A Qualitative Study on the Role of Big Data Technology in Influencing Capital Structure, Profitability, Dividend Policy, Firm Performance, Firm Value, and Sustainability

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ABSTRACT

This study seeks to explore how organizations perceive and utilize Big Data technology in shaping financial and sustainability strategies. This study also develops a new measurement for Big Data Technology variable. This study employs a qualitative research design using a multiple case study approach to gain in-depth insights into how firms adopt and interpret Big Data technology in relation to financial and sustainability outcomes. Data will be transcribed and coded using qualitative analysis software. Big Data Technology have a great effect on Capital Structure, Profitability, Dividend Policy, Firm Performance, Firm Value, and Sustainability. Big Data is not just a technological tool, but a strategic asset that supports integrated decision-making across both financial and non-financial performance areas. Future studies could use quantitative or mixed-method approaches to test hypotheses derived from this qualitative research, such as measuring the impact of Big Data maturity on profitability or ESG scores.

INTRODUCTION

In today's dynamic and digitally-driven business environment, the adoption of Big Data technology has emerged as a transformative force across industries (Xu et al., 2024). Big Data enables firms to collect, process, and analyze vast volumes of structured and unstructured data to derive actionable insights (Chaudhary & Alam, 2023). This technological advancement is increasingly being viewed not merely as an operational tool, but as a strategic asset that influences various dimensions of corporate decision-making, including financial and sustainability outcomes (Mikalef et al., 2020).

While quantitative studies have explored the measurable effects of technology adoption on firm performance indicators, there is a growing need for a deeper qualitative understanding of how Big Data technology influences the strategic financial behavior of firms. Specifically, questions remain about how Big Data affects capital structure decisions, enhances profitability, informs dividend policy, and improves both operational and financial performance. Moreover, the impact of Big Data on a firm's perceived value in the market and its approach to long-term sustainability and environmental, social, and governance (ESG) practices is still underexplored from an interpretative and managerial perspective (Junaedi, Panjaitan, et al., 2024).

This study aims to fill that gap by conducting a qualitative investigation into how firms leverage Big Data technology to influence financial strategies and corporate sustainability. By engaging with key decision-

makers, financial managers, and IT professionals through interviews and document analysis, this study seeks to provide insights into the thought processes, organizational dynamics, and perceived outcomes associated with Big Data initiatives. This study also develops a new measurement for Big Data Technology variable.

Ultimately, understanding the strategic role of Big Data in financial and sustainability contexts can help organizations better align technological investments with value creation, risk management, and long-term resilience. This study seeks to explore how organizations perceive and utilize Big Data technology in shaping financial and sustainability strategies. Based on the literature review, the following research questions are formulated:

1. How do firms perceive the role of Big Data technology in influencing their capital structure decisions?
2. In what ways does Big Data technology contribute to improving firm profitability from a managerial perspective?
3. How is Big Data utilized in guiding dividend policy decisions within firms?
4. What is the perceived impact of Big Data adoption on overall firm performance?
5. How do corporate leaders interpret the relationship between Big Data and firm value?
6. What are the experiences and strategies of firms in integrating Big Data into their sustainability and ESG initiatives?

LITERATURE REVIEW

Big Data and Capital Structure

Capital structure decisions involve determining the optimal mix of debt and equity. According to Modigliani and Miller's theory (1958), such decisions are crucial for maximizing firm value. Big Data, by providing predictive insights on market behavior and financial trends, it can enhance firms' ability to manage financial risks and make informed financing choices. Yet, how managers interpret and act upon Big Data in this context remains largely unexplored qualitatively.

Big Data and Profitability

Big Data analytics can identify cost-saving opportunities, optimize operations, and reveal consumer patterns, leading to improved profitability (Wamba et al., 2017). However, profitability is not merely a number, it reflects strategic decisions influenced by managerial perceptions, technological integration (Renaldo, Susanti, et al., 2024), and data interpretation, all of which are suitable for qualitative investigation.

Big Data and Dividend Policy

Dividend policy is a signal to investors regarding a company's financial health and future expectations. The role of Big Data in informing dividend-related decisions, such as cash flow forecasting and investor sentiment analysis, has not yet been adequately discussed in qualitative studies.

