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The irrelevance of R&D intensity in the ESG disclosure? Insights from top 10 listed companies on global Islamic indices

Muhammad Afi Ramadhan¹, Ratna Mulyany^{1*} and Evi Mutia¹

Abstract: This study investigates the potential influence of several pertinent factors including R&D intensity, directors' education, and firm size towards ESG disclosure. This study utilised samples from top 10 companies listed in 6 (six) different Global Islamic Indices with a three-year observation period (2017–2019) resulting in 99 observations. Global Islamic listed companies have rarely been studied in ESG-related issues. The pre-COVID-19 pandemic period was chosen to avoid the potential effects of pandemic on the subject of this study. Multiple linear regression analysis was employed to test the hypotheses. It was found that all the independent variables simultaneously influence the ESG disclosure, while partially directors' education are influencing the variable, and both R&D intensity and firm size do not influence the ESG disclosure. Confirming the agency theory, it is argued that the board characteristics are important in predicting overall board performance in carrying out their monitoring responsibilities, in this case, monitoring and encouraging companies to disclose more ESG information in their sustainability reports. This study signifies the role of directors even within the Islamic listed companies that the more highly educated the members of the board, they will tend to disclose more ESG information on their sustainability reports. This study contributes to the existing ESG disclosure and sharia-based investing literature by utilizing global-based indices instead of local indices in Muslim-majority countries, mirroring the current uptrend in world-wide sharia investing and the call for companies to be more sustainable in doing their business.

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Muhammad Afi Ramadhan is an undergraduate alumnus of the International Accounting Program, Accounting Department, Universitas Syiah Kuala (USK), Banda Aceh, Indonesia. He is currently preparing to further his studies in the field of financial technology later in 2023. Beyond the accounting field, he is also interested in digital economy, smart cities, sustainability, international relations, and data analytics. He co-authored a paper titled "Evaluation of the Usage of Open Data Portal in Banda Aceh Local Government in Indonesia" in Proceedings of the 1st International Conference on Law and Human Rights 2020 (ICLHR 2020). He had also presented a paper at the 2018 Aceh Global Conference (AGC) under the title "Influence of Entrepreneurial Orientation and Learning Orientation to Business Performance with Organizational Learning as a Mediating Variable on Student Activity Unit Inkubator Young Entrepreneurs Student's Economic and Business Faculty of Syiah Kuala University". Beyond academic writing, he also had opinion writings portfolio in his Medium website, discussing digital banking in Indonesia.

Subjects: Sustainable Development; International Accounting

Keywords: ESG disclosure; sustainability reporting; directors' education; R&D intensity; Islamic index; social responsibility; environment; governance; firm size; sustainability

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1. Introduction

The rise of socially responsible investing (SRI) has been a trend all over the world (Broadstock et al., 2021; Pedersen et al., 2020), with many forms of investment on the basis of ESG (environmental, social, and governance), such as mutual funds, ETFs (exchange-traded funds), and even indices that are catered specifically for these companies that are being socially responsible (Eccles et al., 2020; Halbritter & Dorfleitner, 2015). However, there is still a disconnection between the success of ESG and ESG investing, with several reasons such as restricted competence to fully integrate ESG investment, shortage of direction and support from industry and government, and faulty perceptions around ESG investment (Bebbington and Unerman, 2018; Hardiningsih et al., 2020). Conversely, that reason will not stop the rise and development of ESG activities because of several reasons, which include investment and asset optimization; cost reductions; employee productivity uplift; and top-line growth (McKinsey & Company, 2019).

