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Enhancing Financial Reporting Quality: The Association between Alternative Data, Information Timeliness and Analytics Capabilities

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Abstract: Financial reports have traditionally relied on historical data, but this approach is increasingly inadequate in today's fast-moving and data-rich financial environment. While prior studies have examined individual types of alternative data, such as social media sentiment or web traffic, there has been a limited comprehensive evaluation of how these heterogeneous sources can be integrated with conventional reporting frameworks to enhance financial reporting quality (FRQ). This study, therefore, investigates the role and potential of alternative data, for example, social media sentiment, satellite imagery, geolocation traces, and ESG-related indicators, in addressing the limitations of conventional measures that are often slow, periodic, and unable to capture real-time market dynamics. A narrative review of the literature suggests that alternative data can improve forecasting accuracy, strengthen risk management, and enhance corporate governance; in particular, prior studies document gains in the predictive accuracy of earnings forecasts and a more granular understanding of market behaviour. At the same time, there are significant challenges related to data quality, ethical and lawful use, and the fragmented legal and regulatory environment for alternative data, especially in developing economies. Synthesising these insights, the paper develops a conceptual framework in which alternative data affect FRQ both directly and indirectly via information timeliness, with analytics capabilities acting as a boundary condition that shapes the magnitude of these effects. The study concludes that realising the potential of alternative data will require clearer regulatory guidance, robust data-governance practices, and cross-disciplinary collaboration so that these new data sources can be integrated responsibly with existing reporting systems and used to support more transparent and accountable financial decision-making.

Keywords: *Alternative Data, Financial Reporting, Analytic Capabilities, Risk Management, Corporate Governance*

1. Introduction

Conventional financial reporting, which consists of financial position, income statements, and cash flow statements, provides a record of a company's past performance and financial position. However, these reports are lacking in providing predictions on future outcomes or adaptation to sudden market changes (Brown et al., 2023). There is a greater demand for timely information that can provide forward-looking insights as business environments become more complex and technology advances. Stakeholders such as investors, regulators, and analysts are currently acquiring alternative data to assess performance and risks as it happens (Johnson & Liu, 2022). This demand has encouraged the need for alternative data, which provides support to conventional reporting and provides a broader view of both current conditions and future possibilities.

Alternative data refers to information obtained from non-conventional sources rather than standard financial statements. This alternative data is typically unstructured and generated across various platforms and activities. This data can provide insights that conventional records cannot capture, which include social media activity, satellite imagery, website traffic, geolocation data, and transaction records such as credit card or online purchases (Smith & Jackson, 2023). These sources provide real-time insights; for instance, social media sentiment reflects consumer opinions immediately, while satellite imagery can reveal trends in retail activity or supply chain disruptions. Advances in big data analytics and artificial intelligence have enhanced the capacity to process these large and complex datasets, increasing the practical utility of alternative data for financial analysis (Thompson, 2022). By complementing conventional financial reports, which often focus on past performance and are released with delays, alternative data enables companies and investors to have more accurate, timely, and informed decisions (Williams & Chen, 2023).

Conventional financial reporting continues to provide pertinent information regarding current economic activity—particularly in contexts where value is generated by software, data, and other intangibles—thereby decreasing decision usefulness at times when users require prompt and accurate signals (Duțescu, Stănilă, & Hoinaru, 2019; Giuseppe & Maccarrone, 2007). Alternative data provide high-frequency external signals that may suggest underlying conditions and enhance relevance beyond conventional indicators (Cumming & Glatzer, 2024; Sun, Liu, Xu, & Abraham, 2024; Green & Zhang, 2024), with empirical evidence of anticipated improvements in credit and risk contexts highlighting practical potential (Bai & Ma, 2024; Lu, Zhang, & Li, 2019). However, these advantages do not appear voluntarily: delays in audit and disclosure remain as significant challenges (Asmara & Situanti, 2018), and tangible enhancements depend on the analytics capabilities at the company level—managed processes, model validation, and lifecycle controls—to transform unverified inputs into assurance-ready evidence (Ekster & Kolm, 2021; Mitra, Hoang, Gladilin, & Mani, 2023). Furthermore, the accessibility, legality, and cost-effectiveness of alternative data vary significantly among countries, particularly in emerging economies where issues of privacy, origin, and access are more significant, hence complicating the generalisation of suggested methods (Zhang, 2024). The fundamental issue is to elucidate how alternative data enhances the quality of financial reporting via timeliness and to determine when such improvements are attainable considering capacity and contextual limitations (Duțescu et al., 2019; Sun et al., 2024).

Therefore, this study examines how alternative data can improve the accuracy, timeliness, and quality of financial reporting. Miller and Green (2023) revealed that alternative data provides real-time insights often missing from conventional financial sources, while Taylor et al. (2022) proved that social media sentiment, consumer behaviour, and satellite imagery enhance forecasting, strengthen risk management, and support more informed investment decisions. However, gaps remain, as only a few studies explore how to integrate alternative data into existing reporting systems or address regulatory compliance (Anderson & Wang, 2023). Although there are concerns in terms of data quality, ethical adherence and technological capacity, specifically in processing large volumes of unstructured information, as highlighted by Davis (2023), the use of alternative data significantly revolutionises financial reporting and investment analysis, enabling these financial metrics to provide more comprehensive, more timely and more actionable insights compared to conventional reporting.

