

Natural Language Processing for Evaluating Shariah Governance Disclosures and Investor Confidence in The Saudi Sukuk Market

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Abstract- This review paper examines how natural language processing (NLP) can be used to evaluate Shariah governance disclosures and strengthen investor confidence in the Saudi sukuk market. The topic is timely because Saudi Arabia has become one of the most influential sukuk jurisdictions, while regulators and standard setters are simultaneously increasing expectations around governance clarity, disclosure discipline, and market transparency. Yet the information environment surrounding sukuk remains uneven. Important Shariah governance signals are dispersed across prospectuses, annual reports, Shariah committee statements, risk-factor sections, transaction documents, exchange announcements, and post-issuance updates. Traditional manual reading remains valuable but is increasingly insufficient for comparing disclosure quality across issuers, structures, and reporting periods at scale. This paper therefore reviews recent literature from 2020 to 2026 on Shariah-related disclosure, Islamic finance governance, sukuk market development, and NLP-based analysis of financial narratives. Following a structured review design, sources were identified through Scopus, Web of Science, Google Scholar, ScienceDirect, SpringerLink, MDPI, and official Saudi and international institutional repositories. The review synthesizes evidence around five themes: the economics of disclosure and investor confidence; the distinct content of Shariah governance disclosure in Islamic finance; the current Saudi regulatory and market context; NLP methods suitable for Arabic-English financial texts; and implementation implications for issuers, regulators, rating agencies, and investors. The paper argues that NLP can move the market beyond generic transparency claims by converting narrative disclosures into measurable indicators of Shariah board independence, governance specificity, monitoring depth, uncertainty, readability, and consistency over time. It proposes a Saudi-oriented review framework in which disclosure analytics are used not to replace Shariah scholars or legal review, but to support comparability, early-warning detection, and evidence-based confidence formation. The review concludes that stronger, machine-readable, and

semantically richer Shariah governance disclosures can plausibly reduce information asymmetry, improve screening efficiency, support pricing discipline, and deepen confidence in Saudi sukuk among both domestic and international investors.

Index Terms- Natural Language Processing; Sukuk; Shariah Governance; Disclosure Quality; Investor Confidence; Saudi Arabia; Islamic Finance; Review Paper

I. INTRODUCTION

Saudi Arabia's debt capital market has become more strategically important as the Kingdom broadens financing channels, deepens domestic capital markets, and aligns financial-sector development with Vision 2030 and the Financial Sector Development Program. Within that evolution, sukuk occupy a distinctive position. They are not merely debt substitutes with Islamic branding. They are instruments whose legitimacy, marketability, and investor reception depend on legal structure, asset-linkage logic, contractual design, and credible Shariah governance. In Saudi Arabia, this matters even more because the market sits at the intersection of sovereign issuance, bank balance-sheet development, institutional investment, retail market innovation, and a broader effort to enhance transparency and investor protection (Capital Market Authority [CMA], 2024; Saudi Vision 2030, 2025; Saudi Exchange, 2025a).

Recent Saudi and international developments show that market depth alone does not eliminate information frictions. Sukuk investors still need to assess whether an issuance is not only financially sound but also convincingly governed from a Shariah perspective. That assessment depends on disclosures:

Who approved the structure? How clearly is the Shariah basis explained? How are compliance, purification, monitoring, and ongoing governance described? Are disclosures specific and decision-useful, or merely formulaic? Are risks, uncertainties, and post-issuance controls described in sufficient detail for investors to distinguish robust governance from symbolic assurance? These questions are especially important at a time when Saudi regulators are tightening Shariah governance expectations for financial institutions, while AAOIFI's work on sukuk standards has intensified debate over structure, authenticity, and disclosure quality (SAMA, 2024a, 2024b; AAOIFI, 2025; Nawaz, 2025).

The challenge is that the relevant information is largely narrative. Analysts, investors, and researchers must interpret substantial amounts of text spread across prospectuses, annual reports, board and committee reports, exchange announcements, sustainability reports, and risk-factor sections. Manual review can produce deep insight, but it is slow, expensive, and difficult to scale across issuers and time periods. That is where natural language processing becomes relevant. Across mainstream finance, textual analysis is increasingly used to examine sentiment, readability, uncertainty, topical emphasis, risk disclosure, and prediction of economically meaningful outcomes such as risk, profitability, and cost of capital (Bahoo et al., 2024; Todd et al., 2024; Dambra et al., 2024; Bogachek et al., 2025). In Islamic finance, the use of NLP remains comparatively limited, but recent studies already show how machine learning and textual analysis can extract meaningful signals from Islamic banks' annual reports and climate disclosures (Ali et al., 2025; Zafar et al., 2026).

