The Integration of ESG in Islamic Asset Management – A Practical Approach

Farah A'liyah binti Hj Amer Hishamuddin, Institutional Asset Management, BIBD Securities, Brunei Darussalam, farah.hishamuddin@bibd.com.bn

Abstract

Islamic finance and sustainable finance (ESG) have many overlaps including asset management activities. In Islamic finance, transactions should promote equality, social justice, inclusion, and economic prosperity while sustainable finance focuses on ethical and responsible financial practices. Investments in certain industries, products, and services are prohibited, whilst ESG investing may apply absolute rules such as the exclusion of harmful products such as alcohol and weapons. As such, the incorporation of ESG in Islamic Finance should be a natural pathway for progression in the growth of the industry. However, the Islamic finance industry is fractionally smaller than the conventional space. Filtering for ESG-labelled securities limits the investible universe further and may limit the ability to form a diversified ESG investment portfolio. This paper outlines a practical approach to incorporating ESG and Islamic finance in the asset management space and explores how fund managers have been incorporating ESG into fund management via case studies and industry practice. We explore the use of a systematic ESG overlay approach, which builds upon the investible sukuk universe to construct a portfolio in line with the asset manager's strategic positioning. The approach of both Shariah filters and ESG risk ratings act as both blacklists and whitelists for securities, removing non-compliant securities and overweighting quality securities with differentiated and sustainable business models. The approach views ESG investing as a form of risk management and monitors these risks in the same manner as traditional financial risk management. A typical criticism of ESG investing is greenwashing within sustainability-labeled products. In this regard, the proposed approach utilizes the ESG risk scores of the individual issuers and is irrespective of any green or sustainability labels, offering a practical method for ESG investing in the Islamic space.

Keywords: *ESG, Islamic Finance, Asset Management, greenwashing, sustainability*

Research Background

This paper aims to investigate the complexities and challenges associated with the integration of ESG factors into Shariah-compliant investing, with a specific focus on the Sukuk investment process, while also exploring inherent limitations that impede the seamless adoption of ESG factors. Through comprehensive literature reviews, this study seeks to shed light on the evolving landscape of ethical and sustainable finance within the context of Sukuk investments, providing valuable insights into the potential harmonization of ESG principles with Islamic finance practices.

In this section, this paper introduces the concepts of Islamic finance, Environmental, Social and Governance (ESG) and ESG investing. The paper then presents the literature review surrounding these themes, particularly on the rise in demand of ESG-centric investments, the relationship between incorporating ESG considerations into investment decisions and returns as well as the existing practices of ESG investing. The section thereafter presents a practical guide on building an ESG global sukuk strategy and discusses the considerations taken and limitations of such an approach.

Maqasid Shariah are the objectives behind the enactment of Shariah rulings, which is comprised of protection of faith or religion (din), protection of life (nafs), protection of lineage (nasl), protection of intellect (‘aql) and finally, protection of property (mal) (Salihin Academy Sdn Bhd, 2020). It is these Shariah rulings that the Islamic finance industry, including Islamic banking, Takaful and Islamic asset management, was built on the premise of. The global Islamic finance industry boasted assets of USD 3.25 trillion in 2022 and is forecasted to grow to USD4.94 trillion by 2025, driven by capital inflows into Islamic exchange-traded funds (ETFs), though still nascent to the global financial wealth market of USD 255 trillion in 2022 (Islamic Financial Services Board, 2023).

Shariah-compliant investing, a subset of Islamic finance, refers to investment activities that adhere to Shariah principles end-to-end including asset allocation, investment strategy, execution, and monitoring. The concept of Shariah-compliant investing goes back over four decades ago with first appearance in the late 1960s in Malaysia and the mid-1970s in the Middle East. In 1986, the first Islamic equity fund, Amana Income Fund, was created by Saturna Capital, and apart from being Shariah-compliant, this fund also embeds sustainability screening in its investment universe (Saturna Capital, 2017). In contrast, the first USD Sukuk mutual fund was only created less than a decade ago by Malaysia’s Maybank, which is partly invested in sukuk issued from Gulf countries (Reuters, 2014). In general, compliance to Shariah ensures that investments are community-driven and that returns are diverted to stakeholders instead of just shareholders, and ensures acceptance, validity, and enforceability of financial contracts from a Shariah point of view.

Environmental, Social, and Governance (ESG) may be interpreted as a framework to consider the externalities of a company on three metrics (Trelstad, 2016). First, the environmental impacts of the company and any actions the company is undertaking to mitigate such risks. Second, the company’s impacts on the communities in which they operate in, the treatment of their employees

and stakeholders within their supply chain, and third, how the company is being governed, led, and managed – such as the company's pledges to promote transparency and accountability of the company's leadership and management. Mirroring the natural evolution of the financial industry which tends to begin with the banking sector and evolve into a more complex industry with insurance and capital markets products, ESG products in the financial industry also began with products such as low-interest loans to finance socially responsible projects with the next developments entailing products in the capital markets space, including socially responsible investing (Trelstad, 2016). Incorporating ESG values into investments represents the method in which investors deliberately incorporate ESG factors into their investment philosophy, processes, and decisions to complement the investors' return objectives.

ESG investing falls under the broader concept of responsible investing, whereby environmental, social, and governance factors are factored into investment decisions. Responsible investing itself is not a new phenomenon, appearing in many different forms throughout history. One of the earliest widely known forms of responsible investing started as faith-based, with the creation of the 'Pioneer Fund in 1928 by a group in Boston stemming from the values of Methodists who advocated against supporting "business practices and companies that may be socially harmful" (Trelstad, 2016). More historic examples of ESG investing would include the banning of investments in slave labour and coordinated divestments in South Africa to protest the country's apartheid system.

Today, national agendas, global reporting standards, and organizations have put in significant work and formed frameworks to develop the ESG investing landscape. Namely, the United Nations' Principles for Responsible Investment ("UN PRI" or "PRI"), established in 2006, is a United Nations-backed initiative of asset owners, investment managers, and service providers, with over 5,000 signatories who commit to incorporating ESG factors into their investment and decision processes (PRI, 2023). Nations' coordinated efforts to combat climate change through frameworks such as the United Nations Framework Convention on Climate Change, the Kyoto Protocol, the Global Reporting Initiative (GRI) as well as the Carbon Disclosure Project (CDP) are some of the many pledges which have led to the rise in prominence of green, socially responsible and ethical practices in the financial industry.

On this note, the drive to sustainable assets has indeed become stronger than ever, both globally, and within Brunei Darussalam, with the nationally determined commitments stemming from the UN Sustainable Development Goals ("UN SDGs"), Brunei's Wawasan (Vision) 2035, the National Climate Change Policy ("BNCCP") and the Brunei Darussalam Central Bank's Financial Sector Blueprint 2016-2025, all the while encompassing the Nation's Islamic values via the Objectives of the Shariah (Maqasid Shariah).

According to Matos (2020), ESG investing can be regarded as the process of assessing the environmental impact, social impact, and governance attributes of a portfolio's assets, based on data that is not necessarily financial. The overarching objective of this process is to limit the exposures to investments in the portfolio that pose greater ESG risks. ESG investing is also

recognized as part of the fiduciary duty of institutional investors, pension fund trustees, asset managers, and investment advisors as part of a legal framework commissioned by the United Nation's Environment Programme Finance Initiative ("UNEP FI"), commonly known as the 'Freshfields Report' (2005). The Report argues from a legal standpoint that the integration of E, S, and G into the investment process is permissible, if not, a requirement as part of the investor's duty to deliver financial returns.

