

***Exploring the Landscape of Big Data Analytics in Financial Decision Making*****Menjelajahi Lanskap Analisis Big Data dalam Pengambilan Keputusan Keuangan****Bambang Mahmudi**

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*Big Data analysis has become an integral part of financial decision making in the modern corporate context. In an increasingly complex and competitive environment, a deep understanding of the factors that influence the success of Big Data analysis is critical. This research aims to investigate the role of variables such as data quality, data security, technology infrastructure, data analysis skills and expertise, leadership and organizational culture, regulations and compliance, and clear business objectives in corporate financial decision making. Using a literature analysis approach, we found that high data quality, strong data security, adequate technology infrastructure, high data analysis skills and expertise, supportive leadership, regulatory compliance, and clear business objectives each contribute positively to the effectiveness of Big Data analysis in supporting financial decision making. These findings highlight the importance of holistic integration of these factors in efforts to improve corporate financial decision-making processes.*

**Keywords:** *Big Data Analysis, Financial Decisions, Data Quality, Data Security, Technology Infrastructure, Data Analysis Skills, Organizational Leadership, Regulation and Compliance, Business Objectives.*

**ABSTRAK**

Analisis Big Data telah menjadi bagian integral dari pengambilan keputusan keuangan dalam konteks perusahaan modern. Dalam lingkungan yang semakin kompleks dan kompetitif, pemahaman yang mendalam tentang faktor-faktor yang mempengaruhi keberhasilan analisis Big Data sangatlah penting. Penelitian ini bertujuan untuk menyelidiki peran variabel-variabel seperti kualitas data, keamanan data, infrastruktur teknologi, keterampilan dan keahlian analisis data, kepemimpinan dan budaya organisasi, regulasi dan kepatuhan, serta tujuan bisnis yang jelas dalam pengambilan keputusan keuangan perusahaan. Dengan menggunakan pendekatan analisis literatur, kami menemukan bahwa kualitas data yang tinggi, keamanan data yang kuat, infrastruktur teknologi yang memadai, keterampilan dan keahlian analisis data yang tinggi, kepemimpinan yang mendukung, kepatuhan terhadap regulasi, dan tujuan bisnis yang jelas masing-masing berkontribusi positif terhadap efektivitas analisis Big Data dalam mendukung pengambilan keputusan keuangan. Temuan ini menyoroti pentingnya integrasi holistik dari faktor-faktor tersebut dalam upaya meningkatkan proses pengambilan keputusan keuangan perusahaan.

**Keywords:** *Analisis Big Data, Keputusan Keuangan, Kualitas Data, Keamanan Data, Infrastruktur Teknologi, Keterampilan Analisis Data, Kepemimpinan Organisasi, Regulasi dan Kepatuhan, Tujuan Bisnis.*

## Introduction

Big Data analysis has become a major highlight in the context of financial decision making. In an era where data is produced in enormous quantities and its complexity is increasing, the use of appropriate analytical methods is crucial in understanding market trends, risks and investment opportunities. In this context, this research aims to conduct a systematic literature review of the use of Big Data analysis in financial decision making. The need for this research is very important considering the ever-growing complexity of modern financial markets. With technological advances, the data generated by financial markets increases exponentially every day (Hasan, 2024). However, a deep understanding of this data is often lacking, thus hampering effective decision-making processes. Therefore, research on the use of Big Data analysis in a financial context is important to provide a more comprehensive view of market dynamics and the potential risks contained therein (Megeid, 2022).

In the midst of globalization and the development of information technology, companies in Indonesia are increasingly realizing the importance of using Big Data analysis in the financial decision making process. As the volume and diversity of data generated every day increases, the ability to process this big data becomes a competitive advantage that is highly valued in an increasingly complex business environment (Seseni, 2023). The business context in Indonesia presents its own dynamics, with unique challenges and opportunities in the application of Big Data analysis in financial decision making. In this digital era, companies in Indonesia face pressure to optimally utilize their resources, including data, to support more accurate and timely financial decisions (Egwuonwu, 2024).