Big Data and Firm Performance

Firm performance, often measured through both financial and non-financial metrics, is deeply impacted by operational efficiency and strategic agility, areas where Big Data has shown promise. Studies have begun to quantify this effect, but a qualitative lens is essential to uncover how organizational culture, leadership, and capabilities affect the deployment of Big Data in performance enhancement.

Big Data and Firm Value

Firm value encompasses market perception, brand equity, and financial stability. The application of Big Data in risk analysis, customer relationship management, and innovation could potentially enhance firm value. However, the causal perceptions and strategic narratives from within firms remain a qualitative gap in the literature.

Big Data and Sustainability

Sustainability, especially within the ESG framework, has become a top priority for global enterprises. Big Data supports sustainability by enabling precise monitoring of environmental impact, social engagement, and governance practices. Nevertheless, the qualitative processes behind integrating Big Data into sustainability reporting and strategic planning are still insufficiently documented.
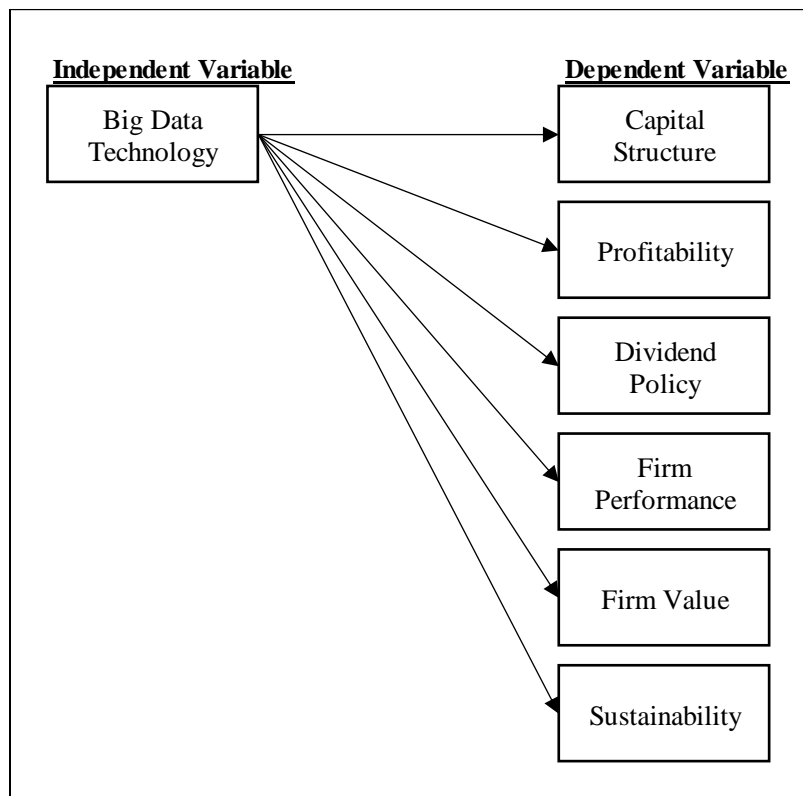
Research Framework

Figure 1. Research Framework

METHODOLOGY

Research Design

This study employs a qualitative research design using a multiple case study approach to gain in-depth insights into how firms adopt and interpret Big Data technology in relation to financial and sustainability outcomes.

Data Collection Methods

Semi-Structured Interviews: Conducted with key informants such as CFOs, financial analysts, IT/data managers, and sustainability officers in selected companies. Document Analysis: Analysis of internal reports, annual reports, ESG disclosures, and strategy documents that mention Big Data initiatives. Observation: Where possible, virtual or on-site observations of data-related processes can complement interviews.

Sampling Technique

Sample target medium to large firms known to have adopted Big Data technologies across various sectors (e.g., finance, manufacturing, technology, and retail). Sample size are 5–10 firms with 2–3 informants per firm, depending on data saturation.

Data Analysis

Thematic Analysis: Data will be transcribed and coded using qualitative analysis software (e.g., NVivo or ATLAS.ti). Themes will be identified through iterative coding to uncover patterns, similarities, and differences across cases. Triangulation: Cross-validation of findings through different sources (interviews, documents, and observation) to enhance reliability and credibility.

Trustworthiness

To ensure the credibility, transferability, dependability, and confirmability of the research: member checking will be conducted, an audit trail of decisions and coding will be maintained, reflexive journaling will be used to mitigate researcher bias.