This paper argues that ESG investing and Islamic finance share major common factors. The commitments of Shariah-compliant investing and ESG investing are to ethical and responsible investment practices. An example is the prohibition within Shariah-compliant investing in companies involved in excessive leverage, which would be filtered in ESG investing due to non-adherence to best governance practices. Trelstad (2016) mentioned in his study that socially responsible investors dating back to the 1960s were actively avoiding exposure to tobacco, weapons, and companies doing business in South Africa in support of the apartheid in their investment portfolios. This is indeed a similar screening process in Islamic finance. Additionally, both investing approaches consider the impact of investments on society and the environment. Shariah-compliant investing encourages investments that are beneficial to the community meanwhile ESG investing seeks to invest in companies that contribute positively to social and environmental goals while avoiding those with negative impacts. These overlaps indicate a natural convergence between Shariah-compliant and ESG investing and provide strong support for ESG incorporation in Shariah-compliant investing to be the pathway for progression in the growth of the Islamic asset management industry.

Additionally, while ESG investing continues to gain traction, particularly since COP26, it remains a relatively new strategy. One challenge with the ESG investing space is that it remains unclear what constitutes an ESG investment. Furthermore, investors remain cautious in considering the trade-off between ESG considerations and financial returns, arguing it is investors', or managers and trustees who act on their behalf, fiduciary duty to achieve financial returns. There is also the risk of greenwashing – conveying a false impression that the company's activities are ESG-friendly. ESG risk is also not standardized, relative to other risk measures of companies such as those typically reported by credit rating agencies. However, several agencies and associations have undertaken academic research on the materiality of ESG factors on financial returns and case studies to combat the challenges of green-washing, including the UNEP FI and the United Nation's Principles for Responsible Investment ("UN PRI").

Literature review

Demand for ESG Sukuk

According to Refinitiv's 2022 report on Green and Sustainability Sukuk, there are sustainability-related sukuk classifications, as outlined below:

Figure 1: Types of ESG Sukuk

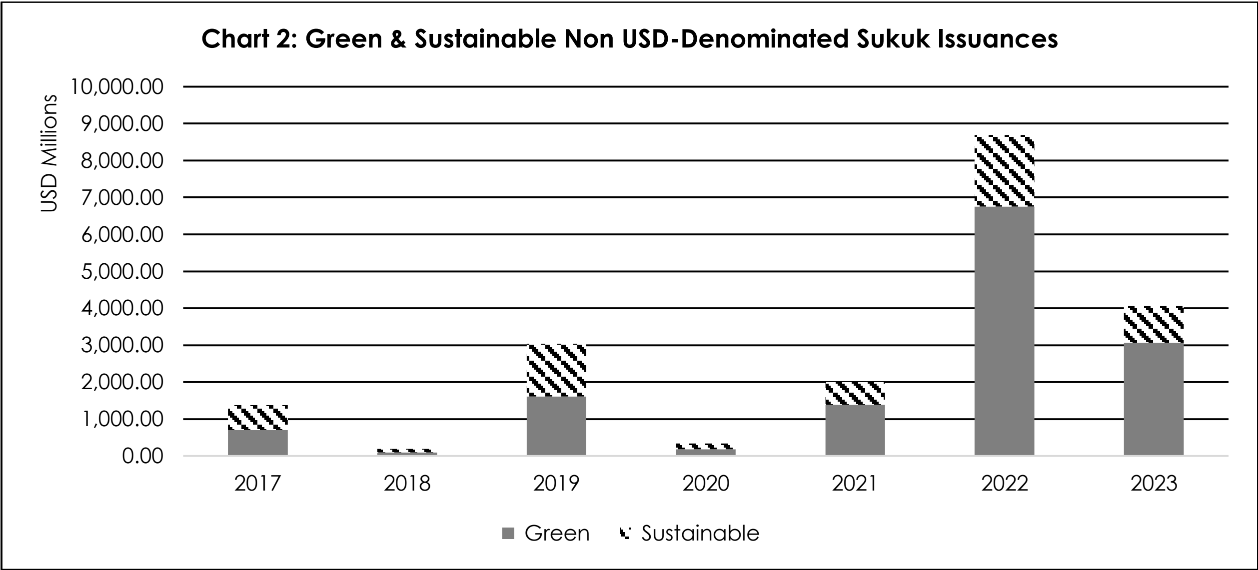
Green sukuk	To fund projects with a positive environmental impact
Social sukuk	To fund projects with positive social impact
Sustainability sukuk	Proceeds applied to green and social projects
Sustainability- or SDG-linked sukuk	Proceeds for general purposes with specified targets. Missing the targets will invoke coupon step-ups as a penalty to the issuer
Transition sukuk	To fund the firm's transition towards reducing environmental impact
Blue sukuk	To fund marine-related projects

Source: Green and Sustainability Sukuk Report (Refinitiv, 2022)

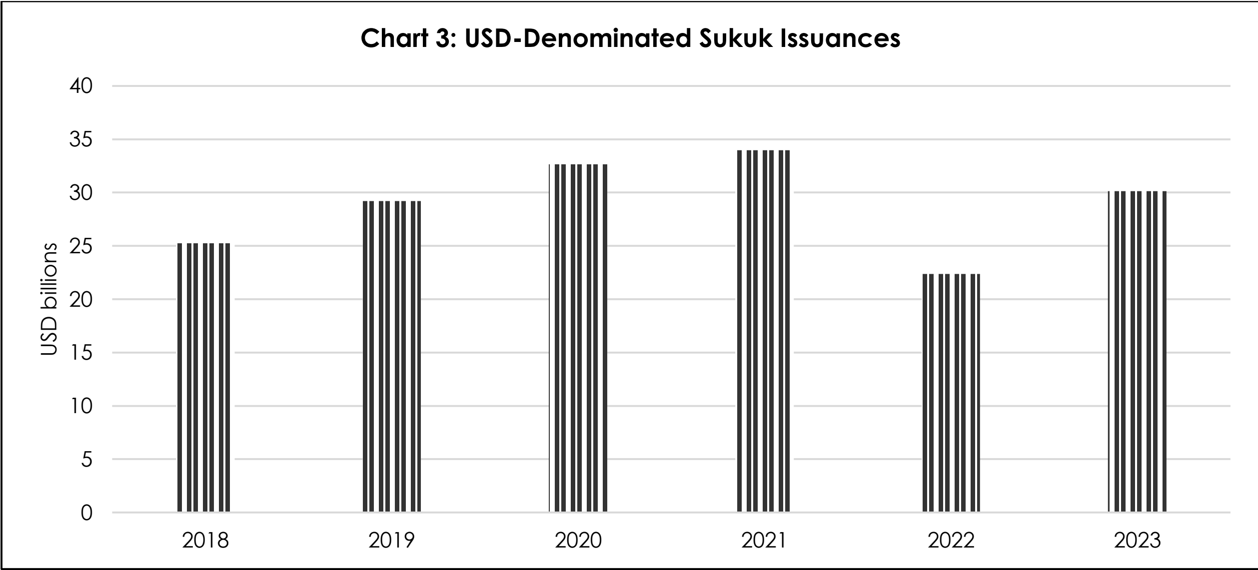
In October 2023, Fitch Ratings reported that outstanding ESG sukuk rose by 66% year on year to USD33.3 billion globally as of Q3 2023 with expectations of further growth in the medium term. While sukuk issuances have been less upbeat in 2022 and 2023 given corporates remaining prudent with their capital expenditure given the bleaker outlook on growth, Fitch expects ESG sukuk to surpass 7.5% of global outstanding sukuk by 2028.

The drive-in demand for ESG investing products has primarily been driven by shifts in objectives and mandates of institutions to meet national or global targets that have been set out. Nevertheless, while demand for ESG products has continued to increase, it is currently not matched with current supply. A study by PwC (2022) has found that nearly nine in ten institutional investors believe that asset managers should be more active in developing new ESG products but fewer than half of managers plan to launch new ESG funds.