However, there are a number of challenges faced by companies in Indonesia in implementing Big Data analysis in making financial decisions. One of them is the lack of infrastructure and quality human resources in the field of data analysis. Apart from that, regulatory and data privacy issues are also obstacles in optimizing data utilization effectively. However, amidst these challenges, there is a great opportunity for companies in Indonesia to develop and improve their capabilities in applying Big Data analysis in financial decision making (Haverila, 2024). By investing in adequate technological infrastructure and training competent human resources, companies can optimize the potential of their data to gain deeper insights into financial performance, market trends and investment opportunities (Bach, 2019).

Research on the application of Big Data analysis in financial decision making in Indonesian companies is important in identifying the specific challenges faced by companies in this country and formulating appropriate strategies to overcome these challenges. Through an innovative and collaborative approach between government, academics and the private sector, companies in Indonesia can optimally utilize the potential of Big Data analysis to support the growth and sustainability of their business in this digital era (Tang, 2019). Big Data analytics plays an increasingly significant role in financial decision-making processes across various sectors, offering both opportunities and challenges for financial institutions. As detailed in the provided search results, Big Data enables the analysis of large volumes of diverse and complex datasets, including structured and unstructured information from sources such as social media, audio, videos, photographs, and texts (Araz, et al.2020) (Cockcroft, et al. 2018). This access to comprehensive data improves financial accounting, reporting, and decision-making, leading to enhanced transparency and utility of information for all parties involved in the financial ecosystem (Duan, et al. 2019) (Óskarsdóttir, 2019)

However, along with these benefits come challenges associated with data security, privacy concerns, and the requirement for advanced analytical skills among decision-makers (Yasmin, 2020) (Araz, 2020): [1]. Research studies have explored the adoption of Big Data analytics within small-scale enterprises, manufacturing industries, service industries, and even global markets like South Africa and Nigeria[3][4]. Additionally, there is evidence suggesting that the successful implementation of Big Data analytics impacts not only firms' financial performance but also nonfinancial aspects of their operations[4]. In summary, Big Data analytics offers valuable insights for financial decision-making, yet it requires careful consideration of its implications regarding data governance, privacy, and skill development among professionals.

Some examples of Big Data analytics in financial decision-making include (Araz, 2020) (Iqbal, 2020): (1) Improved financial accounting and reporting: By leveraging Big Data, financial institutions gain access to more accurate and timely information derived from various sources, enhancing financial accounting practices and providing greater transparency. (2) Enhanced risk assessment and fraud detection: Utilizing machine learning algorithms and predictive modeling techniques, Big Data analytics helps identify patterns and anomalies in transactional data, enabling early warning systems against potential risks or fraudulent activities. (3) Personalized customer experiences: Analyzing customer behavior through social media interactions, purchase histories, and other digital footprints allows banks and investment firms to tailor products and services to individual customers' needs, improving customer retention rates. (4) Supply chain optimization: Big Data analytics supports efficient inventory management, demand forecasting, and logistics planning, ultimately reducing costs and increasing profitability. (5) Real-time trading strategies\*: High-frequency trading relies on Big Data analytics to make rapid decisions based on market dynamics, allowing traders to capitalize on short-term price movements. (6) Credit scoring and loan underwriting: Big Data analytics assists lenders in assessing borrowers' creditworthiness by incorporating alternative data sources beyond traditional credit scores, thereby expanding access to credit for underserved populations. These examples demonstrate how Big Data analytics contributes to innovative solutions and competitive advantages in financial decision-making processes. However, it is essential to consider the challenges associated with implementing Big Data analytics, such as data security, privacy, and the need for advanced analytical skills among decision-makers.

Big Data analytics can improve various financial decision-making processes, including (Iqbal, 2020) (Dubey, 2019) (Shen, 2018) : (1) Risk assessment and fraud detection: Big Data analytics can help identify patterns and anomalies in transactional data, enabling early warning systems against potential risks or fraudulent activities. (2) Credit scoring and loan underwriting: Big Data analytics assists lenders in assessing borrowers' creditworthiness by incorporating alternative data sources beyond traditional credit scores, thereby expanding access to credit for underserved populations. (3) Supply chain optimization: Big Data analytics supports efficient inventory management, demand forecasting, and logistics planning, ultimately reducing costs and increasing profitability. (4) Real-time trading strategies: High-frequency trading relies on Big Data analytics to make rapid decisions based on market dynamics, allowing traders to capitalize on short-term price movements. (5) Financial reporting and managerial accounting: Big Data analytics can improve the quality and relevance of accounting information in financial accounting, resulting in increased transparency and utility of information for auditors, management, and stakeholders in the decision-making process. (6) Personalized