This creates a clear review opportunity. The literature on Shariah governance disclosure has grown, but it is still fragmented across Islamic banking, governance indices, reporting studies, and broader disclosure-quality debates. Meanwhile, the Saudi sukuk market is advancing institutionally and commercially, yet the specific question of how NLP can evaluate Shariah governance disclosure and influence investor confidence has not been synthesized in a single review paper. Existing studies often examine performance, ratings, governance, or market growth

separately. They less often connect disclosure analytics, Saudi regulatory architecture, and investor confidence in a unified framework (Abdulrahman et al., 2024; Baig et al., 2024; Fitch Ratings, 2024; Islamic Financial Services Board [IFSB], 2025).

This paper addresses that gap. It reviews recent literature from 2020 to 2026 and asks how NLP can be used to evaluate Shariah governance disclosures in ways that are analytically robust and practically useful for the Saudi sukuk market. The review is intentionally interdisciplinary. It draws from Islamic finance, disclosure studies, capital-market research, NLP in finance, and Saudi regulatory and market sources. The paper's argument is not that textual analytics should replace juristic judgment, prospectus due diligence, or credit analysis. Rather, it argues that NLP can become a complementary governance technology: a way to convert dispersed narrative content into comparable indicators that help issuers improve transparency, help regulators monitor market discipline, and help investors form more confident judgments.

The rest of the paper is structured as follows. Section 2 defines the aim, unique objectives, and review questions. Section 3 explains the review procedure and methodology, including the keyword strategy and PRISMA-style screening flow. Section 4 develops the conceptual link between disclosure quality and investor confidence. Sections 5 through 8 synthesize the literature on Shariah governance disclosure, NLP methods, the Saudi institutional environment, and the proposed Saudi-oriented review framework. The final sections discuss implications, future research directions, and conclusions.

III. REVIEW PROCEDURE AND METHODOLOGY

3.1 Review Design

This study is a structured review paper rather than an empirical field study. Its design follows the sectioning logic and methodological discipline used in the sample review-paper format supplied by the user: introduction, analytical framework, review procedure, synthesis of findings, discussion, conclusion, and future research directions. A review methodology was chosen because the literature

relevant to the topic is heterogeneous. It includes conceptual papers on Shariah governance, empirical studies on disclosure and investor outcomes, market reports on sukuk development, regulatory documents, and methodological studies on NLP in finance. A narrow meta-analysis would therefore be unsuitable. A structured review with thematic synthesis is more appropriate for integrating diverse evidence while preserving practical relevance.

3.2 Databases and Search Strategy

The search process was conducted in March 2026 and focused on sources published from January 2020 to March 2026. Priority databases and platforms included Scopus, Web of Science, Google Scholar, ScienceDirect, SpringerLink, MDPI, Wiley Online Library, and selected finance and accounting journal sites. These were complemented by official repositories from SAMA, the CMA, Saudi Exchange, the Financial Sector Development Program, AAOIFI, IFSB, and LSEG/ICD.

Search strings were organized into four keyword groups. Group A covered the market and governance domain: “sukuk”, “Saudi sukuk”, “Islamic capital market”, “Shariah governance”, “Shariah board”, “Shariah disclosure”, and “Islamic finance transparency”. Group B covered disclosure and investor outcomes: “investor confidence”, “cost of capital”, “yield spread”, “credit rating”, “readability”, “financial disclosure”, “narrative reporting”, and “information asymmetry”. Group C covered NLP methods: “natural language processing”, “textual analysis”, “topic modeling”, “sentiment analysis”, “machine learning”, “readability analysis”, “transformer models”, and “financial narratives”. Group D combined these clusters into review-relevant queries, such as “NLP sukuk disclosure”, “Shariah governance disclosure investor confidence”, “Islamic banks annual report textual analysis”, and “Saudi Arabia sukuk market disclosure”.