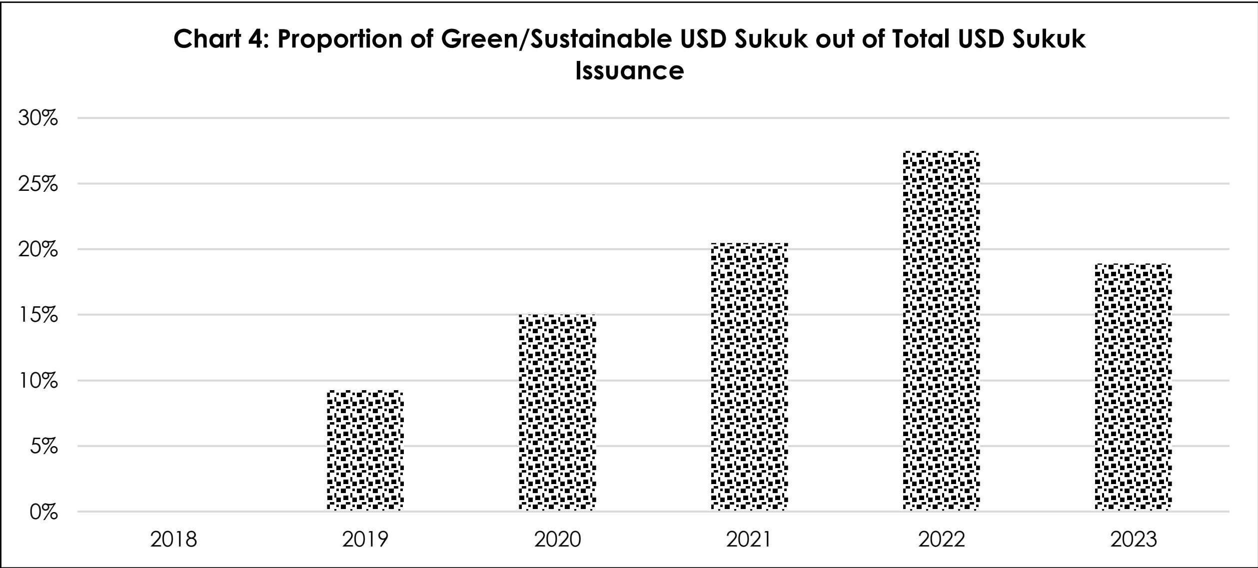
Additionally, Charts 2 and 3 below illustrate the green and sustainable sukuk issuances from 2017 to 2023. Chart 4 shows the proportion of green and sustainable USD sukuk issuances as a proportion of total USD sukuk issuances for the corresponding year. While there is no obvious trend in terms of green and sustainable sukuk issuances in absolute terms, Chart 4 seems to indicate that the proportion of green and sustainable USD sukuk issuances out of total USD sukuk issuances is on an increasing trend. The dip in the proportion in 2023 is believed to have been due to the high cost of sukuk issuances during the year as yields rose over the year (Chart 5). Nevertheless, according to the Green and Sustainability Sukuk Report 2022 by Refinitiv, green and sustainability sukuk represents only about 1% of total ESG fixed income issuance and 4% of total sukuk issuance by H1 2022. Furthermore, green and sustainability sukuk issuance has mostly been concentrated within Indonesia and the GCC, which at the time accounted for approximately 53% of total ESG sukuk (Refinitiv, 2022). The report also discussed that green and sustainability sukuk were 4.4 times oversubscribed on average, compared with 3.3 times for traditional sukuk. More recently, Malaysia has also begun to explore ESG sukuk issuance. Leveraging on investor appetite for sustainable financing, Malaysia has announced plans to issue a sovereign biodiversity sukuk of up to MYR1 bn in their 2024 budget speech to fund restoration activities and increase funding to rangers to combat poaching.



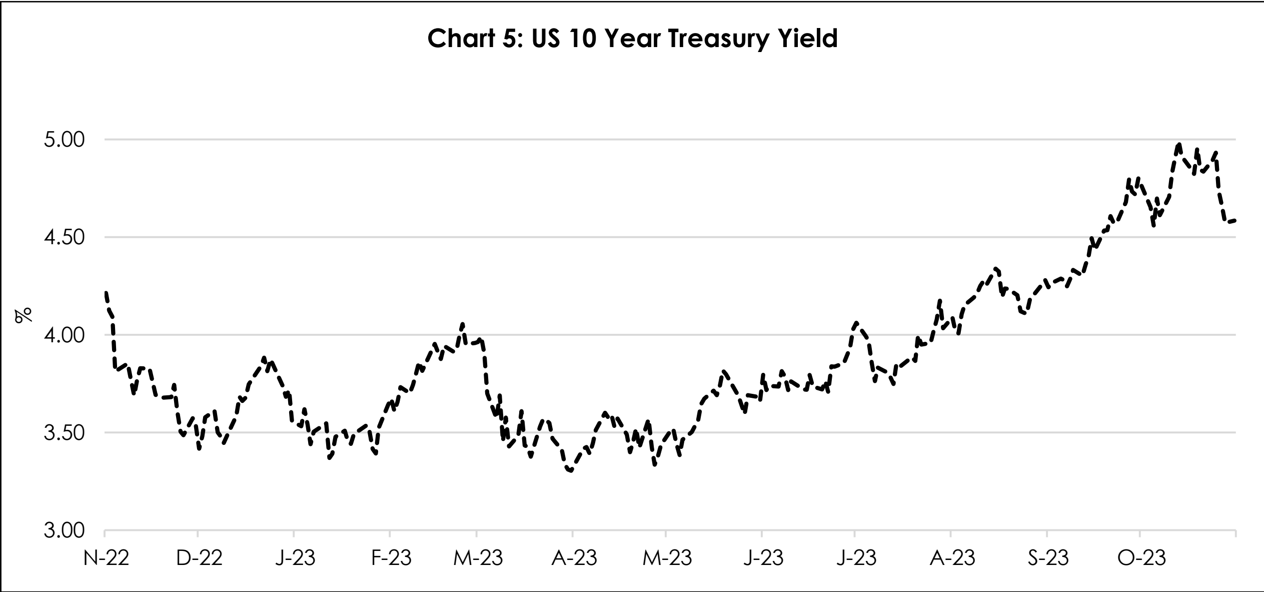
Source: Bloomberg (Extracted on 6 November 2023)



Source: Bloomberg (Extracted on 6 November 2023)



Source: Bloomberg (Extracted on 6 November 2023)



Source: Bloomberg (Extracted on 6 November 2023)

Sukuk issuances that are ESG-linked have been more focused on green sukuk that are typically for renewable energy and real estate projects while other focus areas such as social sukuk have continued to lag. This implies that there is a lot more room for growth in the ESG-Islamic finance space such as a broader Sustainable and Responsible Investing ("SRI") sukuk, Blue sukuk to fund marine and ocean-based projects, and SDG sukuk. At the same time, the lag in supply growth of sustainability-related sukuk presents as one of the challenges of building an ESG Sukuk portfolio strategy.

Criticisms to ESG Investing

While ESG investing continues to gain traction, it is not without gaps and challenges. Firstly, there has been a lot of debates surrounding the definition of an ESG investment and consequently, this ambiguity increases the risk of greenwashing, which refers to the act of conveying a false impression that the company's activities are ESG-friendly. There are also arguments over the potential trade-off between ESG considerations and financial returns and that it is the fiduciary duty of the investors or the managers and trustees who act on their behalf, to achieve financial returns. These factors are examined in the following sections.