customer experiences: Analyzing customer behavior through social media interactions, purchase histories, and other digital footprints allows banks and investment firms to tailor products and services to individual customers' needs, improving customer retention rates. These examples demonstrate how Big Data analytics contributes to innovative solutions and competitive advantages in financial decision-making processes. However, it is essential to consider the challenges associated with implementing Big Data analytics, such as data security, privacy, and the need for advanced analytical skills among decision-makers.

Big Data analytics can help financial institutions make more accurate predictions through several approaches (Cockcroft, 2018): (1) Machine learning models: Implementing machine learning algorithms, such as random forests, gradient boosting, and hybrid methods like Naive Bayes combined with other classifiers, can lead to precise predictions of loan defaults, credit card usage, account transactions, and financial risk identification (Shamim, 2019) (Duan, 2019). (2) Decision trees: Decision tree classifiers, such as those developed specifically for credit assessment problems in big data environments, offer competitive accuracy when applied to credit assessment tasks. (3) K-Nearest Neighbor algorithm: KNN demonstrates superiority over simpler techniques like Naive Bayes and Logistic Regression when dealing with highly skewed credit card fraud data. (4) Customer profiling: Big Data analytics can assist in creating profiles of customers based on their behavior, preferences, and historical transactions, helping financial institutions anticipate future actions and make more accurate predictions. (5) Market trend analysis: By analyzing vast amounts of data generated from social media, audio, video, photos, and textual information, financial institutions can track emerging trends and make more informed decisions. (6) Predictive maintenance: For financial institutions managing physical assets, Big Data analytics can enable predictive maintenance, ensuring equipment operates at peak efficiency while minimizing downtime and repair expenses. These methods contribute to more accurate predictions, which in turn facilitate better decision-making processes in financial institutions. However, it is essential to note that the success of Big Data analytics depends on the availability of relevant and reliable data, as well as the expertise of analysts who interpret the findings accurately.

The problematic phenomenon that is the main focus of this research is that although there is a lot of data available, there is still a gap in the application of appropriate analytical techniques to produce valuable insights for financial decision making. This is an obstacle to maximizing the potential of available data to inform better investment and risk management decisions. In this context, systematic research of the literature becomes relevant to identify the most effective approaches in applying Big Data analysis in financial decision making.

By investigating and summarizing existing research, it is hoped that this research can identify knowledge gaps or research gaps in the existing literature. Thus, this research will make a significant contribution in expanding understanding of the role of Big Data analysis in the context of financial decision making and provide direction for further research in improving and developing more effective analytical approaches.

## **Research Methods**

In this research, a systematic literature review method was carried out to investigate the use of Big Data analysis in financial decision making. The process starts with identifying relevant keywords such as "Big Data Analytics", "Financial Decision Making", and other related

terms. These keywords were used to search for related articles in various academic databases such as ScienceDirect, IEEE Xplore, Google Scholar, and ProQuest.

After conducting an initial search, articles relevant to this research topic were identified. Each article is then examined to determine its relevance to the research topic and its quality as a reliable source of information. Articles that did not fit the scope of the study or were of low quality were eliminated from the analysis.

In the next stage, the selected articles are analyzed in more depth to identify the main findings, research methods used, results and conclusions relevant to this research topic. This information is then compiled and synthesized to form a comprehensive understanding of the use of Big Data analysis in financial decision making.

This process was carried out systematically and transparently, with detailed records of each step taken in the research. Data obtained from selected articles were then critically analyzed to identify patterns, trends and key findings emerging in the literature.

The number of articles found and filtered during the search and research process will be recorded in detail to provide a clear picture of the scope and relevance of the literature used in this research. These steps ensure that the systematic literature review is carried out rigorously and meets high scientific standards, so that the results are reliable and useful for the development of knowledge in this field.

