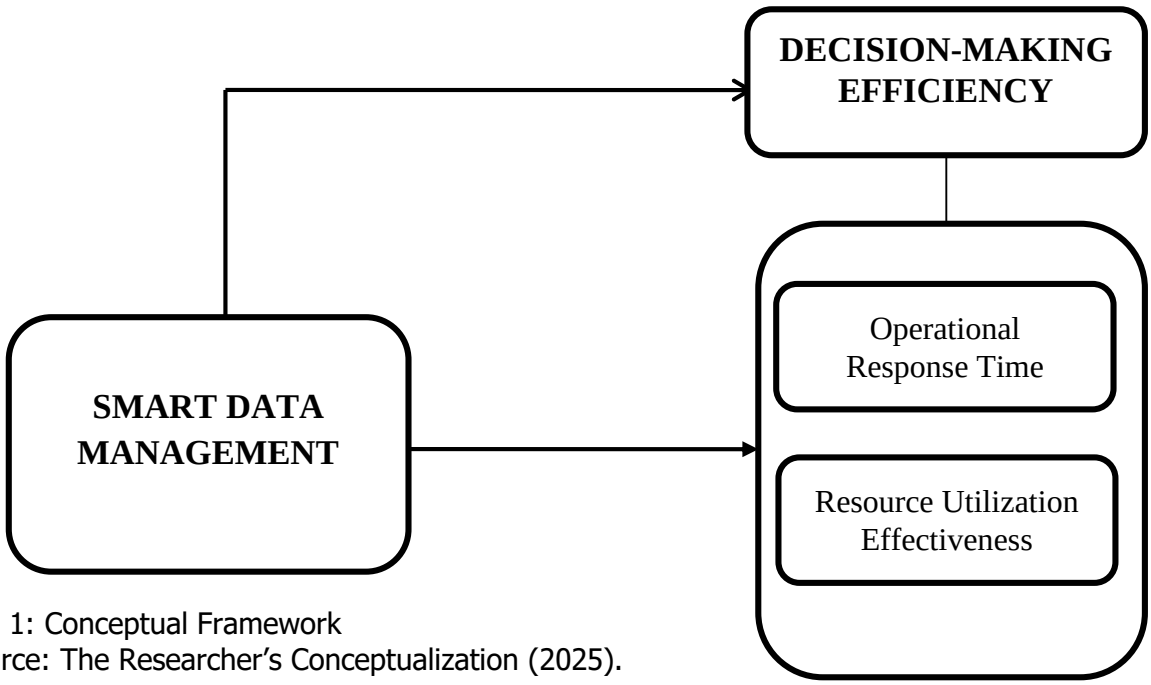

Fig. 1: Conceptual Framework
Source: The Researcher's Conceptualization (2025).

Aim and Objectives

The aim of the study was to investigate the relationship between smart data management and decision-making efficiency of airline operators in Rivers State. The objectives of the study were to:

1. examine the relationship between smart data management and operational response time of airline operators in Rivers State;
2. ascertain the relationship between smart data management and resource utilization effectiveness of airline operators in Rivers State.

Research Hypotheses

Based on the objectives above, the research hypotheses below were tested at 0.05 level of significance:

Ho_1: There is no significant relationship between smart data management and operational response time of airline operators in Rivers State.

Ho_2: There is no significant relationship between smart data management and resource utilization effectiveness of airline operators in Rivers State.

Theoretical Foundation

Resource-Based View (RBV) Theory

This study is anchored on Resource-Based View (RBV) Theory. The Resource-Based View (RBV) theory, originally posited by Barney (1991), argues that organizations gain and sustain competitive advantage when they possess and effectively utilize resources that are valuable, rare, inimitable, and non-substitutable (VRIN). This perspective emphasizes that internal resources, such as human

capital, technological systems, and knowledge management, are more critical to long-term success than external factors. Within the context of smart data management, Resource-Based View provides a useful framework because effective use of data as a strategic resource can significantly enhance decision-making efficiency and provide firms with a competitive edge (Barney, 1991; Wernerfelt, 1984). The theory assumes that:

i. resources are heterogeneously distributed across organizations;
ii. these resources are not perfectly mobile (meaning they cannot be easily transferred or replicated across firms), and
iii. firms with unique combinations of strategic resources can achieve sustained superior performance.

Implication/Justification of Resource-Based View Theory to the Study

The Resource-Based View (RBV) theory is highly relevant to the study on Smart Data Management and Decision-Making Efficiency of Airline Operators in Rivers State because it highlights how organizational resources, particularly data and technological capabilities, can serve as strategic assets that drive superior performance. In the context of airlines, smart data management represents a unique and valuable resource that, when effectively harnessed, enhances operational decision-making, improves resource allocation, and ensures timely responses to complex challenges such as scheduling, customer service, and safety operations. By applying RBV, the study is justified as it explains how data, when transformed into smart, actionable insights, becomes a rare and inimitable capability that fosters decision-making efficiency and provides competitive advantage in the airline industry (Barney, 1991; Peteraf, 1993; Grant, 1996). Thus, the theory underscores the importance of viewing smart data management not merely as an IT function but as a core strategic resource that aligns directly with organizational success.

