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Understanding Influences on Risk Management in Islamic Banks in the Kingdom of Saudi Arabia (KSA): A Qualitative and Text Mining Approach

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Abstract

Purpose: Risk management is crucial in all financial sectors, including Islamic Banks (IBs). Most IBs use traditional risk assessment methods such as analyzing risk registers, risk maps, and risk matrices. However, there is limited information on understanding risk management using qualitative interviews and text-mining methods. Therefore, this study aims to investigate risk management practices through qualitative interviews and text-mining methods.

Design of study: A case study was conducted in Islamic banks in the Kingdom of Saudi Arabia (KSA). This study conducted constructive interviews, using both the qualitative research method and the text mining approach, to analyze current risk management practices and evaluate their associated influences. Thirty-four semi-structured in-depth interviews were conducted in four complete IBs in KSA. The data were analyzed using a thematic analysis technique, qualitative analysis using Nvivo, and text mining using Python to reveal significant insights.

Findings: The study found that bank personnel often need more knowledge of Shariah law, while Shariah committees may need more financial expertise. This mutual dependence necessitates comprehensive training for both groups to ensure compliance and profitability. Key findings underscore the potential risks of independent Shariah decision-making. While it can reduce Shariah risk, it may also increase financial and reputation risks. Text mining techniques such as topic modelling, sentiment analysis, and network analysis support qualitative insights by identifying common themes related to Shariah compliance and risk management.

Originality: The study underscores the importance of a robust regulatory framework defining Shariah committees' and banking personnel's roles and responsibilities. It also advocates for establishing a national Shariah advisory body to oversee and harmonize Shariah governance practices across all Islamic banks, thereby providing practical guidance for the industry.

Keywords: Risk management, Islamic Banks (IBs), Shariah compliance, Shariah committee, Qualitative Analysis, Text Mining and Kingdom of Saudi Arabia (KSA).

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Introduction

Risk management in Islamic banking involves identifying, assessing, and mitigating risks that align with Shariah principles. Islamic banks face unique risks due to their adherence to Islamic law, which prohibits interest (riba), excessive uncertainty (gharar), and gambling (maysir).

Most studies on risk management in IB focus on identifying the risk, quantifying its severity, and determining a treatment. Comparable to the studies that examine the different methods and techniques utilized by organizations to recognize and appraise risks, including risk registers, risk maps, and risk matrices (Eid & Asutay, 2019; Zuhroh, 2022; Alhejaili, 2022; Mohd Noor et al., 2018; Shafii et al., 2010; Mohammad et al., 2020). Some surveys investigated how organizations communicate and report risks to stakeholders, including employees, customers, shareholders, and regulators. It examines the different methods and channels used for risk communication, including risk reports, dashboards, and disclosures. It also explores the role of risk communication in building trust and credibility with stakeholders, as well as the challenges and opportunities associated with communicating risks effectively (Van Greuning & Bratanovic, 2020; Malim, 2015; Grassa et al., 2021; Basiruddin & Ahmed, 2020; Reyad et al., 2022). Research streams also examine organizations' strategies and tactics to treat and mitigate risks. It explores the different approaches organizations take to manage risks, including risk avoidance, risk reduction, risk transfer, and risk acceptance (Zainol & Kassim, 2010; Al Rahahleh et al., 2019; Ahmed, 2010; Basiruddin & Ahmed, 2020). It also examines the effectiveness of different risk treatment strategies in reducing the impact of risks on organizational performance. However, most of the research conclusions are drawn from experience and specific analyzing frameworks; none have so far used text mining to extract information from the survey to bring a conclusion about the risk management practice.

KSA is one of the largest countries in the Middle East and has significant relationships with major countries worldwide (Ben Mimoun, 2019; Bani-Khalaf & Taspinar, 2022). Thus, Shariah compliance is vital for Islamic banks to develop credibility and sustainability in the market and gain the trust of their customers. Islamic banking is founded on the principles of Islamic law (Shariah law) and economics, which include risk-sharing, profit-sharing, and the exclusion of interest (riba) (Ariff & Iqbal, 2011; Abbasi et al., 1989). With the global expansion of Islamic finance, the petition for Islamic banking has increased, and the number of Islamic financial institutions (IFIs) has also grown. With nearly 75% of all Islamic financial assets under control, the banking sector leads the industry (Saâdaoui & Khalfi, 2022; Hussain et al., 2016). However, some research has criticized the faith-based identity of Islamic financial institutions and considered their products and services as quasi-Shariah compliance due to their attempt to co-exist and compete with conventional financial institutions (Hidayah et al., 2021; Hidayah et al., 2019; Maurer, 2012; Pollard & Samers, 2013). Ensuring Shariah compliance is crucial for IBs to maintain their identity, gain and maintain customer trust, and sustain the industry in the long term. Shariah non-compliance risk adversely affects stakeholder confidence in IB operations (Abu-Tapanjeh, 2009). The traditional risk management process, which includes risk identification, measurement, monitoring, and reporting, is followed by IBs (Al Rahahleh et al., 2019; Abu et al., 2012), but the type of risks and who is responsible for determining them differ from those in conventional banks (Eid & Asutay, 2019). Since Shariah's risk management is crucial in managing Shariah's non-compliance risk and improving institutional honour and stakeholder assurance, IB must seek to improve and develop its risk management practice (Salem, 2013). To this end, Islamic banking has been increasing in recent years, and IBs must ensure Shariah compliance in their operations to maintain the confidence and trust of stakeholders (Alqahtani et al., 2024; Saâdaoui and Khalfi, 2024). Therefore, extensive research is required on Shariah risk management practices in IBs in KSA. Nevertheless, text mining is the best solution to determine if compliance is correctly implemented, as it will not contain human errors or emotional ties.

Text mining, also known as text data mining or text analytics, is extracting useful information and insights from text. It involves various techniques, such as natural language processing (NLP), machine learning, and statistics, to analyze and interpret textual data (Lian et al., 2024; Novera et al., 2024;; Shamshiri et al., 2024; Xue & Shao, 2024).
In this context, the objectives of current research are to explore ways to advance the involvement of Shariah committees in risk management practices in IBs and to develop a framework for Shariah risk management in IBs in KSA. The research contributes to the literature on Shariah risk management in IBs by examining the existing Shariah risk management practices and developing a scheme for Shariah compliance risk management. Regarding contextual relevance, the study is conducted in the context of KSA, an essential Islamic banking and finance country.

Literature Review

In the context of Corporate Governance (CG) discourses, risk management refers to the set of processes and practices used to identify any threats that may affect the company's ability to continue operating or damage its reputation or competitiveness relative to other institutions operating in the same market place (Gaultier-Gaillard & Louisot, 2006); or risks that create losses for the firm's owners, its shareholders (Mohammed & Knapkova, 2016). Risk management may also generally refer to governance risks resulting from the mismanagement of funds, improper conduct and reckless decision-making by the Board of Directors or senior management. Thus, while the ultimate cost of poor governance mechanisms may be financial, for instance, in reduced shareholder profits, continuous exposure to certain risks may be described as a failure of governance. These failures may be due to low board accountability or operational efficiency and transparency (Earle, 2006). These failures may also stem from a clear attribution of roles and responsibilities between senior management or the absence of auditing and other compliance mechanisms, including the regular reporting of material risks.

The extensive literature on risk management in the banking sector tends to focus more particularly on specific categories of financial risks (Mardiana & Purnamasari, 2018). This is not surprising as banks are in the business of managing financial assets, holding deposits, and providing capital for investments. Consequently, the focus of the literature will invariably be on how banks manage and minimize any risk exposures that may disrupt capital resiliency and their capacity to absorb losses and retain shareholder value. Moreover, the study by Culp (2002) indicated that such risks could result from unforeseen market pressures and externalities. The financial performance of banks may also be threatened by operational risks, such as inadequate governance controls, mismanagement, and employee fraud (Gillet et al., 2010). However, financial risk management discourses focus on how risks impact the performance of financial institutions and their capacity to anticipate and plan for future losses (Fox & Tannenbaum, 2011). Several studies indicate that risk management processes are a necessary component in ensuring that banks have access to stable and low-cost sources of funding to maintain levels of working capital (Bhat et al., 2019; Handriani & Robiyanto, 2019; Al Rahahleh et al., 2019). After the global financial crisis, several risk mitigation and management best practices were established (Hopt, 2021). The objective of these practices is to optimize the financial performance of banks by helping them to manage and mitigate any risks that may adversely undermine confidence in these institutions with a corresponding negative effect on the banks' corporate value and resiliency.

As mentioned earlier, the analysis indicates that various metrics have been utilized to assess a firm's performance (Aziz et al., 2015). In its non-intrinsically financial dimensions, economists define performance broadly to capture a corporation's (operational) efficiency, distributional effects, technological innovation, ability to attract and retain business and overall competitiveness (Hertati et al., 2019). IB has established various processes and practices to enhance the quality of service in the Gulf region over the past several years. However, the researchers generally observe that the IBs have yet to consider risk management very seriously despite the growing awareness of this field worldwide (Al-Tamimi & Al-Amiri, 2003). Credit risk management must be adequately handled, which will indeed affect the Bank's revenue. Although there are many different credit risk models, choosing the one that applies to a particular bank depends on various factors, including the Bank's location, volume of transactions, services provided, consumers, etc. (Fatemi & Fooladi, 2006). Adherence to Islamic Sharia (law) is one of the main obstacles IBs would encounter compared to their competitors (Khan & Bhatti, 2008). Additionally, when it comes to risk management, Beck (1992) and Cairncross (1997) advised applying cause-and-effect links to the different interconnected components of banking. That time and space must be condensed. To make the bank operation particularly effective, attention must also be paid to the processes, systems, and practices (Collingridge, 1984). Most of the top banks in the world's operational strategies include risk management, and QIB is eager to consider risk management-related issues.

