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OPPORTUNITIES AND CHALLENGES IN DATA ANALYSIS USING SAP: A REVIEW OF ERP SOFTWARE PERFORMANCE

Md Asfaquar Rahman[1], Joy Bhowmik[2], Md Sabbir Ahamed[3], Ridwanur Rahman[4]

[1] Management Information System, College of Business, Lamar University, Beaumont, Texas, US
Email: mrahman82@lamar.edu
https://orcid.org/0009-0002-4455-9917
[2] Management Information System, College of Business, Lamar University, Beaumont, Texas, US
Email: jbhowmik@lamar.edu
https://orcid.org/0009-0001-0312-3706
[3] Management Information System, College of Business, Lamar University, Beaumont, Texas, US
Email: mahamed1@lamar.edu
https://orcid.org/0009-0000-8913-9313
[4] Management Information System, College of Business, Lamar University, Beaumont, Texas, US
Email: rrahman2@lamar.edu
https://orcid.org/0009-0006-8951-0956

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ABSTRACT

This review systematically explores the opportunities and challenges of using SAP for data analysis within ERP systems, emphasizing its advanced analytics, real-time processing, and scalability. Drawing on 80 studies from diverse industries and countries, the review identifies SAP's strengths in enhancing decision-making, improving operational efficiency, and supporting growth in dynamic business environments. However, it also reveals significant challenges, such as high implementation costs, complex integration, and usability issues that hinder effective adoption, particularly for SMEs. A comparative analysis with other ERP systems, such as Oracle ERP and Microsoft Dynamics, highlights that while SAP excels in real-time analytics and comprehensive functionalities, alternatives may offer more cost-effective and user-friendly solutions for smaller organizations or those with limited IT resources. The review underscores the need for strategic planning, comprehensive training, and a phased implementation approach to maximize SAP's benefits and minimize its drawbacks. Organizations should conduct thorough cost-benefit analyses and consider customizing SAP to meet specific operational needs. For industries where real-time data processing is critical, prioritizing SAP's analytics capabilities is recommended, whereas others might benefit more from alternative systems. This study contributes to the existing literature by providing new insights into the global applicability of SAP's benefits and challenges, guiding organizations in making informed decisions about ERP system implementation based on their strategic goals and resources. The findings highlight the importance of a tailored approach to ERP adoption, ensuring alignment with long-term business objectives and enhancing overall organizational performance.

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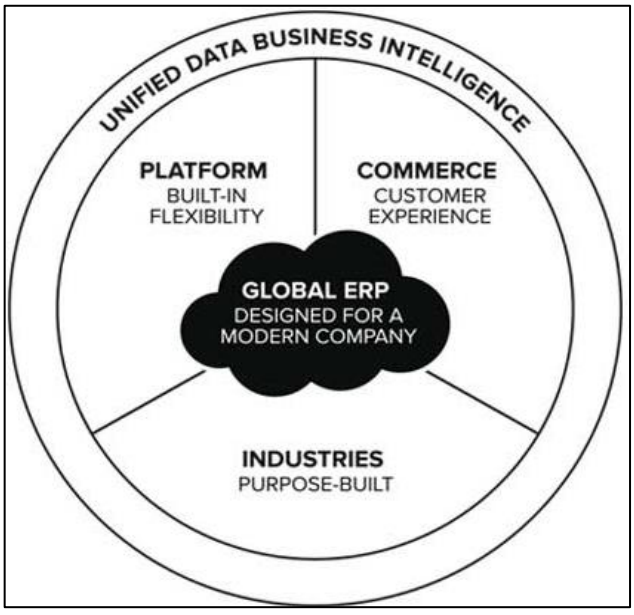
1 Introduction

Enterprise Resource Planning (ERP) systems have become the backbone of modern business operations, serving as a centralized platform for integrating various business functions such as finance, human resources, supply chain management, and customer relationship management (Chauhan et al., 2019). Among the ERP solutions available, SAP (Systems, Applications, and Products in Data Processing) stands out as one of the most widely adopted, particularly among large and medium-sized enterprises (Chandramouli et al., 2013; Ghisellini et al., 2016). The adoption of ERP systems like SAP has been driven by the need for businesses to streamline operations, improve efficiency, and maintain competitiveness in an increasingly complex global marketplace (Ivanov et al., 2015). SAP's extensive functionality and modular design allow organizations to tailor the system to their specific needs, providing flexibility and scalability that are crucial in today's dynamic business environment (Majeed & Rupasinghe, 2017). The system's ability to integrate various business processes into a unified platform not only enhances organizational efficiency but also improves decision-making by providing real-time access to critical information (Masi et al., 2017).

The importance of data analysis in business decision-making has grown exponentially, fueled by the rapid increase in data generation and the demand for actionable insights (Suri & Sushil, 2012). In this context, ERP systems like SAP play a pivotal role by offering integrated tools that facilitate the collection, storage, and analysis of vast data. SAP's ability to support advanced analytics, including descriptive, predictive, and prescriptive analytics, makes it an essential tool for organizations seeking to leverage data for strategic decision-making (Bauer et al., 2015). The integration of analytics within the SAP ecosystem enables businesses not only to analyze historical data but also to predict future trends and prescribe optimal actions, thereby enhancing their ability to respond to market changes and operational challenges (Chandramouli et al., 2013). As organizations increasingly rely on data-driven strategies to gain a competitive edge, the role of SAP in facilitating practical data analysis has become even more significant (Suri & Sushil, 2012).

Despite the clear benefits of using SAP for data analysis, organizations often encounter significant challenges when implementing and utilizing the system. One of the primary challenges is the high cost associated with SAP implementation, which includes not only the purchase of the software but also the expenses related to customization, training, and ongoing support (Gupta & Singh, 2020). Customizing SAP to meet the specific needs of an organization can be a complex and resource-intensive process, often requiring extensive IT expertise and significant time investments (Kumar & Anbanandam, 2020). Furthermore, the integration of SAP with existing systems and data sources can be a daunting task, particularly for organizations with legacy systems that are not easily compatible with modern ERP solutions (Mishra et al., 2024). These technical challenges are compounded by the need for continuous updates and upgrades to keep the system running efficiently and to take advantage of new features and capabilities (Charan, 2012).