1. What Constitutes an ESG Investment

Individual countries, regions, and international associations have actively worked towards developing taxonomies and standards to address the risk of greenwashing and enable the growth of ESG-labeled financial instruments. Amidst the increasing popularity of green bonds, and its Shariah-compliant counterpart green sukuk, green certifications exist to classify whether these financial instruments may be labeled as 'green' or not (Alessi & Battiston, 2022). One of the most well-known bond certification frameworks is the Green Bond Principles (GBP), developed by the International Capital Market Association, which outlines recommendations on disclosures, eligibility of Green Projects, and taxonomies for environmentally sustainable projects (The Green Bond Principles, 2021). Following this, the ICMA has also developed the Social Bond Principles, Sustainability Bond Guidelines, and the Sustainability-linked Bond Principles. However, one limitation of the Green Bond Principles, and other sustainable counterparts, is its binary nature on defining 'green' or 'not green', excluding projects which are transitioning to green or the 'various shades of green'; projects that may have 'green' elements and run on a similar 'green' spectrum as green bonds.

The establishment of the EU Taxonomy for Sustainable Activities overcomes the issues on transparency and measurements of 'greenness', acting as a classification system for environmentally sustainable activities across various industries whilst also defining 'enabling' and 'transitional' activities which itself may not be sustainable, but promote the defined objectives of the taxonomy (S&P Global, 2021). In Brunei Darussalam, the ASEAN Taxonomy Board released the first version of the ASEAN Taxonomy for Sustainable Finance in November 2021 and the second version in June 2023. The ASEAN Taxonomy builds upon the EU Taxonomy as a classification system for sustainable financing activities, but tailors for the various stages of development within the ASEAN member states (Asean Taxonomy Board, 2023). The Taxonomy uses a traffic light classification system (green, amber, and red), whereby Green indicates sustainable activities that fulfill the Objectives of the Taxonomy, Red does not fulfill the Objectives and Amber applies to activities that indicate a transition towards fulfilling the Objectives. The Amber classification was developed to accommodate for the diversity in cultures and advancements in efforts for sustainability within the ASEAN member states, supporting activities that allow for a transition to a more sustainable economy.

2. ESG investments and Financial Returns

A common concern among investors regarding the integration of ESG in the investment process is the potential drag on returns. Despite the belief that ESG is concessionary and ESG investors are willing to accept lower returns in favor of reaching non-financial goals, literature has found that ESG strategies do not necessarily impede returns. A study by Giese and Lee (2019) supports this hypothesis whereby the authors investigated the potential impact of integrating ESG elements in an equity strategy and concluded that ESG characteristics have a positive effect on risk, particularly in mitigating tail risks and that ESG momentum is linked with portfolio performance. Jain et al. (2019) also found that there is no significant difference in returns between indices focused on sustainability and conventional indices while a study by Milonas et al. (2022) on the performance of ESG Funds vis-à-vis non-ESG 80 European and 64 conventional US funds indicated that ESG funds have slightly higher returns than non-ESG funds, but there is no statistically significant difference between them.

A study on Korean firms by Hwang et al. (2021) investigated this theory at the firm level, studying companies on their ESG risk exposures. The authors concluded that companies with better ESG practices tend to be more resilient during times of market turmoil in terms of their financial performances during the COVID-19 pandemic and experienced relatively smaller declines in earnings. The authors explained that companies that are more active in investments in social capital earn better trust with their investors and other stakeholders, resulting in friendlier stakeholders' decisions during times of market uncertainty.

In the Islamic asset management space, Erragraguy and Revelli (2015) found that the performances of Islamic portfolios are not negatively impacted when incorporating ESG screenings. The authors also concluded that the inclusion of good governance criteria in Islamic portfolio management resulted in substantially higher performance during the post-subprime crisis period. This complements the study by Hwang et al. (2021) above. These findings therefore argue against the myth that incorporating ESG screening into strategies can be costly and eat into performance returns. In addition, Erragragui & Revelli (2016)'s review on the cost to be both Shariah-compliant and socially responsible has shown that integrating ESG screens in Islamic portfolios does not negatively impact returns and can lead to higher performances, and a negative performance is associated with an SRI strategy of disengagement from Shariah-compliant stocks with community and human rights controversies. On a similar note, a study by Paranque & Erragragui (2016) concluded that Islamic and Socially Responsible Investment (SRI) screening can enhance the performance of stock portfolios without negatively impacting returns, with positive governance screening showing higher returns during the 2008-2011 periods.

Mohanty et al. (2021) argue better ESG performers tend to be more competitive compared to their peers as they tend to have lower exposure to systematic risks and low expected cost of capital leading to higher valuations. The authors concluded that higher alpha can be generated by restricting investment exposures to ESG themes combined with other factors that focus on credit quality.

While it is the investment manager's or trustees' duty, acting on behalf of investors and asset owners, fiduciary duty to deliver financial returns while forgoing any ESG considerations, taking

aside the empirical evidence that finds ESG incorporation does not negatively impact financial returns, the 'Freshfields Report' (2005) makes a legal standpoint that the integration of Environmental, Social and Governance factors into the investment process is permissible, if not, a requirement for institutional investors, pension fund trustees, asset managers and investment advisors as part of their duty to deliver sustainable financial returns. The Freshfields report, commissioned by the United Nations' Environment Programme Finance Initiative ("UNEP FI"), outlines a legal framework for the integration of ESG factors into institutional investment and argues that such considerations do abide by laws requiring to act in the best interests of investment managers' clients.

Common Practices in Integration of ESG Factors

The following depicts a general process in portfolio management:

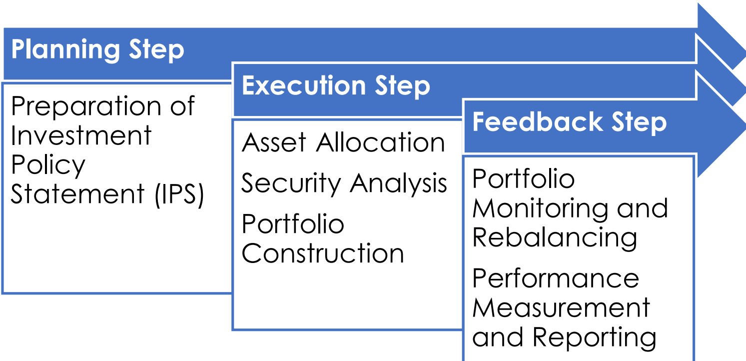


Figure 2: Portfolio Management Process

The approach of integrating ESG factors in the investment process will vary from one manager to another. Regardless of the approach, in ESG Shariah-compliant investing, there is precedence for Shariah screening over ESG screening to ensure the investment universe is permissible and does not misalign with Shariah principles. Henceforth, the baseline portfolio management in reference in this paper is already Shariah-compliant.

Policy Integration

ESG integration can begin and occur across various layers of the investment process. However, the first common step in integrating ESG is to incorporate it in the investment policy statement, which is a document that outlays the client's technical guidance for the definitions of responsible investment objectives and the constraints that apply to the investments. In this aspect, the PRI recommends two potential approaches in integrating ESG into the policy:

Integrated Investment Policy	Standalone Investment Policy
Ensure that the existing investment policy reflects ESG factors and aligns mainstream policy considerations with ESG.	Additional ESG policy to complement the existing investment policy to lay out ESG considerations.

Figure 3: ESG in Investment Policies

ESG Teams and Committees

To be able to execute and implement the integration of ESG as outlined in the investment policy statement, for best practice, there needs to be a team of analysts or researchers to investigate and specialize ESG data to ensure that biases in investment strategies are specialized, especially given that ESG data at the firm level as well as across ratings providers vary considerably. To execute this, the portfolio managers and investment analysts may choose to also specialize in ESG skills and integrate them into the decision-making process or an independent team can be created to provide their ESG analysis to complement the existing investment decision-making processes.

Integrated ESG Teams	Standalone ESG Teams
ESG factors are analysed and assimilated into overall analysis and decisions by the existing portfolio managers and investment analysts.	A separate ESG team that conducts ESG analysis and engagement activities, who will work with the investment teams to integrate ESG factors into overall investment decisions.