There is a crucial need to explore the alternative data potential and practical application of alternative data integration for its significant benefits. To exemplify, Johnson and Kim (2023) only highlighted the use of individual data types, such as social media sentiment or web traffic in financial reporting, while Smith (2022) reported a limited number of studies on regulatory and ethical issues concerning data privacy and transparency in relation to the integration of alternative data into financial reporting. Therefore, this study aims to review current relevant literature on alternative data in financial reporting to further explore its impact on conventional metrics and the challenges, as well as trends about the integration of alternative data into financial reporting. With such insightful information, this study offers a deeper understanding of the practical benefits and limitations of alternative data integration, in addition to providing future research with potential directions.

2. Literature Review

Understanding Alternative Data

Conventional data is commonly structured accordingly to a standardised format, as seen in financial position and income statements. In comparison, alternative data is often unstructured with no fixed format, high in frequency, and derived from diverse forms and sources, such as social media, satellite imagery, and website traffic (Smith & Jackson, 2023). These features of alternative data necessitate the utilisation of advanced technological tools to optimise its usage. For example, machine learning and AI are required to process the high volume of information produced by alternative data. Correspondingly, this real-time high-frequency information also helps organisations and investors monitor market changes and make more strategic decisions (Taylor et al., 2022). Produced in various formats and forms, such as text, images, and transaction records, alternative data also provides more comprehensive insights into a company's performance as well as market conditions. Nevertheless, there is concern about the standardisation and integration of the data into

conventional financial reporting due to its unformatted and diverse forms (Miller & Green, 2023). Overall, these features make alternative data both valuable and challenging in modern financial analysis.

Alternative data is typically categorized into two types: publicly available and proprietary data. Publicly available data includes freely accessible sources such as government databases, social media and open-source websites, offering insights into consumer behaviour and market trends without extra cost (Thompson, 2022). Proprietary data, by contrast, is collected by commercial providers who sell specialised datasets. These are usually more structured and detailed, including aggregated consumer spending records, advanced geolocation analytics, and high-resolution satellite imagery (Anderson & Wang, 2023). Major providers like Bloomberg, FactSet, and PitchBook supply both data and analytical tools that enhance their use in financial analysis (Davis, 2023). Choosing between publicly available and proprietary data depends on analytical goals and resources, as each type offers unique opportunities and challenges.

The Role of Alternative Data in Financial Reporting

In comparison to conventional financial data, one key advantage of employing alternative data is that it provides a more comprehensive and detailed understanding of factors affecting financial performance, therefore improving forecasting, risk management, and market analysis of companies, as evidenced by a number of studies. To exemplify, a study by Johnson and Liu (2022) revealed that foot traffic data gathered using geolocation data allows companies to predict their quarterly earnings compared to relying only on past sales data. Also, companies can strategically identify market trends that enable them to adjust their strategies before official reports by instrumenting consumer opinions on social media as the data source (Miller & Green, 2023). In the field of agriculture, investors rely on the real-time performance of agricultural yields gained from satellite imagery instead of official statistics to make any significant financial decision (Taylor et al., 2022). In risk management, companies and investors instrument Environmental, Social, and Governance (ESG) metrics to identify sustainability-related risks, such as regulatory penalties or reputational harm (Williams & Chen, 2023).

Conventionally, structured financial data is used to only record past performance, but integrating alternative data, such as social media sentiment, geolocation patterns, and satellite imagery, enables analysts to gain a better understanding of a company's performance and market dynamics, thereby strategically responding to these circumstances (Smith & Jackson, 2023). Specifically, big data analytics and artificial intelligence (AI) can be optimised by organisations to efficiently process and interpret large, complex datasets. A study by Davis (2023) demonstrated the use of machine learning algorithms to identify patterns and correlations in massive datasets in the effort to improve prediction accuracy. According to Anderson and Wang (2023), a company's risk assessment models and decision-making process can be significantly improved by leveraging AI-driven analytics. Similarly, Thompson (2022) also noted the positive impact of technology integration in producing more accurate forecasts and strategic plans.

Williams & Chen (2023) asserted that timely and relevant information on consumer behaviour, market movements, and company performance gained from unstructured sources significantly helps investors in making strategic financial decisions, as they reflect current market trends. Miller & Green (2023) further exemplified the significance of alternative data compared to conventional financial reports in assessing market sentiment and potential risks before they appear in quarterly earnings reports through social media feedback and web traffic. This real-time information significantly reduces the delay caused by conventional financial metrics and allows for quicker investment decisions. Moreover, with such comprehensive information, market transparency can be improved, thereby reducing information gaps and promoting fairer markets (Thompson, 2022).

Challenges in Utilizing Alternative Data for Financial Reporting

A key challenge of using alternative data is ensuring it is accurate, complete and reliable. Unlike audited and standardised financial data, alternative data comes from unstructured sources without formal validation, raising trust concerns (Smith & Jackson, 2023). Missing or inconsistent data can reduce analysis accuracy and lead to wrong forecasts (Davis, 2023). It also contains noise, such as spam in social media posts, which can obscure real consumer sentiment (Miller & Green, 2023). Advanced analytics, including machine learning and AI, help filter out noise and improve insight quality (Thompson, 2022).

Privacy and regulatory compliance are also critical. Alternative data often includes personal information from social media, geolocation, or transactions (Smith, 2022). Laws like the GDPR and CCPA require informed consent and responsible, transparent use (Johnson & Kim, 2023). Financial institutions must balance compliance with using alternative data for competitive advantage (Anderson & Wang, 2023). Failure to comply can result in fines and reputational damage, making strong compliance measures essential (Taylor et al., 2022).