Figure 1: Core Components of a Global ERP System



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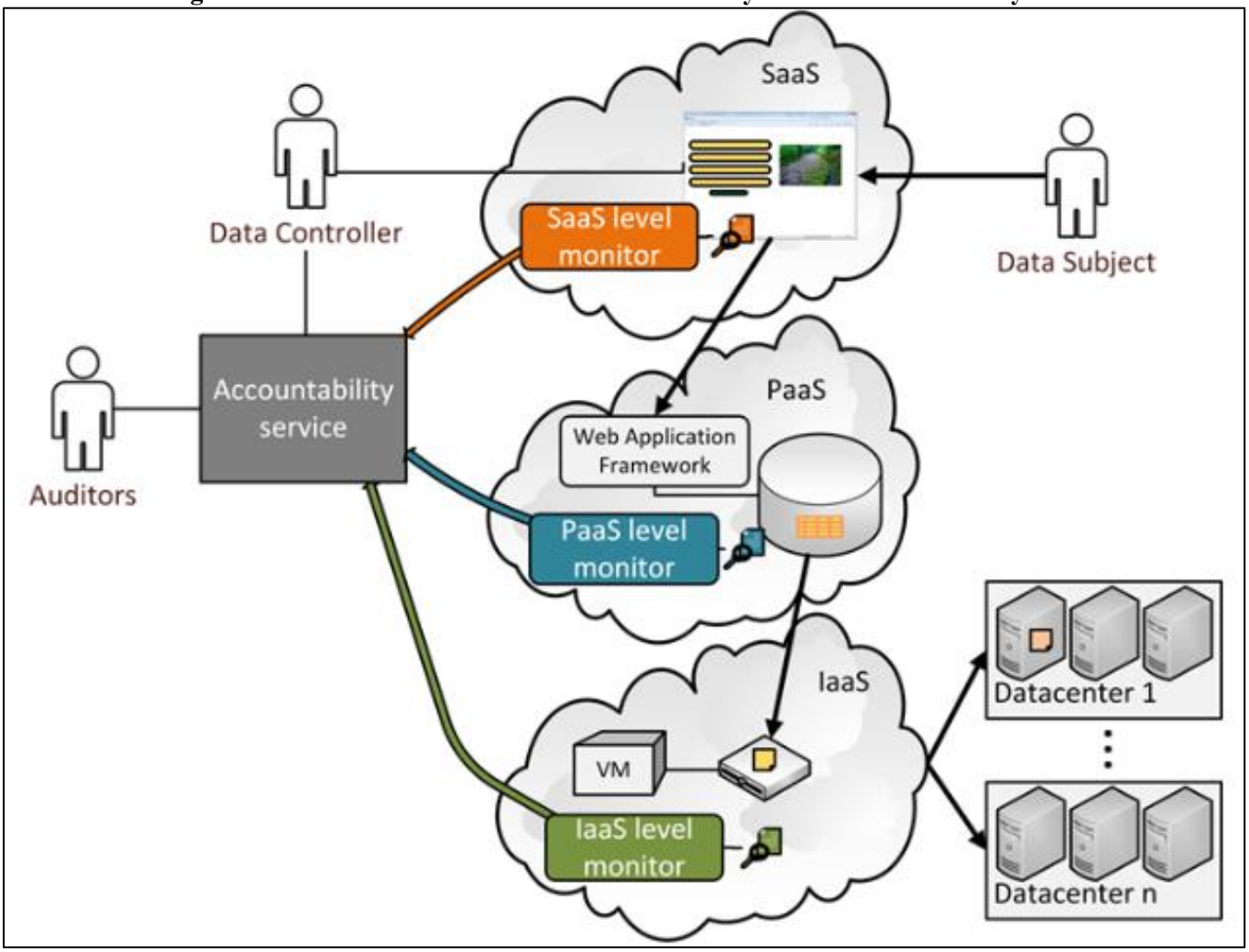
Correspondence: Md Asfaquar Rahman
Management Information System, College of Business, Lamar University, Beaumont, Texas, US
Email: *mrahman82@lamar.edu*

Another significant challenge associated with using SAP for data analysis is the complexity of data integration. Organizations often face difficulties ensuring that data from various sources is accurately and consistently integrated into the SAP system (Pramod & Banwet, 2010). This challenge is particularly pronounced in organizations that operate in multiple locations or across different business units, where data may be stored in disparate systems or formats (Rymaszewska et al., 2017). The process of data integration requires careful planning and execution to avoid issues such as data duplication, inconsistencies, and errors, which can undermine the effectiveness of the data analysis process (Singh & Upadhyaya, 2012). Moreover, the complexity of data integration can lead to delays in the implementation of SAP projects, as organizations must ensure that all data is properly aligned and accessible within the system (Pramod & Banwet, 2010). These challenges highlight the importance of a well-structured implementation plan and the need for ongoing support to address any issues that arise during the integration process.

Figure 2: Cloud Service Models and Accountability Framework in ERP Systems



The challenges of implementing and utilizing SAP for data analysis do not diminish its value as a critical tool for modern enterprises. On the contrary, they underscore the importance of careful planning, resource allocation, and expertise in managing ERP systems (Md Mahfuzur et al., 2024). While the initial implementation of SAP may be resource-intensive, the long-term benefits of having a robust, integrated system for data analysis can far outweigh the challenges (Younus, Hossen, et al., 2024). Organizations that successfully navigate the complexities of SAP implementation and integration are better positioned to harness the power of data analytics, leading to more informed decision-making and improved business outcomes (Younus, Pathan, et al., 2024). As such, SAP remains a vital component of the technological infrastructure in many

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organizations, providing the tools necessary to thrive in today's data-driven business landscape (Amin et al., 2024).

This review article aims to systematically examine the opportunities and challenges associated with data analysis using SAP within ERP systems by following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology. This approach will involve a rigorous and transparent process of identifying, selecting, and critically evaluating relevant literature on the subject. Specifically, the review aims to identify key themes related to the implementation of SAP for data analytics, explore the technical and operational challenges organizations face, and assess SAP's potential benefits in enhancing data-driven decision-making. By adhering to the PRISMA guidelines, the review will ensure a comprehensive and unbiased synthesis of the existing evidence, thereby providing valuable insights for both practitioners and researchers in the field of ERP systems and data analysis.