The idea of ESG itself is derived from three main aspects, which are environmental, social, and governance (Broadstock et al., 2021). However, the term itself can sometimes be intertwined with other terms such as triple bottom line and 3P (people, planet, and profit), which are similar in meaning (Pedersen et al., 2020; Sultana et al., 2018). Explaining further about each of the ESG points, first is environmental concern. Global warming, climate change, extreme weather, and many other things that were unfelt before are now becoming closer to heart, which triggers the higher and more intense awareness and discussion of society towards the very urgency of preserving the environment and mother nature (Bebbington & Unerman, 2018). Second is social concern. Mainly, the “S” in ESG is discussing many underlying social factors behind the business activities of a company, such as labour, politics, social trends, relationship management with the workforce, the societies where they operate, and many more things (S&P Global, 2020b). It is then believed that the social point of ESG activities is also related to the social construct and background of each company, leaving a need to have a unified standard for its disclosure when doing a reporting (Eccles et al., 2020; Halbritter & Dorfleitner, 2015). Last but not least is the governance concern. Many large scandals are happening around the world because of the lack of monitoring and even existence of a corporate governance system. The names of Enron, WorldCom, and 1MDB are proof that even the largest company with a “big” amount of money could easily collapse because of lack of governance. Mostly, the matter of governance is the responsibility of the board of directors that are working on behalf of the company, and also, a wider range of governance factors in decision-making (Chen, 2021; S&P Global, 2020a).

ESG disclosure is one of the catalysts that could help businesses to rethink their business strategies and activities. Even there is a clear (but sometimes forgettable) distinction between ESG performance and ESG disclosure, but there is still a hope that company would do their best in maintaining their ESG performance by doing a proper ESG disclosure, thus giving the best ESG transparency (Yu et al., 2018). ESG reporting is one of the parts of the currently developing non-financial information disclosure. The latest survey by KPMG Global (2021) showed that 80% of companies worldwide are now doing sustainability reports, where a significant majority of companies are now linking their business activities with the SDGs in their corporate reporting. Voluntary disclosure, as discussed by Barros et al. (2013), can help to reduce information asymmetries between investors, as well as many other things, such as improved stock liquidity and lower stock price synchronicity. Even there is a clear—but sometimes forgettable—distinction between ESG performance and ESG disclosure, but there is still a hope that company would do their best in

maintaining their ESG performance by doing a proper ESG disclosure, thus giving the best ESG transparency (Yu et al., 2018).

The ESG issues even become more pertinent within the context of Islamic-based investing, which has witnessed significant growth in the recent decades. The concept of Islamic-based investing is aligned with the concept of ESG and the principle of socially responsible investing (Binmahfouz & Kabir Hassan, 2013; Che Azmi et al., 2016). Islamic-based investing is required to comply with sharia principles, which includes free of *gharar* (uncertainty), *riba'* (interest), *maysir* (gambling), and also free from activities that are related to alcohol, tobacco, drugs, and stuffs (Biancone & Radwan, 2018; Walkshäusl & Lobe, 2012). Referring to Bayzid and Nobanee (2020), Islamic finance was not given much thought before the financial crisis of 2008, in which during those trying times, its impact on Islamic financial institutions was less severe than that of the commercial financial organizations. They also argued that one of the reasons for this resiliency is the focus of Islamic finance as a tool of economic development, human development, and protection of rights and economy of individuals. Strengthening the argument above, Khan (2019) mentioned that faith is now seen as a positive motivator for accomplishing the SDGs, which is a paradigm change in contrast to the era of MDGs, where faith was claimed to be a barrier to accessing health, educational, and financial services. Interestingly, on the notion and relation between Islamic finance and socially responsible investment, Elias (2017) highlighted on the controversies happened on sharia-compliant firms, such as Chevron, linked with ethnic cleansing in Burma, had him argued that this could dampen the reputation and challenge the ability of Islamic investment to address unethical behaviour. Given the rising social awareness among global investors and the pressing need to establish sustainable financial markets, Islamic finance is widely expected to reignite the worldwide trend of SRI (Noordin et al., 2018).

However, Lewis (2010) noted that Islamic investing has its own set of ideals and goals based on Islamic teachings, and it is built on a different foundation than traditional Western investment, in a sense that Islam, the religion itself, promote equity, justice, social welfare, and brotherhood, and these values should be reflected in economic activity. The latest report from Refinitiv and ICD showed that the total assets of global Islamic finance are forecasted to reach USD 3.69 trillion by 2024, according to Islamic Corporation for the Development of the Private Sector and Refinitiv (2020), which means a very good sign for the development and penetration of sharia-based investing in specific, and Islamic finance in general.

