



(REVIEW ARTICLE)



## Enhancing managerial decisions through strategic intelligence: The contribution of advanced information retrieval systems

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### Abstract

This study explores the comparative impact of classic and advanced information retrieval systems (IRS) on strategic intelligence and decision-making quality within organizations. Classic IRS, rooted in keyword-based searches and basic indexing, have supported decision-making by providing fast access to relevant data. However, their limitations in contextual depth, adaptability, and capacity to handle complex, unstructured information often restrict their effectiveness in today's dynamic business environments. Advanced IRS, on the other hand, utilize techniques such as natural language processing, machine learning, and semantic analysis to deliver richer, contextually relevant insights. These systems enable a more comprehensive understanding of complex information landscapes, aligning with strategic goals and supporting proactive decision-making. The paper's analysis highlights that while advanced IRS offer substantial advantages in data precision, strategic alignment, and responsiveness, they also entail higher costs and technical requirements. The findings provide actionable insights for organizations in selecting and implementing the most suitable IRS to enhance decision quality, considering factors like organizational goals, resources, and ethical considerations. This research contributes to the body of knowledge on strategic intelligence by examining the evolution of IRS and their implications for organizational success.

**Keywords:** Strategic intelligence; Information retrieval; Decision-making; Structural aspect; Semantic analysis; Strategic alignment

### 1. Introduction

Strategic intelligence can benefit greatly from the integration of advanced information retrieval systems (IRS) [1] [2] [3]. These systems can help organizations gather, store, and manage complex internal and competitive data, transforming it into actionable insights that can inform strategic decision-making. The ability to efficiently access and analyze this wealth of information can be a critical differentiator, enabling organizations to make more informed and strategic choices.

Information retrieval systems (IRS) have long been a crucial component of strategic decision-making, providing organizations with the data and insights necessary to make informed choices. However, the traditional approaches to information retrieval have faced challenges in keeping pace with the ever-evolving information landscape, prompting the development of more advanced systems. [4].

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In fact, strategic decision makers have become increasingly aware of the potential advantages offered by more advanced IRSs, which leverage techniques such as natural language processing, machine learning, and neural networks [2] [1]. These innovative systems can potentially provide more accurate, relevant, and nuanced information to support high-stakes strategic decisions, ultimately enhancing organizational decision quality. The theoretical foundation of this study is rooted in the concepts of strategic intelligence and decision quality. The study also draws upon the existing body of knowledge on IRS design and performance. [5] [2].

For decades, organizations have relied on classic IRSs to support their strategic decision-making processes. Although these traditional systems utilizing keyword-based search algorithms and Boolean logic have demonstrated some effectiveness in retrieving relevant information from large, structured data repositories, they have also faced challenges in keeping pace with the growing volume and complexity of available information. These approaches often struggle to provide the nuanced, contextual understanding required to support strategic decision-making in today's dynamic business environment, particularly when dealing with unstructured and semi-structured data, such as customer reviews, industry reports, and market intelligence [6] [2] [7] [8].

To address these limitations, advanced IRSs have emerged. These advanced systems take into account the structure, semantics, and relationships within data to deliver more precise and relevant information. They are designed to extract valuable insights from diverse data sources by leveraging sophisticated techniques like natural language processing, which can analyze and interpret unstructured text data, and machine learning algorithms, which can identify patterns and relationships within complex datasets. As the volume and complexity of information continue to grow, traditional approaches have also encountered difficulties in meeting user expectations and the need for more sophisticated search capabilities.

This research paper aims to conduct a comprehensive comparative analysis of classic and advanced IRSs, exploring their respective impacts on strategic intelligence and decision-making quality within organizations. By examining the capabilities, limitations, and performance characteristics of these systems, this study seeks to provide insights that can guide the strategic selection and implementation of information retrieval technologies to enhance organizational decision quality.

The structure of this paper is as follows: Section 2 provides a detailed review of the related literature on strategic intelligence, decision quality, and IRSs. Section 3 outlines the methodology used in this study, including the evaluation criteria, and comparative analysis approach. Section 4 presents the findings of the comparative analysis, highlighting the key differences between classic and advanced IRSs in terms of their capabilities, limitations, and impact on strategic decision-making. Section 5 discusses the implications of the research findings, providing recommendations for organizations seeking to optimize their information retrieval practices to enhance strategic decision-making.