Combining alternative and conventional data is complex because they differ in structure, frequency, and format. Conventional financial data is structured and reported regularly, while alternative data is often unstructured, high-frequency, and comes from sources like social media, satellite images, or geolocation data (Smith & Jackson, 2023). Integrating them requires advanced technology to process and analyse large volumes of information in real time. A major challenge is storing and managing data, as systems designed for structured data may struggle with the scale and unstructured nature of alternative data (Taylor et al., 2022). Advanced analytics, including machine learning and AI, are needed to extract useful insights, which demands investment in high-performance computing and cloud storage (Davis, 2023). Strong data governance is also essential to ensure accuracy, consistency, and security. Without proper infrastructure, analytics, and governance, the benefits of integrating these data sources cannot be fully realised (Miller & Green, 2023).

Current Trends in Literature

Key findings indicate that alternative data enhances financial decision-making, forecasting accuracy, and risk management. Studies show that combining alternative data with conventional financial models improves predictions. For example, companies using social media sentiment data forecast stock price movements more accurately than those relying only on conventional reports (Johnson & Liu, 2022). Similarly, satellite imagery and geolocation data help analysts predict retail performance and supply chain trends, especially in volatile markets (Miller & Green, 2023). Incorporating Environmental, Social, and Governance (ESG) metrics also allows investors to identify sustainability and regulatory risks that conventional data may miss (Taylor et al., 2022). Despite these benefits, gaps remain in understanding how to integrate alternative data into financial reporting and manage its regulatory implications (Anderson & Wang, 2023).

Recent literature has examined hybrid financial reporting models that integrate alternative data with conventional metrics to provide a fuller view of company performance. These models address the limits of conventional reporting, which relies on historical, structured data and may miss real-time market changes (Brown et al., 2023). High-frequency alternative data, including social media sentiment, geolocation, and ESG metrics, can enhance the timeliness and detail of forecasts (Smith & Jackson, 2023). For example, combining quarterly earnings reports with daily alternative data allows companies to update investors more frequently on performance and risks (Johnson & Kim, 2023). Miller & Green (2023) revealed that machine learning algorithms help process large volumes of unstructured data and detect trends not visible in conventional statements. These models improve transparency and forecasting, but Taylor et al. (2022) cautioned about the challenges in terms of data standardisation, integration, and regulatory compliance. As they evolve, hybrid models have the potential to transform financial reporting by providing a more dynamic and comprehensive view of corporate health.

Alternative data provides deeper insights into company performance through ESG reporting and earnings forecasting. In corporate governance, data such as social media sentiment and employee reviews offer real-time feedback on reputation and organisational culture, helping boards and executives make better leadership and risk management decisions (Williams & Chen, 2023). Alternative data also improves ESG reporting; satellite imagery monitors environmental impacts, and geolocation data tracks supply chain sustainability, enabling faster and more accurate risk assessment than conventional reports (Johnson & Liu, 2022). In earnings forecasting, combining alternative data with conventional financial metrics increases accuracy—for example, social media and online transaction data better predict sales trends (Thompson, 2022). Overall, alternative data enhances decision-making by providing detailed, real-time insights, though challenges remain regarding data quality, ethics, and regulatory compliance (Smith & Jackson, 2023). As these sources expand, they are expected to play an even larger role in governance and forecasting, offering more timely and forward-looking information.

Below is a table summarising empirical evidence on alternative data sources in financial reporting from 2020-2024:

Table 1: Representative empirical evidence on alternative data and financial reporting (2020-2024)

Author(s)	Year	Title	Method	Main Findings
Johnson & Liu	2022	Leveraging Social Media Sentiment for Earnings Forecasting	Empirical analysis using social media sentiment data	Integrating social media sentiment improves earnings forecasts by providing real-time insights into consumer behaviour.
Smith & Jackson	2023	The Role of Alternative Data in Enhancing Financial Transparency	Case study analysis with geolocation and web traffic data	Alternative data, such as geolocation and web traffic, offers valuable insights that enhance market transparency and forecasting.
Miller & Green	2023	The Impact of Satellite Imagery on Retail and Supply Chain Forecasting	Satellite data analysis applied to the retail sector	Satellite imagery significantly improves supply chain analysis by providing real-time data on inventory levels and logistics.
Anderson & Wang	2023	Integrating ESG Metrics and Alternative Data in Financial Reporting	Mixed-methods study involving ESG metrics and financial performance	ESG metrics, when combined with alternative data like social media and satellite imagery, provide more comprehensive risk assessments.
Thompson	2022	Big Data Analytics in Financial Markets: A Review of Alternative Data Applications	Literature review of big data analytics applied to financial markets	Big data analytics, particularly AI-driven methods, enhance the accuracy of market analysis and financial decision-making when using alternative data.
Williams & Chen	2023	Real-Time Data for Corporate Governance and Investor Decision-Making	Quantitative analysis of social media and corporate reputation	Social media data helps companies and investors better assess corporate governance and reputational risks in real time.

Recent studies show that integrating alternative data into financial reporting improves transparency, forecasting, and risk management. Including real-time social media sentiment in earnings forecasts enhances accuracy by providing immediate insights into consumer behaviour (Johnson & Liu, 2022). Geolocation and web traffic data add detailed insights that complement conventional financial metrics, increasing market transparency (Smith & Jackson, 2023). Satellite imagery helps track inventory and logistics in fast-changing markets, improving retail and supply chain forecasts (Miller & Green, 2023). Combining ESG metrics with alternative data such as social media sentiment and satellite imagery provides a more complete assessment of corporate risks, particularly in sustainability and governance (Anderson & Wang, 2023). AI analytics can process large volumes of alternative data to enhance market analysis and financial decisions (Thompson, 2022). Real-time alternative data also enables companies and investors to evaluate reputational risks and make timely decisions (Williams & Chen, 2023). Overall, combining alternative and conventional data enhances the timeliness, accuracy, and comprehensiveness of financial reporting and forecasting.