Companies with high levels of institutional ownership are predicted to be effective at monitoring management practices (Candradewi & Sedana, 2016). Institutional owners can perform vital supervisory functions over managing and utilizing company assets (Ovami & Lubis, 2018). External audit committees can further supplement and support external auditing processes toward improved control over company employees, including monitoring any irregularities in financial reporting and investigating complaints of misconduct, abuse of power, or fraud. A special audit may be conducted if this misconduct involves the Bank's director (Effendi, 2016). Haryetti Haryetti (2021) has described good CG indicators as the mediator between effective risk management and improved financial performance. In its broader dimensions, compliance with CG is perceived to reduce firm efficiencies resulting from opportunism, incompetence, unprofessionalism, and conflicts of interest. Therefore, it is essential to recognize that while suitable CG mechanisms may reduce the potential agent costs (in reduced shareholder value), they may also create additional compliance costs for companies. Viscelli et al. (2017) note in this regard that "ERM seeks to strategically consider the interactive effects of various risk events to balance an enterprise's entire portfolio of risks to be within the stakeholder's appetite or risk tolerance." (2017). Thus far, the analysis has yet to consider whether banks, in general, and more specifically, variations between certain types of banks, such as Islamic and conventional banks, have different risk exposures from other kinds of companies.

Risk management processes define a broad range of practices, including those used to identify, measure, monitor and control various types of risks. In its most comprehensive, generic formulation, risk management refers to the combined policies, standards and processes used to identify, monitor, and measure risk probabilities, as well as measures that should be taken to minimize or prevent the adverse effects of such risks (Pyle, 1999). In this regard, it is notable that the Basel Committee, the leading authority on international banking standards, has set out four stages of a viable risk-management strategy. These phases include mechanisms for i) identifying probable or possible institutional risk exposure, ii) the assessment of combined risk factors using models such as stress testing, iii) best practices on how to measure and monitor short-, medium- and long-term risks, and subsequent iv) practices of risk control and loss mitigation (Young, 2011). In this regard, the Basel Committee sets out a meta-regulatory framework whereby supervisory authorities, at a state and infra- institutional level, can assess a bank's capital structure and its resiliency against future risk (Arnold et al., 2012). Edwards and Shaoul (2003) note that state regulators are better positioned to pierce the corporate veil to assess a bank's liabilities and compel them to report any undisclosed financial risks, supported by regular auditing and disclosure procedures. However, beyond these market disclosure and supervision standards, the Basel framework needs to be more active in the Bank's duty to implement good governance practices at the Board and operational levels of bank management (Greuning & Bratanovic, 2009). Brown and Wang (2002) conducted a study about the challenges faced by Australian financial institutions due to credit risk over the period from January 1986 to August 1993. The Australian financial institutions could not provide a wide variety of alternatives to their clients, leading to higher risks as there was a lack of diversification in their services. The research suggested that CG practices allow firms to adopt appropriate rules, policies, and procedures to ensure that the rights of all stakeholders are fulfilled. Financial institutions use hedging to minimize the risk associated with the transactions conducted with the bank customers as it allows the Bank to minimize the risk by offering flexible offers that enable customers to make their decisions effectively (Dupire, 1997). The work of El Karoui and Huang (1997) indicates that the super- hedging strategy could be implemented to achieve a surplus downside market risk as it possesses a duality of both the super-hedging and open hedging approaches. The prices of options can increase due to the volatility of the asset prices. Suppose the prices of financial instruments fluctuate (Brown & Moles, 2014). In that case, the price of the options contract might also be influenced as the buyers or sellers will be deriving their profit from the price of the financial security (Hobson, 1998). In contrast with the processual and technocratic definitions of risk management put forward by the Basel Committee, Al-Tamimi and Al-Mazrooei (2007) propose that the risk management approaches be holistic and, therefore, take due account of legal, operational, strategic, and financial risks in the contexts of a fully integrated risk management system. Along similar lines, Acharya et al. (2009) contend that technical standards and processes used to identify and contain future risks will have limited efficacy if they are not embedded in sound governance practices that include strategic risk planning at the level of Board decision-making. In governance literature, scholars such as Ismal (2010) define risk management as "the process by which managers satisfy the need to manage banks' risk exposure by identifying key risk factors, obtaining consistent, understandable, operational risk measures, choosing which risk to reduce, and which to increase and by what means; and establishing procedures to monitor the resulting risk positions.'' (Schooner, 2016).

It has been observed that IBs have particular risk exposure factors that distinguish them from conventional banking institutions. These factors, therefore, should be considered when assessing the impacts, positive and negative, of risk management by IBs. As noted in the previous chapter, Islamic finance frameworks are deemed more risk-averse and responsible than their conventional alternatives, evidenced by the fact that many Islamic financial institutions remained unaffected by the global financial crisis (Ahmad & Halim, 2014). However, empirical studies indicate that Islamic finance institutions are not immune to systemic risks and collapse (Fitri & Hafiz, 2022). Before providing a literature-based overview of these risks, it is necessary to begin with a brief reassessment of the Shariah conception of risk. The Islamic principle of gharar captures the Islamic concept of risk. This concept is broadly defined as the Islamic injunction on any uncertainty regarding the material terms of a business transaction (e.g., the price of an asset plus any mark-up or the date at which the transaction will take place, etc.) (Kuyateh, 2022).

Literature on Islamic finance also reveals that this principle may invalidate any transaction involving speculation on the future value of assets (Hassan et al., 2022). The authority for rule interpretation is derived from the following verse of the Quran: "And do not eat up your property among yourselves for vanities, nor use it as bait for the judges." (2: 188). The overarching concept of Gharar has been elaborated in narrower risk regulatory rules that, for instance, proscribe certain types of insurance contracts, futures contracts, and options as impermissible under the Shariah model of governance (Al Rahahleh et al., 2019). Furthermore, any deception or misrepresentation in financial dealings, regardless of whether Board members or lower-level officials undertake such activities, will be sufficient to render the contract or transaction void and invalid (Ahmed, 2010). It was also noted in the previous chapter that interest-taking is forbidden in Islam because it unjustly enriches the lending party (Errico & Sundararajan, 2002). The literature also shows that Islamic forms of structured finance must be based on the trade of real, tangible assets and that the sale or financing of such investments must be based on the price of that asset plus any mutually agreed mark-up, as fairly valued at the time of the transaction (Au-Yong-Oliveira & Costa, 2020). Despite these risk-regulating principles, an empirical study conducted by Čihák and Hesse (2008) supports the finding that Islamic finance institutions, like all finance institutions, face risks, including market, liquidity, and credit risk exposures. Indeed, such disclosures may have a more pronounced effect on an Islamic bank's financial performance and its investments than may typically be the case for conventional banking institutions. In addition, the research findings of various studies indicated that IBs might face additional burdens in the form of higher regulatory compliance risks, which may, in turn, increase the costs of running their business or impact their ability to attract new depositors or investors (Bhatti & Misman, 2010). This suggests that the conventional standards applied to banking governance in the non-Islamic context have limited applicability to Islamic finance (Laldin, 2011).

At the very least, scholars have noted that conventional risk regulation paradigms, including risk regulation and accounting standards, must be properly transposed to Islamic finance institutions (Masruki et al., 2020). In this regard, the existing lliterature also indicates that IFIs may be exposed to elevated credit, investor exit, and liquidity risk exposures than their conventional counterparts due to religious-regulatory restrictions on the types of financing they can attract or offer (Thijs, 2010). Studies note that while IBs share certain similarities to conventional investment banks, the corporate structure of IBs is distinctive in many respects, with significant implications for prevailing principal-agent theories of governance (Zainuldin et al., 2018). As one illustration of these differences, individuals cannot buy shares and become shareholders in IFIs since IBs may only act as joint investors or as managers of retail or investment banking deposits. In addition, the research findings of Diaw and Mbow (2011) suggest that IFIs differ from conventional banking institutions because of the types of assets they hold and the resulting balance of their debts-to-equity portfolios. The previous chapter noted that Islamic finance instruments might only take limited forms, including joint ventures based on profit and loss sharing and contracts allowing for asset sale or asset-backed financing agreements (such as a lease with a conclusion by sale contracts) (Kettel, 2010). Given these restrictions, many scholars note that IBs may be expected to implement stricter prudential risk management policies and practices, for instance, because loan finance cannot be issued to a borrower with sufficient evidence of documentary credit or third-party guarantees (Errico & Farahbaksh, 1998). However, studies note that these requirements do not immunize Islamic finance institutions against credit (default) risk exposures (Misman & Bhatti, 2020). These features of Islamic finance contracts are complex and cannot be fully outlined here. It is sufficient to note that the IFSB has defined credit risk exposure to include any failure to honour repayment obligations under the terms of an Islamic finance arrangement (Hoque & Liu, 2021). The existing literature reveals that the highest-risk credit exposures of an IB result from Murābahah and Ijārah transactions (Chapra, 2002). Regarding their credit risk exposures, banks may experience difficulties collecting loan and lease finance repayments, particularly when prices are to be repaid in instalments (Budi, 2021). On the one side, such arrangements ensure that IFIs behave cautiously by creating incentives for such banks to perform diligence in their risk assessment of a borrower's ability to make repayments as they fall due. Simultaneously, it exposes banks to the risk that they will be unable to recover equity investments should the borrower default on the terms of the agreement (Jatmiko et al., 2023). In addition, the literature has also observed that the use of installment- based payment agreements creates perverse incentives for the borrower to sell the leased assets before the repayment period has expired (Alam et al., 2020). Yaakub (2011) noted that these components of SG also create ownership risks for the Bank. Research on Islamic banking operations indicates that aspects of SG may also create higher transactional costs for Islamic financial institutions (Smaoui et al., 2019). In terms of operational risks, bringing with its reach other related types of regulatory compliance risks, IBs have limited opportunities to secure their investments against the borrower's collateral because of Shariah-related restrictions on the transfer of property without valid sale (Johari et al., 2021), nor may they charge late payment penalties if these appear to be structurally like the taking of interest (Chong & Liu, 2009).