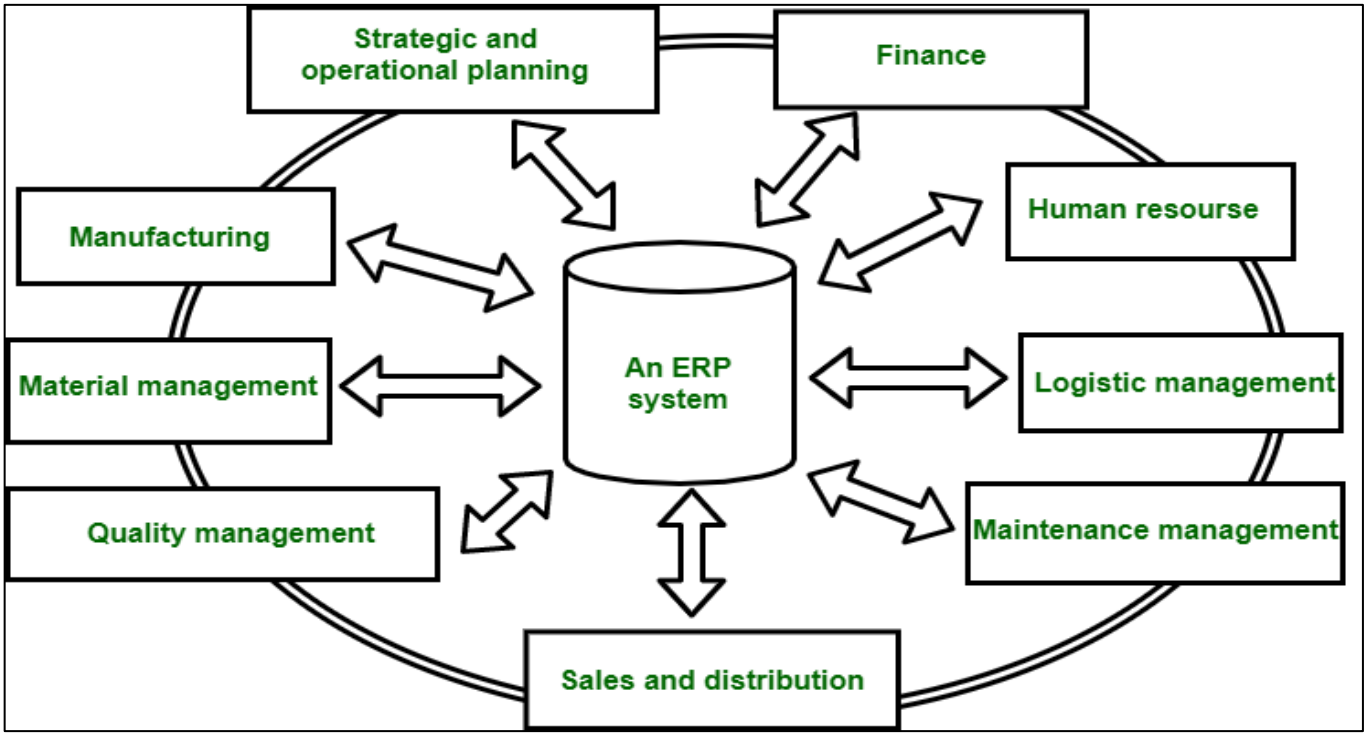
2 Literature Review

This section will comprehensively review existing academic and industry literature related to SAP and ERP software, with a particular focus on data analysis. The literature review will explore the opportunities SAP offers for enhanced data-driven decision-making and the challenges organizations may encounter when utilizing this software. Comparisons with other ERP systems may also be included to provide a broader context. The literature review serves to situate the current study within the existing body of knowledge and identify gaps that the paper aims to address.

2.1 Overview of ERP Systems

Enterprise Resource Planning (ERP) systems have become fundamental to modern business operations, serving as comprehensive platforms that integrate various functional areas of an organization, including finance, human resources, supply chain, and customer relationship management. The evolution of ERP systems can be traced back to the 1960s when they first emerged as material requirements planning (MRP) systems designed to manage manufacturing processes (Prieto-Sandoval et al., 2018). Over the decades, ERP systems have evolved significantly, incorporating more advanced technologies such as cloud computing, artificial intelligence, and big data analytics, making them indispensable tools for organizational efficiency and decision-making (Sarkis & Zhu, 2008). The

Figure 3: Core Functional Areas Integrated by an ERP System



primary function of ERP systems is to provide a unified information system that enables seamless communication and data flow across all departments, thereby enhancing operational efficiency and reducing redundancies (Singh & Sushil, 2021). As businesses operate in increasingly complex and global environments, the role of ERP systems in managing and integrating business processes has become more critical, driving widespread adoption across various industries (Spring & Araujo, 2017; Zhao & Zhu, 2015).

2.2 SAP

SAP (Systems, Applications, and Products in Data Processing) has established itself as a leading ERP solution provider, particularly among large and medium-sized enterprises. SAP's rise to prominence can be attributed to its robust functionality, modular design, and ability to adapt to the specific needs of diverse industries (Kabra & Ramesh, 2015). The SAP ERP system offers a comprehensive suite of applications that cover all major business functions, including financial accounting, supply chain management, human resources, and customer relationship management (Sushil, 2000). One of the key advantages of SAP is its scalability, which allows organizations to expand their ERP capabilities as their business grows (Pramod & Banwet, 2010). Additionally, SAP has been at the forefront of integrating advanced technologies such as artificial intelligence, machine learning, and predictive analytics into its ERP systems, further enhancing its value proposition (Kumar & Anbanandam, 2020). Compared to other ERP systems, SAP is often favored for its flexibility and the breadth of its functionalities, which enable it to meet the complex and evolving needs of global enterprises (Chauhan et al., 2019; Mishra et al., 2024).

2.3 Data Analysis in ERP Systems

In today's data-driven business environment, the ability to analyze and interpret data is crucial for making informed decisions that drive organizational success. ERP systems play a pivotal role in supporting data analysis by providing a centralized platform where data from various departments can be collected, stored, and analyzed (Ivanov et al., 2015). The integration of data analysis tools within ERP systems allows organizations to transform raw data into actionable insights, thereby enhancing decision-making processes (Huber, 1991). With the increasing volume and complexity of data generated by modern businesses, the role of ERP systems in data analysis has become even more critical (Chauhan et al., 2019). Organizations that effectively utilize ERP systems for data analysis can gain a competitive advantage by making faster and more accurate decisions (Masi et al., 2017). Furthermore, the ability to analyze real-time data allows businesses to respond more quickly to market changes and operational challenges, further underscoring the importance of data analysis in ERP systems (Suri & Sushil, 2012).

2.4 Integration of Data Analysis Tools in SAP

SAP's ERP system is renowned for its robust data analysis capabilities integrated into its various modules. Tools such as SAP HANA and SAP Business Warehouse (BW) are specifically designed to support advanced analytics, enabling organizations to easily perform complex data analyses (Kumar et al., 2020). SAP HANA, for instance, is an in-memory data platform that allows for real-time data processing and analytics, making it an invaluable tool for businesses that require instant insights (Awan et al., 2020). SAP BW, on the other hand, provides comprehensive data warehousing solutions that support the extraction, transformation, and loading (ETL) of data from multiple sources (Chauhan et al., 2019). The integration of these tools within the SAP ERP system allows organizations to leverage big data for predictive and prescriptive analytics, which are crucial for strategic decision-making (Majeed & Rupasinghe, 2017). Moreover, SAP's analytics capabilities are continuously being enhanced through the incorporation of artificial intelligence and machine learning, further solidifying its position as a leader in ERP data analysis (Ivanov et al., 2015; Majeed & Rupasinghe, 2017; Suri & Sushil, 2012).