Figure 4: Types of ESG Teams

ESG Incorporation / Analysis

In the PRI guidance on managing ESG issues in fixed income, ESG factors can be incorporated into existing portfolio construction practices using any or the combination of the following three approaches:

Figure 5: Approaches to ESG Integration in Portfolio Construction

Integration	Screening	Thematic
Explicitly and systematically including ESG factors in investment analysis and decisions, especially in managing downside risk.	Applying filters to a list of potential investments to exclude issuers or securities that do not meet the client's ESG preferences.	Designing the portfolio to skew towards supporting a specific ESG theme such as a green portfolio.

Source: UNPRI (2019)

Next, the application of the above methods can be done via a top-down or bottom-up approach. Top-down investment management involves a funnel approach, starting with the global investible universe followed by filtering for economies, sectors, industries, and lastly individual companies.

Adding the ESG factor in this process may be done by applying additional filters based on investment managers' chosen criteria, which could be based upon filtering for ESG-related Sukuk only, regulatory guidance, third-party ESG risk rating providers or internally managed ESG risk scores.

Filtering does not necessarily lead to exclusion because three types of filtering can be done:

Figure 6: Types of Filtering

Negative Screening (Avoid the worst ESG performers)	Norms-based Screening (Use an existing framework)	Positive Screening (Include the best perfomers)
Excluding non-ESG sukuk or excluding specific sectors, companies, or projects due to subpar ESG performance compared to industry peers, or by specific ESG criteria, such as steering clear of particular products/services or business practices.	Evaluating investments against established standards of business conduct rooted in international norms. Valuable frameworks for this assessment encompass UN treaties, Security Council sanctions, UN Global Compact, Universal Declaration of Human Rights, and OECD guidelines.	Investing in sectors, companies, or projects chosen for favorable ESG performance compared to industry peers.

Source: UNPRI (2019).

On the other hand, a bottom-up approach entails selecting investments at the security level and focuses on analysing the companies or issuers individually, generally with the expectation that investment managers can identify performing companies regardless of sectors and economies. In this approach, incorporating ESG factors in security selection could be done by considering ESG factors such as financial metrics or public disclosures when assessing the merits and risks of each company. Similarly, the investment manager will then apply any of the chosen filtering methods to build the investment portfolio.

The criteria in each approach, whether top-down or bottom-up could be qualitative or quantitative, based on the investment manager's rationale, access, or preference. For example, quantitative methods include setting a rule to ensure the company's revenues generated via non-ESG-friendly sources do not exceed a certain threshold. The qualitative screening process would entail screening companies or industries for conflicts. The following table showcases the examples of qualitative and quantitative metrics used in either top-down or bottom-up approach.

	Top-Down Approach	Bottom-Up Approach
Qualitative	• Sanctions • Labor Practices • Human Right Policies • Commitment to Net Zero • Political conflicts • Anti-Bribery and Corruption Policies	• Employment Practices • Corporate Governance Structure • Board Diversity • Ethical Business Practices • Product Safety and Accessible
Quantitative	• Country's ESG Rating Agencies Score • Carbon Emissions • Corruption Index • Income Inequality Index • Political Stability Index • Biodiversity Index • Education Attainment Index	• Carbon Footprint • Water Usage Efficiency • Employee Turnover Rate • Customer Satisfaction Score • Debt ratio level • ESG Rating Agencies Score • Sustainable Revenue

Figure 7: Qualitative and Quantitative Metrics

Companies' ESG data and scores can be assessed by the investment manager or rely on existing data banks or providers such as Morningstar Sustainalytics or MSCI ESG ratings. For ESG-labelled sukuk, they are usually accompanied by additional disclosures compliant with international bond standards, such as the Green Bond Principles, or subjected to a third-party review of ESG factors on the issuer which investment managers can refer to. Additionally, analysts may look at the companies' ESG impacts, past and potential controversies, and the extent of the companies' pledges to ESG issues.

Allocation in Portfolio Construction

After ESG analysis, the investment manager will undergo an allocation process to determine how to distribute or allocate investments among the securities across different regions and sectors based on macroeconomic and market views, fundamental analysis, and ESG scores. For ESG allocation, the investment manager can choose either of the following approaches:

Quantitative (Systematic)	Fundamental
An approach that relies on systematic and predefined rules, algorithms, or models to make investment decisions. For E.g. the investment can include a rule of equal allocation among securities that surpass certain ESG score threshold	An approach that focuses on analyzing a company's underlying financial health and overall fundamentals and allocates based on the company's ESG standing

Figure 8: Approaches to Allocation in Portfolio Construction

ESG Engagement

Investor engagements represent a continuous process in the ESG investing space, which refers to the active involvement of investors with companies to promote sustainable practices and responsible behavior. Investors may leverage on their rights as asset owners to encourage positive societal and environmental impact, improve disclosures or highlight any ESG concerns investors may harbor. Investors may also use their influence to encourage individual issuers or companies to issue more sustainability-labeled or linked securities. The importance of investor engagement with companies and their impact on pushing for more ESG disclosures have been highlighted in the literature. For example, a study by Yang, Du, and Zhang (2021) has shown that ESG disclosure, which can be encouraged by investors, significantly reduces credit spreads on corporate bonds in the secondary market.

Additionally, investors should also have engagements with third-party ESG data providers so as not to publish any misleading information about the ESG risks of companies. As outlined in Chen & Yang (2020), adverse changes in the ESG ratings of companies may lead to overreactions by investors. The ESG methodologies employed by data providers play a critical role in influencing investor behavior. Investors should analyse third-party raters' methodologies and independently assess if the ESG risks identified represent a true representation of the companies' actual ESG risks.

Discussion

Based on the literature reviews, there is certainly a case for embedding ESG into Sukuk portfolio management via various approaches. However, as highlighted in the previous section, the limited supply of green and other sustainability-labeled sukuk in the market may impede the development of an ESG Sukuk portfolio strategy. Given these considerations, this paper proposes a practical approach to ESG Sukuk investing strategy that is built upon a high conviction investment grade sukuk strategy which aims to generate alpha versus a traditional benchmark by utilizing a systematic ESG overlay approach to potentially achieve superior risk-adjusted returns.

The proposed Investment strategy utilizes both Shariah filters and ESG risk ratings to provide a systematic overlay over the bottom-up traditional global sukuk strategy. These filters act as both blacklists and whitelists for securities, removing non-compliant securities and overweighting quality securities with differentiated and sustainable business models. As such, this strategy views ESG investing as a form of risk management and monitors these risks in the same manner as traditional financial risk management, to the likes of credit, market, and liquidity risk. Based on the PRI guidelines on ESG investing in fixed income, this approach would be akin to negative screening and involve tilting to securities with relatively better ESG risk performance. Most importantly, it does not rely on building a portfolio using sustainability-labeled sukuk only.

The Blacklist

As in any Shariah-compliant investment strategy, the fixed income universe is screened through a Shariah filter, and the investment grade filter is given the strategy before the ESG screening. The ESG screen is a combination of self-reported data by the obligor, relevant market and company news, investors' views, and an ESG risk score for the company. In the absence of an internal ESG scoring methodology, the paper proposes employing a third-party leading ESG research and score provider as a reference. At this stage, the sukuk investment universe is filtered for companies with severe levels of unmanaged ESG risk with significant potential negative impact on their credit ratings, which are then added to the ESG *blacklist*. From this screening process, the blacklist would capture sukuk issuers with severely poor management and accountability for ESG-related risks.

While the ESG scores can address the issues of inconsistency and deficiency of ESG data amongst companies, a paper by Chen et al. (2021) argues that commercial ESG ratings can suffer from quantity bias in which companies who disclose more ESG data tend to get better scores from commercial ESG risk scores and may get biased and more favorable treatment in the capital market. A further argument against the utilization of a commercial ESG rating provider is that ratings across ESG data providers also vary significantly and the choice of the data provider can have profound impacts on the overall construction of the portfolio and consequently, the performance of the portfolio (Atta-Darkua et al.,2020).