Qualitative research employs interpretive techniques to describe and understand phenomena in the social world, focusing on meaning rather than frequency (Denzin et al., 2006; Cooper & Schindler, 2011). This method and case studies are particularly suited for answering "what," "why," and "how" questions, providing broad and detailed insights (Alam, 2020). The study chose qualitative research over quantitative to address "how" questions (Silverman, 2010). The case study approach was used to explore the significance of the Shariah Governance Framework (SGF) in Bangladeshi Islamic banks, emphasizing "how" and "why" questions (Myers, 2009). It is ideal for in-depth exploratory investigations of Shariah governance issues (Alam, 2020) and can highlight processes and behaviours within institutions (Stake, 2005). In qualitative research, the researcher cannot influence respondent behaviour, adding value to the findings (Yin, 2009). A semi-structured interview method was chosen for data collection to comprehensively understand Shariah risk management practices in IBs in Saudi Arabia (Dane, 1990). This method's flexibility allows in-depth exploration of respondents' views, resulting in detailed responses (Dane, 1990). It enables respondents to freely share their experiences and knowledge (Saunders et al., 2007), making it distinct from other methods (Berg & Lune, 2007). It effectively clarifies events and behaviours and better explains respondents' perspectives (Bryman & Bell, 2003). Face-to-face interviews facilitated clear communication and comprehensive responses, ensuring participants understood the questions and felt free to express their opinions (Gillham, 2000). Our Participants included regulators, Shariah committee members, Shariah department executives, senior management risk management committee members, other compliance employees, and field experts from Saudi Arabia, all directly involved in Shariah risk management practices. A total of 34 respondents were interviewed for this paper. The research strategy connects research objectives and questions to data collection, analysis, and outcomes (Yin, 2009; Rowley, 2002). NVivo software was used to analyze transcriptions and documents for better data management and analysis (Alam, 2020; Gibbs, 2002). NVivo facilitates initial coding, categorizing, and theme development, supporting an environmentally friendly data management process (Strauss, 1987; Alam, 2020).

Methodology

In this paper, constructive interviews were conducted so that both the qualitative research method and the text mining approach could be used to analyze current risk management practices and evaluate the associated influences.

Thirty-four semi-structured in-depth interviews were conducted in four complete IBs in KSA (Table 1). Most of the interviews were conducted in person; however, due to the widespread COVID-19 outbreak, some were conducted virtually, using various video and audio services, including Skype, phone, and Zoom. The interviewees were provided with an open and honest explanation of the goal of the interview. In addition, those interviewed were asked if the conversation could be recorded to guarantee accurate transcriptions for subsequent analysis. The interviewees were informed that the recording would only be used for this project and that their identities would be kept confidential. Following the RMIT ethical requirements, the recordings will be disposed of after five years. Five participants declined to provide permission to videotape interviews and give open-ended responses to the interview questions. The interviews were conducted in Arabic since it was the first language of the researcher and the research participants. This allowed for a high degree of effectiveness from the interviews. This was done so that the participants would have an easier time comprehending the subtleties of the questions that were being posed (Murray & Wynne, 2001). The purpose of translating the questions from English to Arabic was to create a text in the target language that is comparable (of equal value) to the text in the source language (Pym, 2007).

Table 1. Interviewee Profile.

Designation	Participants selected
Shariah committee member	12
Senior management	10
Risk management committee	8
Other employees involved in Shariah compliance	4

Qualitative Research Method

The data were analyzed using a thematic analysis technique, one of the most prevalent approaches in qualitative data analysis (Thompson, 2022), to discover the emergence of patterns of similarities and differences within the data. Many research scholars have used this method to analyze their data because it minimally organizes and describes it in rich detail (Boyatzis, 1998). Thematic analysis is a robust qualitative research method used to identify, analyze, and report patterns (themes) within textual data. It involves several systematic steps to uncover meaningful insights from qualitative data sources such as interview transcripts or documents. The process begins with **familiarisation with the data**, where researchers immerse themselves in the content to understand its context and nuances. Next, **generating initial codes** involves systematically labelling data segments that capture key concepts or ideas relevant to the research objectives. This phase lays the foundation for further analysis. **Searching for themes** follows, where researchers organize and group similar codes to identify overarching patterns in the data. Researchers revisit the original data to validate and refine themes, ensuring they are grounded in the dataset and aligned with research objectives. **Defining and naming themes** involves clearly articulating each theme and providing a descriptive summary. Each theme should be distinct yet comprehensive, covering all relevant aspects of the data while addressing the research questions. The authors employed the NVivo software to analyze qualitative data, as it provides an efficient method for adequately analyzing and organizing massive interview data sets. The data analysis process comprised five steps: familiarisation, generating initial codes, searching for themes, and reviewing and finalizing themes, leading to the following themes and sub-themes (Table 2).

Table 2. Overview of themes generated.

Major themes	Sub-themes
Theme 1. Shariah Risk Management Practices in IBs	Identification and Assessment of Shariah Non- Compliance Risk
	Risk Treatment and Mitigation Strategies in IBs
	Shariah Risks in IBs
	Effectiveness of the Committee in Risk Management
Theme 2. The framework of Shariah Compliance Risk Management	More Information to Meet the Needs of Customers
	The Involvement of Professional Bodies in the Approval and Regulation
	Discussion between Scholars
	Skilled Resource

Text Mining Method

Text mining, also known as text data mining or text analytics, is the process of extracting useful information and insights from textual data. It can efficiently conduct numerous analytics within a few seconds without any external help. One of the fundamental techniques in text mining is **Natural Language Processing (NLP)**, which deals with processing and analyzing large amounts of natural language data. This involves tasks such as tokenization, which breaks down text into smaller units called tokens, and stemming and lemmatization, which reduce words to their base or root form to ensure consistency in analysis. Another critical technique is **sentiment analysis**, which determines the sentiment or emotion expressed in a text, categorizing it as positive, negative, or neutral. **Topic modelling** is used to identify the main themes within a collection of texts, employing methods like Latent Dirichlet Allocation (LDA) and Non-Negative Matrix Factorization (NMF). **Text classification** involves assigning predefined categories to text data using supervised machine learning techniques such as Naive Bayes, Support Vector Machines (SVM), and neural networks. **Named Entity Recognition (NER)** identifies and classifies named entities within the text, such as people, organizations, and locations. **Clustering** groups similar texts based on their content using algorithms like K-means and hierarchical clustering. **Information retrieval** focuses on extracting relevant information from a large corpus of text data, a technique commonly used in search engines. The applications of text mining are diverse.

In **customer feedback analysis**, it helps understand customer satisfaction and identify areas for improvement. **Social media monitoring** leverages text mining to gauge public opinion, track trends, and manage brand reputation. In **healthcare**, text mining extracts valuable insights from medical records, research papers, and clinical notes to enhance patient care and medical research. It also plays a crucial role in **fraud detection** by analyzing textual data in insurance claims and financial transactions to identify fraudulent activities. **Market research** benefits from text mining by understanding market trends and consumer preferences through the analysis of surveys, forums, and online reviews. Furthermore, it aids in **legal and regulatory compliance** by analyzing legal documents and contracts to ensure adherence to regulations and identify potential risks. Several tools and libraries facilitate text mining, including **NLTK (Natural Language Toolkit)**, **SpaCy**, **Gensim**, **TextBlob**, **Scikit- learn**, and **Stanford NLP**. Each tool offers specialized capabilities for text mining tasks, from basic NLP processing to advanced machine learning applications.

For analysis, the whole interview is fed into the text mining algorithm, as the interviewer's questioning affects the interviewee's answer. Twenty-one interviews were analyzed using the same process as shown in Fig. 1.