The studies discussed in Table 1 demonstrate that alternative data are not only beneficial for trading or forecasting independently, but they also directly relate to the components of financial reporting quality. Social media sentiment and site traffic metrics enhance earnings projections and risk evaluations, hence facilitating more accurate estimations and narrative disclosures. Satellite imaging and geolocation data provide earlier and more comprehensive evidence of operational circumstances in retail and supply chains, facilitating more prompt recognition of revenues, expenses, and associated risks. ESG-focused alternative data enhances the scope of non-financial exposures that are becoming increasingly crucial to users' decision-making processes. From the perspective of the IASB, these contributions align with relevance, faithful representation, and timeliness, indicating that alternative data can improve financial reporting quality both directly, by broadening

the evidential foundation of reports, and indirectly, by reducing the information cycle during which preparers and auditors make their assessments.

Opportunities and Future Directions

Current research on alternative data in financial reporting identifies areas needing further study. One key gap is how to integrate alternative data effectively into existing financial reporting systems. Although alternative data can improve forecasting and risk assessment (Johnson & Liu, 2022; Smith & Jackson, 2023), few models show how companies can systematically combine structured financial data with unstructured, high-frequency alternative data. Future research could develop standardised methods and best practices for merging these data types, improving consistency, reliability, and practical use in financial reporting.

Another important area is the regulatory and ethical use of alternative data, especially regarding privacy and potential misuse. Laws such as the GDPR and CCPA provide guidance on personal data, but their application to alternative data in financial decisions remains unclear (Anderson & Wang, 2023). Future studies integrating law, technology, and finance could clarify regulatory issues and guide ethical practices. Research could also examine how financial institutions ensure that alternative data from third-party vendors complies with legal requirements, remains accurate, and maintains transparency and accountability.

Another promising area for future research is the technology needed to manage alternative data. While advanced analytics, machine learning, and AI play a key role in processing large volumes of unstructured data (Thompson, 2022), few studies address the practical challenges companies face in adopting these technologies. Small and mid-sized companies may struggle to implement advanced systems. Future research could explore scalable solutions that allow organisations of different sizes to use alternative data effectively without overloading existing operations and IT systems.

Policymakers, industry professionals, and researchers should collaborate to develop frameworks that maximise the benefits of alternative data, as such frameworks can further foster transparency, standardisation, and ethical use in financial reporting. Noteworthy, such frameworks can also involve cross-disciplinary research in finance, data science, and law, making them more strategic and comprehensive. Also to be recommended are policies addressing data governance, quality control, and privacy protection to ensure efficient and responsible usage of alternative data.

3. Methodology

This study adopts a narrative review to theorise how alternative data shape financial reporting quality (FRQ) through the mediating role of information timeliness and moderated by analytics capabilities. A narrative approach is appropriate to a question that cuts across heterogeneous evidence, such as accounting, finance, information systems, and practitioner guidance, where the goal is integrative sense-making rather than meta-analytic estimation. The design is concept-driven; alternative data operate as the independent input, information timeliness serves as the mediating mechanism, analytics capabilities act as the moderator, and FRQ is the outcome. To maintain transparency and replicability, this review is based on a Scopus database, with a written protocol covering the search string, search date, inclusion and exclusion criteria, a two-stage screening workflow by independent reviewers, and a structured coding plan. Although the synthesis is narrative, the procedure retains systematic elements—decision logs, a standardised extraction template, and inter-coder reliability checks—so that the propositions emerge from a disciplined reading of the field and remain testable in subsequent empirical work.

The review begins by framing the problem and aligning constructs, establishing working definitions and operational boundaries for alternative data, information timeliness, analytics capabilities, and FRQ, and mapping their theorised interrelations. A protocol is then finalised, specifying Scopus as the main source, Title–Abstract–Keyword fields as the search domain, the search date of 17 July 2025, eligibility rules, and the coding and synthesis approach. The comprehensive search is executed as specified; all records are exported with complete bibliographic metadata. Screening proceeds in two stages—titles and abstracts, followed by full texts—conducted independently by two reviewers, with disagreements resolved through discussion and reasons for exclusion recorded in a decision log.

For each included item, data extraction captures study design, context, the nature and provenance of alternative data, timeliness proxies, such as audit delay or disclosure lag, indicators of analytics capabilities, such as data governance arrangements, business intelligence or machine-learning use, and model lifecycle controls, and FRQ indicators aligned to the conceptual framework. Integrative thematic analysis then combines a deductive codebook rooted in the four constructs with inductive coding to allow new subthemes to surface, after which themes are mapped to the mediation pathway and the moderation. Internal validity is strengthened through inter-coder agreement checks (target Cohen's $\kappa \geq 0.70$), sensitivity analyses by outlet type and time window, and reflexive consideration of publication and disciplinary biases.

All material is sourced from Scopus to take advantage of its multidisciplinary coverage and consistent metadata, which are conducive to concept-driven synthesis. The search was conducted on 17 July 2025 across Title, Abstract and Keywords using the pre-specified string:

"(alternative data" OR "non-traditional data" OR "big data" OR "external data") AND ("information timeliness" OR "data timeliness" OR "reporting speed" OR "information latency") AND ("analytics" OR "data analysis" OR "business intelligence" OR "predictive analytics") AND ("financial reporting" OR "financial statements" OR "accounting reports" OR "financial disclosure") AND ("quality" OR "accuracy" OR "reliability" OR "integrity").