RESULTS AND DISCUSSION

Big Data and Capital Structure: Enhancing Financial Risk Management

Most informants noted that Big Data analytics plays a significant role in forecasting financial risks, credit evaluation, and cash flow projection, all of which influence capital structure decisions. "We use predictive models based on historical and real-time data to decide whether to raise capital through debt or equity." (CFO, Manufacturing Firm).

These findings align with the view that Big Data can provide firms with deeper insights into financing risks and opportunities (Brynjolfsson & McAfee, 2014). The integration of advanced data analytics enables companies to process large volumes of internal and external financial data, ranging from market trends, interest rate movements, competitor behavior, to macroeconomic indicators, at unprecedented speed and accuracy. By doing so, firms are better equipped to assess their cost of capital, evaluate optimal debt-equity ratios, and simulate the outcomes of various capital structure scenarios under different risk assumptions.

However, the impact of Big Data on capital structure decisions is often indirect. Rather than serving as a rigid framework that dictates financial policy, Big Data acts as a decision support system (Mukhsin et al., 2024), enhancing managerial visibility and confidence. It provides nuanced insights that allow finance leaders to make more informed, agile, and context-sensitive judgments. For instance, real-time dashboards and predictive analytics do not replace financial expertise but augment strategic thinking by offering early warning signals and trend forecasts. This shift, from traditional intuition-based decisions to data-augmented strategies, represents a transformative but gradual evolution in financial decision-making paradigms.

Big Data and Profitability: Operational Efficiency and Market Responsiveness

Big Data is perceived as a key enabler of cost reduction, customer behavior analysis, and pricing optimization, which collectively contribute to improved profitability (Hocky & Renaldo, 2024). "By analyzing transaction patterns in real time, we were able to adjust product mix and reduce operational waste by 15%." (Data Manager, Retail Company).

This reinforces the strategic value of Big Data in achieving competitive advantage, consistent with Wamba et al. (2017), who emphasized the role of data analytics capabilities in improving organizational performance. Firms that successfully integrate Big Data into their operations often report increased efficiency, improved customer targeting, better demand forecasting, and faster decision-making. These advantages are not only operational but also strategic, enabling firms to respond more effectively to market dynamics and customer needs.

However, the realization of these benefits is not automatic. Successful outcomes depend heavily on the firm's data maturity, which includes the quality of data infrastructure, availability of skilled data professionals, and the sophistication of analytical tools in use. Equally important is management support, as leadership plays a crucial role in setting data-driven goals, allocating resources for data initiatives, and fostering a culture that embraces evidence-based decision-making. In organizations where leadership does not prioritize digital transformation (Junaedi, Renaldo, et al., 2024) or where departments work in silos, Big Data projects often struggle to deliver meaningful results. Therefore, the strategic value of Big Data is closely tied to an organization's ability to embed data thinking across all levels of its operations and culture.

Big Data and Dividend Policy: Informing Strategic Communication

Although not directly controlling dividend decisions, Big Data helps by providing accurate cash flow projections and stakeholder sentiment analysis. "We monitor shareholder reactions through social media analytics, which sometimes influences how we shape our dividend announcements." (Investor Relations Officer, Financial Sector).

This suggests a more nuanced role for Big Data, as a strategic communication tool in dividend policy (Renaldo, Octavellyn, et al., 2024), rather than a direct financial determinant per se. While traditional determinants of dividend policy include profitability, cash flow availability, and capital structure, the advent of Big Data allows firms to consider stakeholder sentiment, investor expectations, and market perception more deeply when shaping dividend announcements. By analyzing social media trends, investor forums, news analytics, and behavioral patterns of institutional shareholders, companies gain real-time insights into how their dividend decisions can be perceived.

Such data-driven insights enable management to align communication strategies with shareholder interests, thereby fostering transparency and trust (Hadi et al., 2024). For instance, if data indicates rising concerns among investors about the firm's liquidity, a dividend cut can be strategically communicated with supporting data that demonstrates prudent financial management during volatile periods. Conversely, if Big Data reveals positive

sentiment around recent earnings, firms can leverage that momentum to announce or maintain dividends to reinforce investor confidence. In this way, Big Data serves as a reputation management tool, enhancing the narrative surrounding dividend decisions without necessarily dictating the decision itself.