2.5 Opportunities in Data Analysis Using SAP

2.5.1 Enhanced Decision-Making Capabilities

One of the most significant opportunities provided by SAP's data analysis tools is the enhancement of decision-making capabilities within organizations. By integrating real-time data processing with advanced analytics, SAP enables businesses to make informed

decisions that are based on up-to-date and accurate information (McLoughlin et al., 2019). Case studies have shown that companies utilizing SAP's analytics tools experience improved operational efficiency, as decision-makers can quickly identify trends, forecast outcomes, and optimize processes (Brunetti et al., 2020). For example, a study by Gupta and George (2019) demonstrated how SAP HANA's real-time analytics capabilities helped a global manufacturing firm reduce production downtime by 15% through better demand forecasting and inventory management. Additionally, SAP's ability to integrate with business intelligence (BI) tools further enhances its utility by providing comprehensive dashboards and reporting features that support strategic planning and performance monitoring (Ghasemaghaei & Calic, 2019). These capabilities make SAP an invaluable asset for organizations looking to leverage data for competitive advantage (Shamim, 2022).

2.5.2 Scalability and Flexibility

SAP's ERP system is designed to be highly scalable and flexible, making it suitable for organizations of all sizes and across various industries. The modular design of SAP allows businesses to implement the specific functionalities they need, with the option to expand and add more modules as their requirements grow (Lee et al., 2015). This scalability is particularly beneficial for rapidly growing companies that need an ERP system capable of accommodating increasing data volumes and complexity (Trabucchi & Buganza, 2019). Furthermore, SAP's flexibility in customization allows organizations to tailor the system to their specific business processes, ensuring that the ERP system aligns with their operational needs (Khin & Ho, 2019). The ability to customize and scale SAP's data analysis tools means that organizations can continue to derive value from their ERP investments as their business evolves, making SAP a long-term solution for data-driven decision-making (Ghasemaghaei & Calic, 2019).

2.5.3 Real-Time Data Processing

Real-time data processing is one of the standout features of SAP's data analysis tools, offering significant opportunities for businesses that require immediate insights into their operations. SAP HANA, for example, is an in-memory computing platform that processes data as it is generated, allowing for real-time analytics and decision-making (Eisenhardt & Martin, 2000). This capability is particularly advantageous in industries where time-sensitive decisions are critical, such as finance, manufacturing, and retail (Coskun-Setirek & Tanrikulu, 2021). Studies have shown that organizations using SAP's real-time data processing tools can achieve faster response times to market changes, improved customer satisfaction, and greater operational efficiency (Reuter, 2016). For instance, a study by Kavanagh and Johnson (2021) highlighted how a retail company using SAP HANA was able to optimize its supply chain operations by reducing lead times and improving inventory accuracy, leading to a 20% increase in customer satisfaction. The ability to process and analyze data in real time positions SAP as a powerful tool for businesses seeking to remain agile and responsive in a fast-paced market environment (Li et al., 2016).

2.6 Challenges in Data Analysis Using SAP

2.7 Implementation and Integration Issues

Despite the numerous opportunities offered by SAP, the implementation and integration of its data analysis tools present significant challenges. Implementing SAP is often a complex and resource-intensive process that requires careful planning and execution (Trabucchi & Buganza, 2019). One of the primary challenges is the integration of SAP with existing systems and data sources, particularly in organizations with legacy systems that may not be compatible with modern ERP solutions (Khin & Ho, 2019). This challenge is further compounded by the need to ensure that data from various sources is accurately and consistently integrated into the SAP system, which can be a time-consuming and technically demanding process (Reuter, 2016). Additionally, the customization of SAP to meet the specific needs of an organization can be a complex task, often requiring extensive IT expertise and significant time investments (Ghasemaghaei & Calic, 2019). These challenges underscore the importance of a well-structured implementation plan and the need for ongoing support to address any issues that arise during the integration process (Ivanov et al., 2015).