3.3 Inclusion and Exclusion Criteria

Sources were included if they met at least three conditions. First, they were published between 2020 and 2026. Second, they addressed at least one of the following: Shariah governance or disclosure, sukuk market development, investor confidence or capital-market consequences of disclosure, or NLP/textual

analysis methods relevant to financial reporting. Third, they were published in peer-reviewed journals or issued by credible regulatory, standard-setting, or official institutional bodies. Sources were excluded when they were pre-2020, purely descriptive news pieces without analytical value, technical computer-science papers with no meaningful finance-disclosure relevance, or publications focused on Islamic finance themes unrelated to governance, disclosure, or market confidence.

3.4 Screening Logic and Final Sample

The initial search identified 214 records. After removing duplicates and near-duplicates, 171 records remained for title and abstract screening. Eighty-seven records were excluded because they did not address governance disclosure, investor-facing information, or textual analysis in a way useful for the present topic. The remaining 84 full-text sources were assessed for eligibility. Thirty-eight were excluded at that stage because they focused on unrelated Islamic-finance segments, offered only market commentary without sufficient methodological or policy value, or did not provide adequate relevance to the Saudi or disclosure-analytics problem. The final synthesis therefore included 46 sources. Of these, 28 were peer-reviewed journal articles, 10 were official or regulatory reports, 5 were institutional market-development reports, and 3 were legal or professional guidance sources directly relevant to Saudi sukuk and Shariah governance.

3.5 Analytical Approach

The synthesis used a review matrix with five questions: (1) What disclosure problem or governance issue does the source address? (2) What kind of textual or informational signal does it analyze or imply? (3) What investor-confidence mechanism is discussed or suggested? (4) Is the source directly relevant to Saudi Arabia or transferable to the Saudi sukuk market? (5) What does the source imply for NLP-enabled disclosure evaluation? This matrix made it possible to compare Islamic-finance governance studies with mainstream disclosure-analytics research and then translate convergent findings into a Saudi-oriented framework.

The study is interpretive but systematic. It does not claim that the final framework has already been

tested on a large corpus of Saudi sukuk documents. Rather, it synthesizes current knowledge to explain why such testing is now both feasible and necessary. That limitation should be kept in mind when interpreting the results. The paper is best read as a review and framework article that prepares the ground for later empirical implementation.

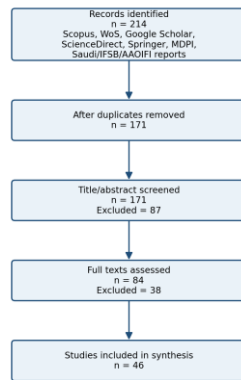


Figure 1. PRISMA-style review flow for the structured literature synthesis.

IV. CONCEPTUAL LINK: FROM SHARIAH GOVERNANCE DISCLOSURE TO INVESTOR CONFIDENCE

The core proposition of this review is that investor confidence in sukuk is partly a disclosure-mediated outcome. Confidence depends on many factors, including sovereign strength, issuer fundamentals, liquidity, legal enforceability, ratings, and macro conditions. However, for sukuk there is an additional layer: the credibility of the instrument's Shariah basis and governance architecture. That credibility cannot be inferred from the label "sukuk" alone. It has to be communicated. Investors therefore rely on disclosures not only to understand economic risk, but also to interpret whether the issuance has been structured, reviewed, and monitored in a way consistent with Shariah requirements and market expectations (Abdulrahman et al., 2024; Nawaz, 2025).

Disclosure affects confidence through several channels. First, it reduces information asymmetry. Where investors face uncertainty about the

governance process, clearer disclosure lowers ambiguity and improves screening efficiency. Mainstream finance studies continue to show that reduced or lower-quality disclosure can increase information risk, default risk, or the cost of capital, while better disclosure environments can improve investor processing and pricing efficiency (Dambra et al., 2024; Yin et al., 2024; Hosseiniakani et al., 2026). These insights transfer conceptually to sukuk because Shariah governance information is part of the broader information set investors use to evaluate instrument quality.

