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Research Article

Leveraging Green Bonds to Address Debt Sustainability and Economic Recovery in South Asia: Lessons from EU and ASEAN Countries

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Abstract: This paper intends to analyze how green bond markets can address debt sustainability and post-COVID-19 economic recovery in South Asia and draws lessons from the European Union (EU) and Association of Southeast Asian Nations (ASEAN) countries using desk approach and survey of grey literature. The study reveals that COVID-19 crisis induced the European governments to launch innovative bonds such as social and sustainability bonds to meet large public finances for pandemic and post-pandemic recovery actions, while issuance of green bonds in ASEAN region has been quite slow but remained positive despite declining trend in global market in 2020. Robust policies and regulations have been developed and implemented in the EU and ASEAN regions, whereas development of green bond markets in South Asian countries has been facing numerous barriers. The roadmap to promote green bond markets in South Asia should focus on following broad policy issues: primary policies, established instruments, innovative products and new strategies. The primary policy options should focus on building and strengthening infrastructure for development of green bond markets. In this context, the policies should focus on developing a shelf of climate-compatible green projects to achieve inclusive and sustainable post-COVID-19 recovery and to meet the sustainable development goals. Local bond markets should be bolstered to issue innovative green bonds and tactical public green bonds to finance the post-COVID-19 recovery in South Asian countries. The compatible EU and ASEAN green bond standards should be replicated with suitable modifications to develop South Asian country-specific green and sustainable bond standards.

***Keywords*:** debt sustainability, economic recovery, green bonds, ASEAN, EU, South Asia

JEL Code: F34, G01, G15, G28, N24, N25

1. Introduction

The COVID-19 shock contracted the global growth by 3.5% between 2019 and 2020 (IMF, 2020a) and forced the governments to initiate the fiscal support of $14 trillion to mitigate the economic impacts, which led to rapid decline in revenues (Nagata, 2021) and surge in public debt from 84% of GDP in 2019 to 98% in 2020 (IMF, 2020b). With the advent of the COVID-19 vaccines, the attention has been shifted from livelihood and business support for economic recovery, which entails huge public spending. Rising public debt requires more public borrowing, which is complemented by surge in private financial surpluses. Debt sustainability requires sustainable investing of public

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borrowing in public assets and entails private investment in more productive assets to cover the interest payments and pay down debt. Therefore, there is need to tap novel financing instruments to invest in economic recovery through climate-compatible green projects for meeting the sustainable development goals (SDGs) and ensure debt sustainability in South Asian economies.

Venture capital can finance the climate-compatible green projects, but have limited penetration in Asia (Peimani, 2019). Venture capital refers to the early-stage finance to non-publicly listed startup firms. The banks consider the climate-compatible green projects dicey due to longer maturity (Noh, 2019). Other financial institutions can finance long-term projects, however, these institutions hesitate to fund the climate-compatible green projects controlled by the public sector (Yoshino et al., 2019). The green finance can tap private capital to mitigate climate crisis. The green finance refers to futuristic financing for green projects linked to meet the SDGs (Noh, 2019). The 2015 Paris Agreement (UNFCCC, 2015) acknowledged the contribution of private capital in the transition towards sustainability (Sachs et al., 2019) and supported the development of the green bond markets (Whiley, 2015). Green bonds refer to debt securities directed towards climate compatible green projects and regulated by the Green Bond Principles (GBP) instituted in 2014 under the guidance of the International Capital Market Association (ICMA) and use of proceeds criterion.

Green bonds center on environmentally friendly projects with low-carbon emissions and aligned to the SDGs (Nguyen et al., 2020). The European Investment Bank (EIB) issued the first green bonds in 2007 followed by the World Bank in 2008. In 2013, the International Finance Corporation issued the first billion dollar of green bonds followed by the EIB's issues in 2014, which increased from $3.1 billion to $36.6 billion within two years. Since 2008, more than $16 billion of green bonds have been issued for green project by the World Bank (World Bank, 2020). The Asia and the Pacific region host nearly 345 issuers of green bond in 2016 and achieved a significant growth of 35% per annum in green bonds in 2018 (CBI, 2019a). In 2019, total green bonds stood at $754 billion (CBI, 2020).