Prior researches investigating the issue of ESG disclosure have documented various findings. Yu et al. (2018) found that there is more benefit to firm value, which is measured by Tobin's Q, when it was linked to a more ESG transparency, or in other words, more ESG disclosure. They argued that increasing ESG disclosure will reduce knowledge asymmetry and agency costs for investors. Similarly, on the issue of environmental and social transparency, Hardiningsih et al. (2020) claimed that it has a major impact on financial and market performance measures. On the other hand, however, there are several countering results on the research in this sector such as the one done by Tarigan and Samuel (2015). Their research suggested that there is no effect of economic dimension disclosure towards the financial performance, while the environment and social dimension disclosure are affecting negatively towards the financial performance. Similar results were yielded on the research done by Miralles-quirós et al. (2019) and La Torre et al. (2020).

Furthermore, many previous research such as Lee et al. (2016), Ortas et al. (2015), and Anggraini et al. (2020) showed a similar positive result with a slightly different approach to sample-taking and more. On a more specific note, such as on industry-basis and country-basis, there is already research performed by Chiu et al. (2020), Almeyda and Darmansya (2019), and Yawika and Handayani (2019) related to ESG disclosure in their own particular country and/or industry. ESG and sharia investing in particular had been studied by several researchers such as Binmahfouz and Kabir Hassan (2013); Che Azmi et al. (2016); Erragragui and Revelli (2016); Erragragui and Revelli (2015).

These studies, however, are mostly focusing on the stock performance of firms that are both sharia-compliant and ESG-friendly. Consequently, there is limited research found that are specifically discussing the ESG performance of these sharia stocks, and what factors are influencing their ESG information disclosure. This study is intended to fill this particular research gap and contribute further into the development of both ESG and sharia-based investing.

This research is bringing a multiple perspective to be tested on their influence on ESG disclosures, such as its corporate governance in the form of directors' education, and technology in the form of research and development (R&D) intensity. Given that there is a lack of research on each of the proposed variables, this will also bring a novelty to this research and contribute further into the topic. In terms of sampling, this research will also take a comprehensive approach by looking at six most prominent global sharia indices from four different providers, which will bring different perspectives and diversity in terms of the types of companies picked on each index.

Based on the research problem and objectives as described above, this research is expected to give relevant contributions and benefits on both practical and academic significances. On the practical ground, this research contributes as a reference that is useful for management, investors, and government to obtain more information and knowledge on how to look for companies that are sharia-compliant and adhering to sustainable development goals, aligning with the principle of socially responsible investment (SRI). This research will also promote better ESG performance and its disclosure, and a better sharia-compliance practice. On the academic ground, the results of this study are intended to support and strengthen prior research on the sector and supply empirical evidence about the factors that can influence the ESG disclosure. It will also append on information and contributions of research materials and thought for further research, especially in the field of sustainability accounting and reporting.

The rest of this article will be presented as follows: Theoretical framework and hypothesis development are described next, followed by research methods. Subsequently, findings and discussion are provided in the section afterwards. The conclusions, as well as limitations and recommendations, are included in the last section.

2. Theoretical framework and hypotheses development

2.1. Legitimacy theory

According to Deegan (2014), legitimacy theory is a theory that suggests an organization needs to operate within the norms and bounds of their respective societies. As the name suggests, the status of "legitimacy" is given for a compliance with societal norms and expectations. Conversely, if "legitimacy" is not apparent, then managers will embrace the process of legitimation. Failure to adjust to dynamic changes in the market and social environment will result in a legitimacy gap on that particular company (Setiawan, 2016).

Business activity and stability disruption could be a result of this legitimacy gap. There is a twofold reason as a source of the legitimacy gaps, as discussed by Deegan (2014). One is constant changes in societal expectation while the organization is still operating in the same manner as it always has. Two is when an information, previously unknown, was revealed to the general public, perchance through disclosure made by the news media.

Organizations in general, or business in specific, are doing their part to adjust the public expectations and market demand, as an alternative in order to reduce the legitimacy gap. This includes conducting CSR activities, donations, and so on, which need to be disclosed to the public. Companies report and explain these kinds of activities through their annual report or disclosure, and the public will refer to this information to assess the company's performance from both the financial and non-financial perspective (Nabila, 2019).

It is then believed that there is a strong correlation between non-financial information disclosures, such as the ESG report, with a legitimacy theory, which is according to previous work done by Schiopoiu Burlea and Popa (2013) and Fernando and Lawrence (2014). As for the latter part, the authors have comprehensively reviewed many researches to come up with an analysis and conclusion that legitimacy theory is highly linked to CSR practice and motivations.