No language filters are applied at the search stage to avoid premature exclusion. However, items are excluded at full-text review if adequate translation is not feasible. Inclusion criteria encompass peer-reviewed journal articles and scholarly books or chapters that examine or theorise alternative data in finance or business, address information timeliness or reporting delays, discuss analytics capabilities, and operationalise or theorise FRQ. Exclusions cover technical without reporting implications, studies confined to market microstructure with no link to reporting, non-scholarly commentary, duplicates, and records without accessible full texts. Screening begins with de-duplication, followed by title/abstract checks and then full-text assessment, with every exclusion reason recorded. Forward and backward citation chaining is undertaken within Scopus on seed papers to reduce the risk of omission; any additional records are subjected to the same screening protocol.

Data extraction follows a standard template to facilitate cross-study comparison. This study records bibliographic details, method, domain, alternative data source and structure, for instance, social media sentiment, geolocation, IoT telemetry or web traffic, the operationalisation of timeliness, such as days from year-end to report release, regulatory filing lags, or data refresh cycles, proxies for analytics capabilities, for example, the evidence of analytics infrastructure and staffing, data governance maturity, model validation practices, and FRQ outcomes, which include accruals quality, restatement incidence, readability or clarity measures, and timeliness as an enhancing characteristic. This detail enables the subsequent synthesis to tie specific evidence to the hypothesised mechanisms and contingencies.

Themes are then aggregated and arranged into a concept that explicitly links bodies of evidence to the three propositions: the direct effect of alternative data on FRQ (P1), the mediating role of timeliness in the alternative data (P2), and the moderation of analytics capabilities on the alternative data (P3), which together imply a strengthened indirect effect on FRQ. Collectively, the procedures ensure that the evidence base is assembled and synthesised to speak directly to the study aim: developing a conceptual framework with three propositions that is theoretically rigorous yet readily operationalised for empirical testing in future research.

The narrative review converges on six cross-cutting themes that explain how alternative data can enhance FRQ, why information timeliness operates as the principal mechanism, and when analytics capabilities strengthen these effects. Table 1 summarises the themes, key findings, brief descriptions, representative sources and linkages to the study propositions.

Table 2: Thematic synthesis linking alternative data, timeliness, analytics capabilities and financial reporting quality

Theme	Key Findings	Brief Description	Sources
Alternative data delivers orthogonal, decision-useful signals	Alternative data provide economically meaningful information beyond conventional indicators	Non-conventional, often unstructured signals (e.g., social media, geolocation, telemetry) add predictive and explanatory power for company fundamentals and disclosure-relevant events	Saivasan & Lokhande (2024); Sun et al. (2024); Cumming & Glatzer (2024); Green & Zhang (2024)
Timeliness as the conduit to FRQ	Information timeliness mediates the Alternative data	High-frequency Alternative data compresses information cycles; earlier visibility of conditions later recognised in reports increases decision usefulness	Duțescu et al. (2019); Giuseppe & Maccarrone (2007); Asmara & Situanti (2018)
Analytics capabilities as a boundary condition	Analytics capabilities intensify gains from Alternative data by accelerating signal extraction and quality control	Data governance, feature engineering, BI/ML tooling, and model-risk controls convert noisy Alternative data into reliable, auditable insights, thereby speeding timeliness	Mitra et al. (2023); Ekster & Kolm (2021)
Governance, privacy, and provenance risks	Weak controls over Alternative data (collection, consent, lineage) can undermine credibility and FRQ	Risks include unlawful collection, unauthorised use, leakage, and poor provenance; robust controls are necessary for decision-useful reporting	Zhang (2024)
Dynamic Alternative data landscape and alpha decay	Alternative data value is non-stationary; benefits erode without continuous monitoring and adaptation	Regulatory shifts, market learning, and technological change cause alpha decay; sustained FRQ benefits require ongoing recalibration of pipelines	Green & Zhang (2024); Ekster & Kolm (2021)
Outcome relevance in adjacent domains	Alternative data improves prediction and monitoring in credit and asset management	Field and practitioner evidence (e.g., default prediction, active management) indicates practical gains with plausible spillovers to reporting processes	Bai & Ma (2024); Green & Zhang (2024); Lu et al. (2019)

Table 1 summarises various studies and their respective contributions, whereas Table 2 synthesises these findings into general concepts that reflect the organisation of this study's conceptual framework. The initial two themes illustrate how alternative data produces supplementary, unconventional signals and, crucially, how its worth is actualised through expedited information cycles, which precisely aligns with the function characterised as information timeliness in connecting alternative data to the quality of financial reporting. The third and fifth themes emphasise that these benefits are not inherent; they rely on analytical capabilities and the capacity to modify models in response to evolving regulations, markets, and technology, so confirming our characterisation of analytical capabilities as a boundary condition. The residual themes concerning governance, privacy, and provenance highlight the prevailing institutional and data-governance landscape, emphasising that inadequately managed alternative data can compromise credibility and negate possible improvements in reporting quality. The themes in Table 2 thus serve as a foundation for transitioning from study-level evidence to the mediated and regulated links outlined in the conceptual model.

Overall, the literature indicates that alternative data yield orthogonal, decision-useful signals capable of enhancing FRQ by enriching relevance and supporting faithful representation, thereby substantiating a direct link to FRQ (Cumming & Glatzer, 2024; Green & Zhang, 2024; Saivasan & Lokhande, 2024; Sun et al., 2024). The core mechanism is information timeliness: because alternative data arrive at a higher frequency and often pre-signal economic events, they shorten the information cycle and enable users to act before information loses

value, consistent with the IASB's emphasis on timeliness and with evidence on the effects of reporting delay (Asmara & Situanti, 2018; Duțescu et al., 2019; Giuseppe & Maccarrone, 2007).