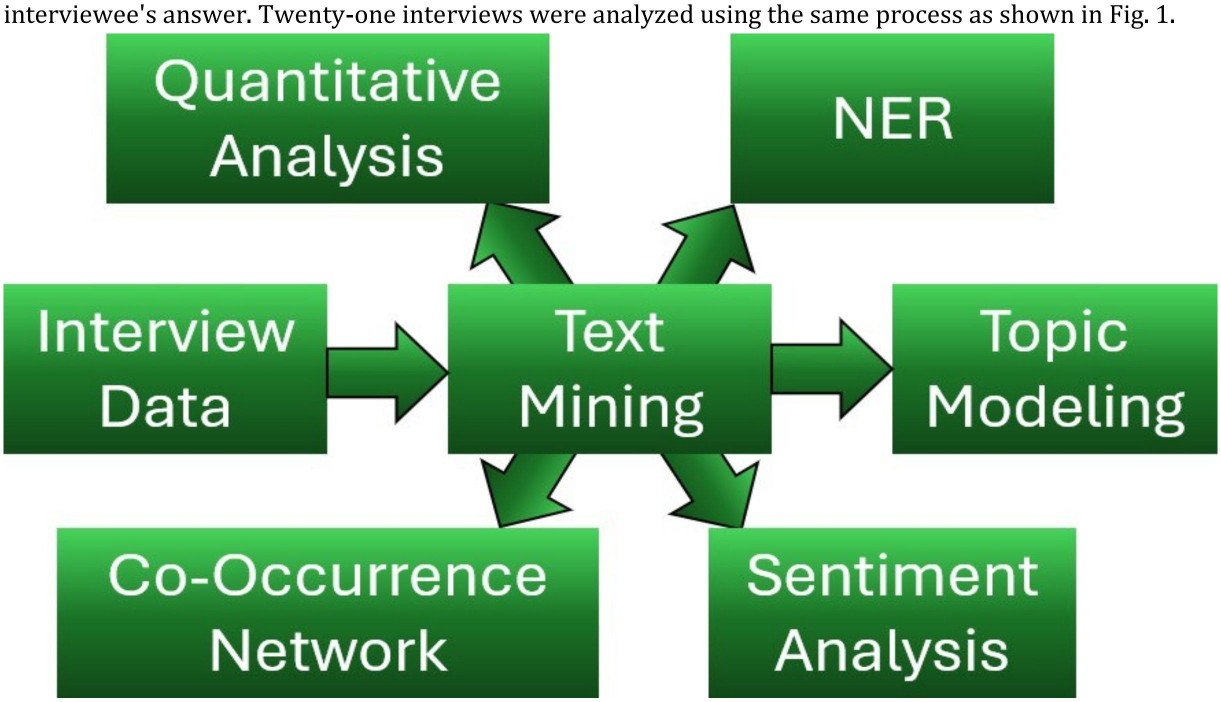

Figure 1. Text mining processes used on the paper

Ethical Consideration

The letter of permission to carry out the study was received for the period beginning July 15, 2018, and ending July 15, 2022, in line with the University Research Governance Framework. This was done following the ethical recommendation that RMIT University had supplied. In- person interviews were conducted with most interviewees from each Bank who expressed interest in participating in the study.

The members of the Supreme Council make up the first group, while those working for Islamic financial institutions make up the second. All participants supplied written permission and were informed that their participation was entirely optional and that they may withdraw any data they had submitted before the start of the research or refuse participation at any moment up until the deadline (July 15, 2020). If any participants wanted to contact the researcher, they were given his email address and phone number. According to the ethical requirements of RMIT University, the only person who has access to the interview transcript is the researcher. The transcript was kept in a safe location and kept separate from the raw and processed data for five years.

Results

Theme 1. Shariah Risk Management Practices in IBs

The research participants discussed the practices, causes, and frameworks implemented by Islamic banks to manage Shariah risk effectively. Based on their views, this theme is divided into sub-themes discussed below. Sub-theme Identification and Assessment of Shariah Non-Compliance Risk

The research participants discussed the organizational structure and explained through which channel the evaluation and approval happen. Participant 11 mentioned that the Shariah control department is a part of the Shariah secretariat, which is a subordinate department to the Shariah committee. It comprises three sub-departments: the Shariah control sub- department, the research and studies sub-department, and the humanitarian services sub- department. All these sub-departments operate under bank management. The participants reported that as bank management lacks knowledge regarding Islamic Shariah law, all violations and transgressions related to this are reported to the Shariah control centre, which acts accordingly.

"*……..Because the internal audit department, which represents the Bank's internal control system, has no shariah audit role and even has no understanding of the more intricate shariah-related matters and if there is a substantial and obvious violation of shariah provisions, we only report such violation to the shariah control sector, which in turn reports to the Shariah committee to develop a Shariah control plan. So, there has to be a strong controlling body in place to deal with transgressions at any Islamic bank. Otherwise, many violations are likely to occur. This controlling body will put the customer's mind at ease and, at the same time, will cause employees to think twice before violating the provisions of Islamic Shariah*" (P11)

Participants also stated that, besides Islamic knowledge, the Shariah board should include members with competence in marketing, legal concerns, and risk assessment. According to the participants, a lack of such expertise on the board may result in the risk committee taking over the risk assessment function, including the assessment of Shariah compliance risk. This lack of competence may jeopardize the Shariah committee's independence and efficacy, making its decisions less valuable. The significance of a robust Shariah risk management framework in Islamic banks is substantiated by the research carried out by Ginena (2014). The study places significant emphasis on the pivotal role of the Shariah board as the primary authority entrusted with the crucial responsibility of overseeing and ensuring Shariah compliance within these institutions. Proponents contended that the composition of the Shariah board ought to consist of individuals possessing a profound understanding of Islamic law and finance. This is crucial to guarantee the proficient evaluation and handling of the risk associated with non-compliance to Shariah principles.

The research conducted by Ayub et al. (2023) underscores the imperative of possessing expertise that extends beyond a mere understanding of Islamic principles within the Shariah board. Professionals with backgrounds in law, economics, and accounting are recommended to improve the overall governance of Islamic institutions. According to the findings of their study, the independence and efficacy of the Shariah committee are enhanced by the existence of a varied and highly trained Shariah board. As a result, it is easier to make educated decisions about mitigating Sharia-related risks. Shafii et al. (2010) stressed the need for Islamic financial institutions to establish a Shariah control department to emphasize further the need to detect and assess the risks associated with Shariah non-compliance. The author argues that a competent team of professionals trained in the nuances of Islamic law and finance is essential for the control department. This would pave the way for strict monitoring and enforcement procedures to be implemented, assuring their effectiveness. The present study's findings, which highlight the role of the Shariah control department in efficiently resolving instances of infractions and transgressions, are consistent with those of Shafii et al. (2010) research.

Sub-theme: Risk Treatment and Mitigation Strategies in IBs

Participants in discussions on risk management practices in Islamic banks highlighted the presence and strength of the Bank's internal control department. They stated that the Bank has an internal control department that closely analyses its operations to guarantee progress and compliance with rules. They further noted that the internal control department monitors the application process by sampling operations and performing field visits to branches and subsidiaries. This rigorous supervision process is critical in ensuring the Bank's compliance and control.

"*…….In the Bank, we have an internal control department. The application process is monitored by taking samples from the operations and making a field visit to the branches and subsidiaries of the Bank…* " (P6)

Participants also addressed the role of the board of directors in decision-making processes. They revealed that Shariah committees are tied to the board of directors in some banks and the general assembly in others. As a result, the Shariah committee develops a report on the Bank's conformity with Islamic law, which is then submitted to higher management, most likely including the board of directors, which has the highest level of authority and is responsible for making crucial decisions that shape the Bank's operations.

"*………The bank management controls decision-making processes. Thus, the Board of Directors has the greatest authority. The Board of Directors is responsible for critical decisions* " (P9)

The governance structure of Islamic banks in Malaysia was thoroughly investigated in a study conducted by Noordin et al. (2015). The study shed light on the pivotal role played by the internal control department in ensuring effective compliance and risk management within these banks. The importance of establishing a robust internal control system to effectively oversee and mitigate risks within Islamic banks was underscored. The findings above align with the conclusions drawn from the present study, which underscore the critical importance of the internal control department. Furthermore, the literature has examined the significance of the board of directors' involvement in decision-making processes. In their study, Shahzad et al. (2017) delved into the intricate governance mechanisms employed by Islamic banks in Pakistan. Their findings shed light on the board of directors' pivotal role in ensuring the Bank's adherence to the principles of Shariah. The significance of robust governance structures and efficient decision-making processes in upholding the integrity and stability of Islamic banks was underscored. A comprehensive study by Ahmad and Halim (2014) examining risk management practices within Islamic banks revealed the critical significance of proactive measures in identifying, assessing, and mitigating risks. The proponents contended that Islamic banks must embrace risk management frameworks specifically designed to accommodate their distinctive attributes while simultaneously adhering to the principles of Shariah. The present study's discoveries regarding the role of the internal control department in overseeing operations and guaranteeing compliance are based on the proactive risk management approach advocated by Al Rahahleh et al. (2019).

Sub-theme Shariah Risks in Islamic Banking

The participants in the discussions highlighted various risks Islamic banks face, namely Shariah, interpretation, financial, and reputation risks. They emphasized that these risks present potential challenges for Islamic banks. They further noted that Shariah risk, which refers to the potential non-compliance with Shariah principles in the Bank's activities, is managed by the Risk Committee in collaboration with the Shariah Supervision Department. The partnership between these entities demonstrates a dedicated effort to address and mitigate risks effectively. This involves the integration of Shariah restrictions and controls into the Bank's policies and procedures, reflecting a proactive approach to ensure Shariah compliance across all facets of the Bank's operations. These findings are substantiated by the scholarly contributions of Shahzad et al. (2017), which underscored the significance of Shariah risk management in Islamic banks and the imperative for seamless collaboration among various departments and committees within these financial institutions.