However, utilizing the third-party rating provider controls for country and industry factors. Gyönyörová et al. (2021) found that controlling for these factors helps to ensure the ESG data incorporated into portfolio management are not misleading as the authors found in their study of the S&P Global 1200 index that there exists considerable uncertainty, inconsistency, and validity across ESG data depending on the industry type and country of domicile. Nevertheless, the method of negative screening based on ESG data has been argued by Amir & Serafeim (2018) to have the least benefits to investments as opposed to full integration, which is more relevant to investment performance. Pan (2020) concluded in their paper that ESG issues should instead be included in general credit evaluation as part of the manager's overall credit risk management. This could be one approach to the full integration of ESG factors into an investment strategy. Nonetheless, the challenges of ESG disclosures at the firm level remain and the strategy outlined in this paper is put forward as a workaround for current challenges surrounding ESG investing.

ESG Overlay

After filtering for the ESG Blacklist, the Whitelisted securities form the new investible universe by which a portfolio can be constructed, in line with the asset manager's strategic positioning. For this paper, this is the 'base portfolio'. An integrated ESG investment approach utilizes both negative and positive screening, hence an ESG Overlay is used. An asset manager may implement a systematic ESG overlay on the base portfolio by weighing the constructed portfolio against the inverse of the ESG risk scores of the individual constituents, ultimately overweighting higher quality or lower-ESG risk-facing, entities versus the non-ESG benchmark as there are no widely available ESG sukuk indices. While this method allocates heavier weights to better ESG risk

performers, it does not limit those on the lower end of the ESG risk spectrum (entities that face relatively higher ESG risk). Strategies that frequently switch between low ESG risk performers to high ESG risk performers run the risk of return reversion in the long run. Chen & Yang (2020) found that investors tend to overreact to environmental factors compared to social and governance factors and investors exaggerate corporate ESG information. As a result, their empirical study found that an ESG momentum strategy can lead to substantial profits in the short run but reversals in the long run, consistent with the overreaction hypothesis. Chong and Phillips (2016) investigated the returns of an investment strategy that utilises a publicly available ESG stock list, with low volatility, mean-variance optimization, and equal weights and concluded that this method was able to generate alpha over the S&P 500 index while minimizing the ESG risks of the portfolio.

On the other hand, Mohanty et al. (2021) found that incorporating an ESG overlay on factor-based strategies such as 'multi-factor', 'value', and 'low volatility' reduces systematic and idiosyncratic risks. The authors further argued that having an ESG overlay on the 'quality' factor in portfolios provides the highest return among ESG indices with the 'quality' factor being the bigger contribution to return. This is in line with the proposed overlay outlined above as the base strategy for its global sukuk portfolios focuses on quality credits first before the ESG overlay. Mulvey et al. (2007) also found support in utilizing a specialized 'overlay' strategy. In their study of widely diversified and leveraged multi-stage portfolios, utilizing overlays does not require additional capital beyond the core portfolio but can provide higher risk-adjusted returns.

Challenges

Although the proposed strategy has addressed the issue surrounding the limited supply of ESG-labelled sukuk, there remain several limitations. ESG data methodology, standardisation, and availability are still in their nascent stages of development and third-party ESG rating providers may not fully cover investors' investible universe. Particularly within the Sukuk space, where issuers are concentrated in the Middle East and Asia region which tend to have lower ESG coverage than issuers in the Western regions. However, one method to overcome this gap can be addressed via applying proxies to unrated companies. For example, a supranational body may not be rated but an approximate rating can be derived from the ESG ratings of the member countries that govern the entity. However, this further adds to the ambiguity of ESG scorings of issuers and may not be an accurate representation of their true ESG risk. Additionally, ESG integration widely depends on the availability of ESG data and information available given that ESG disclosure is widely not mandatory, what is typically reported may not be standardised, audited or comparable.

The increasing pressure from investors calling for better transparency and comparability of companies' ESG issues has driven greater disclosures in recent years. Nevertheless, there remains ample room for further work to be done in the standardisation of ESG data for investors to make useful comparisons and make analytical investment decisions. Additionally, finance is largely a quantitative discipline while ESG is often qualitative in nature, hence why it continues to be a challenge for investors and fund managers to incorporate the two in a single universe.

Kotsantonis and Sarafeim (2019) listed more than twenty ways in which companies report their data and inconsistencies in ESG methodologies will lead to different results even when looking at the same group of companies. The authors further found that not only are discrepancies among ESG data providers large, but the discrepancies also even increase as the amount of publicly available data increases. This relates to the different styles of disclosures and reporting which can lead to different interpretations. The authors called for a more standardised practice by ESG data providers and for better transparency in their methodologies to enhance the reliability of their data.

As the ESG investing ecosystem is further developing, the methodologies of ESG risk ratings providers also continue to evolve to address deficiencies and gaps. As a result, changes in methodologies could result in big swings in ESG risk ratings, which would be challenging for investors in the screening and allocations stage. An extreme example of disruptive changes in the ESG ratings space is the Standard and Poor's decision to abandon their ESG scores in August 2023, which presents itself as a further indicator that the ESG ratings have not stabilised and some providers may not be dependable yet (Barrons, 2023).

Lastly, as the methodology outlined above relies on a third-party provider for screening and tactical allocations, the approach bypasses the labels of the securities, whether it be green, social or sustainable Sukuk. ESG risk is measured at the entity level, unlike credit ratings, which may vary across a given issuer's sukuks due to differing seniority of debt. While this can address the issue of limited supply of green or sustainability labelled sukuks in the investible universe, there is a disconnect between the approach outlined and the ESG factors at the security level. For example, a company with an undesirable ESG risk score issues a green or sustainable sukuk. During the filtering stage, due to its' ESG risk score, the company was blacklisted. As ESG risk scores are applied at the company level, not at the sukuk programme level, the structure of the sukuk in the context of ESG is not directly taken into consideration and the company remains excluded from the investible universe (Garz & Volk, 2019). This is particularly problematic if the sukuk proceeds were raised to fund transitional activities to improve the company's ESG standing. Such an example highlights the differing approaches to ESG investing between negative and positive screening. Negative screening, or the use of a blacklist, aligns with the view of ESG as a risk-management tool, while positive screening which favours green or sustainable sukuk regardless of the obligor's ESG risk performance would be better suited for an impact-style investing. ESG risk scores measure the unmanaged ESG risks that a company faces, such as an agriculture-based company's vulnerability to climate change or a goods manufacturer likelihood to face scrutiny for its labour practices (Garz & Volk, 2019). Hence, similar to the use of credit ratings on credit risk management, the use of ESG risk scores can be made parallel to the management of ESG risks. On the other hand, a positive ESG-labelled sukuk screening approach focuses greater weight towards the use of proceeds as issuers have pledged a certain proportion of the sukuk proceeds to be used towards funding 'green' or 'sustainable' projects. While the methodology proposed in this paper uses both negative and positive screening, given the lack of availability of green and sustainable sukuk in the market, the use of ESG risk scores act as the main screening criteria on both ends.

Conclusion

While institutional investors have been driving the rise in demand for ESG Sukuk investing, the supply of ESG sukuk remains considerably limited in comparison to demand. The added difficulties arising from the variability in measuring companies' ESG and the nascent stage of the measurements of ESG risks further challenge fund managers. To meet investors' demand and bypass these challenges, the paper proposes a practical approach to constructing a Global ESG Sukuk Strategy based on an ESG risk scoring methodology that partly utilises a third-party ESG rating provider to as a filter and overlay on the overall investment process. While this methodology addresses the issue of a limited supply of sustainability-labelled sukuk, there remain other challenges such as the lack of standardisation of ESG-related disclosures, coverage and variability of third-party ESG ratings, which may give rise to discrepancies on measures of ESG risk and distort the optimal ESG-risk allocation process. The development of regional and international taxonomy on ESG, although progressive, still requires further refinement to facilitate ESG sukuk issuances. Continued and sustained investor demand, further developments in the ESG investing space, from standardised reporting frameworks, ESG rating frameworks and increased issuances of ESG-labelled sukuk may further close this gap.