Second, disclosure influences perceived authenticity. In Islamic finance, the issue is not only whether a transaction is legally enforceable but whether it is credibly presented as Shariah-compliant. Boilerplate statements may provide formal assurance, yet they do little to distinguish stronger governance from weaker governance. By contrast, more specific discussion of the Shariah structure, committee role, review scope, ongoing monitoring, non-compliance treatment, and post-issuance oversight offers investors richer signals. Prior work on Shariah governance disclosure suggests that transparency in this area is linked to stronger governance perception and can be associated with performance-related outcomes in Islamic financial institutions (Abdul Rahim et al., 2024; Baig et al., 2024).

Third, disclosure affects comparability. Investor confidence is easier to sustain in markets where information can be compared across issuers and structures. One of the persistent problems in sukuk markets is that Shariah governance disclosures can vary in language, depth, emphasis, and document location. This makes comparative assessment costly. NLP matters precisely because it can convert text into comparable measures without flattening everything into a single crude score. It can separately analyze readability, uncertainty, repetition, governance specificity, lexical diversity, thematic coverage, and consistency over time (Todd et al., 2024; Bogachek et al., 2025; Zavitsanos et al., 2025). Fourth, disclosure influences the market's interpretation of risk and yield. Evidence from recent sukuk-related work suggests that governance and ESG-related attributes can matter for spreads and investor preferences in ways that differ from

conventional bonds, especially in dual financial systems where ethical or governance-based preferences shape pricing (Low et al., 2025). That does not imply a simple one-directional relationship; stronger disclosure may sometimes reveal greater complexity or risk. But even then, more decision-useful information can still increase confidence because investors prefer transparent risk to opaque reassurance.

For these reasons, the most useful definition of investor confidence in this paper is not narrow optimism. It refers to the willingness of investors to participate, price, hold, and compare sukuk on the basis of information they regard as sufficiently credible, intelligible, and governance-relevant. NLP can support that process by making governance disclosure more observable and analytically tractable.

V. SHARIAH GOVERNANCE DISCLOSURE IN RECENT LITERATURE

The literature on Shariah-related disclosure has expanded considerably in the last few years. Abdulrahman et al. (2024) show that the field has moved from asking whether such disclosure exists to examining its determinants, content, and consequences. Their review highlights recurring dimensions such as Shariah board composition, committee reports, compliance review, zakat and purification information, fatwa disclosure, and institutional governance quality. A key implication is that Shariah disclosure should not be treated as a cosmetic add-on to conventional reporting. It is part of the information architecture through which Islamic financial institutions demonstrate accountability.

Recent empirical work strengthens that point. Abdul Rahim et al. (2024) report that more extensive Shariah governance disclosure among Islamic banks is associated with stronger performance outcomes, suggesting that disclosure can function both as an accountability mechanism and as an indicator of underlying governance quality. Baig et al. (2024) similarly show that Shariah governance attributes moderate the relationship between corporate governance characteristics and credit ratings in Islamic banks. Their findings are especially relevant

to sukuk because rating processes and investor confidence both depend on credible governance signals. If Shariah governance quality helps explain creditworthiness, then the way that quality is disclosed should matter for investor interpretation.

A second strand of literature focuses on governance architecture and market authenticity. Nawaz (2025) argues that current sukuk debates are increasingly centered on how to balance market stability with stronger Shariah authenticity. The significance for disclosure is straightforward: when standards tighten or interpretation becomes more contested, investors require more specific explanations, not fewer. Generic references to compliance become less sufficient when market participants are actively debating structural legitimacy and post-issuance monitoring. A third relevant strand comes from broader Saudi disclosure research. Although much of it is not specifically about sukuk, it helps explain the local information environment. Al-Matari and Al-Dubai (2025) show that governance committees in Saudi financial firms strengthen financial risk disclosure. Ali et al. (2025a) find that ESG disclosure among Saudi-listed firms is associated with profitability in the context of Vision 2030, while Hamdouni et al. (2025a, 2025b) show that AI adoption and ESG disclosure are becoming increasingly important in Saudi corporate reporting and value-creation debates. The important inference is not that ESG and Shariah governance are identical. They are not. The inference is that Saudi capital markets are becoming more disclosure-sensitive, more governance-sensitive, and more receptive to data-driven evaluation of narrative reporting.