"*……Yes, it is considered a risk facing Islamic banks. Yes, it is managed by the Risk Committee, and specialists in risk management manage it…* " (P4)

The participants also drew attention to the occurrence of multiple fatwas as a significant Shariah risk. They engaged in a discussion regarding the challenges encountered in attaining Shariah compliance within Islamic banks. Regarding this, one of the participants expressed their perspective as follows:

"*……….In the Bank, we experienced many negative things; for example, some Shariah Scholars need to gain acquaintance with jurisprudential, Shariah, and financial matters. Shariah scholars are responsible for making Fatwas according to the demands of the Islamic Banks and Shariah rules and regulations. However, these Fatwas may need to be more flexible, especially concerning dealing with non-Islamic banks and financial institutions. Sometimes, there is a conflict of Fatwas among Shariah scholars concerning determining the legality of financial transactions and products of the Bank…* " (P15)

The discovery above aligns with the scholarly investigation carried out by Haridan et al. (2018), which sheds light on the complexities arising from the presence of numerous fatwas and the subsequent conflicts that may arise among Shariah scholars when deliberating the permissibility of financial transactions and products within Islamic banking institutions.

Participants also talked about how different fatwas and different interpretations affect shariah risk. They acknowledged that such disputes might harm banks, increase the danger to their reputation, and reduce clients' trust in the institution. During the discussion of the impact, the participants emphasized that many consumers of Islamic banks choose these companies expressly because of their devotion to Shariah principles. Suppose a different fatwa is issued by a scholar who is not a member of the Sharia Committee, and it conflicts with the Committee's decision. In that case, it might pose a risk to the Bank, causing confusion and disagreement and potentially leading to the failure of the Bank's products. The significance of maintaining the credibility and reputation of Islamic banks through consistency in fatwas and interpretations has been underscored by Hamza et al. (2013). It has been emphasized that conflicting fatwas can confuse customers, eroding their trust in these financial institutions' products and services.

"*………..Sure, it does constitute a marketing risk because customers have varying levels of education and understanding. I mean, you could lose a customer because he is more convinced of the Fatwa issued by a sheikh on the shariah board of another bank than by that issued by this Bank's shariah board, and that could mean the difference between success and failure of a certain product…* " (P 12)

Participants shared that the existence of contradictory Fatwas within the domain of Shariah committees can provide notable difficulties in the process of decision-making as these committees have the crucial role of evaluating the adherence of financial products and services to the principles of Islamic finance. Zain and Shafii (2018) reached a similar conclusion, emphasizing the impact of competing Fatwas on the decisions of Shariah committees in Islamic financial institutions. The presence of conflicting Fatwas issued by several scholars or organizations regarding a certain product or subject compromises the unity and uniformity of the decision-making process. The presence of conflicting views and perspectives might give rise to a sense of doubt and ambiguity among members of the Shariah committee.

"………..Yes, I do think that different Fatwas between Shariah scholars and organizations on the same product or issues impact the function of the Shariah committees. This is because each Fatwa plays a crucial role in determining the permissibility of a particular product or issue. If there are conflicting opinions, the Shariah committee may find it challenging to decide or provide guidance to the Islamic financial institution. ………..." (P20)

The participants also expressed that different interpretations of Shari'a principles might lead banks to reputation-related problems. This is because clients may lose trust in the Bank due to a discrepancy in Fatwas. In addition, operational and financial risks may arise due to the uncertainty generated by the variation of Fatwas. Since the Bank has already invested funds and resources, it may suffer significant financial losses if a product is introduced before receiving the Shariah committee's permission and is later shown to be incompatible. It has been suggested that to address these risks effectively, it is of utmost importance for Islamic banks to establish well-defined processes and rules, both internally and with the backing of government guidelines. Furthermore, implementing a merit-based selection process for experienced scholars to serve on the Shariah committee can play a significant role in protecting the Bank's reputation and mitigating any possible risks. Alkhamees (2013) agrees with this suggestion, stressing the need for qualified and competent scholars to serve on Shariah committees to guarantee the integrity of Islamic financial products and services.

The differences in fatwas between Shariah scholars and organizations are acknowledged as a challenge for Shariah committees in making decisions and providing guidance to Islamic financial institutions. During the discussion, the participants highlighted the need for transparent systems, regulations, and strategic planning to address these risks. Karbhari et al. (2020) also emphasized the significance of formulating comprehensive frameworks and guidelines for managing Shariah risk in Islamic banking institutions. The individuals in question emphasized the importance of well-defined regulatory frameworks that maintain consistency and mitigate the possibility of conflicts arising from differing interpretations of Shariah.

"*……….This constitutes a danger to the Bank; otherwise, if there are no clear systems and regulations, whether internal from the Bank or the government, this problem will continue. In one case, a product was approved by the Bank's Sharia committee and offered to clients. After four months had passed, it was presented to one of the fatwa scholars, and it was forbidden for non-compliance, and the Bank caused heavy compensation losses…….*" (P16)

Sub Theme Effectiveness of the Committee in Risk Management

Several key factors influence the effectiveness of the Shariah Committee in Islamic banks. Based on the interviews, three factors were highlighted as necessary for the Committee's effectiveness, which are discussed below.

The data analysis shows that *the cooperation and collaboration* between the Shariah committee and the executive management in Islamic banks is the most essential factor in the effectiveness of the Committee and the implementation of products and services. The participants shared that the power of the Shariah committee is derived from the board of directors, as they have the authority to stamp the approval made by the Committee. They added that while the Shariah committee cannot examine all transactions, they rely on a representative sample, and it is the responsibility of the Bank's personnel to ensure compliance with Shariah provisions in all other transactions. The cooperation between the Committee and the executive management is deemed necessary in maintaining Shariah compliance. The assertion made in this statement is corroborated by the earlier investigation carried out by Basiruddin and Ahmed (2020), wherein they emphasized the crucial nature of a productive partnership between the Shariah Committee and the executive management to execute Shariah governance and compliance measures successfully.

"................... The members of the SC are required to collaborate with the bank employees that are considered the frontline employees, to fulfil the objectives of the Bank… " (P15)

The participants stated that the effectiveness of this collaboration is critical, as executive management plays a crucial part in ensuring Shariah compliance. They indicated that cooperation and support from the board of directors and management are required to strengthen the Shariah committee's role and effectiveness. Ayedh et al. (2021) underscored the significance of incorporating Shariah compliance into the routine functioning of Islamic banks using efficient communication and coordination between the Shariah Committee and the Bank's staff.

"………Continuous communication and cooperation between the Shariah board, the Bank's management, and the Bank's board of directors. There will be good and effective Shariah governance. Continuous follow-up is an important element. Continuous meetings between the Sharia board and the executive management are a good and important element, giving more care, follow-up, and strength….." (P8)

The analysis reveals that the Committee's *independence* is the key element that significantly affects the Committee's efficacy. Participants underscore the utmost importance of the Committee's independence in facilitating appropriate decision-making processes, upholding ethical principles, and safeguarding the institution's credibility. In a comprehensive investigation by Ahmad and Halim (2014), Shariah committees' pivotal role within Malaysia's Islamic banks was thoroughly explored. The study revealed that independence emerged as a critical determinant in facilitating sound decision-making processes. The study underscored the significance of maintaining the Committee's autonomy from the Bank's management and board of directors to ensure optimal operational efficacy.

"……….The independence of the Shariah Committee in any Islamic bank is key to proper decision-making, whether on the part of the board or potential investors……." (P14)

It was also discovered that certain participants opposed the Bank's organizational structure. They reported that while the Shariah committee depends on the Bank's management, its internal control arm should be independent of the board of directors to attain complete independence. They agreed that the Committee should be granted all the necessary powers and administrative support to carry out its task successfully and without impediment. A comprehensive investigation by Alahmadi et al. (2017) delved into the intricate dynamics surrounding the pivotal function of Shariah committees within the Islamic banking sector in the Kingdom of Saudi Arabia. The study revealed that preserving the Committee's decision- making integrity hinged upon the pivotal factors of independence and autonomy.

"…….Many factors help in the Committee's effectiveness, but the important factor is if it is given all the powers that make it carry out its work without hindrance, with complete independence……" (P2)

Participants also stated that *transparency and disclosure* of any business conflicts are vital to the Committee's efficient operation. They added that Shariah governance regulation emphasizes the need to avoid interference from the board of directors in Shariah decisions. It also provides committee members with access to all necessary documents and information, ensuring the Committee's full autonomy and independence. Ariffin and Kassim (2011) investigated Malaysian Shariah risk management practices and stressed the need for Shariah Committees to operate independently.

"………….It also emphasized that it is ensured that the Board of Directors does not interfere with the issue of the Shariah decision, as well as that the Bank allows the member of the Committee to view all the documents and information necessary to express an opinion……" (P18)

This theme also focuses on the efficiency with which the Shariah Committee performs its duties within a bank. It was stated that the administration's response to the Committee's recommendations and amendments provides evidence of its efficacy. Fatmawati et al. (2022) researched the usefulness of Shariah Committees in Pakistan. They found that the Committee's effectiveness in reducing Shariah-related risks is correlated with the degree to which the Bank's administration is receptive to the Committee's recommendations and amendments. However, it was also shared by the research participant that the Committee's sheer existence serves as a "de facto risk-reduction tool" (P14); formal participation in risk management is required to ensure the Bank's status as a Shariah-compliant.