Conceptual Review

The Concept of Smart Data Management

The term "smart data management" describes the application of cutting edge tools and techniques to manage, process, and use data more securely and effectively (Sharma, 2024). It includes a variety of procedures intended to maximize the value of data for operational effectiveness and decision making while guaranteeing that it is correct, available, and secure. Smart data management, as stressed by Deloitte (2022), uses automation, artificial intelligence (AI), and analytics to improve and expedite data operations, in contrast to traditional data management, which frequently depends on human process methods. As buttressed by Sharma (2024), the key principles of smart data management include:

Data Quality: It is essential to guarantee the correctness, consistency, and completeness of data. In order to reduce errors and increase reliability, smart data management uses automated technologies to validate data and identify abnormalities.

Data Governance: Determining guidelines and practices for data asset management. Good data governance makes sure that rules and guidelines are followed, and astute data management solutions make it easier to enforce these guidelines.

Data Accessibility: Making sure that, when needed, authorized people can easily access data. Utilizing technologies like data virtualization and cloud storage, smart data management offers secure access without sacrificing functionality.

Data Integration: Creating a single, cohesive perspective by combining data from several sources. Intelligent data management systems provide a comprehensive picture that aids in improved decision making by combining diverse data sources using sophisticated integration techniques.

Data Security: guarding against breaches and illegal access to data. To protect sensitive data, smart data management integrates strong security measures including encryption, access limits, and frequent security audits.
Smart data management refers to the systematic process of collecting, organizing, integrating, and analyzing accurate and relevant data to generate actionable insights, often supported by artificial intelligence, machine learning, and predictive analytics (Gartner, 2019). Unlike traditional big data, it emphasizes quality, timeliness, and usability of information for strategic decisions. In the airline industry, this is crucial as airlines process vast streams of real-time data from flight operations, bookings, weather forecasts, and maintenance systems. Managing this data smartly enhances decision-making efficiency in areas such as scheduling, crew allocation, safety compliance, and customer experience. By turning raw data into actionable insights, airlines can predict delays, manage costs, optimize resources, and personalize passenger services, thereby strengthening competitiveness and operational agility (Kim et al., 2019; Mariani & Borghi, 2021).

The Concept of Decision-Making Efficiency
Decision-making has long been recognized as a critical element of organizational performance, and in contemporary business contexts, the efficiency with which decisions are made has become increasingly important. Decision-making efficiency has been defined as the speed and accuracy with which decision-makers arrive at choices that maximize benefits while minimizing costs and resource waste (Rteimeh, 2021). Another definition frames it as the degree to which decision processes yield timely, relevant, and actionable outcomes aligned with organizational goals (Wang et al., 2021). These definitions stress not just how fast decisions are made, but also how well they are informed, resource-sparing, and strategically aligned. In this light, decision-making efficiency becomes essential for firms that must respond to volatile environments, competing pressures, and operational uncertainty, balancing speed, quality, and relevance (Ćwięk et al., 2023).

Within the airline industry, decision-making efficiency plays a vital role in operational sustainability and competitiveness, given the highly dynamic and uncertain environment in which airlines operate. Airlines must process vast streams of data, from passenger demand, weather conditions, maintenance records, and flight schedules, to make timely decisions that ensure safety, profitability, and customer satisfaction. Efficient decision-making allows airline operators to minimize delays, optimize fuel usage, allocate resources effectively, and respond proactively to disruptions such as technical failures or sudden policy changes (Kim & Park, 2019). Moreover, as the industry integrates smart technologies and predictive analytics, decision-making efficiency becomes a differentiator in achieving cost-effectiveness, enhancing passenger experience, and ensuring compliance with international aviation standards (Mariani&Borghi, 2021). Thus, improving decision-making efficiency in airline operators is not only a matter of internal performance but also of strategic survival in a globalized and highly competitive market. To expand the course of this study, decision-making efficiency is measured through the metrics of operational response time and resource utiliaation effectiveness.

Operational Response Time: Operational response time refers to the interval between the moment a situation requiring action is identified (or a customer request comes in) and the time when an appropriate response is initiated (Chilala et al., 2025). Efficient response times in decisions about rerouting flights, addressing mechanical issues, handling customer disruptions, or reallocating crew can reduce downtime, costs, and passenger dissatisfaction (Davari et al., 2024). For example, airlines that employ smart data management can monitor indicators (weather data, maintenance logs, flight schedules) in real time, thereby reducing operational response time dramatically and improving decision-making efficiency.It captures speed not at the expense of quality, but as a marker of an organization’s ability to balance haste and accuracy in decision cycles.