The literature also suggests that investors respond not only to the existence of disclosures but to their quality. Studies in conventional finance repeatedly show that reduced disclosure can elevate default risk, while abnormal, low-credibility, or manipulative narrative patterns can increase the cost of equity or impair investor interpretation (Yin et al., 2024; Hosseiniakani et al., 2026). Readability and narrative clarity matter as well. Cano-Rodríguez and Moreno (2026) find that more religious environments are associated with more readable financial disclosures, which is conceptually relevant because Shariah governance is partly about ethical

communication and trust formation. In a sukuk setting, unclear language can erode confidence even when formal compliance exists.

Taken together, the recent literature supports four conclusions. First, Shariah governance disclosure is now a substantive research topic rather than a peripheral one. Second, the most useful disclosures are specific, governance-rich, and comparable over time. Third, disclosure quality has plausible links to ratings, pricing, and investor confidence. Fourth, the field still lacks scalable methods for evaluating disclosure quality across large document sets. That gap is where NLP has strategic value.

VI. NLP METHODS FOR EVALUATING SUKUK AND SHARIAH GOVERNANCE DISCLOSURES

NLP is best understood here as a toolbox rather than a single method. Different governance questions require different techniques. Dictionary-based approaches can be used to identify disclosure related to Shariah boards, fatwa language, uncertainty, assurance, and monitoring. Readability metrics can assess whether documents are excessively complex. Topic modeling can identify the themes that dominate different sukuk documents and whether governance language is concentrated in narrow formal sections or integrated across the disclosure package. Supervised machine-learning models can classify documents according to richer governance categories once labelled training data become available. Transformer-based models can go further by capturing context, semantic similarity, and cross-document consistency (Bahoo et al., 2024; Todd et al., 2024).

Recent finance research demonstrates that textual analysis can extract economically useful information from narrative disclosures. Bogachek et al. (2025) show that qualitative discussion in annual reports can meaningfully improve prediction of tax outcomes. Wei et al. (2025) find that annual-report tone helps explain subsequent bank risk-taking. Neunsinger et al. (2026) show that investors respond to narrative disclosures relating to firm capabilities, while Dambra et al. (2024) reaffirm that disclosure choices and capital-market consequences remain closely

linked. These studies do not concern sukuk directly, but they establish the broader point that narrative disclosures contain information relevant to stakeholder decision-making and market outcomes.

Within Islamic finance, the methodological frontier is becoming clearer. Ali et al. (2025b) use long short-term memory methods to derive AI and machine-learning sentiment from Islamic banks' annual reports and link it to financial performance. Zafar et al. (2026) use a four-step NLP pipeline to analyze climate disclosures in Islamic banks across multiple jurisdictions, showing that machine learning can be adapted to Islamic-finance narratives that combine conventional risk language with values-based commitments. These studies are important because they demonstrate transferability. If climate discourse and AI-related sentiment can be extracted from Islamic-bank reports, then Shariah governance content in sukuk-related documents can also be systematically modeled.

For Saudi sukuk, an NLP architecture would likely need five capabilities. First, corpus ingestion and normalization. Sukuk information is distributed across prospectuses, base offering circulars, annual reports, governance reports, ratings notes, and exchange announcements. These documents may contain Arabic and English text, tables, legal clauses, and repeated standard wording. Second, domain-specific lexicon development. A general financial sentiment dictionary is not enough. The model needs a Shariah governance vocabulary covering terms such as Shariah committee, fatwa, compliance review, purification, profit distribution, asset transfer, agency, undertaking, impairment of structure, non-compliance treatment, and ongoing supervision. Third, feature extraction. Candidate features include disclosure length, density of governance discussion, readability, specificity of committee statements, uncertainty or caveat language, cross-document consistency, references to post-issuance monitoring, and presence of remedial procedures. Fourth, classification or scoring. Documents can be scored along multiple dimensions rather than collapsed into one opaque number. Fifth, validation. Human experts—especially Islamic-finance lawyers, Shariah scholars, and sukuk analysts—must validate whether

the model is actually detecting meaningful differences.