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## **2. Literature Review**

### **2.1. Key Concepts of Strategic Intelligence and Decision Quality and Information Retrieval**

In the context of this article, it is essential to clarify the fundamental concepts related to strategic intelligence and the quality of managerial decisions, as well as the role of information retrieval in this process. The table below defines these concepts by addressing their main aspects, utility, and implications for strategic decision-making. Each element in the table highlights the critical dimensions of strategic intelligence, including relevance, contextualization, and semantic and structural analysis, which support informed decision-making aligned with organizational objectives.

**Table 1** Key Concepts of Strategic Intelligence and Decision Quality

Concept	Aspect et Details
Strategic Intelligence	<p>Definition: The systematic gathering, analysis, and interpretation of information relevant to an organization's competitive environment, including market trends, industry dynamics, competitor activities, and emerging technologies, to inform strategic decisions [9].</p> <p>Purpose: To enhance an organization's ability to anticipate and respond to changes in the competitive landscape, ultimately supporting more effective strategic decision-making.</p> <p>Key Components: Information collection, analysis, and interpretation to derive meaningful insights.</p>
Decision Quality	<p>Definition: The degree to which a decision-making process and its outcomes align with an organization's strategic objectives, considering factors such as the accuracy, timeliness, and relevance of the information used [10].</p> <p>Factors Influencing Decision Quality: The quality of information available, the decision-making process itself (including the use of analytical tools and frameworks), the alignment of decisions with strategic goals, and the timeliness and adaptability of the decision-making process.</p>
Information Retrieval	<p>Definition: The process of obtaining relevant information from a large repository, which can be used in decision-making contexts; includes both traditional keyword searches and advanced semantic-based searches for deeper insights [11].</p> <p>Types of Retrieval Systems: - Classic Retrieval System: Utilizes keywords and basic indexing to retrieve information. - Advanced Retrieval System: Incorporates text, structure, and semantics to enhance relevance and context in information retrieval.</p>
Semantic Analysis	<p>Definition: The study of meaning in language, which helps improve the quality of information retrieval by ensuring that the context, nuances, and relationships in data are captured, offering more insightful analysis for strategic intelligence [12].</p> <p>Applications in Decision-Making: Enhances the relevance of retrieved information by interpreting data based on context and meaning, aiding in more informed and strategic decisions.</p>
Structural Analysis	<p>Definition: The organization and categorization of information based on its format, source, and relationships, making it easier to retrieve and analyze structured data effectively [13].</p> <p>Applications in Information Retrieval: Structured data organization enables faster access to relevant information, improves the consistency of information retrieved, and supports better integration of complex information sources in decision-making.</p>
Relevance	<p>Definition: The extent to which the retrieved information aligns directly with the strategic needs of the organization, ensuring that only pertinent information is considered [14].</p> <p>Role in Decision Quality: Relevant information helps direct decisions toward strategic goals and reduces the influence of extraneous or irrelevant data.</p>
Contextualization	<p>Definition: The ability of the system to place information within a relevant context for the organization, allowing for better interpretation and alignment with strategic objectives [15].</p> <p>Role in Strategic Intelligence: Contextualization aids managers in understanding the importance of each piece of information by providing a perspective that aligns with the organization's strategic reality.</p>
Timeliness	<p>Definition: The degree to which information is available within an appropriate time frame to influence strategic decisions effectively, crucial for responsive and proactive decision-making [16].</p>

Impact on Strategic Decisions: Timely information enables organizations to react swiftly to market changes and emerging threats, while delays can hinder decision effectiveness and competitiveness.
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## 2.2. Evolution of Strategic Intelligence and Information Retrieval Systems

Strategic intelligence is not a recent concept but has been a focus of strategic management and organizational decision-making literature for decades. It involves the systematic gathering, analysis, and interpretation of information relevant to an organization's competitive environment, including market trends, industry dynamics, competitor activities, and emerging technologies [17], [2] [18] [19]. This intelligence can be used to inform strategic decisions, enabling organizations to anticipate and respond to changes in the competitive landscape more effectively.

IRs have also long played a crucial role in supporting strategic decision-making by providing access to relevant data and insights. Traditional or "classic" IRs typically rely on keyword-based search algorithms and Boolean logic to identify and retrieve information from structured data repositories. While these approaches have demonstrated some effectiveness, they have faced limitations in keeping pace with the growing volume and complexity of available information, particularly unstructured data sources such as social media, industry reports, and news articles.