"....................... Yes, I see that it is effective in performing its duties, as the administration responds to it in terms of what is recommended and amended. This gives an indication of the effectiveness of the Committee. " (P21)

In summary, the findings emphasize the importance of the Shariah committee's independence and autonomy in Islamic banks, emphasizing the necessity for structural independence, complete powers, openness, and non-interference to promote effective decision-making and respect ethical values.

Theme 2. Framework of Shariah Compliance Risk Management

This theme is divided into subthemes; discussions of themes with participants will be led to develop an appropriate understanding of Shariah Compliance Risk Management in IBs in KSA. This is through discussion on elements and factors that affect the framework of risk management in IB, identification and implementation challenges and strategies.

More Information to Meet the Needs of Customers

The participants offered insight into multiple strategies for addressing stakeholders' concerns about the Islamic nature of banks. The provision of information was a topic that was brought up by the majority of the participants. According to the participants, published information about a bank's Shariah compliance should be adequate for customers. This transparency in providing confidence to stakeholders is demonstrated through the sharing of information indicating the Bank's adherence to Islamic finance principles, such as yearly reports or official statements.

"*……….Of course, some banks attach their decisions, the decisions of the Shariah committee, on their website, such as Bank Albilad and, I think, Alinma Bank. In some banks, no, but if I went to the branch and asked them for the decision to receive it, it may mean that it is already available at the branches, or if you asked for it, they would provide you with it. It means an excellent addition, also the reassurance of compliance with the Shariah law… "*
(P27)

It is also noted that some stakeholders need more detailed information to increase their confidence and make informed choices regarding investments in Islamic institutions. These parties may be more interested in specific banking operations information and the steps taken to achieve Shariah compliance. Therefore, according to the participants, banks should ensure that they address the specific information needs of various stakeholders in order to foster their trust and aid in decision-making.

"*…………Yes, I expect it meets my needs. However, there may be requirements from the point of view of stakeholders and there are means of communication that suffice with regard to the commitment to legality… "* (P 03)

As mentioned above, the findings follow the research conducted by other esteemed scholars within the field. Al-Sulaiti et al. (2018) underscored the importance of transparency and information disclosure within Islamic banking. Alahmadi et al. (2017) asserted that providing Shariah compliance reports encompassing the determinations made by Shariah committees is imperative in fostering trust and confidence among various stakeholders. Moreover, Haddad and Souissi (2022) proposed that Islamic banks should embrace a proactive stance when divulging pertinent details regarding their products, operations, and adherence to Shariah principles. This is deemed necessary to address various stakeholders' information requirements effectively.

The Involvement of Professional Bodies in the Approval and Regulation

The participants discussed Islamic banks' structural and administrative aspects, mainly focusing on the Shariah Committee. They emphasized the importance of establishing the Shariah Committee as a distinct entity within the Bank with a separate organizational structure. While it should be connected to the Bank's board, the Committee should operate independently in carrying out its functions.

"…………*There is a requirement for establishing an independent Shariah authority to monitor and regulate the work of Shariah committees; however, the professional accounting bodies need to be specialized in and qualified for monitoring and regulating the work of Shariah Committees….*" (P15)

The Shariah Committee's independence is critical to its effectiveness. This independence helps to ensure the integrity and credibility of the Committee's decision-making process, as it may focus entirely on reviewing and certifying Shariah-compliant financial products and transactions. Because it operates independently, the Committee can make judgments without being swayed by outside forces or interests.

"……………….. *The best organizational structure for the Sharia Committee to become more effective in the Bank would be one that is specifically tailored to its unique responsibilities and functions within the Bank. This might include a dedicated Sharia Committee department with its own management and staff, or it may be integrated into a larger department or division… "* (P16)

The participants advocated for creating an independent Shariah authority to oversee and control the operations of Shariah committees. Other scholars (Qattan, 2003; Rahim et al., 2015; Eldaia, 2020), have also underlined the importance of an independent oversight body, stating that this is necessary to protect the honesty and reliability of Shariah decision-making procedures. This autonomous body would offer direction, evaluation, and certification for Shariah-compliant financial products and transactions to ensure that Shariah principles are followed.

Discussion between Scholars

The theme underscores the importance of achieving a consensus among the members of the Shariah Committee to prevent conflicting opinions and uncertainty for the general public. The present theme highlights the significance of resolving differences in opinions within a committee or group. Specifically, in the context of fatwa issuance, such a resolution is deemed crucial to maintain the trustworthiness of the Committee's rulings and prevent inconsistencies in Islamic principles.

"*…….If the differences are not resolved, it could lead to a loss of trust in the Committee's rulings and possibly even create contradictions in Islamic law. Therefore, it is crucial for the committee members to communicate effectively and work towards a harmonious resolution……*" (P 31)

Participants also highlighted the significance of efficient communication and consultation among Sharia scholars and organizations. The individuals expressed that effective communication among scholars is crucial for resolving disparities in fatwas and attaining unanimity. One cited source briefly refers to a scenario in which the fatwa issuer was instrumental in resolving, suggesting that the original ruling provider is critical in resolving disputes.

"*…………To overcome such issues, a proper mechanism should be in place that includes regular communication, discussion, and consultation between Shariah scholars and organizations. This can help bridge Fatwas's differences and come to a consensus…* "

(P34)

The participants also proposed that seeking counsel from esteemed scholars could be a viable solution for a deadlock among committee members regarding specific matters. This statement suggests that the Committee acknowledges the significance of soliciting guidance and proficiency from seasoned scholars in order to reconcile differences and attain clarity on intricate issues.

"*…….The Shariah committee should also seek guidance from senior scholars on the issues they face if they cannot find an agreement among themselves. Ultimately, the Shariah committees should prioritize the interest of the clients and the principles of Shariah in making their decisions…* " (P 29)

They added that Shariah committees endeavour to make informed and ethically sound decisions that align with the Islamic legal framework and benefit the parties involved. This is achieved through seeking counsel from experienced scholars and placing clients' interests and Shariah principles at the forefront of their considerations. The findings align with those of other scholars, underscoring the significance of consensus, efficient communication, consultation, and seeking guidance from seasoned scholars when constructing a framework for managing Shariah compliance risks in Islamic banks (Nomran et al., 2018). These measures play a crucial role in upholding consistency, fostering trustworthiness, and facilitating well-informed decision-making that aligns with Islamic principles and serves the best interests of all stakeholders involved (Aldohni, 2014; Iqbal & Mirakhor, 2011).

Skilled Resource

This theme emphasizes the importance of possessing specialized knowledge, obtaining suitable training, and exhibiting expertise among Shariah committee members. According to the participants, these attributes guarantee their effectiveness, skillfulness, and capacity to deal with Islamic finance's unique challenges and developments.

"....................*In addition, the bank has to recruit employees who specialize in relevant fields, such as Islamic economy and Islamic banking. Some members of the Shariah Committee have pure Islamic backgrounds, so they need help to reach solutions that keep pace with rapid development…* " (P25)

Furthermore, they also emphasized the importance of hiring employees with a specific understanding of subjects such as the Islamic economy and banking. This implies that some Shariah committee members may need more experience developing banking procedures and may be unable to keep up with rapid improvements. As a result, having qualified employees can assist the Committee in providing ideas and solutions that align with Islamic banking principles and support the Bank's growth and improvement.

"*………….On the other hand, members of the Shariah committee must take specialized courses to conduct internal Shariah audits. Of course, this is a challenging matter since the Institute of Internal Auditors (IIA) has developed many* *standards that must be observed. So, if the chairman and members of the Shariah control board have a combined knowledge of Shariah and internal audit standards as issued by the Institute of Internal Auditors (IIA), then they will be more efficient and effective...* " (P 30)

The discovery confirms the research carried out by Haron and Khalid (2018), who argued that individuals serving on Shariah committees must thoroughly comprehend both Shariah principles and internal audit standards. Therefore, it is strongly recommended that the Shariah committees operating within Islamic banks in Saudi Arabia actively engage in specialized training programs encompassing a comprehensive understanding of Shariah principles and internal audit standards. This will significantly enhance their expertise in efficiently overseeing and mitigating risks related to Shariah compliance (Khalid et al., 2017; Ayedh et al., 2021; Ghauri, 2015).

Text Mining Analytics

An automated Text mining algorithm is applied to each interview and all the interviews to extract different features or properties. Features and data that were extracted consist of word count, average word length, frequency of a word, NER, LDA topic modelling, sentiment analysis, word cloud generation, and co-occurrence analysis network. The top 20 most word frequency distribution for interview one is given in Fig. 2, where the most discussed word is "shariah". The word frequency distribution for all the other interviews is in supplementary Fig. S1 to Fig. S20. The Quantitative statistics for each interview are provided in Table 3. The statistics imply that most discussed topics were related to "shariah" and "committee". Only one interview was more towards "risk". Text statistics of all the interviews provide an overview of how many words and sentences were present, shown in Fig. 3. Giving information on total words of 24836 and sentences of 2678. The NER distribution for all the interviews gives insight into which type of entity was focused on more in these interviews, which is given in Fig. 4. The most discussed entity is ORG (organization). From the quantitative statistics, text statistics, and NER distribution, all the conversations were likely learning about Shariah law in the banking system and the corresponding risk management committee in the banking system for an organization.