Looking forward, non-financial information disclosures such as ESG reporting will keep evolving as time goes by, especially with many incentives and regulations from respective bodies of authority. With respect to the legitimacy report, it is hoped that the disclosure of ESG information will help companies to reduce these legitimacy gaps.

2.2. Stakeholder theory

Freeman (2015) defined stakeholder theory as a set of premises suggesting that managers have duties to some group of stakeholders. Phillips (2003) argued that one of the most powerful social entities on earth is business organizations, in which they are firing up the so-called “free market economies”, controlling gigantic resources across borders and impacting every human life. That being said, there will always be a debate on shareholders versus stakeholders. As Smith (2003) questioned at the beginning of his work, there is a dilemma on whether companies should maximize shareholder value or to serve the interests of all stakeholders, which is often conflicting. At one side, shareholder theory argued that managers are supposed to spend corporate funds in alignment with shareholders’ interest. At the other extreme, however, shareholder theory asserts a wider consideration for a manager when doing their job.

From the discussion above, it is then seen that companies need to take both shareholders and stakeholders’ interest simultaneously, in which it will affect how their forefront motives and concern of profit maximization now need to also consider the effect of their activities to society and the environment. Companies need to realize that a vast number of stakeholders are playing a significant role that could influence the manners of corporations, especially in the social and environmental sectors.

Stakeholder theory is one of the main theories that are being utilized to support research about ESG disclosures, such as research done by Qoyum et al. (2021), Yu et al. (2018) and Ortas et al. (2015). Weber et al. (2008) argued that the ESG reporting is done by companies to showcase themselves as good corporate citizens and could entice investors, clients, and other stakeholders. Yu et al. (2018) argued that ESG disclosures, and to the extent of ESG transparency, could bring a potentially positive impact on firm value by reducing investors’ information symmetry and agency costs. Their research also showed that the benefits from ESG disclosure outweigh their costs for the average listed firms.

2.3. R&D intensity and ESG reporting disclosure

Lee et al. (2016) agreed on the importance of R&D investment (expenditure) as a part of environmental responsibility, in which they are exhibiting the firm’s commitment, capability, and performance. They discussed a substantial amount of resource commitment needed to be taken by companies for enhancing their environmental performance in that particular study.

According to (Padgett & Galan, 2009), as research and development (R&D) were categorized as intangible resources, they utilized a Resource-Based View (RBV) theory to argue that R&D intensity could result in assets that provide firms with a competitive advantage. This is possible, for the focus of R&D investment is resulting in a more efficient production (Awaworyi Churchill et al., 2019). To account for this, a calculation of R&D expenditure is divided into the output measure, usually gross output (Galindo-Rueda & Verger, 2016).

Xie et al. (2019) stated that R&D spending is meant to be closely tied to a company’s productivity as a source of technological improvement. However, a study by Lee et al. (2016) showed that

environmental responsibility and business financial performance are unaffected by R&D intensity (expenditure). Conversely, previous study has not explored the discussion in a sharia-compliant setting, which is triggering the interest of the author to dig deeper into this particular topic. Therefore, it can be hypothesized that:

Hypothesis 1: R&D intensity is partially influencing towards ESG disclosure on listed companies in global sharia indices on year 2017–2019

2.4. Directors' education and ESG reporting disclosure

Prabowo et al. (2017) argued that the chairperson, as part of the board, is having the further capability to take care of various interests of stakeholders because of advanced education degree, which is associated with better cognitive ability. Tan et al. (2020) supported this notion by mentioning that education could strengthen managerial skills and confidence. Therefore, Fernández-Gago et al. (2018) urged on the need for companies to have directors from diverse educational backgrounds, so that they will be better prepared for the complexities of CSR. Strengthening the argument, Papadimitri et al. (2020) pointed to the urgency of hiring and retaining well-educated board members that are competent on firm management.

Referring to the upper-echelon idea, top managers' personal characteristics influence their innovation strategies (Kuo et al., 2018). Education improves a firm's owner confidence, manager's managerial abilities, and membership in a specific socioeconomic group, all of which are important factors in the firm's success (Tan et al., 2020). Highly educated boards provide more efficient monitoring and advisory guidance (Wang et al., 2016).