Resource Utilization Effectiveness: Resource utilisation effectiveness, as a measure of decision-making efficiency, refers to how well an organization uses its available inputs, such as labor, capital, equipment, and materials, to produce its desired outputs, while minimizing waste, downtime, or idle capacity. In academic literature, resource utilisation has been defined in terms of the percentage of actual resource usage over available potential (i.e., actual output divided by maximum possible output under ideal conditions) (Forbes Advisor, 2023). Also, studies using Data Envelopment Analysis (DEA) identify resource utilisation effectiveness as the efficiency score derived when decision-making units operate near the efficiency frontier by optimally combining inputs to yield maximal outputs (Lim et al., 2022; MDPI Studies, 2023).For airlines, effective utilization means maximizing aircraft usage (flight hours vs ground time), crew scheduling that minimizes idle periods, and optimal deployment of routes so that seats are filled and resources are used cost-efficiently.

Methodology

The study made use of cross-sectional explanatory survey research design. The population of the study consisted of eleven (11) airline operators in Rivers State (Source: Airline Operators of Nigeria, Rivers State Branch). The entire population of eleven (11) airline operators in Rivers State were used for the study without sampling. Therefore, the sample size of the study comprised of eleven (11) airline operators in Rivers State. As pertaining to respondents, six managers (airline operations manager, fleet manager, crew manager, safety manager, and finance manager customer service manager) were chosen from each of the airline operators, which gave a total of 66 respondents. The validation of the instrument was done by the project supervisors and other experts in Office and Information Management, Ignatius Ajuru University of Education, Port Harcourt. The reliability of the instrument was carried out using Cronbach Alpha. The administration of the instrument was carried out by the researcher and two research assistants. A total of sixty-six (66) copies of the questionnaire was administered and 58 copies were retrieved. The primary data obtained from the field were analyzed using Pearson Product Moment Correlation in SPSS version 27.0 for the bivariate analysis. The resolution guiding the acceptance or rejection of the hypotheses was stated hence: The null hypothesis will be rejected if the significance value (p value) is below the alpha level of 0.05 level of significance, if otherwise, the null hypothesis will be rejected. In determining the strength of relationship, the correlation values were used based on the following interpretation scheme: (a) No Relationship = 0, (b) Low/Weak Relationship = 0.1-0.3 (c) Moderate or Relatively Strong Relationship = 0.4-0.6, (d) High/Strong Relationship = 0.7-0.9, (e) Perfect Relationship = 1. The population table is presented below:

Table 1: Study Population

S/N	Airline Operating Firms in Rivers State
1	Air Peace, 55B, Old Aba Road Rumuobiakani, Port Harcourt.
2	Allied Air, Port Harcourt International Airport, Port Harcourt.
3.	Bristow Helicopters (Nigeria) Ltd. Nigerian Air Force Base, City Centre, Port Harcourt 500102, Rivers State.
4	OAS Helicopters. Civil Operators Wing, NAF Base, Port Harcourt.
5	Arik Air Nigeria Limited, 47 Aba Road, Eastern Garden House, Omagwa, Port Harcourt.
6	Dana Airlines Ltd, Port-Harcourt International Airport. Omagwa, Port Harcourt.
7	Fly Aero Nigeria Limited, Nigerian Airforce Base, Port Harcourt.

8	Med-View airline, Terminal Building Port-Harcourt International Airport, Port Harcourt.
9	First Nation Airways (SS) Limited, 47, Aba Road, CFC Bus Stop, Port Harcourt.
10	Glory Airline, BiodunOlanrewaju Lane Off Mife Road, Rumuogba Estate, Port Harcourt.
11	Aero Contractors. Rumuomasi 500102, Port Harcourt, Rivers, Nigeria.
	Total

Source: Human Resource Department, 2025

Results

Ho_1: There is no significant relationship between smart data management and operational response time of airline operators in Rivers State.

Table 1: Correlation between Smart Data Management and Operational Response Time

Correlations

		Smart Data Management	Operational Response Time
Smart Data Management	Pearson Correlation	1	.884**
	Sig. (2-tailed)		.000
	N	58	58
Operational Response Time	Pearson Correlation	.884**	1
	Sig. (2-tailed)	.000	
	N	58	58

**. Correlation is Significant at the 0.01 level (2-tailed).
Source: SPSS Output, 2025.

Table 1 above reveals r value of 0.884 at a significance level of 0.00 which is less than the chosen alpha level of 0.05 for the hypothesis relating smart data management and operational response time. Since the significance value is less than the alpha level of 0.05, the null hypothesis (Ho_5) which states that there is no significant relationship between smart data management and operational response time of airline operators in Rivers State, was rejected. This means that there is a very strong positive relationship between smart data management and operational response time of airline operators in Rivers State.