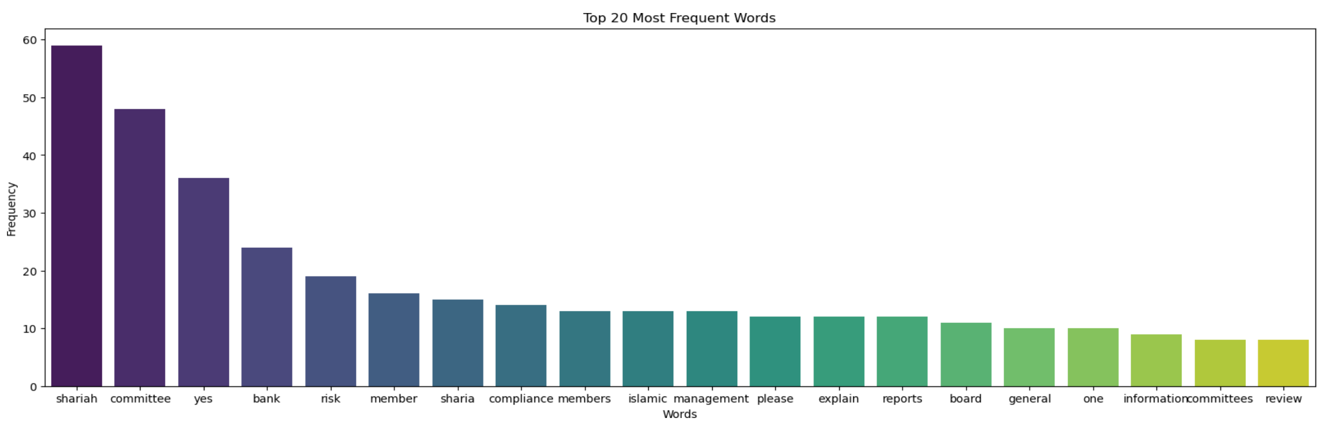

Figure 2. Word frequency distribution for interview 1.

Table 3: Quantitative Statistics for Each Interview

Interview No.	Quantitative Statistics			Most Frequent Word
	Word Count	Sentence Count	Average Word Length	
1	1231	158	7.31	Shariah
2	617	74	7.11	Committee
3	798	99	6.94	Shariah
4	1085	163	7.13	Committee
5	1749	140	7.23	Shariah
6	908	107	6.89	Committee
7	608	74	7.10	Committee

8	934	81	7.07	Shariah
9	824	119	6.88	Bank
10	337	47	7.27	Shariah
11	2674	250	7.27	Shariah
12	1433	109	7.17	Shariah
13	1873	242	7.17	Shariah
14	1426	119	7.41	Shariah
15	1241	131	7.33	Shari
16	1792	156	7.40	Committee
17	835	95	7.28	Shariah
18	1310	177	7.12	Shariah
19	1247	135	7.13	Risk
20	894	111	7.18	Shariah
21	807	87	6.99	Shariah
All	24836	2678	7.18	Shariah

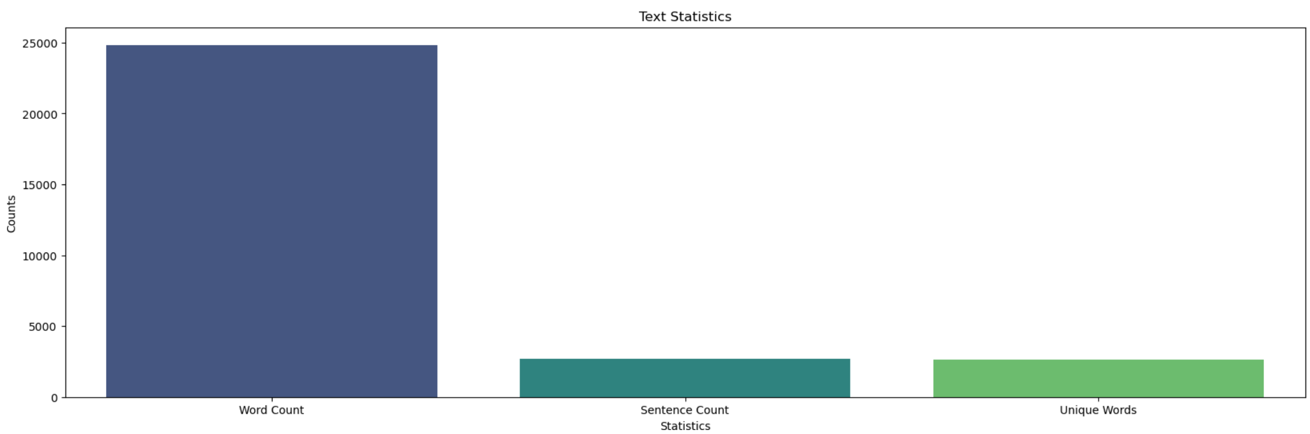

Figure 3. Text statistics of all the interviews together.

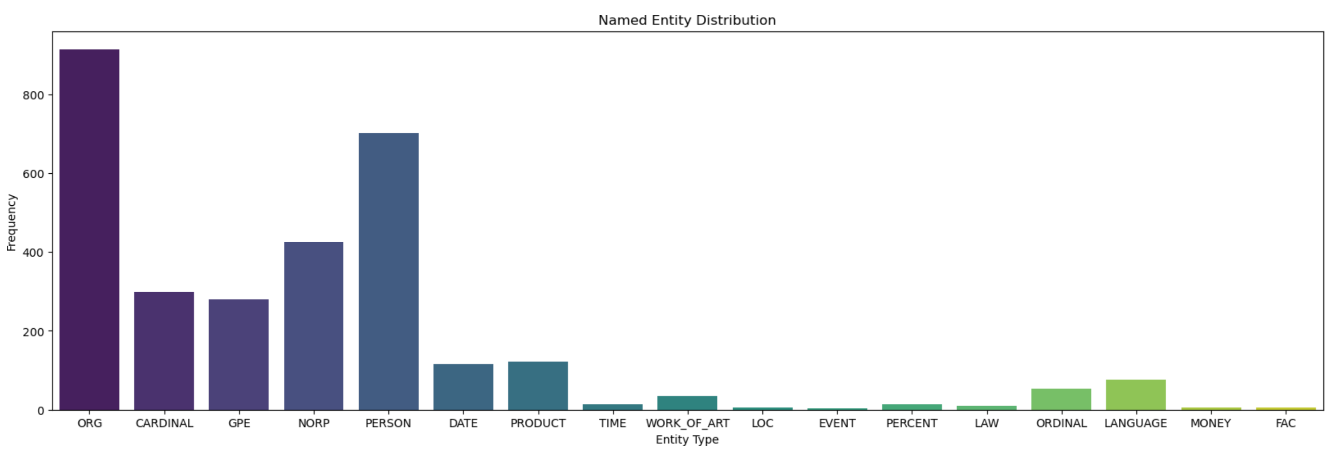

Figure 4. NER distribution of all the interviews, where OGR is an organization, GPE is a Geopolitical Entity, NORP is Nationalities or Religious or Political Groups, LOC is Location, and FAC is a Facility.

Topic modelling using Latent Dirichlet Allocation (LDA) is a statistical method for discovering the abstract "topics" in a collection of documents. LDA assumes that each document is a mixture of a small number of topics and that each word is attributable to one of the document's topics.

Topic modelling with LDA was applied to all the interviews separately and together to group them into two topics to see discrepancies. These are given in Table 4. Table 4 shows that all the conversations would discuss the Shariah and committees within the banks, further supporting that there is a concern of the banks with “shariah” or the “committee”. The topics found when doing LDA on the whole conversation give us the topic of “risk”.