## **Results and Discussion**

In applying Big Data analysis in financial decision making, there are several key factors that are very important to consider. Here are some factors to pay attention to:

### **1. Data Quality**

Data quality is a very important aspect in the context of Big Data analysis. Accurate, complete and structured data forms a solid foundation for a reliable analysis process. When data does not meet expected quality standards, such as inaccuracy, inexactness, irregularity, or incompleteness, the resulting analysis results tend to be inaccurate or unreliable. For example, inaccurate data can lead to wrong conclusions, while incomplete or unstructured data can reduce the usefulness and relevance of analysis (Idil, 2018).

#### **Hypothesis 1:**

By considering the importance of data quality in Big Data analysis, the hypothesis around data quality states that high data quality will make a positive contribution to the success of Big Data analysis in the context of financial decision making. In other words, the higher the quality of the data used in the analysis process, the more accurate and reliable the resulting analysis results will be, which in turn will strengthen the financial decisions made by the company.

### **2. Data Security:**

Data Security: Data security is a very important factor in the context of using Big Data analytics, especially in financial environments where data is often sensitive and can be the target of cyber attacks. Ensuring data protection from unauthorized access and security breaches is key to maintaining integrity, confidentiality and trust in the analysis process. Because data security is a top priority, any leak or security incident can cause significant

financial losses, reputational harm, and potential legal repercussions for the company (Haddara, 2018).

**Hypothesis 2:**

Taking into account the importance of data security in the Big Data analysis environment, this hypothesis states that strong data protection will have a positive impact on the integrity and trust in the Big Data analysis process, especially in the financial context. This means that the higher the level of data protection implemented by the company, the stronger the integrity and trust that is maintained in the Big Data analysis process, which in turn will increase the reliability and relevance of the analysis results and financial decisions taken.

**3. Infrastructure Technology**

**Technology Infrastructure:** Adequate technology infrastructure is an important foundation to support the analysis of large and complex volumes of Big Data. This includes data storage systems that can accommodate large volumes of data, scalable computing capacity to process data quickly, as well as cloud technologies that can provide the flexibility and scalability required in Big Data analysis environments (Mishra, 2018).

**Hypothesis 3:**

Taking into account the important role of technological infrastructure in Big Data analysis, this hypothesis states that adequate investment in technological infrastructure will increase the efficiency and effectiveness of Big Data analysis in the context of financial decision making. This means that the more sophisticated the technological infrastructure a company has, the more capable the company is of storing, managing and analyzing data efficiently and effectively, which in turn will increase the company's ability to make appropriate and data-based financial decisions in an accurate and timely manner.

**4. Data Analysis Skills and Expertise**

**Data Analysis Skills and Expertise:** Data analysis skills and expertise are key components in the successful implementation of Big Data analysis. An individual's ability to use statistical analysis techniques, perform predictive modeling, and operate data analysis software effectively is critical to unraveling data complexity and generating valuable insights (Mishra, 2018).

**Hypothesis 4:**

By considering the vital role of data analysis skills and expertise in the context of Big Data analysis, this hypothesis states that a high level of skills and expertise in data analysis will make a significant contribution to the results of Big Data analysis in financial decision making. This means that the higher the data analysis skills and expertise possessed by a company's workforce, the more capable they are of generating more valuable insights from data, which will ultimately strengthen financial decisions taken based on Big Data analysis.

**5. Leadership and Organizational Culture**

**Leadership and Organizational Culture:** The role of supportive leadership and an organizational culture that promotes innovation and the use of data is crucial in the successful implementation of Big Data analysis. Organizations that have a culture that supports the use of data to support decision making tend to be better prepared to face digital change and are better able to get maximum benefits from Big Data analysis (Srinivasan, 2018).

**Hypothesis 5:**

By considering the important role of leadership and organizational culture in the context of Big Data analytics, this hypothesis states that supportive leadership and a progressive organizational culture will facilitate more successful adoption of Big Data analytics in financial decision making. In other words, the stronger the leadership role in supporting and promoting the use of data, and the more progressive the organizational culture in this regard, the more successful the implementation of Big Data analysis will be in supporting financial decision making in the company.

**6. Regulation and Compliance**

Regulatory compliance and compliance with data privacy regulations have a significant impact in the context of the use of Big Data analytics. Moreover, with regulations such as the GDPR (General Data Protection Regulation) in Europe or the PDP Law (Personal Data Protection Law) in Indonesia, companies are required to ensure that their customer data is carefully protected and that the use of that data complies with applicable regulations. (Jothimani, 2018).