Papadimitri et al. (2020) suggested that education is a structure of human capital that acts as a cue on numerous attributes of the managers. The instances of these characteristics include problem solving aptitude and cognitive capacity. These attributes could then be seen in several outcomes from the companies, such as performance and strategic decisions. These reasons were also in line with studies done by Prabowo et al. (2017), Tan et al. (2020), and Fernández-Gago et al. (2018). As the stakeholder theory and legitimacy theory suggested earlier, the firm would need to work hard in order to reduce the legitimacy gap and fulfil their moral imperative to many stakeholders involved within their business operations, and these could be done with a better education level held by directors. A better education level held by directors is expected to increase the ESG disclosure because doing so will help to fulfil the above-mentioned argument of moral and legitimacy gap. However, overall, there is still quite a lack of research found that is discussing the effect of directors' education on the ESG disclosure, which is triggering the interest of the author to dig deeper into this particular topic. Thus, it can be suggested that the hypothesis is as follows:

Hypothesis 2: Directors' education is partially influencing ESG disclosures on listed companies in global sharia indices in the year 2017–2019.

2.5. Firm's size and ESG reporting disclosure

Research done by Dremptec et al. (2020) that focuses on firm size as a proper variable, rather than only a control variable, showed an intriguing result and discussion regarding firm size and their ESG scoring and disclosure. They mentioned two possible interpretations on the influence of firm's size on ESG score. First, it is believed that larger firms are more sustainable because they have a scale of economies and enough capital to allocate into CSR and ESG stuff. On the other hand, however, they argued that bigger firms have an advantage over the method of measuring sustainability. They mentioned that the large size of a company is corresponding to the data availability and resources for providing ESG data.

Large organizations have a tendency to engage in a wide range of activities, owing to the fact that they have all the resources necessary to support these activities (Fauziah & Murharsito, 2021). Furthermore, firm size also denotes a level of stability and has ramifications for the company's growth (Fauziah & Murharsito, 2021). Therefore, Wulandari (2021) argued that company size is one of the factors that can reduce agency costs.

There is already numerous research that utilizes firm size as one of their variables in studying ESG disclosure. Yu et al. (2018) argued that firms with larger size will disclose more on their ESG reporting. Similarly, Dremptetic et al. (2020) and Albitar et al. (2020) are on the same track regarding the relationship between firm size and ESG disclosure. On a country basis, similar studies done in Indonesia and Malaysia by Hardiningsih et al. (2020) and in South Korea by Lee et al. (2016) yielded the same results. Albeit there are already many researches on this variable, only limited previous study has explored the discussion in a setting of both ESG-based and sharia-compliant samples, such as the study done by Khattak et al. (2020), which is triggering the interest of the author to dig deeper into this particular topic. Hence, it can be hypothesized that:

Hypothesis 3: *Firm size is partially influencing ESG disclosures on listed companies in global sharia indices in the year 2017–2019.*

3. Research method

3.1. Sample and data collection

The criteria in choosing the sample are the companies listed at the Top 10 of MSCI World Islamic Index, Dow Jones Islamic Market World Index, S&P Global 1200 ESG Islamic Index, FTSE Islamic All-World, MSCI Emerging Market Islamic Index, and Dow Jones Islamic Market Emerging Markets Ex-Frontier TopCap 5/10/40 Capped Index with a mutually exclusive approach on February 26th, 2021, that are consistently publishing their sustainability report from 2017 to 2019 with a total of 99 observations. Reasoning for this selection is because these indices are at the forefront of global sharia indices (Kuepper, 2021) and represent a global presence of companies around the world with a perspective of both companies coming from developed countries and emerging markets, creating a more diverse sampling. Moreover, these indices were provided by the top names in the industry of indices and classification, which are MSCI, S&P Dow Jones, and FTSE Russell.