Table 4: Topic Modeling for Each Interview

Interview No.	Topics No.	Topic Modeling LDA into 2 groups
1	Topic 0	'shariah', 'committee', 'yes', 'bank', 'member'
	Topic 1	'shariah', 'committee', 'yes', 'bank', 'member'
2	Topic 0	'committee', 'bank', 'shariah', 'islamic', 'yes'
	Topic 1	'committee', 'shariah', 'bank', 'yes', 'islamic'
3	Topic 0	'shariah', 'bank', 'committee', 'role', 'islamic'
	Topic 1	'shariah', 'bank', 'committee', 'role', 'risk'
4	Topic 0	'committee', 'shariah', 'member', 'yes', 'bank'
	Topic 1	'committee', 'shariah', 'member', 'bank', 'yes'
5	Topic 0	'committee', 'shariah', 'bank', 'compliance', 'institution'
	Topic 1	'committee', 'shariah', 'bank', 'compliance', 'role'
6	Topic 0	'bank', 'committee', 'shariah', 'islamic', 'yes'
	Topic 1	'bank', 'committee', 'shariah', 'islamic', 'yes'
7	Topic 0	'committee', 'shariah', 'bank', 'islamic', 'yes'
	Topic 1	'committee', 'bank', 'shariah', 'yes', 'islamic'
8	Topic 0	'shariah', 'bank', 'committee', 'example', 'mean'
	Topic 1	'shariah', 'bank', 'committee', 'example', 'mean'
9	Topic 0	'bank', 'committee', 'shariah', 'yes', 'one'
	Topic 1	'bank', 'committee', 'shariah', 'yes', 'islamic'
10	Topic 0	'shariah', 'committee', 'think', 'bank', 'yes'
	Topic 1	'shariah', 'committee', 'bank', 'think', 'explain'
11	Topic 0	'shariah', 'committee', 'bank', 'researcher', 'participant'
	Topic 1	'shariah', 'committee', 'bank', 'researcher', 'participant'
12	Topic 0	'shariah', 'bank', 'committee', 'board', 'researcher'
	Topic 1	'shariah', 'bank', 'committee', 'board', 'researcher'
13	Topic 0	'bank', 'shariah', 'committee', 'participant', 'researcher'
	Topic 1	'bank', 'shariah', 'committee', 'researcher', 'participant'
14	Topic 0	'shariah', 'bank', 'committee', 'researcher', 'participant'
	Topic 1	'shariah', 'committee', 'bank', 'researcher', 'participant']
15	Topic 0	'shari', 'bank', 'committee', 'researcher', 'participant'
	Topic 1	'shari', 'bank', 'committee', 'participant', 'researcher'
16	Topic 0	'committee', 'bank', 'islamic', 'shariah', 'risk'
	Topic 1	'committee', 'bank', 'islamic', 'shariah', 'risk'
17	Topic 0	'shariah', 'bank', 'committee', 'risk', 'islamic'
	Topic 1	'shariah', 'bank', 'risk', 'committee', 'islamic'
18	Topic 0	'shariah', 'committee', 'bank', 'member', 'management'
	Topic 1	'shariah', 'committee', 'bank', 'member', 'risk'

19	Topic 0	'risk', 'shariah', 'bank', 'committee', 'management'
	Topic 1	'risk', 'shariah', 'bank', 'committee', 'management'
20	Topic 0	'shariah', 'committee', 'bank', 'role', 'islamic'
	Topic 1	'shariah', 'committee', 'bank', 'role', 'islamic'
21	Topic 0	'shariah', 'bank', 'committee', 'risk', 'role'
	Topic 1	'shariah', 'bank', 'committee', 'risk', 'role'
All	Topic 0	'shariah', 'committee', 'bank', 'islamic', 'risk'
	Topic 1	'shariah', 'committee', 'bank', 'islamic', 'risk'

Topic modelling is also done again with LDA into 3 groups to see if dividing it into more groups gives us more conversation topics. The division of 3 groups for all the interviews was done, and its word clouds are shown in Fig. 5. The LDA group word cloud was also done for each interview, which is given in supplementary Fig. S21 to Fig. S42. When grouping it into three topics, the word clouds indicate similar words such as "shariah", "committee", and "bank", with newer words like "risk", "compliance", "role", and "management", which were discussed in qualitative analysis of the interview. The word cloud in Fig. 5 gives rise to a new predicament that must influence Risk Management.

Figure 5: Word cloud generated of the LDA Topic modelling into three groups for all interviews.

A sentimental analysis of the interviews was conducted to see which conversation expressed more positivity and which one expressed negativity while talking about the risk management of Islamic banks. Table 5 shows the sentiment analysis of each interview and all the interviews together. Table 5 shows that most of the conversations leaned towards being neutral, indicating that conversations did not point to any existing problems. However, positive and negative aspects can be seen through the sentiment-analyzed word cloud of all the interviews together, which is given in Fig. 6. The separate word cloud of each interview is given in supplementary Fig. S43-S63. We were able to receive the following negative words more frequently: "risk", "conflict", "difficult", and "confusion", while the neutral words remained as common as previously. Indicating that there are influences on Shariah risk management.

Table 5: Sentiment Analysis for Each Interview

Interview No.	Sentiment Analysis		
	Positive	Negative	Neutral
1	0.136	0.061	0.803
2	0.136	0.061	0.803
3	0.127	0.061	0.811
4	0.113	0.041	0.846
5	0.111	0.045	0.844
6	0.137	0.054	0.809

7	0.133	0.026	0.841
8	0.138	0.042	0.821
9	0.116	0.019	0.865
10	0.094	0.049	0.857
11	0.106	0.042	0.852
12	0.105	0.057	0.839
13	0.102	0.066	0.833
14	0.098	0.056	0.846
15	0.084	0.051	0.864
16	0.12	0.051	0.83
17	0.113	0.06	0.827
18	0.114	0.068	0.818
19	0.106	0.105	0.789
20	0.098	0.35	0.868
21	0.085	0.067	0.847
All	0.116	0.056	0.828

Figure 6. Word cloud of the sentiment analysis of all the interviews.

Also, the generated word cloud of the frequent words in all the interviews (Fig. 7) validates that the words "shariah", "committee", "compliance", "risk", "bank", "Islamic", etc., are discussed more widely. The Co-occurrence Analysis network also gives the relation between words (Fig. 8). Which gives insight into the relation between "risk", "role", "shariah", "committee", "bank", "compliance", and "Islamic".

Figure 7. Word cloud of frequent words in all the interviews.

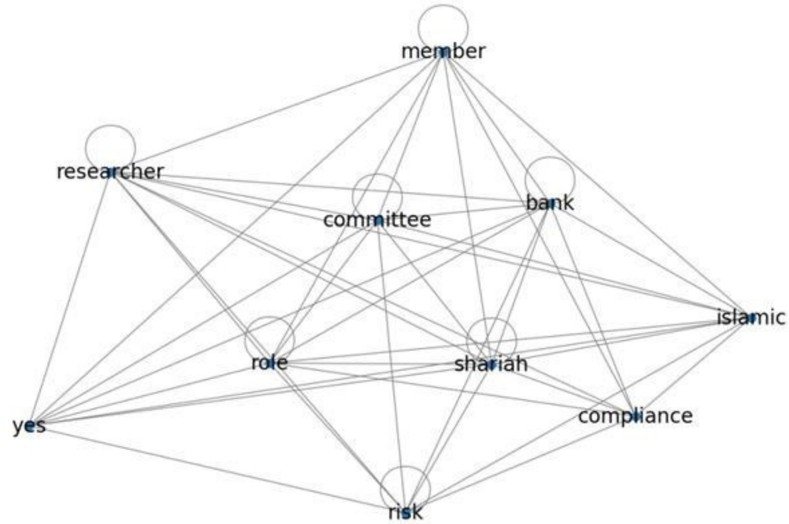

Figure 8. Co-occurrence Analysis network for all the interviews for the top 10 words.

Discussion & Conclusions

The study conducted interviews in various Islamic banks across the Kingdom of Saudi Arabia (KSA) and employed both qualitative and text-mining methods to analyze the data. The text mining approach, which was highly efficient in processing large amounts of data quickly, provided an advantage over qualitative analysis, which is time-consuming due to the detailed examination required for each paragraph. The analysis using Nvivo for qualitative data and Python for text mining revealed several key findings. Firstly, it became apparent that bank management personnel could sometimes lack knowledge of Islamic Shariah law, risking unintentional violations if they proceed without Shariah committee approval. Conversely, Shariah committees might lack financial, banking, or marketing expertise, which can result in profit losses, indicating that both groups need each other's approval.

Moreover, the absence of financial knowledge among Shariah personnel may lead to bank risk management personnel assessing Shariah compliance, thus posing a compliance risk and increasing dependency on other bank staff. To mitigate these issues, the study suggests enforcing training for Shariah personnel in finance and providing Shariah law education to banking staff. However, sampling operations and transactions to gauge operational quality might yield false positives. Independent decision-making by Shariah personnel could lower Shariah risk but might increase interpretation, financial, and reputation risks. This complexity becomes further intensified when dealing with non-Islamic banks, as they may not comply with Shariah law.

The interviews underscored the necessity for transparency, disclosure of business conflicts, and the employment of competent personnel due to differing perspectives on Islamic law among Shariah personnel, which can cause delays and risks. The text mining analysis enhanced these insights, identifying common themes and words such as "Shariah," "committee," and "bank," which dominated the interview discussions. Sentiment analysis and co-occurrence networks identified influences on risk management, highlighting key terms like "risk," "role," "compliance," "conflict," and "confusion." Collectively, these text mining analytics corroborated the qualitative findings, creating a comprehensive and robust analysis.

This study highlights valuable insights that could significantly impact the development of robust risk management strategies within Islamic banking, potentially enhancing stakeholder confidence in the seamless functioning of these operations. The study advocates for establishing a robust regulatory framework that clearly outlines the duties and responsibilities of Shariah committees in risk management. It proposes a comprehensive standardized framework for Shariah risk management applicable to all Islamic financial institutions, which should be adaptive to changes in market conditions and regulatory landscapes. Additionally, the creation of an autonomous national Shariah advisory body to oversee and harmonize Shariah governance across Islamic banks is suggested. The study also calls for crafting policies and regulations that foster technological advancement to improve risk management efficacy.

Nevertheless, the research possesses limitations, including its geographic focus solely on Saudi Arabian Islamic banks, which may restrict the generalizability of the findings to other Islamic financial systems with different regulatory frameworks. The small sample size and subjective interpretation of data present further limitations, along with the study's failure to integrate perspectives from a wider array of stakeholders, such as regulators, depositors, shareholders, and borrowers, whose views could provide a broader understanding of risk management practices and their effectiveness.

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