The effect of this mediated pathway depends on analytics capabilities, the routines, infrastructure, and controls that convert unverified inputs into auditable insights at speed—so that stronger capabilities compress latency and stabilise model performance, positively moderating the link (Ekster & Kolm, 2021; Mitra et al., 2023). The positive outcomes are dependent on reliable governance and provenance; privacy violations, illegal data acquisition, or inadequate lineage can undermine trust and diminish quality improvements, hence moderating the actual effects of H1–H3 (Zhang, 2024). Furthermore, due to the dynamic nature of the alternative-data ecosystem—affected by alpha decay, regulatory changes, and technological advancements—sustaining FRQ enhancements necessitates ongoing monitoring and recalibration. This assertion is supported by outcome-based evidence from credit risk and active management, which indicates the practical feasibility and external validity of the proposed model (Bai & Ma, 2024; Green & Zhang, 2024; Lu et al., 2019).

4. Development of the Theoretical Framework

The theoretical framework incorporates three interrelated perspectives: (i) the IASB Conceptual Framework for Financial Reporting, which grounds Financial Reporting Quality (FRQ) in relevance and faithful representation, enhanced by timeliness (Duțescu et al., 2019); (ii) information economics, focusing on signalling and information asymmetry, which elucidates how prior credible signals mitigate the preparer–user gap; and (iii) the resource-based view (RBV) and dynamic capabilities, which regard analytics capabilities as organisation-specific practices that convert data into decision-useful information (Ekster & Kolm, 2021; Mitra et al., 2023). In the fields of finance and data science, alternative data has demonstrated the capacity to provide distinct insights into company fundamentals, enhancing prediction and monitoring when managed responsibly (Cumming & Glatzer, 2024; Green & Zhang, 2024; Sun et al., 2024). This triangulation prompts a comprehensive explanation of how and when alternative data can improve FRQ, emphasising information timeliness as the key mechanism.

This study theorised alternative data as upstream inputs that pre-signal conditions later recognised in formal reports, thereby compressing information latency and increasing decision usefulness (Bai & Ma, 2024; Sun et al., 2024). Within the IASB frame, timeliness elevates the utility of relevant, faithfully represented information by ensuring it arrives before its value decays (Duțescu et al., 2019). Empirical evidence that audit delay impairs timeliness strengthens the case for modelling timeliness as the conduit through which alternative data influence FRQ (Asmara & Situanti, 2018; Giuseppe & Maccarrone, 2007). Because extracting reliable signals from noisy alternative data requires governance, tooling, and skilled routines, analytics capabilities are posited to condition the speed and quality of this translation (Ekster & Kolm, 2021; Mitra et al., 2023). In short, the setting is one where data velocity meets reporting discipline, and capabilities determine whether benefits materialise.

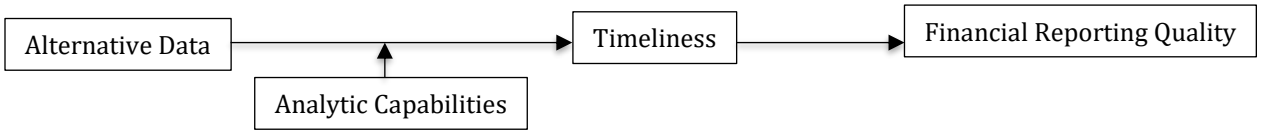
Theoretically, this synthesis contributes in three ways. It reinterprets timeliness as an active mechanism rather than a passive attribute, aligning contemporary data realities with the IASB's qualitative characteristics (Duțescu et al., 2019). It embeds signalling logic: earlier, verifiable alternative data-based insights operate as credible signals when supported by governance and model controls, reducing information asymmetry. And it operationalises both RBV and dynamic capabilities by treating analytics capabilities as the boundary condition explaining heterogeneous payoffs from alternative data (Ekster & Kolm, 2021; Mitra et al., 2023). The literature on asset management and credit risk offers external validity cues that alternative data can materially improve prediction and monitoring, strengthening the plausibility of propositions in the reporting domain (Bai & Ma, 2024; Green & Zhang, 2024). At the same time, dynamic features of alternative data imply that capability renewal is necessary to sustain benefits (Green & Zhang, 2024; Sun et al., 2024).

Practically, the framework points Chief Financial Officers, audit committees, and regulators toward investments with the highest marginal impact on FRQ: (i) (i) build governed alternative data infrastructures with documented provenance and consent; (ii) institutionalise analytics capabilities (data quality controls, feature stores, model validation, monitoring for drift); and (iii) target latency-reducing processes around close, audit, and disclosure so that AD-derived insights are reflected promptly and verifiably in narrative and

numerical reporting (Ekster & Kolm, 2021; Mitra et al., 2023). Conclusion: By specifying alternative data as the driver, Timeliness as the mediator, and analytics capabilities as the moderator, the framework offers a clear, testable pathway by which organisations can translate high-velocity external signals into higher-quality financial reporting—coherent with accounting doctrine and consistent with contemporary evidence from finance and information systems (Asmara & Situanti, 2018; Duțescu et al., 2019; Green & Zhang, 2024).