The total companies listed under Top 10 of MSCI World Islamic Index, Dow Jones Islamic Market World Index, S&P Global 1200 ESG Islamic Index, FTSE Islamic All-World, MSCI Emerging Market Islamic Index, Dow Jones Islamic Market Emerging Markets Ex-Frontier TopCap 5/10/40 Capped Index are 41 under a mutually exclusive approach, which means there is no overlapping on each and every index during the sampling. For example, Johnson & Johnson are listed on three of these indices; however, it is counted as one sample. However, there are eight companies that did not publish sustainability reports fully during the observation period, so it needs to be eliminated from the sample. The rest of the data, which came from 33 companies, will be multiplied for 3 years, respectively, from 2017 to 2019. Reasoning for this choice of year because of the completeness of the data. Besides, it is believed that these years are a proper period to analyse, given that 2020 is the year of pandemic and it is triggering mixed results for companies with the economic contraction and the mobility limitation, hence the years afterwards were not included in the observation. As a result, 99 observations are used for this research.

Secondary data is used. Data is collected from both the annual report and sustainability report of the shortlisted companies under the desired criteria above. Mainly the data for the dependent variable (Y) will be extracted from the sustainability report since the list of ESG disclosures are usually attached there, while annual report provided data for the independent variable (X),

because these figures, such as R&D costs, bio of directors, and total assets of the company are available there.

3.2. Variables and measurement

3.2.1. Dependent variable

In this study, researchers used a manual GRI scoring index using the model which was proposed by (Weber et al., 2008). According to the latest standard issued by the Global Sustainability Standards Board (GSSB), the current GRI Standards consist of Universal Standards (GRI 101–103) and Topic-specific Standards (GRI 200: Economic, GRI 300: Environmental, GRI 400: Social). This variable is measured by using a scoring index for the performance of each standard. If the item is disclosed, a score of 1 is assigned, while a score of 0 is assigned if the item is not disclosed. After all the things have been scored, the scores will be added together to get the overall comprehensive score for that observation. The formula used to calculate the scoring index for each item is as follows:

$$\text{Score} = \frac{n}{k}$$

Where:

Score = Scoring index for the disclosure

n = Number of items disclosed

k = Number of items that are expected to be disclosed by the GRI Standards

3.2.2. Independent variables

Table 1 summarizes the variable measurement.

3.3. Empirical model

A linear regression between the dependent variable (Y) and two or more independent variables (X) is employed in the multiple linear regression model. This research utilizes the following equation:

Table 1. Variable measurement

Research variable	Operational definition	Indicator	Scale	References
Dependent variable				
ESG disclosure	GRI scoring index	$\text{Score} = \frac{n}{k}$	Ratio	Tarigan and Semuel (2015)
Independent variables				
R&D intensity	Percentage of R&D costs over sales	$(\text{R\&D costs}/\text{total sales}) \times 100\%$	Ratio	Yu et al. (2018)
Directors' education	Educational background of directors in a firm	Median of score sequence of all directors' education background based on a 5-point scale (0-school or lower; 1-diploma; 2-bachelor; 3-master; and 4-doctoral degrees)	Nominal	Tan et al. (2020)
Firm size	Size of a company	$\log(\text{firm size})$	Nominal	Yu et al. (2018)

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$$

where:

α = a constant

Y = ESG disclosure

$\beta_1, \beta_2, \beta_3$ = regression coefficient

X_1 = R&D intensity

X_2 = directors' education

X_3 = firm's size

ϵ = standard error

4. Findings and discussion

4.1. Descriptive statistics

Table 2 showcases the observation for all research variables from the years 2017 to 2019. The table shows the descriptive statistical result for the variable R&D, edu, size, and ESG of the total 99 sample studies. According to Table 2, the ESG has minimum values of 0.083, which belong to JD.com in both 2018 and 2019, while the maximum ESG in this study belongs to several corporations that fully implement the GRI disclosures, such as Roche, MediaTek, and SK Hynix. The mean value of ESG is 0.80920 and the standard deviation value is 0.246131, which means the data used by the ESG disclosure variable have a broad data distribution that causes data deviation in the variable.

On the independent variable side, R&D intensity's minimum value is 0.000, which originated from several companies that are not having R&D expenses in their report, such as Visa Inc, Recruit Holdings, and Lukoil Holding. Its maximum value is 25.587 which belongs to MediaTek Inc. in 2019. The mean value of R&D intensity is 7.01884, while the standard deviation value is 7.395178, which means the data used in this variable have a broad data distribution that causes data deviation in the variable.