The process of strategic intelligence begins with the collection of relevant information, which is then analyzed and interpreted to derive meaningful insights. Finally, these insights are applied to inform strategic choices and actions [17] [20] [2]. However, the efficacy of this process is heavily dependent on the ability of IRs to provide timely access to high-quality, contextually relevant information [17].

To address the limitations of classic IRs, advanced techniques have emerged that leverage natural language processing, machine learning, and other data-driven approaches to deliver more precise and relevant information. These advanced IRs are designed to extract insights from diverse data sources by analyzing the structure, semantics, and relationships within the data, rather than relying solely on keyword matching.

Existing research has explored the potential of advanced IRs to support strategic decision-making. Findings suggest that these systems can provide a more comprehensive and nuanced understanding of the strategic landscape, enabling organizations to make more informed and effective decisions.

## 2.3. Improvements in Decision Making through Strategic Intelligence

Research on strategic intelligence reveals its substantial influence on decision-making quality, particularly when paired with advanced information retrieval methods and business intelligence tools. [21] demonstrate that information visualization tools can significantly enhance decision quality, though the degree of benefit is closely tied to cognitive integration. Their findings indicate that managers with high cognitive integration skills utilize visualized data more effectively, reducing decision overconfidence and improving strategic outcomes.

Additionally, [22] discuss the pivotal role of business intelligence (BI) tools in enhancing decision-making across operational, tactical, and strategic levels. They note that BI tools contribute to data quality and foster essential leadership traits, thereby improving decision-making across multiple organizational layers [23].

[24] further explore the impact of strategic intelligence dimensions, such as foresight, creativity, and structured thinking, on production and operational decisions. Their study underscores the importance of strategic intelligence frameworks in effective decision-making processes.

Wieder and Ossimitz (2015) highlight the mediating role of BI systems, which directly improve managerial decision quality by enhancing the accessibility and relevance of data. They emphasize that effective BI system management and scope play a crucial role in elevating decision support quality [25].

Recent research from 2023 sheds light on adaptive information retrieval strategies, showing that managers often employ a combination of uncertainty-driven and discovery-driven search techniques under conditions of risk. This flexibility optimizes information acquisition and supports decision-making in uncertain environments [26].

En synthesizing the research on strategic intelligence and decision-making, the following table highlights key studies that examine the impact of various tools and frameworks on enhancing decision quality. Each entry in the table

encapsulates the primary findings of the studies, focusing on how tools like information visualization, business intelligence systems, and adaptive information retrieval strategies contribute to informed decision-making. This table serves as a concise reference for understanding the specific insights and applications of strategic intelligence in managerial contexts, providing a foundation for further exploration into how these tools influence quality and effectiveness in decision-making processes.

**Table 2** Insights on the Role of Strategic Intelligence and Business Intelligence in Enhancing Managerial Decision-Making

Source	Key Insight
[21] Information Visualization in Strategic Decisions: Impact of Cognitive Integration and Over- confidence	Visualized data improves decision quality when combined with cognitive integration
[23] Impact of BI Tools on Business Decisions and Development of Leadership Traits in Managers	BI tools enhance strategic decision-making and leadership traits
[24] The Impact of Strategic Intelligence on Production and Operations Decisions	Strategic intelligence fosters quality in production decisions
[25] The Impact of Business Intelligence on the Quality of Decision Making	BI systems improve decision-making quality through enhanced data
[26] Strategic information search in decisions from experience	Adaptive search strategies optimize decision-making under uncertainty

### 3. Methodology

The methodology of this study adopts a rigorous comparative analysis framework to evaluate both classic and advanced IRSs. This methodical approach is structured into several key stages that ensure a comprehensive and detailed assessment.

The first stage involves an in-depth literature review. This phase is crucial for identifying and understanding the fundamental principles, capabilities, and inherent limitations of each type of retrieval system. The literature review was conducted by exploring a wide range of sources, including academic articles, white papers, case studies, and industry reports. This diversity of sources ensures a comprehensive and nuanced understanding of the systems studied and provides a solid theoretical foundation for the comparative analysis.

Next, specific evaluation criteria were defined. These criteria include aspects such as data processing capacity, adaptability to unstructured data, response efficiency, and the ability to generate relevant contextual insights. These criteria were chosen for their relevance in assessing the performance of retrieval systems in the context of strategic decision-making. Each criterion is examined in detail, allowing for a systematic and objective evaluation of the effectiveness of the systems studied. The selection of systems to be analyzed is another crucial step in the methodology. Representative systems from each category were chosen to ensure a balanced and relevant comparison. Classic systems, generally characterized by the use of keyword-based search techniques and simple indexing methods, are compared to advanced systems that integrate more sophisticated approaches such as semantic analysis and structural processing. These advanced systems allow for a deeper and more contextual understanding of data, which is essential for trend identification and strategic decision-making.