Ho_2: There is no significant relationship between smart data management and resource utilization effectiveness of airline operators in Rivers State.

Table 2: Correlation between Smart Data Management and Resource Utilization Effectiveness

Correlations

		Smart Data Management	Resource Utilization Effectiveness
Smart Data Management	Pearson Correlation	1	.816**
	Sig. (2-tailed)		.000
	N	58	58
Resource Utilization Effectiveness	Pearson Correlation	.816**	1
	Sig. (2-tailed)	.000	

N	58	58

**. Correlation is Significant at the 0.01 level (2-tailed).
Source: SPSS Output, 2025.

Table 2 above reveals r value of 0.816 at a significance level of 0.00 which is less than the chosen alpha level of 0.05 for the hypothesis relating smart data management and resource utilization effectiveness. Since the significance value is less than the alpha level of 0.05, the null hypothesis (Ho_6) which states that there is no significant relationship between smart data management and resource utilization effectiveness of airline operators in Rivers State, was rejected. This implies that there is a relatively strong positive relationship between smart data management and resource utilization effectiveness of airline operators in Rivers State.

Discussion of Findings

The tests of hypotheses one and two showed that there is a very strong positive relationship between smart data management and decision-making effectiveness of airline operators in Rivers State, especially in terms of operational response time and resource utilization effectiveness. The result of this study indicates that airline operators in Rivers State who use intelligent methods in dealing with information are more likely to make faster and more dependable decisions especially in regard to how they respond better to operational demands and how they can better utilize resources. The point is similar to the argument that the application of structured data is central in aviation to enhance efficiency and responsiveness. Indicatively, the research by Tonye et al. (2025) emphasized that the operational strategies based on systematic use of data directly promote the performance of delivery, which validates the existing evidence that data-based mechanisms support the responsiveness of a company. Equally, Iroanwusi (2025) has noted that role clarity, when supported by proper flow of information, would help the employees in the airline operations to adapt well to evolving demands, which also again aligns with the fact that the effective data systems enhance speed and efficiency in the decisions. All these arguments bring to the fore the fact that in an environment where smart data management is a priority, the airline operators will be better placed to deal with unforeseen problems and optimize efficiency.

In addition to the local context, there is also broader literature that supports the result of this study, which propose that data-enabled decision-making is a decisive force in the efficiency of aviation management. Opuala-Charles (2025) found that the implementation of digital technologies in the regulation of the aviation industry helps to ensure strategic alignment and improve operational results which aligns with the benefits of smart data management among operators in Rivers State. Similarly, Gustafsson and Östlund (2024) revealed, on the basis of qualitative case studies, that managing practices that focus on data-driven insights positively affect the quality and the timeliness of decisions, which supports the argument that resource utilization and operational nimbleness are positively affected by the adoption of smart data practices in organizations. Lastly, Gonzalo (2025) offered systematic evidence of the significant role of the big data analytics in the aviation industry, which positively affects the quality of operational coordination and the quality of decision-making, which can be taken as strong support of the existing observation. All these pieces of evidence combined indicate that efficient smart data management is not only beneficial but critical to airline operators who aim to shorten the response time of operations and maximise the utilisation of resources in an exceptionally dynamic environment.

Conclusion

The research has revealed that adoption of smart data management practices significantly contributes to the efficiency of decision making of airline operators in Rivers State especially in terms of response time to operations and efficient use of resources. Outsourcing to third parties can ensure airlines reduce downtimes by adopting cutting-edge data-driven strategies, including predictive analytics and real-time IoT integration, to minimise delays and use assets, including aircraft, crew,

and maintenance schedules, more efficiently. This highlights the reality that in the current competitive aviation industry, the use of disjointed systems or systems that are out of date cannot be sustained. Hence, the study concludes that airline operators that fail to adopt smart data management risk being left behind, as efficiency in decision-making has become the new currency for survival and growth. In the end, the research confirms that intelligent data handling is an essential plan to be responsive, optimize resources, and remain competitive over time in the airline sector.

Recommendations

The following recommendations were made based on the findings and conclusion of the study:

1. Airline operators should deploy centralized smart data platforms that integrate real-time data from operations, customer service, and logistics to support faster and evidence-based decisions, thereby reducing delays and inefficiencies.
2. Airlines should invest in predictive analytics, artificial intelligence, and machine learning applications to improve forecasting, streamline resource allocation, and enhance response to operational challenges.
3. Continuous training should be provided for administrative and operational staff in airline companies to strengthen data literacy, ensuring that personnel can interpret and apply insights from smart data systems effectively in decision-making.

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