Given the preceding discussions, Figure 1 illustrates the proposed theory of the study:

Figure 1: Proposed theoretical framework



Proposition Development

Alternative data and FRQ

Drawing on the IASB's Conceptual Framework, financial reporting quality (FRQ) is anchored in relevance and faithful representation, enhanced by characteristics such as timeliness, comparability, and verifiability (Duțescu et al., 2019). The finance and information-systems literatures increasingly show that alternative data—non-conventional, often unstructured traces such as social media sentiment, geolocation, IoT telemetry, and web traffic—carry information that is orthogonal to conventional accounting and market indicators (Cumming & Glatzer, 2024; Sun et al., 2024). By enriching the evidential base available to preparers and external users, alternative data can sharpen assessments of underlying economic events (e.g., demand shifts, operational disruptions, intangible asset utilisation), thereby improving the decision usefulness of reports and supporting a more faithful representation of economic substance (Giuseppe & Maccarrone, 2007; Sun et al., 2024).

Prior studies document incremental predictive power from alternative data in active asset management and risk analytics, suggesting economically meaningful signal content that can translate—directly and not only via faster disclosure—into higher-quality reporting narratives and estimates (Green & Zhang, 2024; Saivasan & Lokhande, 2024). Field evidence from credit contexts likewise shows material performance gains when alternative data are integrated responsibly into decision workflows (Bai & Ma, 2024). While later sections theorise information timeliness as a mechanism and analytics capabilities as a boundary condition, Proposition 1 isolates the direct relationship: even holding timeliness constant, richer, corroborative evidence streams can reduce measurement error, enhance verifiability, and improve the alignment between recognised amounts/disclosures and underlying phenomena (Duțescu et al., 2019; Green & Zhang, 2024; Sun et al., 2024).

Proposition 1 (P1): Alternative data are positively associated with financial reporting quality, such that greater breadth, depth, and integration of alternative data correspond to higher levels of relevance and faithful representation in financial reports, independent of information timeliness.

Timeliness Mediated the Alternative data and FRQ.

In the IASB's Conceptual Framework, timeliness is an enhancing qualitative characteristic that increases decision usefulness by ensuring information is available before its capacity to influence decisions diminishes (Duțescu et al., 2019). Alternative data (e.g., social media sentiment, geolocation, IoT telemetry, clickstream) arrive at a higher frequency than periodic reports and often pre-signal economic events that will later be recognised in financial statements (Cumming & Glatzer, 2024; Sun et al., 2024). By compressing information latency—shortening the interval between underlying business conditions and their observability—alternative data plausibly improve the relevance and faithful representation of disclosures through more timely recognition, measurement, and narrative corroboration (Duțescu et al., 2019; Giuseppe & Maccarrone, 2007).

Evidence on reporting delays emphasizes the centrality of timeliness: audit delay materially influences the speed of financial disclosures, with slower reporting eroding the usefulness of decisions (Asmara & Situanti, 2018). Parallel literatures in asset management and credit analytics document that alternative data enhances

early detection and monitoring, yielding incremental predictive content and faster updates to priors (Bai & Ma, 2024; Green & Zhang, 2024). Transposed to the reporting domain, the same high-frequency signals can accelerate preparers' ability to substantiate estimates, triangulate fair values, and update risk narratives, thereby improving financial reporting quality because the underlying information arrives sooner and is integrated more promptly into the reporting process (Duțescu et al., 2019; Sun et al., 2024).

The mediating pathway operates as follows: alternative data reduces information latency by bringing forward externally observable traces of company activity; reduced latency increases the timeliness of internal close, audit readiness, and disclosure cycles; improved timeliness, in turn, elevates financial reporting quality via more decision-useful recognition and disclosure. While analytics capabilities strengthen this conduit (addressed in Proposition 3), the mediation logic is distinct: even without assuming capability heterogeneity, earlier visibility of economic conditions channels the effect of alternative data into higher-quality reports through timeliness (Duțescu et al., 2019; Asmara & Situanti, 2018; Sun et al., 2024).

Proposition 2 (P2): Information timeliness mediates the relationship between alternative data and financial reporting quality, such that greater availability and integration of alternative data lead to faster information cycles, which in turn improve financial reporting quality.

Analytic Capabilities Moderated between Alternative Data and Timeliness

Within resource-based and dynamic-capabilities perspectives, analytics capabilities—spanning governed data pipelines, feature engineering, model validation, and lifecycle controls—constitute company-specific routines that convert noisy, high-variety inputs into reliable, decision-useful signals (Ekster & Kolm, 2021; Mitra et al., 2023). In the context of financial reporting, these routines determine the speed and quality with which alternative data are cleaned, fused with internal records, and translated into evidence that can be audited and embedded in estimates and disclosures. Because the IASB's Conceptual Framework positions timeliness as an enhancing characteristic that elevates the usefulness of relevant, faithfully represented information, any capability that compresses latency and stabilises signal quality should strengthen the alternative data towards the timeliness conduit (Duțescu et al., 2019). In short, stronger analytics capabilities make early signals earlier and cleaner, tightening the pathway from alternative data to timeliness.

Empirical plausibility and boundary conditions. Practice-facing literature reports that alternative data deliver incremental predictive content but also highlight non-stationarity and model-risk hazards that can quickly erode value without active monitoring and recalibration (Green & Zhang, 2024; Ekster & Kolm, 2021). Organisations with mature analytics capabilities are better placed to sustain signal integrity and throughput, thereby realising faster close, review, and disclosure cycles. Conversely, weak capability environments face privacy risks and operational frictions that slow ingestion and raise assurance hurdles, blunting the timeliness gains that alternative data could otherwise deliver (Mitra et al., 2023; Zhang, 2024). The moderation logic is asymmetric; capabilities enhance positive outcomes and mitigate adverse effects, resulting in a higher trend for alternative data regarding timeliness when capabilities are robust and an easier route when they are constrained.