To complete the analysis, ethical considerations were integrated into the methodology. Aspects such as data privacy, security, and algorithmic transparency were examined to assess the practical challenges associated with using advanced systems. These considerations are essential to ensure that the evaluation is not limited solely to technical performance but also includes ethical and practical implications, ensuring a holistic approach to the analysis.

The methodology includes a synthesis of theoretical perspectives. This synthesis is essential for drawing conclusions about the alignment of each type of system with organizational needs and specific strategic objectives. By combining these different stages, the methodology offers a structured and comprehensive approach to evaluating IRSs, providing contextually relevant and timely insights for strategic decision-making in dynamic and constantly evolving environments. This methodological approach ensures that the study's results are both rigorous and relevant for practitioners and researchers in the field of information management.

## 4. Theoretical Comparison between the Two Information Retrieval Systems

### 4.1. Impact of the Classic System on the Quality of Managerial Decisions

Classic IRs, as described in the literature, are characterized by their reliance on keyword-based indexing and simple matching algorithms. These systems excel at rapid information retrieval, providing users with quick access to relevant data based on their search terms. However, their ability to deliver contextually rich insights that support strategic decision-making is limited. According to [27] classic systems were primarily designed for transactional data retrieval, focusing on speed and ease of access rather than interpretative depth, which is essential for strategic analysis.

Managers using classic retrieval systems often face challenges in obtaining a comprehensive understanding of their competitive landscape. The rigid nature of keyword-based searches can result in an incomplete or even misleading representation of the information landscape, as these systems may fail to capture nuanced relationships and implications in complex business environments. Davenport and Prusak (2000) highlight that keyword-based systems often lack the interpretative capacity to connect disparate pieces of information, resulting in “data silos” that fail to provide a holistic view. Consequently, the focus on transactional retrieval rather than strategic interpretation can limit managerial insight, potentially impacting decision quality. [28] found that without the ability to contextualize information within broader business dynamics, managers may struggle to link retrieved information to long-term organizational objectives, leading to suboptimal choices that do not fully align with the firm’s strategic priorities.

Moreover, classic retrieval systems often exhibit an inability to adapt to evolving information needs, which can be a significant limitation in fast-paced competitive environments. As the competitive landscape shifts, there is an increased demand for flexible and responsive systems that can continuously provide timely and contextually relevant intelligence. [29] argue that static retrieval systems may become outdated quickly, failing to keep pace with the dynamic nature of competitive intelligence. Without adaptive capabilities, managers relying on classic systems may find themselves at a strategic disadvantage, as they are unable to access the latest insights or respond proactively to emerging market trends.

Overall, while classic IRs provide valuable support for basic information needs, their limitations in contextual depth, adaptability, and strategic alignment highlight the need for more advanced retrieval solutions. Chang et al. (2013) suggest that organizations seeking to enhance decision quality should consider systems that integrate semantic and contextual analysis, enabling a more comprehensive understanding of competitive forces and market shifts [30]. This shift from transactional to strategic intelligence is essential in elevating the quality of managerial decisions, aligning them more closely with organizational goals.

### 4.2. Impact of the Text, Structure, and Semantic-based System on the Quality of Managerial Decisions

In contrast to classic retrieval systems, advanced, text-structure, and semantic-based approaches offer a more comprehensive and strategically aligned approach to information retrieval and decision support.

These systems leverage natural language processing and machine learning algorithms to analyze the content, structure, and context of information, enabling a deeper understanding of the strategic implications of the retrieved data. By incorporating semantic analysis, advanced systems can identify and extract relevant information that may not be easily captured by keyword-based searches, providing managers with a richer, more contextual understanding of their competitive environment. The ability of advanced systems to analyze the meaning and relationships within information, rather than relying solely on surface-level keywords, is a significant advantage. Researchers have found that this semantic-based approach allows for the identification of emerging trends, potential threats, and new market opportunities that may be obscured in classic, keyword-driven retrieval [3] [31]. Moreover, by integrating structured and unstructured data sources, advanced systems can deliver a more comprehensive view of the business landscape, enabling managers to make more informed and strategically aligned decisions.