**Hypothesis 6:**

Based on the important role played by regulation and compliance with data privacy in the Big Data analysis usage environment, this hypothesis states that the level of compliance with data privacy regulations and rules will increase trust and reliability in the use of Big Data analysis in financial decision making. This means that the higher the level of company compliance with applicable data privacy regulations and rules, the stronger the trust and reliability that is maintained in the process of using Big Data analysis, which in turn will increase the relevance and quality of financial decision making.

**7. Clear Business Goals**

Clear Business Goals: Finally, clear business goals should be a primary consideration in implementing Big Data analytics. Companies need to understand how Big Data analysis can provide added value in achieving their business goals, be it increasing operational efficiency, increasing customer satisfaction, or optimizing investment portfolios (Vanani, 2018).

**Hypothesis 7:**

A clear link between Big Data analysis and business objectives will increase the effectiveness and relevance of Big Data analysis in supporting corporate financial decision making.

## Research Framework

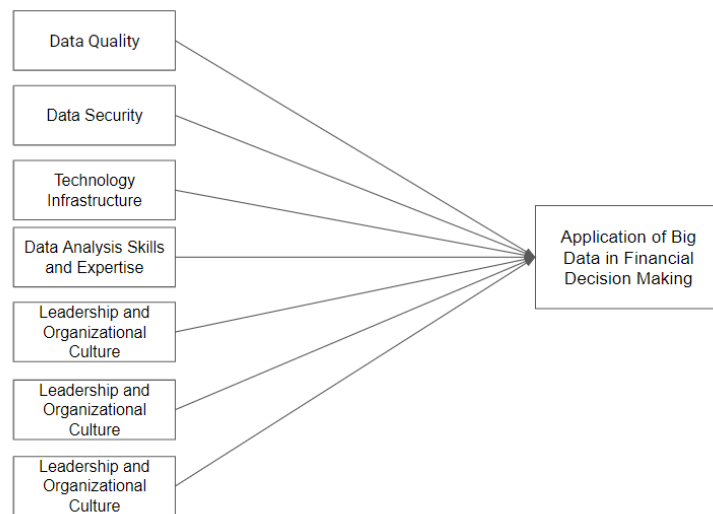


Figure 1 Research Framework

### Hypothesis:

1. The higher the quality of the data used in the analysis process, the more accurate and reliable the resulting analysis results will be, which in turn will strengthen the financial decisions made by the company.
2. The higher the level of data protection implemented by the company, the stronger the integrity and trust that is maintained in the Big Data analysis process, which in turn will increase the reliability and relevance of the analysis results and financial decisions taken.
3. The more sophisticated the technological infrastructure a company has, the more capable the company is of storing, managing and analyzing data efficiently and effectively, which in turn will increase the company's ability to make appropriate and data-based financial decisions in an accurate and timely manner.
4. The higher the data analysis skills and expertise possessed by a company's workforce, the more capable they are of generating more valuable insights from data, which will ultimately strengthen financial decisions taken based on Big Data analysis.
5. The stronger the leadership role in supporting and promoting the use of data, and the more progressive the organizational culture in this regard, the more successful the implementation of Big Data analysis will be in supporting financial decision making in the company.
6. The higher the level of company compliance with applicable data privacy regulations and regulations, the stronger the trust and reliability that is maintained in the process of using Big Data analysis, which in turn will increase the relevance and quality of financial decision making.
7. The clearer the company's business objectives will increase the effectiveness and relevance of Big Data analysis in supporting company financial decision making.

## Conclusion

In an era where data is the most important asset, Big Data analysis is the key to increasing the effectiveness of corporate financial decision making. Based on our literature review, we can conclude that factors such as data quality, data security, technology infrastructure, data analysis skills, organizational leadership, regulatory compliance, and clear business objectives all play an important role in the success of Big Data analytics. Holistic integration of these factors is the key to improving the financial decision-making process and providing added value to the company. Therefore, stakeholders, both from the management and regulatory side, need to pay attention to these factors comprehensively to ensure the successful application of Big Data analysis in the context of financial decision making.

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