Proposition 3 (P3): Analytics capabilities positively moderate the relationship between alternative data and information timeliness, such that the association between alternative data integration and timeliness is stronger at higher levels of analytics capabilities, thereby amplifying the indirect effect of alternative data on financial reporting quality.

5. Conclusion

This review paper began with a straightforward question: how, in practical terms, can alternative data improve the quality of financial reporting, and through what mechanisms do these effects operate inside the firm? The review suggests that the answer lies less in the mere availability of new data sources than in how organisations mobilise them to accelerate and enrich information flows. Real-time traces from social media activity, satellite imagery, geolocation and other non-traditional sources provide signals that sit alongside, rather than replace, conventional accounting inputs (Johnson & Liu, 2022; Smith & Jackson, 2023; Miller & Green, 2023). When these signals are processed through robust analytical pipelines, they sharpen assessments of economic

conditions, support more granular forecasting, and give both preparers and users of financial reports a clearer view of emerging risks and opportunities.

A central message of the review is that timeliness should be treated as an active mechanism rather than a passive reporting attribute. Alternative data matters because it can shorten the distance between underlying economic events and their appearance in decision-relevant information. The narrative synthesis highlighted six recurring ideas: alternative data provide incremental, decision-useful information; timeliness is the main channel through which that information becomes valuable for reporting; analytics capabilities help to accelerate and de-risk that channel; governance and provenance determine whether external traces are perceived as credible; the alternative-data ecosystem is fluid and subject to rapid alpha decay; and there is already strong evidence of outcome relevance in areas such as credit risk modelling and active asset management. These strands are brought together in a mediated–moderated framework in which alternative data affect reporting quality both directly and, more strongly, through faster information cycles that are particularly effective in organisations with more mature analytics capabilities.

The theoretical contribution follows from this reframing. By positioning timeliness as something that can be engineered through organisational design and technology choices, the paper extends conventional decision-usefulness arguments. It connects signalling theory—where earlier, verifiable external traces narrow information asymmetry between insiders and outsiders—with a resource-based view that treats analytics as a firm-specific capability for transforming noisy, heterogeneous inputs into auditable evidence. This perspective helps to explain why the same alternative data can generate very different reporting outcomes across firms: what matters is not only what data are available, but also how quickly they are processed, how models are governed, and how provenance, consent and data lineage are documented. The three propositions advanced in the paper are intended as a bridge between these conceptual ideas and empirically testable claims about financial reporting quality.

From a practical standpoint, the proposed framework has clear implications for preparers, auditors and regulators. For preparers, the priority is to build governed data pipelines that combine structured and unstructured sources, record provenance and permissions, and embed feature engineering and model validation within routine finance processes. Closing, review and disclosure timetables should be redesigned so that latency reduction is treated as a deliberate objective rather than a by-product. Audit committees can strengthen their oversight by linking measures of analytics capability to reporting quality indicators, insisting on model-risk controls and drift monitoring, and requiring reproducible data lineages for key estimates. Regulators, for their part, can lower uncertainty by issuing guidance on the use of external data in financial reporting, specifying minimum governance and transparency standards, and considering safe-harbour arrangements for timely, data-supported narrative disclosures. For the audit profession, the framework points towards assurance approaches that use external traces as corroborative evidence while upholding existing expectations around independence, quality control and ethics.

At the same time, there are clear boundaries to what this study can claim. The evidence base rests on a narrative review drawn from a single scholarly index, which inevitably leaves out some relevant work from adjacent disciplines, professional outlets and grey literature. Without meta-analytic effect-size estimates, it is not possible to speak with confidence about the magnitude of the relationships described. Although screening and coding procedures were designed to be transparent and to minimise bias, they remain subject to judgement. The constructs themselves—such as breadth and depth of alternative-data integration, timeliness beyond traditional audit-delay measures, and analytics-capability maturity—are still evolving in the literature, which complicates comparison across studies. Finally, the paper develops a set of mechanisms and propositions but does not directly estimate them, so causal claims remain, by design, provisional.

These limitations suggest several lines for future inquiry. One priority is the development of reliable and widely usable measures for alternative-data integration (for example, coverage, refresh frequency and provenance quality) and for analytics capabilities (including governance arrangements, technical tooling, staffing profiles and lifecycle controls). A second is to move beyond coarse timeliness indicators and examine finer-grained measures such as intra-period disclosure patterns, update frequencies, and machine-readable time stamps on key announcements. Third, the mediated–moderated framework would benefit from testing through a

combination of archival designs, field experiments embedded in reporting workflows, and longitudinal case studies of "close-to-disclosure" processes. Fourth, researchers could explore sectoral and jurisdictional variation, especially where external traces differ in sensitivity and availability and where data protection, confidentiality and assurance norms vary. A fifth avenue lies in examining how alternative data interact with integrated reporting, ESG and sustainability narratives, and the recognition and communication of intangible assets, building on prior discussions of how integrated reporting frameworks reshape national reporting systems (Ignatova & Shmarova, 2025).

Overall, the review and the proposed framework offer both an interpretive lens and a practical orientation. They suggest that organisations should approach alternative data as credible upstream evidence rather than as a peripheral add-on; invest in analytics capabilities that shorten information cycles without sacrificing robustness; and reconfigure reporting processes so that timely, well-corroborated insights are reflected transparently, and with appropriate safeguards, in financial communication. By making explicit where the gains are likely to be largest and by setting out propositions that can be taken forward in empirical work, the study aims to inform emerging standards and internal policies. The broader ambition is to support reporting practices that are not only faster and more comprehensive but also more faithful to underlying economic reality and more useful to the wide range of stakeholders who rely on them.

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