A useful conceptual distinction is between descriptive NLP and evaluative NLP. Descriptive NLP summarizes what the documents talk about. Evaluative NLP attempts to infer governance quality signals from the way issues are disclosed. The second task is harder and must be designed cautiously. A longer Shariah section is not automatically better. More positive language is not automatically reassuring. What matters is whether the disclosure is specific, consistent, decision-useful, and aligned with credible governance architecture. In practice, the most robust approach is likely to combine rule-based extraction for legally important items with contextual machine-learning models for nuance and consistency. Saudi Arabia adds two methodological considerations. The first is bilingual text. NLP models must handle Arabic-English terminology, transliteration, and differences in legal and religious vocabulary. The second is institutional specificity. Saudi sukuk documents are shaped by local legal, regulatory, and market conventions. A model trained exclusively on Malaysian, Pakistani, or general Islamic-banking corpora may miss important Saudi features. That is why the framework proposed later in the paper is Saudi-oriented rather than universal.

VII. THE SAUDI SUKUK MARKET AND INSTITUTIONAL CONTEXT

Saudi Arabia is now central to the global Islamic finance and sukuk landscape. Official Saudi and international reports show sustained policy interest in deepening the debt and sukuk market as part of broader financial-sector development and funding diversification (CMA, 2024; Saudi Vision 2030, 2025; IFSB, 2025). Saudi Exchange market publications and market-watch tools show that sukuk and bonds have become more visible as a distinct market segment, with ongoing development of listed and unlisted instruments, indices, and investor-facing infrastructure (Saudi Exchange, 2025a, 2026). International market-development reports likewise place Saudi Arabia among the leading sukuk jurisdictions by outstanding value and strategic

relevance (LSEG/ICD, 2025; S&P Global Ratings, 2025).

The Saudi setting matters not just because of scale but because of governance reform. In 2024, SAMA issued a Shariah Governance Framework for local banks operating in Saudi Arabia and separate Shariah governance instructions for finance companies, clarifying roles, responsibilities, independence, and control expectations (SAMA, 2024a, 2024c). It also introduced Shariah-governance-related disclosure requirements for banks conducting Shariah-compliant banking, with effect from the end of 2024 (SAMA, 2024b). Fitch Ratings interpreted these reforms as strengthening transparency and the Shariah-governance environment in Saudi Islamic banking, with implications for confidence and alignment with international standards (Fitch Ratings, 2024).

Although some of these measures apply directly to banks rather than all sukuk issuers, their broader significance is substantial. They contribute to a market environment in which governance language is becoming more standardized, more auditable, and more visible. That is exactly the type of environment in which NLP-based evaluation becomes more useful. Standardization does not eliminate the need for analysis; it often increases it by making cross-issuer comparison more feasible.

The Saudi context also reflects an important shift from disclosure quantity to disclosure usability. Saudi capital-market development is increasingly linked to foreign participation, legal clarity, investor protection, and digital market infrastructure. Official and professional guidance sources emphasize that stronger legal predictability and better disclosure support investor confidence, especially for cross-border or non-specialist participants who may not rely solely on local relationship-based knowledge (Chambers and Partners, 2025; MISA, 2024; White & Case, 2026). In practical terms, this means that the market has a growing need for tools that can process, compare, and flag governance disclosures efficiently. For sukuk specifically, the Saudi market combines several issuer types and information conditions. Sovereign and quasi-sovereign issuers may benefit from high baseline confidence and broader institutional trust. Corporate issuers may face more

variation in disclosure quality, structure complexity, and investor scrutiny. Financial institutions issuing sukuk may disclose governance differently from industrial or infrastructure issuers. An NLP framework therefore needs to be issuer-sensitive. It should not assume that one template captures all governance narratives equally well.

Another distinctive Saudi feature is the interaction between local regulatory architecture and international standards. Market participants often interpret Saudi issuances through both domestic rules and broader Islamic-finance standards or debates, including those linked to AAOIFI and global Shariah-governance expectations. That duality can produce both opportunity and ambiguity. On one hand, the Saudi market can position itself as a high-credibility jurisdiction with increasingly disciplined governance disclosure. On the other hand, investors may still struggle to compare local practice across documents if terminology and disclosure depth remain inconsistent. NLP can help by creating a more systematic analytical bridge between local documentation and internationally legible governance signals.

In summary, the Saudi environment is especially suitable for this review because it combines market scale, reform momentum, rising disclosure expectations, and a growing need for scalable investor-facing analytics. These conditions make Saudi Arabia not only an important sukuk market, but also a compelling test bed for NLP-enabled evaluation of Shariah governance disclosure.