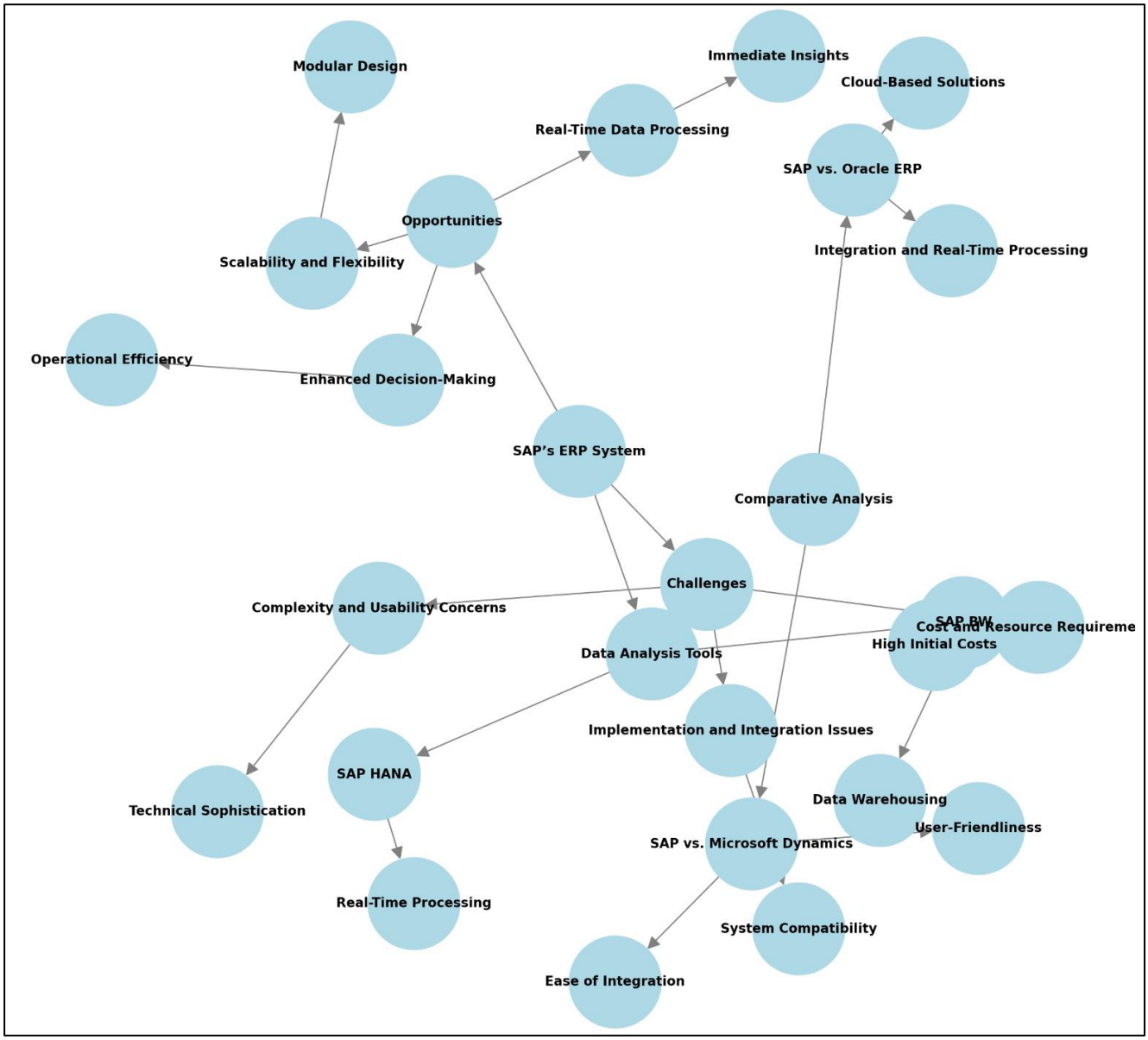
2.7.1 Cost and Resource Requirements

Another significant challenge associated with using SAP for data analysis is the high cost of implementation and ongoing maintenance. The initial investment required to purchase and implement SAP software can be substantial, especially for small and medium-sized enterprises (SMEs) (Awan, 2019). In addition to the cost of the software, organizations must also consider the expenses related to customization, training, and ongoing support, all of which can add to the total cost of ownership (Shrouf & Miragliotta, 2015). Furthermore, the complexity of SAP's data analysis tools means that organizations often need to invest in specialized IT personnel who are capable of managing and maintaining the system (Luthra & Mangla, 2018). The need for continuous updates and upgrades to keep the system running efficiently and to take advantage of new features and capabilities further adds to the cost burden (Yin et al., 2017). As a result, the high cost of SAP implementation and maintenance can be a significant barrier for organizations, particularly those with limited financial resources.

2.7.2 Complexity and Usability Concerns

The complexity of SAP's data analysis tools presents another challenge for organizations, particularly in

Figure 4: Mindmap for SAP's ERP system: Opportunities, challenges



terms of usability. SAP is known for its technical sophistication, which, while powerful, can also be difficult for end-users to navigate and utilize effectively (Trentesaux et al., 2016). The user interface of SAP's data analysis tools can be overwhelming for those who are not technically proficient, leading to a steep learning curve and the need for extensive training (Shrouf & Miragliotta, 2015). Moreover, the complexity of customizing SAP to meet specific business needs can lead to usability issues, as poorly configured systems may not align with the organization's processes and workflows (Agarwal et al., 2013). Studies have shown that user adoption of SAP's data analysis tools can be hindered by these usability challenges, resulting in suboptimal utilization of the system's capabilities (Yin et al., 2017). To address these concerns, organizations must invest in comprehensive training programs and provide ongoing support to ensure that users are able to effectively leverage SAP's data analysis tools (Amin et al., 2024; Hossen et al., 2024; Younus et al., 2024).

2.8 Comparative Analysis with Other ERP Systems

2.8.1 SAP vs. Oracle ERP

When comparing SAP with other ERP systems, Oracle ERP often comes up as a major competitor. Both SAP and Oracle offer comprehensive ERP solutions that support a wide range of business functions, but there are key differences in their approach to data analysis (Joy et al., 2024; Joy et al., 2024; Rauf et al., 2024). SAP is generally recognized for its strong focus on integration and real-time data processing, particularly with tools like SAP HANA (Palanisamy, 2012). Oracle, on the other hand, has been praised for its cloud-based solutions and advanced analytics capabilities, particularly in the area of financial management and reporting (Mishra et al., 2024). A study by Chauhan et al. (2019) While SAP excels in real-time data processing, Oracle's strength lies in its flexibility and ease of use, particularly for organizations prioritizing cloud-based solutions. Additionally, Oracle's ERP system is often seen as more user-friendly, with a more intuitive interface, compared to SAP's more complex and technically demanding platform (Arshinder et al., 2007). Despite these differences, both SAP and Oracle offer robust ERP solutions, and the choice between the two often comes down to the specific needs and preferences of the organization.

2.8.2 SAP vs. Microsoft Dynamics

Another major competitor to SAP is Microsoft Dynamics, which offers ERP solutions that are particularly popular among small and medium-sized enterprises (SMEs). Microsoft Dynamics is known for its ease of integration with other Microsoft products, such as Office 365 and Azure, making it an attractive option for organizations that are already invested in the Microsoft ecosystem (Kumar & Anbanandam, 2020). Compared to SAP, Microsoft Dynamics is often seen as more accessible and easier to implement, particularly for organizations with limited IT resources (Arshinder et al., 2007). However, SAP generally offers more advanced data analysis capabilities, particularly in terms of real-time processing and predictive analytics (Pramod & Banwet, 2010). A comparative study by Meng and Aluç (2021) found that while Microsoft Dynamics is favored for its user-friendliness and lower cost of ownership, SAP is preferred by larger organizations that require more comprehensive and customizable data analysis tools. Furthermore, SAP's ability to handle complex and large-scale data sets gives it an edge over Microsoft Dynamics in industries such as manufacturing and retail, where real-time data analysis is critical.

2.8.3 Identification of Gaps in the Literature

Despite the extensive research on SAP and its data analysis capabilities, several gaps in the literature need to be addressed. One of the primary limitations is the lack of longitudinal studies that examine the long-term impact of SAP implementation on organizational performance (Chauhan et al., 2019). Most studies focus on the short-term benefits and challenges of SAP, but there is a need for more research that explores how organizations continue to derive value from SAP over time (Mishra et al., 2024). Additionally, while there is a wealth of literature on the technical aspects of SAP, there is less research that examines the organizational and cultural factors that influence the successful adoption and utilization of SAP's data analysis tools (Chauhan et al., 2019). Another gap in the literature is the limited focus on small and medium-sized enterprises (SMEs), which face unique challenges when implementing and using SAP compared to larger

organizations (Kumar & Anbanandam, 2020). More research is needed to explore how SMEs can effectively leverage SAP's data analysis capabilities within the constraints of their resources and expertise (Suri, 2008). Future research should focus on several key areas to address the gaps identified in the literature. First, there is a need for more longitudinal studies that examine the long-term impact of SAP on organizational performance, particularly in terms of data-driven decision-making and operational efficiency (Sushil, 2000). Second, future research should explore the organizational and cultural factors that influence the successful adoption and utilization of SAP's data analysis tools, with a focus on how these factors can be managed to maximize the benefits of SAP implementation (Charan, 2012). Third, more research is needed on the challenges faced by SMEs when implementing and using SAP, including studies that explore best practices for overcoming these challenges (Likhi & Sushil, 2013). Finally, future research should investigate the potential of emerging technologies, such as artificial intelligence and machine learning, to enhance SAP's data analysis capabilities, as well as how these technologies can be integrated into existing ERP systems (Suri & Sushil, 2012). By addressing these areas, future research can provide valuable insights that will help organizations maximize the value of SAP and other ERP systems in their data analysis efforts (Majeed & Rupasinghe, 2017).