Big Data and Financial Performance: Data-Driven and Financial Success

High-performing firms attribute part of their success to a data-driven decision-making culture, where Big Data informs both tactical and strategic financial KPIs. "We've embedded analytics into every department, from HR to procurement. This cohesion has significantly improved our financial performance." (COO, Tech Company)

By utilizing Big Data to monitor and optimize various financial indicators, such as cash flow, cost control, and return on investment (ROI), firms are able to identify profitable opportunities and mitigate risks more effectively. The use of real-time financial analytics allows for more accurate forecasting, enabling firms to make quicker adjustments to their strategies. This enhanced financial agility helps high-performing firms respond to market changes more efficiently (Chandra et al., 2024), leading to improved profitability, cost efficiency, and overall financial stability.

Big Data empowers companies to track financial metrics more precisely, align their operational performance with financial goals, and achieve a more data-driven approach to maximizing shareholder value. As firms embrace Big Data across departments, they create a more integrated system that aligns both operational and financial goals, contributing to superior financial performance.

Big Data and Firm Value: Enhancing Investor Confidence

Informants noted that the use of Big Data in ESG reporting and operational transparency has led to stronger investor trust and higher firm valuation. "Our data-driven reporting on carbon emissions impressed institutional investors and raised our ESG score." (Sustainability Head, Energy Company).

This confirms that Big Data contributes to firm value not only through financial metrics but also through reputation and trust-building among stakeholders. While traditional financial indicators such as profitability, return on assets, and stock price are essential for evaluating firm value, Big Data enables companies to strengthen their intangible assets, such as brand reputation, transparency, and stakeholder trust. Through the use of advanced analytics, firms can monitor and respond to consumer sentiment, social media trends, and public perceptions in real-time.

By providing more transparency into operations, financial health, and corporate social responsibility (CSR) efforts, companies can enhance their public image and strengthen relationships with customers, investors, and other stakeholders. For example, companies that use Big Data to track and report their environmental impact, customer satisfaction,

Big Data and Sustainability: Precision, Accountability, and Innovation

Firms are increasingly using Big Data for sustainability performance monitoring, especially in tracking emissions, energy use, and supply chain ethics. "Real-time sensors help us monitor environmental compliance across sites, which we report through our sustainability dashboard." (ESG Manager, Manufacturing Firm).

These insights highlight the critical role of Big Data in advancing sustainable innovation and ensuring regulatory compliance, aligning with global Environmental, Social, and Governance (ESG) standards and the Sustainable Development Goals (SDGs). As businesses increasingly face pressure to operate sustainably and transparently, Big Data provides the tools necessary to measure, track, and optimize their environmental and social impact. By leveraging vast datasets, companies can gain actionable insights into their resource usage, waste production, carbon emissions, and supply chain sustainability, enabling them to make data-driven decisions that reduce their ecological footprint and meet regulatory requirements.

Big Data also plays a pivotal role in aligning corporate strategies with ESG criteria, offering insights that help firms understand how their practices align with global sustainability targets. For example, real-time data on energy consumption and waste management can help companies reduce their environmental impact while ensuring compliance with increasingly stringent environmental regulations. Furthermore, by utilizing Big Data for transparent reporting, companies can demonstrate their commitment to social responsibility and governance standards, building trust with investors, regulators, and consumers.

Additionally, as global demand for sustainable products and services continues to rise, Big Data enables companies to innovate and develop solutions that not only meet regulatory expectations but also capitalize on emerging green technologies and sustainable business practices. This integration of Big Data into sustainability strategies fosters innovation, enhances compliance, and contributes significantly to the realization of the SDGs, positioning firms as leaders in the transition toward a more sustainable and responsible future.

Measuring Big Data Technology Implementation (BDT Score)

Since Big Data is not directly a numerical variable, we can create a composite index or proxy (BDT Index) using indicators such as:

- Existence of data analytics infrastructure (e.g., Hadoop, Spark)

- Investment in data technology (annual $ amount or % of IT budget)

- Number of data analytics staff

- Use of predictive analytics in decision-making

- Integration of data analytics across departments

- Frequency of data-driven decision-making reported in annual reports

Formula (BDT Score):

$$\text{BDT Score} = \frac{1}{n} \sum_{i=1}^{n} I_i$$

Where:

- I_i = Indicator score (0–1 or Likert scale)

- n = Number of indicators used

Apart from using this method, can still use the calculation method with the following formula:

$$\text{Big Data Technology} = \frac{\text{Technology Investment}}{\text{Total Assets}}$$