VIII. PROPOSED REVIEW FRAMEWORK: NLP-ENABLED EVALUATION OF SHARIAH GOVERNANCE DISCLOSURE

Based on the synthesis, this paper proposes a five-layer review framework for the Saudi sukuk market. Layer 1 is disclosure capture. Relevant texts are gathered from prospectuses, annual reports, sukuk programme documents, exchange announcements, ratings notes, governance reports, and, where available, Shariah committee reports. The objective is to avoid overreliance on one document type because governance signals may be fragmented.

Layer 2 is domain normalization. Text is cleaned, sectioned, de-duplicated, and normalized across Arabic and English terminology. This stage also maps recurring sukuk concepts, governance roles, Shariah terms, and legally relevant clauses into a domain lexicon. Without this layer, generic finance NLP can misclassify Islamic-finance language or ignore structure-specific meaning.

Layer 3 is multi-dimensional disclosure analytics. Instead of assigning a simplistic pass/fail label, the framework evaluates disclosure along several dimensions: governance visibility, fatwa specificity, independence language, monitoring depth, treatment of Shariah non-compliance, uncertainty and caveat intensity, readability, cross-document consistency, and evidence of post-issuance reporting. The purpose is to generate an interpretable profile rather than a black-box score.

Layer 4 is confidence translation. The analytics outputs are not assumed to measure investor confidence directly. Rather, they are treated as proxies for information conditions that influence confidence. Stronger governance visibility, clearer monitoring disclosure, and lower inconsistency should improve comparability and reduce information asymmetry. Higher ambiguity, excessive boilerplate, or persistent inconsistencies may trigger deeper manual due diligence or affect investor caution.

Layer 5 is decision use. Different market actors use the outputs differently. Issuers can benchmark their disclosure quality. Regulators can identify systemic weak spots in reporting practice. Rating agencies and analysts can enrich qualitative review. Investors can use the results as a screening layer before deeper legal, credit, and Shariah analysis. Shariah scholars can also use the analytics as a market-observation tool, especially for tracking how governance language changes over time.

The value of the framework lies in disciplined complementarity. It does not reduce Shariah legitimacy to machine scoring. Instead, it organizes narrative information in a way that makes expert judgment more scalable and more comparable. In a market like Saudi Arabia, where both growth and

credibility matter, that complementarity may be more valuable than fully automated assessment.

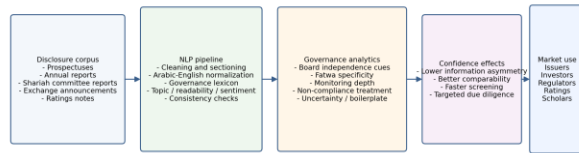


Figure 2. Review framework for NLP-enabled evaluation of Shariah governance disclosure in Saudi sukuk.

IX. DISCUSSION

The review suggests that the strategic value of NLP in the Saudi sukuk market lies less in prediction alone and more in disciplined visibility. Sukuk investors often face an information-processing problem rather than a complete absence of information. Important governance signals exist, but they are scattered, inconsistently framed, and costly to compare. NLP can address that bottleneck by turning textual governance information into structured analytical features.

Three discussion points follow from the synthesis. First, Shariah governance disclosure should be treated as economically relevant information, not merely as a compliance narrative. Research on disclosure quality, default risk, cost of capital, and investor interpretation consistently suggests that information environments shape market outcomes (Dambra et al., 2024; Yin et al., 2024; Hosseiniakani et al., 2026). In Islamic finance, governance disclosure carries an additional reputational and authenticity function. That makes it especially important in sukuk.

Second, the most promising NLP approach is hybrid rather than purely predictive. A Saudi sukuk model should combine rule-based extraction of legally and Shariah-relevant sections with machine-learning models that capture nuance, tone, and semantic consistency. A purely generic sentiment model could misread legally cautious language as negative or treat ritualized compliance phrases as equivalent to substantive disclosure. A hybrid architecture offers

more interpretability and is better aligned with regulatory and investor needs.

Third, the Saudi context makes implementation more realistic than it would have been a few years ago. Regulatory strengthening, market formalization, and growing demand for transparency create institutional conditions that support systematic disclosure evaluation. Market participants are already moving toward more structured governance and risk disclosure. NLP can help ensure that this shift improves not only disclosure volume but also disclosure quality and comparability.