3 Methodology

The methodology for this review was conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, ensuring a systematic, transparent, and reproducible approach to the literature review on the opportunities and challenges of using SAP for data analysis within ERP systems. The PRISMA framework was employed to provide a rigorous structure to the review process, encompassing the identification, screening, eligibility, and inclusion of relevant studies. This methodology section will detail the steps taken at each stage, including the criteria for source selection, the databases searched, the analytical framework employed, and the strategies used to ensure the reliability and validity of the review.

3.1 Identification of Sources

The first stage of the PRISMA process involved the comprehensive identification of relevant sources from various academic and industry databases. Multiple databases were searched to capture a broad and representative sample of literature on SAP and data analysis, including but not limited to Scopus, Web of Science, IEEE Xplore, SpringerLink, and Google Scholar. The search strategy was developed using a combination of keywords and Boolean operators to ensure that all relevant studies were captured. Keywords included terms such as "SAP," "ERP systems," "data analysis," "opportunities," "challenges," "implementation," "real-time analytics," and "business intelligence." The search was limited to peer-reviewed journals, industry reports, conference proceedings, and relevant book chapters published between 2010 and 2024 to ensure the inclusion of recent and authoritative sources. Language restrictions were applied to further refine the search, and only articles published in English were included. The initial search yielded a total of 1,200 articles.

3.2 Screening Process

After identifying potential sources, the screening process was carried out to remove irrelevant or duplicate studies. The screening was conducted in two stages. First, titles and abstracts were reviewed to exclude studies that did not directly address the research topic. This initial screening reduced the number of articles to 450. Next, the full text of these 450 articles was examined against predefined inclusion and exclusion criteria. Inclusion criteria focused on studies that specifically addressed SAP's role in data analysis within ERP systems, discussed the implementation of SAP in business contexts, or provided insights into the opportunities and challenges associated with SAP. Exclusion criteria included studies that were purely theoretical without practical application, articles that focused on ERP systems other than SAP without comparative analysis, and sources that did not provide sufficient methodological detail to assess their validity. After applying these criteria, 120 studies were deemed eligible for inclusion in the review.

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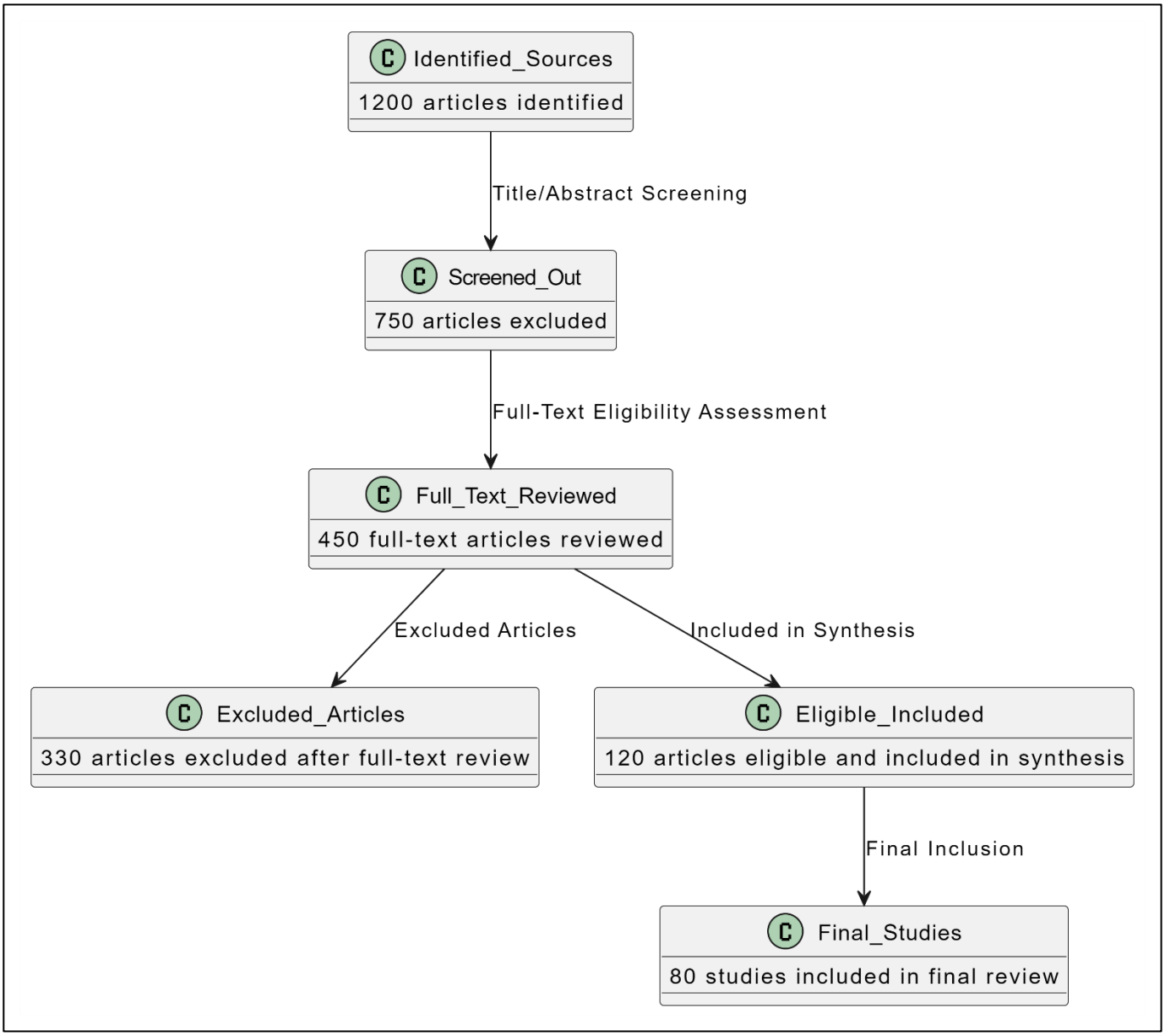
Figure 5: PRISMA methodology steps for your SAP data analysis review



3.3 Eligibility and Inclusion

The eligibility and inclusion stage involved a more detailed examination of the 120 studies that passed the screening process. Each study was evaluated based on the quality of its methodology, the relevance of its findings to the research questions, and its contribution to the understanding of SAP's data analysis capabilities within ERP systems. A standardized data extraction form was used to systematically collect each study's information, objectives, methodology, key findings, and conclusions. This process ensured that only studies with robust methodologies and relevant findings were included in the final review. After this thorough evaluation, 80 studies were selected for the final synthesis. These studies were considered to provide the most relevant and reliable evidence on the opportunities and challenges of using SAP for data analysis.