Financial and Sustainability Outcome Formulas

Table 1. Formula for Each Dependent Variable

Variable	Formula/Indicator
Capital Structure	$\text{Debt-to-Equity Ratio} = \frac{Total\ Debt}{Shareholders'\ Equity}$
	$\text{Debt-to-Assets Ratio} = \frac{Total\ Debt}{Total\ Assets}$
Profitability	$\text{Return on Equity} = \frac{Net\ Income}{Shareholders'\ Equity}$
	$\text{Return on Assets} = \frac{Net\ Income}{Total\ Assets}$
Dividend Policy	$\text{Dividend Payout Ratio} = \frac{Dividends}{Net\ Income}$
Firm Performance	$\text{Earnings per Share} = \frac{Net\ Income - Preferred\ Dividends}{Average\ Outstanding\ Shares}$
	$\text{Operating Margin} = \frac{Operating\ Income}{Revenue}$
Firm Value	$\text{Tobin's Q} = \frac{Market\ Value\ of\ Firm}{Replacement\ Cost\ of\ Assets}$
	$\text{Market-to-Book Ratio} = \frac{Market\ Capitalization}{Book\ Value\ of\ Equity}$
Sustainability	ESG Score (from MSCI, Bloomberg, Refinitiv, or custom index)
	$\text{Carbon Emissions Reduction} = \frac{Base\ Emissions - Current\ Emissions}{Base\ Emmisions} x 100\%$

CONCLUSION

Conclusion

This study highlights the multifaceted role of Big Data in shaping financial strategies and sustainability practices in contemporary organizations. Through interviews with finance, IT, and sustainability leaders across sectors, the research finds that Big Data functions as both a decision support system and a strategic lever for value creation. Its applications span capital structure optimization, profitability enhancement, dividend signaling, performance monitoring, investor relations, and ESG integration.

That means Big Data Technology have a great effect on Capital Structure, Profitability, Dividend Policy, Firm Performance, Firm Value, and Sustainability. Big Data is not just a technological tool, but a strategic asset that supports integrated decision-making across both financial and non-financial performance areas.

While the adoption of Big Data is associated with improved financial and sustainability outcomes, its impact is mediated by organizational capabilities, leadership vision, and data maturity. The insights gathered reveal that firms that invest not only in data infrastructure but also in data culture and cross-functional collaboration are more likely to realize strategic gains from Big Data technology.

Implication

Theoretical: Enriches understanding of Big Data's strategic role in finance and sustainability. **Managerial**: Encourages firms to embed analytics into decision-making culture and align it with long-term value creation. **Policy**: Suggests that regulatory bodies and investors can increasingly expect transparent, data-driven ESG disclosures.

Limitation

The research involved a small number of firms across selected industries. While this allowed for in-depth exploration, the findings can not be fully generalizable to all sectors or firm sizes, particularly micro-enterprises or government entities. As with most qualitative research, the findings rely heavily on participants' self-reported experiences and interpretations. Despite efforts to ensure credibility through triangulation and member checking, some level of subjectivity and social desirability bias can remain.

Recommendation

Firms should align Big Data initiatives with core financial and sustainability goals to ensure coherence between technology investment and strategic priorities. Executive leadership must champion data-driven transformation by fostering a culture that values analytics and evidence-based decision-making. Continuous upskilling of financial and sustainability professionals in data literacy (Junaedi et al., 2023) and interpretation is essential to translate analytics into strategic actions. Breaking down silos and enabling collaboration among finance, IT, and ESG units will enhance the effectiveness of Big Data applications. Companies should establish robust data governance frameworks to ensure ethical use of Big Data, especially in areas involving personal or environmental data. Firms should periodically assess the return on Big Data investments not only in terms of financial gains but also in sustainability impacts and stakeholder value.

Future Research

Future studies could use quantitative or mixed-method approaches to test hypotheses derived from this qualitative research, such as measuring the impact of Big Data maturity on profitability or ESG scores. Comparative research across different countries or regions could reveal how regulatory environments, cultural values, and infrastructure affect the strategic adoption of Big Data. Further research could examine how Big Data interacts with AI, blockchain, and IoT within corporate sustainability and financial decision-making frameworks. Future work might explore the behavioral factors that affect managerial use of Big Data (e.g., cognitive bias, digital literacy) and address ethical concerns such as data privacy, fairness in algorithms, and greenwashing in ESG reporting.

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