There exists substantial green finance gaps, which require investment of $3.95 trillion annually up to 2050 in green projects (IEA, 2019) and is unlikely to be met from public finance and required substantial private capital (Clark et al., 2018). Green bonds cover a big sustainable debt market (BNEF, 2019), which surged rapidly in recent years due to high demand, over-subscriptions, lower capital costs, and substantial capital required for green projects, thereby benefiting firms, investors, and environment (Flammer, 2018). The issuance of corporate green bonds increased their popularity and led to higher stock prices, which helped to lower CO_2 emissions (Flammer, 2021). The prices of public firms' stocks also increased significantly after launch of the green bond issues (Tang & Zhang, 2020). Thus, green bonds bring better financial and environmental outcomes and can support sustainable and inclusive recovery (Bigger & Millington, 2019). Against above backdrop, the paper intends to analyze how the green bond markets can address debt sustainability and post-COVID-19 economic recovery in South Asia and draws lessons from European Union (EU) and the Association of Southeast Asian Nations (ASEAN) countries using desk approach and survey of grey literature.

2. Review of literature

During the late 1980s and early 1990s, studies on debt sustainability emerged (Hakkio & Rush, 1991). Debt sustainability refers to a scenario when a borrower is likely to maintain debt servicing in the future without debt restructuring, accumulating, and retrenching. Bhandari et al. (2017) examined issues related to government debt management. Most studies on debt sustainability confined to developed countries (Afonso & Jalles, 2015; Fincke & Greiner, 2011; Mercan, 2014; Miyazaki, 2014; Neaime, 2015). Some studies analyzed the debt sustainability in EU countries (Mercan, 2014; Afonso & Jalles, 2015; Brady & Magazzino, 2019). In Asia, the public debt has surged significantly after 2010 (Ferrarini and Ramayandi, 2016). The surge in public debt increases high risks to future debt crises (Chudik et al., 2017). The crisis adversely affects the debt sustainability due to rapid surge in healthcare expenditures (Guleryuz, 2017). The recent initiatives to ease debt distress in poor countries were unsustainable (IMF, 2016).

The COVID-19 pandemic aggravates public debt in countries already suffering from debt distress (IMF, 2020c) due to high debt servicing costs (UNDESA, 2020) since the global financial crisis (UNCTAD, 2019). The Debt Service Suspension Initiative (DSSI) has been used to tackle unsustainable debts in many countries. DSSI refers to debt relief on a case-by-case basis by G20 economies until mid-2021. Debt service suspensions may not be enough to shun debt evasion (UNDESA, 2020). Fiscal support to offset the serious recession remained inadequate in developing countries

compared to developed countries due to squeezed fiscal space, which negatively impacted debt sustainability. The International Monetary Fund (IMF) and the World Bank allocated $400 billion as loan to tackle the pandemic crisis in poor economies and are to be paid back, which can cause worsening of debt sustainability (Djankov & Panizza, 2020). In contrast, debt swaps support sustainable economic activities, however, its operational challenges are substantial in the context of the negative social and economic impacts caused by the COVID-19 pandemic. In the context of the fiscal squeeze, private capital can provide the much needed financial resources to fund the green and inclusive economic recovery from the pandemic crisis.

The pandemic shocks led to volatility in stock returns (Baker et al., 2020). The government imposed restrictions negatively impacted the stock markets (Kizys et al., 2021) due to pandemic-induced huge transaction of dicey assets (Baker et al., 2020). Strong government responses may remove investors' uncertainties and return their confidence and alleviate herd behavior (Kizys et al., 2021). During a crisis, financial market becomes more integrated compared to the pre- and post-crisis periods. In recent past, Asian stock markets have been increasingly integrated and experienced greater capital mobility in the region. The COVID-19 crisis has negatively impacted the performance of the sovereign bonds yields and reduced stock markets connectivity (Wu et al., 2019).

The green finance acts as an insurance against shocks like the global financial crisis or the COVID-19 crisis and generates stronger distress resilience during market crisis like the COVID-19 (OECD, 2020). Green bonds are novel green finance instrument and comprise of climate bonds, water bonds, and blue bonds (Asseline & Hiller, 2021). Green bonds generate positive outcomes and magnetize investors from global capital markets (OECD, 2015). The issuance of the green bonds improves the financial outcomes, environmental indicators, green credentials, stock liquidity, and sustainable business practices (Flammer, 2021; Tang & Zhang, 2020). Green bonds bring high returns compared to conventional bonds (Zerbib, 2019), while Flammer (2021) found no premium on green bonds.