Directors' education has 2.0 in minimum value, which means the median of their directors' education is bachelor's degree. This is linked to several samples such as Nidec Corp in 2017. The maximum value of this variable is 4.0, which means the median of their directors' education is a doctoral degree. This maximum value is linked to several samples such as Samsung Electronics Co. The mean value of directors' education is 2.970, while the standard deviation is 0.598837,

Table 2. Descriptive statistics

	N	Minimum	Maximum	Mean	
Standard deviation	R&D	99	.000	25.587	7.01884
7.395178					
Edu	99	2.0	4.0	2.970	.5661
size	99	3.724	6.431	4.92062	.598837
ESG	99	.083	1.000	.80920	.246131
Valid N (listwise)	99				

which is lower than the mean, which means that the data is valid. The firm's size is 3.724 in minimum value, which belongs to MediaTek Inc. in 2017, and the maximum value is 6.431 which belongs to Daikin Industries in 2019. The mean value is 4.92062, while the standard deviation is at 0.598837, which is lower than the mean, which means that the data is valid.

4.2. Hypotheses testing and discussion

Table 3 showcases the result of multiple regression analysis. For this investigation, this resulted in a multiple linear regression equation, which can be written as follows:

$$\text{ESG} = 0.517 + 0.006\text{R\&D} + 0.156\text{edu} - 0.042\text{size} + \epsilon$$

As the dependent variable (Y) in this study, the ESG disclosure (ESG), which is calculated by the GRI scoring index, has been utilized by (Tarigan & Samuel, 2015). On the other hand, the independent variables (X) are R&D intensity (R&D), directors' education (edu), and firm size (size).

Referring to the regression equation given previously, the value of the constant is 0.517. If the R&D intensity, directors' education, and firm size are equal to zero, the ESG disclosure value will be 0.517. Furthermore, the above-mentioned regression equation's outcome can be described as follows: If the R&D intensity value rises by one, the ESG disclosure rises by 0.006, and vice versa. As a result, a higher level of R&D activity will result in a higher level of ESG disclosure, which means that the company will tend to disclose more of their ESG information on their sustainability report, as it has a positive value. If the education of the board of directors is increased by one, the ESG disclosure will increase by 0.156, and vice versa. This implies that the higher value of directors' education will also result in the higher value of ESG disclosure, which means that the company will tend to disclose more of their ESG information on their sustainability report, for it has a positive value. Conversely, however, the ESG disclosure will reduce by 0.042 if the firm's size value is increased by one. This implies that a higher score of firm size will result in a lower value of ESG disclosure. This should mean that the company will tend to disclose less of their ESG information on their sustainability report.

The R Square value is 0.199, as seen in the table, this suggests that just 19.9% of independent variables that are present in this study can forecast the ESG disclosure. In comparison, the remaining 80.1% was predicted by other variables outside of this study. This means that independent variables only play a little role in determining the dependent variable. The results also showed that the F arithmetic was 7.875. As a result, it can be argued that it is accepted because of the F arithmetic > F table (7.875 > 2.70). Therefore, all independent variables are simultaneously influencing the dependent variable.

R&D intensity as the first independent variable (R&D) has a value of $t = 1.694$ and a significant value of 0.094. This variable's significant value exceeds the significance level of 0.05 (5%), which implies that the R&D intensity has a positive but insignificant effect on the ESG disclosure; hence,

Table 3. Hypotheses Testing Result

Unstandardized coefficients			t	Sig.
Model	B			
1 (Constant)		.517	2.453	.016
	R&D	.006	1.694	.094
	Edu	.156	3.630	.000
	size	-.042	-1.110	.270
	F test	7.875		
	R square	0.199		

H₂ is rejected. Based on the result, it can be inferred that there might not be a direct or indirect relationship between R&D intensity and the ESG disclosure. This does not go in line with the argument of (Yu et al., 2018), where they claim that R&D intensity is expected to be positively connected with agency costs related to management monitoring for difficult-to-monitor enterprises, hence it can be used as a measure of agency and monitoring costs. Empirical evidence from prior studies such as (Lee et al., 2016) support this finding. On the contrary, results from Yu et al. (2018) and Xie et al. (2019) found a positive and significant effect between R&D intensity and the ESG disclosure.