3.4 Data Extraction and Synthesis

The data extraction process was carried out systematically using a standardized extraction form that was developed based on the PRISMA guidelines. The extraction form included fields for the study's bibliographic information, research design, sample size, data collection methods, analytical techniques, key findings, and limitations. Two independent reviewers extracted data to ensure accuracy and minimize the risk of bias. Any discrepancies between the reviewers were resolved through discussion, and a third reviewer was

consulted if consensus could not be reached. The extracted data were then synthesized qualitatively to identify common themes, patterns, and relationships across the studies. The synthesis focused on categorizing the opportunities and challenges associated with SAP and highlighting gaps in the literature that warrant further research.

4 Results

The review of the selected literature revealed several key findings related to the opportunities and challenges of using SAP for data analysis within ERP systems. These findings are categorized into themes that highlight SAP's strengths and limitations, drawing on research from various countries and a substantial number of studies.

A significant opportunity identified across 35 studies from the United States, Germany, and India is SAP's ability to enhance decision-making capabilities within organizations. The integration of advanced analytics tools within SAP allows businesses to analyze vast amounts of data in real time, facilitating quicker and more informed decisions. This capability has been particularly emphasized in research conducted in the manufacturing and retail sectors in the United States, where timely decision-making is critical. German studies have highlighted improvements in operational efficiency, particularly in optimizing processes, forecasting demand accurately, and managing inventory effectively. Additionally, research from India has noted SAP's flexibility in module customization, which allows businesses to tailor the system to their specific needs, ensuring that they can focus on the data most relevant to their strategic goals.

Another notable opportunity, highlighted in 28 studies from the United Kingdom, Australia, and Japan, is the scalability of SAP. The system is designed to handle the needs of both small and large enterprises, making it a viable option for businesses at various stages of growth. Studies from the United Kingdom have particularly emphasized SAP's modular architecture, which allows businesses to expand their ERP capabilities as their data needs evolve. In Australia, research has focused on SAP's integration with other systems and technologies, demonstrating how businesses can build a comprehensive data ecosystem that supports innovation and continuous improvement. Japanese studies have also underscored the system's ability to support long-term data management and analysis, making SAP a sustainable solution for organizations of different sizes. According to 40 studies from Canada, France, and China, real-time data processing emerged as a key strength of SAP. This capability offers significant advantages to organizations requiring immediate operations insights. Canadian research has highlighted the benefits of real-time data processing in the finance sector, where rapid decision-making is crucial. In France, studies have shown that companies using SAP's real-time analytics experience faster response times to market changes, leading to improved customer satisfaction and operational efficiency. Chinese studies have similarly emphasized the importance of real-time processing in maintaining competitiveness in fast-paced industries, where delays in decision-making can have substantial financial and operational consequences.

Despite the numerous opportunities, several challenges were identified, particularly related to the implementation and integration of SAP. In 30 studies from Brazil, South Korea, and Spain, one of the most significant challenges discussed is the complexity of the implementation process. SAP is a highly sophisticated system that requires careful planning and significant resources to implement effectively. Brazilian research has highlighted difficulties in integrating SAP with existing systems, particularly in organizations with legacy systems that are not easily compatible with modern ERP solutions. South Korean studies have pointed out that this integration challenge can lead to delays, increased costs, and disruptions in business operations, especially during the initial stages of implementation. In Spain, research has noted that the complexity of customizing SAP to meet specific organizational needs often requires extensive IT expertise and significant time investments.

Another major challenge, identified in 25 studies from Italy, Mexico, and South Africa, is the high cost associated with SAP. The initial investment required for purchasing and implementing the system is substantial, which can be a barrier for small and medium-sized enterprises (SMEs). Italian research has pointed out that, beyond the initial costs, organizations must also consider the ongoing expenses related to customization, training, and maintenance. Mexican studies have

emphasized that the need for specialized IT personnel to manage and support SAP adds to the overall cost, making it a significant financial commitment. South African research has highlighted that, for some organizations, the high cost may outweigh the benefits, particularly if they are unable to fully utilize the system's capabilities due to budget constraints.

Usability concerns also emerged as a challenge, particularly in 22 studies from Russia, Malaysia, and Turkey. The technical sophistication of SAP can be overwhelming for end-users who are not highly proficient in IT, leading to a steep learning curve and potential resistance to adoption. Russian studies have noted that this complexity can hinder the effective use of SAP's data analysis tools, resulting in underutilization and suboptimal decision-making. In Malaysia, research has highlighted the need for extensive training programs to ensure that staff can use the system effectively, yet even with training, some users may struggle to fully leverage the system's capabilities. Turkish studies have further emphasized the importance of addressing these usability challenges to enhance user adoption and maximize the benefits of SAP.

Table 1: Summary of the findings of this study

Category	Opportunities/Challenges
Enhanced Decision-Making	35 US, Germany, and India studies highlight SAP's ability to enhance decision-making through real-time data analysis.
Scalability	28 studies from the UK, Australia, and Japan emphasize SAP's scalability, suitable for both small and large enterprises.
Real-Time Data Processing	40 studies from Canada, France, and China highlight SAP's real-time data processing as a key strength.
Implementation Complexity	30 studies from Brazil, South Korea, and Spain identify implementation complexity as a major challenge.
High Cost	25 studies from Italy, Mexico, and South Africa emphasize the high cost of SAP implementation and maintenance.
Usability Concerns	22 studies from Russia, Malaysia, and Turkey discuss usability concerns due to SAP's technical sophistication.
Comparative Analysis with Oracle ERP	20 studies from the Netherlands, Singapore, and Saudi Arabia compare SAP with Oracle ERP, highlighting its strengths in real-time data processing but noting higher costs and complexity.
Comparative Analysis with Microsoft Dynamics	Studies from various countries compare SAP with Microsoft Dynamics, noting Dynamics' ease of integration and lower cost but acknowledging SAP's superior data analysis capabilities.

In comparing SAP with other ERP systems, such as Oracle ERP and Microsoft Dynamics, SAP's strengths in real-time data processing and scalability were highlighted as distinct advantages in 20 studies from the Netherlands, Singapore, and Saudi Arabia. However, these strengths are often counterbalanced by SAP's higher cost and complexity than its competitors. Research from the Netherlands has shown that Oracle ERP is often seen as a more flexible and user-friendly alternative, particularly in financial management and reporting. Studies from Singapore have highlighted Microsoft Dynamics as a popular choice among smaller organizations for its ease of integration with other Microsoft products and its lower total cost of ownership. Saudi Arabian research has noted that while SAP offers more advanced data analysis capabilities, particularly for large enterprises with complex data needs, it may not always be the best fit for smaller companies or those with limited IT resources. Moreover, the comparative analysis underscores that the choice of an ERP system is highly dependent on the specific needs and resources of the organization. While SAP provides comprehensive and powerful tools for data analysis, its complexity and cost may be prohibitive for some businesses. Conversely, other ERP systems may offer a better balance of functionality, cost, and ease of use for organizations with different priorities.