This strategy approaches ESG Sukuk investing through a risk-management lens by applying ESG analysis at the obligor level rather than on the security level, which blacklists any negative ESG performers regardless of any issuance of sustainability-related sukuk. That said, further studies may be conducted to measure any enhancements from investing in sustainability-related sukuk over utilizing ESG overlay only, and as to whether issuers of such sukuk are better ESG performers than non-sustainability-related sukuk issuers.

References

Ahmed, H. (2014). Islamic banking and Shari'ah compliance: a product development perspective. *Journal of Islamic finance.*, 3(2), 15-29.

Alessi, L., & Battiston, S. (2022). Two sides of the same coin: Green Taxonomy alignment versus transition risk. *International Review of Financial Analysis*, 1-5.

Al-Suwailem, S. (2006). *Hedging in Islamic finance. Islamic Development Bank.* Islamic Research and Training Institute.

Amir, A.-Z., & Serafeim, G. (2018). Why and How Investors Use ESG Information: Evidence from a Global Survey. *Financial Analysts Journal*.

Antova, I., & Tayachi, T. . (2019). Blockchain and Smart Contracts: A Risk Management Tool for Islamic Finance. *Journal of Islamic financial studies*, 5(1).

Asean Taxonomy Board. (2023, June 9). *ASEAN*. Retrieved from ASEAN Taxonomy for Sustainable Finance Version 2: https://asean.org/wp-content/uploads/2023/03/ASEAN-Taxonomy-Version-2.pdf

Atta-Darkua, V., Chambers, D., Dimson, E., Ran, Z., & Yu, T. (2020). Strategies for Responsible Investing: Emerging Academic Evidence.

Barrons. (2023, August 9). Retrieved from https://www.barrons.com/articles/sp-esg-credit-scores-5290338f

Bartoletti, M., & Pompianu, L. (2017). An empirical analysis of smart contracts: platforms, applications, and design patterns. *Financial Cryptography and Data Security: FC 2017 International Workshops*, Revised Selected Papers 21 (pp. 494-509).

Blockchain.com. (2023, November 02). *Total Number of Transactions*. Retrieved from Blockchain.com: https://www.blockchain.com/explorer/charts/n-transactions-total

Chen, H.-y., & Yang, S. S. (2020). Do Investors exaggerate corporate ESG information? Evidence of the ESG momentum effect in the Taiwanese market. *Pacific-basin Finance Journal*.

Chen, M., Behren, R. v., & Mussalli, G. (2021). The Unreasonable Attractiveness of More ESG Data. *SSRN Electronic Journal*.

Chong, J., & Phillips, G. (2016). ESG Investing: A Simple Approach. *The Journal of Wealth Management*.

Cole, R., Stevenson, M., & Aitken, J. (2020). Blockchain technology: implications for operations and supply chain management. *Supply Chain Management*, 24 (4), 469-483.

Crosby, M., Pattanayak, P., Verma, S., and Kalyanaraman, V. (2016). Blockchain technology: Beyond bitcoin. *Applied Innovation*, (2), pp. 6–10.

EBA. (n.d.). Opinion of the European Banking Authority. para D3 and 43.

Erragragui, E., & Revelli, C. (2016). Is it costly to be both shariah compliant and socially responsible. *Review of Financial Economics*, 64-74.

Erragraguy, E., & Revelli, C. (2015). Should Islamic investors consider SRI criteria in their investment strategies? *Finance Research Letters 14*, 11-19.

Etherscan.io. (2023, November 02). *Ethereum Daily Verified Contracts Chart* . Retrieved from EtherScan: https://etherscan.io/chart/verified-contracts

Fitch. (2023, October 25). *ESG Sukuk Cross USD33bn Globally, Set to Grow Further*. Retrieved from https://www.fitchratings.com/research/islamic-finance/esg-sukuk-cross-usd33bn-globally-set-to-grow-further-25-10-2023.

Freshfields Bruckhaus Deringer. (2005). *A legal framework for the integration of environmental, social and governance issues into institutional investment.*

Garz, H. D., & Volk, C. (2019, October). *The ESG Risk Ratings Moving Up The Innovation Curve White Paper - Volume 1.* Sustainalytics. Retrieved from Sustainalytics: https://connect.sustainalytics.com/hubfs/INV%20-%20Reports%20and%20Brochure/Thought%20Leadership/SustainalyticsESGRiskRatings_WhitePaperVolumeOne_October%202018.pdf

Giese, G., & Lee, L.-E. (2019). Weighing the evidence: ESG and equity returns. *MSCI Research Insight*.

Gregoire, E. (2023, June 27). *Boston Consulting Group*. Retrieved from Global Financial Wealth Market Sees First Decline in More Than a Decade: Global Financial Wealth Market Sees First Decline in More Than a Decade

Hofmann, F., Wurster, S., Ron, E., & Böhmecke-Schwafert, M. (n.d.). The Immutability Concept Of Blockchains And Benefits Of Early Standardization.

Hussain, M., Shahmoradi, A., & Turk, R. (n.d.). *IMF Working Paper; An Overview of Islamic Finance.* Washington DC,USA: International Monetary Fund.

Hwang, J., Kim, Hyuna, & Jung, D. (2021). The Effect of ESG activities on Financial Performance During the COVID-19 Pandemic - Evidence From Korea. *Sustainability 13.20*, 11362.

Iqbal, Z. (1997). Islamic financial systems. *Finance and development*, 34, 42-45.

Islamic Financial Services Board. (2023). *Islamic Finance Services Industry Stability Report 2023.* Kuala Lumpur: Islamic Financial Services Board.

Jain, M., Sharma, G. D., & Srivastava, M. (2019). Can Sustainable Investment Yield Better Financial Returns: A Comparative Study Of ESG Indices And MSCI Indices. *Risks, 7(1)*, 15.

John, I. (2022, June 6). *Khaleej Times*. Retrieved from https://www.khaleejtimes.com/finance/2-2t-islamic-finance-industry-set-for-10-expansion-in-2022

Kammer A., Norat M., Piñón M., Prasad A., Towe C., Zeidane Z. (2015). *Islamic Finance: Opportunities, Challenges, and Policy Options.* International Monetary Fund.

Kerikmäe, T., & Rull, A. (Eds.). (2016). *The Future Of Law And Etechnologies (Vol. 3).* Springer International Publishing.

Kotsantonis, S., & Serafeim, G. (2019). Four Things No One Will Tell You About ESG Data. *Sustainability at Work eJournal*.

Ledhem, Mohammed Ayoub & Mekidiche, Mohammed. (2020). Islamic Fintech Development and Blockchain Application in Islamic Finance. .

Lepeshkina K.N. (n.d.). The Problems Of Overcoming The Crisis In The Financial Market:World And Russian Practice Of Anti-Crisis Measures. *Money & Credit*, #2.

Matos, P. (2020). *ESG and Responsible Institutional Investing Around the World: A Critical Review.* CFA Institute Research Foundation.

Milonas, N., Rompotis, G., & Moutzouris, C. (2022). The performance of ESG funds vis-à-vis non-ESG funds. *The Journal of Impact and ESG Investing 2.4*, 96-115.

Mohamed, H. (2017). Smart contracts in Islamic economic transactions. *Retrieved*, 2(19), 2020.

Mohanty, S. S., Mohanty, O., & Ivanof, M. (2021). Alpha Enhancement In Global Equity Markets With ESG Overlay On Factor-Based Investment Strategies. *Risk Management*.