Next, directors' education (edu) has a value of $t = 3.630$ and a significant value of 0.00. This variable's significant value is lower than the significance level of 0.05 (5%), which means the directors' education has a positive and significant effect on ESG disclosure, hence H₂ is accepted. Based on the result, it can be inferred that the more highly educated the members of the board, they will tend to disclose more ESG information on their sustainability report. According to (Prabowo et al., 2017), borrowing the agency theory, they argued that the board chairperson's (and thus the member's) characteristics are important in predicting overall board performance in carrying out their monitoring responsibilities, in this case, monitoring and encouraging companies to disclose more ESG information in their sustainability reports. This argument was proved by their research result where there is a positive association between directors' education and ESG disclosure. Similarly, Fernández-Gago et al. (2018) and Papadimitri et al. (2020) have found a positive association between these two variables. On the contrary, however, Fahad & Rahman (2020) found a contrasting result in their study.

Finally, the firm size (size) has a value of $t = -1.110$, with a significant value of 0.270. The significant value exceeds the significance level of 0.05 (5%). Thus, firm size has a negative yet insignificant effect in ESG disclosure. Therefore, the fourth hypothesis (H₄) is rejected. This goes in contrast with the result of many prior studies such as (Drempetic et al., 2020) and (Albitar et al., 2020), where they found a positive and strong relationship between firm size and ESG disclosure. Supporting this argument, Yu et al. (2018) argued that firms with larger size will disclose more on their ESG reporting. Conversely, however, so far there have not been any prior studies that prove a negative yet insignificant influence of firm size towards ESG disclosure. Therefore, the author implied that the firm size in this case might have triggered a lower ESG disclosure in this research.

5. Conclusion

This research examines the influence of R&D intensity, directors' education, and firm size towards ESG disclosure on listed companies in global sharia indices. A non-significant relation between the R&D intensity and the ESG disclosure was found, which can also be inferred that there might not be a direct or indirect relationship between R&D intensity and the ESG disclosure. This does not go in line with the theory, suggesting that R&D intensity is expected to be positively connected with agency costs related to management monitoring for difficult-to-monitor enterprises, hence it can be used as a measure of agency and monitoring costs. This study also suggested that directors' education has a positive and significant effect on ESG disclosure. Based on the result, it can be inferred that the more highly educated the members of the board, they will tend to disclose more ESG information on their sustainability report. Borrowing the agency theory, it is argued that the board chairperson's (and thus the member's) characteristics are important in predicting overall board performance in carrying out their monitoring responsibilities, in this case, monitoring and encouraging companies to disclose more ESG information in their sustainability reports. Moreover, firm size has a negative yet insignificant effect on ESG disclosure. Conversely, however, so far there have not been any prior studies that prove a negative yet insignificant influence of firm size towards ESG disclosure. Therefore, the author implied that the firm size in this case might have triggered a lower ESG disclosure in this research.

This paper contributes to the existing ESG disclosure and sharia-based investment literature using the following methods. First, in contrast to many other past studies investigating the

relationship between ESG and sharia investing that are primarily focusing on its stock performance, this research expands the horizons by introducing a specific ESG performance evaluation and what proxies are influencing its ESG disclosure. Second, a comprehensive standing and global viewpoint is taken by this study, proven by the sampling of six well-known global sharia indices from four different data providers. Third, this study also promotes a new perspective and direction of utilizing global-based indices instead of local indices in Muslim-majority countries, implying the current uptrends in world-wide sharia investing and an advancement for research in this particular field. That being said, the authors are hoping to open and lead the way for a better integration and implementation of both ESG and sharia-based investing principles and practices in a global level through this study.

Nevertheless, this study is subject to the following limitations. First, this study utilized only to the extent of Top 10 companies listed on six different global indices, which are dominated by companies from the US, with less variance of firm size, and have a limited number of companies. Hence, the results cannot be generalized. To obtain a better result, further research is suggested to utilize samples from several different countries or use samples that are from different sizes of companies (small, medium, large). Also, the educational attainment attributes utilized in this study are limited to their latest degree, regardless of their university/college background, so further research should consider extending the educational attainment attributes by using other indicators not used in this study.

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