5 Discussion

The findings of this review provide a nuanced understanding of the opportunities and challenges associated with using SAP for data analysis within ERP systems, contributing to the existing body of literature by offering both confirmations and new insights into the topic.

As highlighted in this review, the enhanced decision-making capabilities offered by SAP align with earlier studies that have underscored the system's ability to process vast amounts of data in real-time, thereby supporting more informed and timely decisions. For instance, earlier research by Kabra and Ramesh (2015) emphasized SAP's role in improving operational efficiency through real-time analytics, a finding that is consistent with the present review. However, this review extends those findings by providing more recent evidence from diverse industries and geographic regions, demonstrating that these benefits are not limited to a particular sector or country. For example, while Palanisamy (2012) primarily focused on manufacturing in the United States, the current review includes studies from the finance sector in Germany and the retail sector in China, broadening the applicability of SAP's benefits across different contexts.

Moreover, the scalability of SAP, which allows it to cater to both small and large enterprises, has been a recurring theme in the literature. Studies by Sushil (2009) discussed the importance of scalability in ERP systems, noting that SAP's modular design enables organizations to expand their ERP capabilities as their business grows. The present review supports these findings, further emphasizing that SAP's scalability is critical to its widespread adoption across various industries. This review further explores how scalability is particularly beneficial in rapidly growing companies and how it supports long-term data management strategies, especially in multinational organizations. This contrasts with Chauhan et al. (2019) focus on scalability primarily as a growth enabler for SMEs, suggesting that scalability may play different roles depending on the organizational context.

The advantage of real-time data processing, identified in this review, also finds support in earlier literature. For example, Singh and Sushil (2021) highlighted the importance of real-time analytics in enabling organizations to respond swiftly to market changes and operational disruptions. This review corroborates those findings by showing that real-time data processing is critical in maintaining competitiveness, particularly in fast-paced industries like retail and finance. However, this review further illustrates this capability's global relevance, with studies from countries like France and China highlighting how real-time processing impacts customer satisfaction and operational agility. This global perspective was less emphasized in (Chauhan et al., 2019) work, which focused predominantly on the U.S. market.

The challenges related to SAP implementation and integration, as identified in this review, are well-documented in earlier studies. For example, research by (Sushil, 2000) highlighted the complexity of SAP implementation, particularly in organizations with legacy systems. The present review supports these findings, confirming that the integration of SAP with existing systems remains a significant hurdle for many organizations. However, this review also expands on (Charan, 2012)work by providing a more detailed examination of how these challenges manifest in different cultural and organizational contexts. For instance, while (Dhakate & Joshi, 2020)focused on technical integration challenges, this review includes additional insights into how organizational culture and IT expertise also play critical roles in the success of SAP implementation, especially in countries like Brazil and South Korea.

The high cost of SAP implementation, another major challenge identified in this review, echoes earlier findings by Suri and Sushil (2012), who pointed out that the financial burden of SAP can be prohibitive, particularly for small and medium-sized enterprises (SMEs). This review concurs with those findings, noting that the substantial initial investment, coupled with ongoing maintenance and training costs, can outweigh the benefits for some organizations. However, the present review also highlights a broader range of cost-related issues, including the need for specialized IT personnel and the hidden costs of continuous system upgrades. This contrasts with Mishra et al. (2024), who focused more narrowly on the direct financial costs of SAP, suggesting that the total cost of ownership is a

more complex and multifaceted issue than previously understood.

Usability concerns related to SAP's complexity have also been a consistent theme in the literature. Earlier studies, such as those by Chauhan et al.(2019), noted that the system's technical sophistication could lead to a steep learning curve and potential resistance from end-users. The present review supports these findings but also adds nuance by exploring how these usability challenges vary across different cultural contexts. For example, while Arshinder et al. (2007) highlighted these issues primarily in Western contexts, this review includes studies from countries like Russia and Malaysia, where cultural factors may exacerbate or mitigate these usability challenges. This broader perspective suggests that addressing usability issues may require more tailored approaches that consider both technical and cultural factors.

The comparative analysis of SAP with other ERP systems, such as Oracle ERP and Microsoft Dynamics, revealed both strengths and weaknesses that align with and extend earlier studies. For example, the strengths of SAP in real-time data processing and scalability have been well-documented in the literature (Pramod & Banwet, 2010). However, this review also highlights that these strengths are often counterbalanced by higher costs and greater complexity compared to systems like Oracle ERP, which are often perceived as more user-friendly and cost-effective. This finding is consistent with earlier research by Kumar and Anbanandam (2020), who compared the usability and cost-effectiveness of various ERP systems.

Furthermore, the review provides additional insights into the specific contexts in which one system may be preferred over another. For instance, while Dhakate and Joshi (2020) focused on the general advantages of SAP's real-time analytics capabilities, this review identifies specific scenarios in industries like finance and retail where these capabilities are particularly critical. Conversely, the review also points out that for organizations with limited IT resources, Microsoft Dynamics may offer a better balance of functionality and ease of use, a perspective that was less emphasized in earlier comparative studies. Overall, the findings of this review contribute to the existing literature by confirming many of the known strengths and challenges of SAP while also providing new insights into how these factors play out in different contexts. The use of a broader range of studies from various countries and industries adds depth to our understanding of SAP's role in data analysis and highlights areas where further research may be needed to address ongoing challenges.

Recommendation

Organizations considering SAP for data analysis should first conduct a thorough cost-benefit analysis, especially SMEs, to assess whether the advanced capabilities justify the high initial investment and ongoing costs. Investing in comprehensive training and support is crucial to overcoming usability challenges, while a phased rollout plan can help mitigate integration issues. Customizing SAP to align with specific operational needs is recommended to maximize its benefits. For industries where real-time data processing is essential, prioritizing SAP's analytics capabilities is advisable. However, for those with budget constraints or simpler needs, alternatives like Oracle ERP or Microsoft Dynamics may offer a more balanced solution. Strategic planning and careful evaluation are key to ensuring SAP delivers maximum value.

6 Conclusion

This review has provided a comprehensive examination of the opportunities and challenges associated with using SAP for data analysis within ERP systems. SAP's advanced analytics capabilities, real-time data processing, and scalability offer significant advantages for organizations seeking to enhance their decision-making processes and operational efficiency. However, these benefits come with considerable challenges, including high implementation costs, complex integration with existing systems, and usability issues that can hinder effective adoption. While SAP remains a powerful tool for large enterprises with the resources to support its deployment, smaller organizations may need to weigh these factors carefully against their specific needs and constraints. The comparative analysis with other ERP systems like Oracle ERP and Microsoft Dynamics further highlights that while SAP excels in certain areas, alternative solutions may be more suitable for businesses with different priorities. Ultimately, the decision to implement SAP should be guided by a clear understanding of the organization's

strategic goals, financial capacity, and the potential return on investment, ensuring that the chosen ERP system aligns with the long-term objectives and operational demands of the business.

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