There are, however, important cautions. The first concerns construct validity. A model might detect textual specificity without proving real governance quality. Some firms may disclose well while governing poorly; others may govern strongly while disclosing conservatively. That is why NLP outputs should be interpreted as indicators of disclosure quality, not definitive proof of compliance substance. The second caution concerns language and translation. Arabic-English disclosure corpora can generate errors if terminology is not carefully normalized. The third caution concerns legitimacy. In Islamic finance, automated analytics must be framed as support tools rather than authorities over Shariah interpretation.

Even with these caveats, the literature strongly supports the practical value of the proposed direction. If investors can more easily compare governance disclosures across issuers, then confidence formation becomes more evidence-based. If issuers know that their disclosures are machine-readable and comparable, incentives for boilerplate reporting may decline. If regulators can monitor aggregate disclosure quality more efficiently, supervisory conversations can become more targeted. These are not marginal benefits. In a market that aims to combine growth, authenticity, and international credibility, they are foundational benefits.

X. PRACTICAL IMPLICATIONS

For issuers, the implication is that better Shariah governance disclosure should be designed as part of

capital-market strategy. In a disclosure-sensitive market, clear and specific governance reporting can improve comparability and potentially support broader investor reach. Issuers should therefore consider standardized sectioning, explicit explanation of the Shariah basis of the structure, clear identification of committee roles, and transparent reporting on post-issuance monitoring.

For regulators and market infrastructure providers, the implication is that disclosure reform should increasingly consider machine readability. Standardized headings, consistent terminology, digital filing formats, and guidance on governance narrative content would make both human and machine evaluation more reliable. This does not require rigid uniformity, but it does require a baseline reporting architecture.

For investors and analysts, the implication is that NLP can improve triage and comparability. Rather than replacing legal or credit analysis, it can help identify which issuances merit deeper scrutiny and which disclosure dimensions differ materially across issuers. This is particularly useful for portfolio managers, foreign investors, and research teams that need to review multiple sukuk quickly.

For Shariah scholars and advisory bodies, the implication is that disclosure analytics can support market stewardship. It can reveal where market language is becoming more precise, where ambiguity persists, and where standardized expectations may be helpful. That insight can support a healthier interaction between scholarly review, regulatory oversight, and investor communication.

XI. FUTURE RESEARCH

Four future research directions are especially important. First, empirical corpus construction is needed. Researchers should build a Saudi sukuk text corpus that includes prospectuses, annual reports, governance reports, and announcements across multiple issuer categories. Second, Arabic-English Islamic-finance language models should be tested specifically on Shariah-governance tasks rather than assumed to transfer from generic financial corpora. Third, disclosure-analytics outputs should be linked

empirically to market outcomes such as subscription demand, liquidity, yield spreads, secondary-market stability, rating changes, and investor participation patterns. Fourth, future work should examine how emerging standards and reforms, including evolving AAOIFI debates and Saudi legal-market developments, alter disclosure language over time. Together, these directions would move the field from review-based conceptualization to robust empirical validation.

XII. CONCLUSION

This paper reviewed how natural language processing can be used to evaluate Shariah governance disclosures and support investor confidence in the Saudi sukuk market. The literature from 2020 to 2026 shows that three research streams are now converging: the growing importance of Shariah-related disclosure in Islamic finance, the increasing sophistication of textual analytics in financial reporting research, and the rapid institutional development of the Saudi sukuk market. Yet these streams have rarely been synthesized together.

The review's main conclusion is that NLP can add value precisely because Shariah governance information is heavily narrative, dispersed, and difficult to compare manually at scale. When designed carefully, NLP can help transform that information into structured indicators of readability, governance specificity, uncertainty, monitoring depth, and disclosure consistency. Those indicators do not replace juristic or legal judgment. They make such judgment more scalable, comparable, and evidence-informed.

For Saudi Arabia, the case is especially strong. The market is large enough to justify analytical investment, reform momentum is high, and investor confidence increasingly depends on credible disclosure environments. In that setting, stronger NLP-enabled evaluation of Shariah governance disclosure can support deeper transparency, better market discipline, and more confident investor participation. The broader implication is that the future credibility of sukuk markets may depend not only on how instruments are structured, but also on

how convincingly their governance is disclosed and analytically understood.

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