Möhring, M., Keller, B., Schmidt, R., Rippin, A. L., Schulz, J., & Brückner, K. (n.d.). Empirical Insights in the Current Development of Smart Contracts. *PACIS*, (p. 146).

Mulvey, J., Ural, C., & Zhang, Z. (2007). Improving performance for long-term investors: wide diversification, leverage, and overlay strategies. *Quantitative Finance*.

Muneeza, A., & Mustapha, Z. (2019). Blockchain and its Shariah compliant structure. *Halal cryptocurrency management*, 69-106.

Nordin, N., Aziz, S. A., Ahmad, A. A., & Daud, N. (2014). Contracting with Gharar (uncertainty) in forward contract: what does Islam says? *Asian Social Science*, 10(15), 37.

Oseni, U. A., & Ali, S. N. (Eds.). (2019). *Fintech in Islamic finance: Theory and practice.* Routledge.

Paldi C. (2014, March). Understanding Riba and Gharar in Islamic Finance. *Journal of Islamic Banking and Finance Vol 2 No 1*, pp. 249-259.

Pan, L. (2020). Demystifying ESG Investing Considerations for Institutional Cash Investors. *Journal name not available for this finding*.

Paranque, B., & Erragragui, E. (2016). Islamic Investment versus Socially Responsible Investment: Lessons from Comparison. *Finance Reconsidered: New Perspectives for a Responsible and Sustainable Finance (Critical Studies on Corporate Responsibility, Governance and Sustainability, Vol. 10)*, 355-383.

Peredaryenko, M. (2019). FinTech, Blockchain, and Islamic Finance – Building the Future in the New Islamic Digital Economy. *AI Blockchain Fintech IoT - Reinventing a Nation*.

PRI. (2023). *PRI Annual Report.* Retrieved from UN PRI: https://dwtyzx6upklss.cloudfront.net/Uploads/z/s/n/pri_ar2023_smaller_file_8875.pdf

PWC. (2022, October 10). *PWC.com*. Retrieved from https://www.pwc.com/gx/en/news-room/press-releases/2022/awm-revolution-2022-report.html

PWC. (n.d.). *Shariah-compliant funds: A whole new world of investment*. Retrieved from https://www.pwc.com/gx/en/financial-services/islamic-finance-programme/assets/shariah-compliant-funds.pdf

Rahim, S. M., Mohamad, Z. Z., Bakar, J. A., Mohsin, F. H., & Isa, N. M. (2018). Artificial intelligence, smart contract and islamic finance. *Asian Social Science*, 14(2), 145.

Refinitiv. (2022). Financing a Sustainable Future. *Green and Sustainability Sukuk Report 2022*.

Rejeb, D. (2020). Blockchain and smart contract application for Zakat institution. *International Journal of Zakat*, 5(3), 20-29.

Reuters. (2014, October 30). *Malaysia's Maybank launches first USD sukuk mutual fund*. Retrieved from Gulf News: https://gulfnews.com/business/banking/malaysias-maybank-launches-first-usd-sukuk-mutual-fund-1.1406234

S&P Global. (2021, May 12). *A Short Guide to the EU's Taxonomy Regulation*. Retrieved from S&P Global: https://www.spglobal.com/esg/insights/a-short-guide-to-the-eu-s-taxonomy-regulation#:~:text=The%20EU%20Taxonomy's%20definitions%20and,sustainable%20assets%20with%20more%20confidence.

Salihin Academy Sdn Bhd. (2020). Maqasid al-Shariah. *Islamic Finance 1st*.

Saturna Capital. (2017). *Halal Investing*. Retrieved from Saturna Capital: https://www.saturna.com/amana/halal-investing

Semenova E.V. (2009). Features and prospects of development of Islamic banking. BIKI, #13, p. 3-5, 16.

Shaarani, A. Z. M., Muhammad, F., Noor, A. M., & Osman, M. F. (2023). Kontrak Pintar; Analisis Syariah dan Parameter (Smart Contract; Shariah Analysis and Parameter). *UMRAN-International Journal of Islamic and Civilizational Studies*, 10(2), 1-14.

Shafaki, R. E. (2022, August 29). *State of the Global Islamic Economy Report 2022*. Retrieved from DinarStandard: https://www.dinarstandard.com/post/state-of-the-global-islamic-economy-report-2022

Shafaki, R. E. (2022, August 29). *The Global Islamic Fintech (GIFT) Report 2022*. Retrieved from DinarStandard: https://www.dinarstandard.com/post/global-islamic-fintech-report-2022

Stašek, D., Stachoň, M., & Gyönyörová, L. (2018). ESG ratings: relevant information or misleading clue? Evidence from the S&P Global 1200. *Standards, Ethics, and Regulation (SER)*, 87-103.

Szabo, N. (1997). Formalizing and securing relationships on public networks. *First Monday.*

Tatiana, N., Igor, K., & Liliya, S. (2015). Principles and instruments of Islamic financial institutions. *Procedia Economics and Finance*, 24, 479-484.

The Green Bond Principles. (2021, June). *Green Bond Principles (GBP) 2021.* Retrieved from ICMA Group .

Trelstad, B. (2016). Impact Investing: A Brief History. *Capitalism and Society: Vol. 11: Iss. 2* , 5-8.

Tsankov, P., Dan, A., Drachsler-Cohen, D., Gervais, A., Buenzli, F., & Vechev, M. (2018, October). Securify: Practical security analysis of smart contracts. *Proceedings of the 2018 ACM SIGSAC conference on computer and communications security*, (pp. 67-82).

Uddin, M. A. (2015). Principles of Islamic finance: Prohibition of riba, gharar and maysir.

UNPRI. (2019, October 15). *Introductory Guides to Responsible Investment: Fixed Income*. Retrieved from United Nations Principles of Responsible Investment: https://www.unpri.org/introductory-guides-to-responsible-investment/an-introduction-to-responsible-investment-fixed-income/4986.article

UNPRI. (2019, October 15). *Introductory Guides to Responsible Investment: Policy Structure and Process*. Retrieved from UNPRI: https://www.unpri.org/introductory-guides-to-responsible-investment/an-introduction-to-responsible-investment-policy-structure-and-process/4917.article

UN-PRI. (2023). *Annual Report.*

UN-PRI. (2023, November). *Definitions for Responsible Investment Approaches*. Retrieved from UNPRI.org: https://www.unpri.org/investment-tools/definitions-for-responsible-investment-approaches/11874.article

Waemustafa, W., & Sukri, S. . (2015). Theory of Gharar and its interpretation of Risk and Uncertainty from the perspectives of Authentic Hadith and the Holy Quran: A Qualitative Analysis.

Williams, S. (2017). *Big Advantages of Blockchain, and 1 Reason to be very Worried.* US: Motley Fool LLC.

World Bank. (2021). *Consumer Risks in Fintech: New Manifestations of Consumer Risks and Emerging Regulatory Approaches.* World Bank.

Yang, Y., Du, Z., & Zhang, Z. (2021). Does ESG Disclosure Affect Corporate-Bond Credit Spreads? Evidence from China.

Young, M. (2022, August 04). *Over 44 Million Contracts Deployed to Ethereum Since Genesis: Research*. Retrieved from CryptoPotato: https://cryptopotato.com/over-44-million-contracts-deployed-to-ethereum-since-genesis-research/#:~:text=Crypto%20researchers%20have%20been%20taking,'

Zain, N. R. B. M., Ali, E. R. A. E., Abideen, A., & Rahman, H. A. (2019). Smart contract in blockchain: An exploration of legal framework in Malaysia. *Intellectual Discourse*, 27(2), 595-617.

Zheng, Z., Xie, S., Dai, H. N., Chen, W., Chen, X., Weng, J., & Imran, M. (2020). An overview on smart contracts: Challenges, advances and platforms. *uture Generation Computer Systems*, 105, 475-491.