In fact, advanced retrieval systems have been shown to enhance the quality of managerial decisions by providing a stronger alignment between retrieved information and organizational goals. [31] highlight the ability of cognitive agents within these systems to automatically extract and contextualize information, improving the decision-making process by reducing cognitive biases and providing a more holistic understanding of the problem at hand. Furthermore, the adaptability of advanced systems is crucial in supporting strategic decision-making. By continuously updating their knowledge bases and learning from new data sources, these systems can rapidly respond to changing market conditions, equipping managers with the latest intelligence to inform their decisions. [31] argue that the flexibility and responsiveness of advanced retrieval systems are key factors in enabling organizations to maintain a competitive edge in dynamic business environments.

The integration of text-structure and semantic-based analysis within advanced IRSs holds significant potential to enhance the quality of managerial decisions. By furnishing a more comprehensive, contextual, and strategically aligned perspective of the competitive landscape, these systems can empower managers to make more informed, aligned, and adaptable choices that drive organizational success.

#### 4.3. Comparative Analysis of Information Retrieval Systems

In strategic decision-making, the choice of IRS can significantly impact the relevance, speed, and interpretative quality of the information gathered. This comparison highlights key differences between classic IRSs and advanced systems based on text, structure, and semantics. While classic systems rely on simple keyword matching, advanced systems leverage semantic structuring and contextual analysis to deliver more refined and strategically aligned information. The following table summarizes these differences, emphasizing the advantages of advanced systems in handling complex data and aligning information with organizational objectives.

**Table 3** Comparison between a Classic IRS and an Advanced Text, Structure, and Semantic-based IRS

Comparison Criteria	Classic IRS	Advanced Text, Structure, and Semantic-based IRS
Information Precision	Less structured information, with accuracy depending on source selection. May contain irrelevant data.	More precise and relevant information due to semantic structuring and text analysis that extracts context and significant details.
Analysis Speed	Faster for simple searches but often requires manual validation of results.	Increased speed in complex data searches, thanks to algorithms that automatically analyze and filter information based on semantic criteria.
Interpretation of Complex Data	Limited in contextual and complex interpretation, as data processing is based on simple keywords and phrases.	Capable of handling complex data by considering context, semantic relationships, and textual structure, providing a more nuanced interpretation.
Strategic Alignment	Can provide relevant information but lacks deep filtering, which may limit alignment with strategic decisions.	Better adapts to strategic objectives by extracting information aligned with the organization's specific needs.
Data Accessibility	Often limited access to unstructured or poorly organized data, making navigation and analysis more difficult.	Provides structured and organized data access, facilitating search and navigation based on precise criteria.

## 5. Discussion

The comparative analysis reveals notable differences between classic and advanced IRSs in their ability to support strategic intelligence and enhance decision quality. Classic systems, although essential to information retrieval practices, are often limited by their reliance on keyword-based searches and basic indexing. This approach hinders their ability to provide context-rich and nuanced information.

Consequently, this can lead to isolated data points that do not allow for a comprehensive understanding of complex business environments. Managers using these systems may struggle to align retrieved information with long-term strategic goals, potentially impairing decision-making effectiveness.

In contrast, advanced IRSs offer a more robust approach by leveraging textual, structural, and semantic analyses. These systems can process unstructured data, identify relationships within information, and provide an enriched, contextual view of the competitive landscape. This capability allows managers to detect emerging trends and interpret competitive dynamics, resulting in more informed and strategically aligned decisions. The adaptability of advanced systems to evolving data sources is invaluable for organizations in rapidly changing industries, as it enables them to remain proactive and responsive to new market developments, ensuring increased reactivity to changes.

However, it is important to recognize that advanced systems involve higher costs and require technical expertise, which can limit their accessibility, especially for smaller organizations or those with limited resources. Their complexity involves significant investments in technology and skilled personnel. Additionally, there are potential risks related to

data privacy and result interpretability, particularly when using complex algorithms. These challenges must be carefully considered, ensuring that advanced systems align well with organizational priorities, available resources, and ethical standards.

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## 6. Conclusion

To overcome these challenges, companies must first assess their specific data needs to choose the most appropriate IRS. It is crucial to consider the implementation and maintenance costs of advanced systems, as well as the need for deep technical expertise. Investing in staff training is also essential to maximize these systems' efficiency and fully leverage their advanced capabilities. Furthermore, it is vital to monitor ethical considerations to ensure data privacy and ethical standards are adhered to when using these advanced technologies. This includes implementing strict security protocols and clear data governance.

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## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

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