The green bonds facilitate sovereign and corporate borrowers to magnetize new investors in long-term projects with greater local rights (Tang & Zhang, 2020). More investors increasingly showed curiosity in sustainable investments. Lower cost of capital influences sustainability outcomes significantly in the green bond market compared to conventional bonds due to better environment pledge (Zerbib, 2019). The demand for green bonds exceeds supply, which also influence their return (CBI, 2019b). The green bonds funded projects generate greater yields to shareholders due to lower financing costs and stronger linkage to the SDGs (Alonso-Conde & Rojo-Suárez, 2020). Green finance can encourage greater innovation in green technology (Lee et al., 2021) and firm's research and development capacity (Zhou & Cui, 2019).

The Environmental, Social and Governance (ESG) concerns increase the stocks of green investors (Beirne et al., 2020). The green bonds significantly influence economic growth, benefit both issuers and investors, and permit investors to diversify their investments to green projects (Alonso-Conde & Rojo-Suarez, 2020). Gilchrist et al. (2021) examined the drivers of green bond market growth. A premium is attached to green bonds, which depends on the bond rating (Hachenberg & Schiereck, 2018). Green bond pricing and green bond premiums have been investigated widely (Liaw, 2020). Greenwashing remains another issue (Bachelet et al., 2019), which occurs when the declared climate goals are not achieved or transition pathways are not followed. Greenwashing can generate uncertainty regarding the reliability of green bonds if green bonds targets non-approved activities and proceeds used for such activities and lacked additionality towards approved activities (Ehlers et al., 2020).

Despite marvelous performance, the green bond market remained small (Liaw, 2020). The COVID-19 crisis has adversely affected development of the green bond market (Anh Tu et al., 2020) due to substantial distress, lower return, and irregular instability and spillover effects (Park et al., 2020). The review of the extant literature makes it evident that the studies on the impact of the COVID-19 crisis on the green bond market and its role in post-COVID-19 debt sustainability and inclusive and sustainable recovery are scant. Therefore, the present study is an attempt to analyze the role of the green bonds in addressing debt sustainability and future recovery.

3. Recent development in green bonds markets

Broadly, there are two types of climate-related risks, first the physical risks and second the transition risks. The former covers severe risks arising from climate vulnerability and persistent risks from climate variability, which influence asset price stability and the rewards linked to risks. Meanwhile the latter covers regulatory and permissible

risks associated with innovative annihilation in green knowledge, market risk, and reputational risk. The climate-linked risks can be alleviated and protected by green investments using green finance. Subsequently, green bonds found its place in Islamic finance (Stoian & Iorgulescu, 2019). Despite falling debt markets in 2018 (Robins, 2019), the green bonds displayed significant resilience, which followed the launch of biggest green bond fund for emerging economies.

The green finance aims to meet the SDGs, alleviate sustainability risks, and acquire high resilience to shocks through climate-compatible green investments. Since the first issuance of the green bonds in 2007, the green bonds experienced substantial increase and surged from $4.8 billion in 2013 to $142 billion in 2017 (CBI, 2018a). In 2018, the ESG investments in the United States (US) surged by 38% in 2018 from 2016, which stood at 26% of total specialist managed assets. Globally, $31 trillion of assets were managed sustainably in 2018, up by more than one-third from 2016 (Landberg et al., 2019). About $68 trillion investment is likely to be made in social responsibility in the next decade, which can be attached to personal values of the majority of the stakeholders linked to ESG investments (Briere & Ramelli, 2020). Long-term investors and institutional investors are more attracted to the GBs due to higher environment and social (E&S) outcomes (Flammer, 2021).

A Green Bond Standard (GBS) and the Sustainable Finance Taxonomy were aimed to identify the environmentally sustainable economic activities (EC, 2019). The creative chaos has been experienced in the sustainable debt market due to contentious bond issues by some energy firms. The sovereign participation in green bonds markets has also surged (ADB, 2021a). However, the COVID-19 crisis adversely impacted green bond market, despite record issues of the sovereign bonds. The optimism in the green bonds markets was expected to return due to the COP26 climate change summit and the green bonds surpassed vanilla bonds issued to retort the health crisis.

Despite persisting dominance of developed economies in green finance, the Asian countries have turned out to be nucleus of green bond markets. The first Malaysian green *sukuks* (Islamic bonds) was launched in 2017 to finance green projects, which surged five-times to achieve $4 billion in 2019 due to tax benefits and subsidies linked to issuance of the green bonds (Azhgaliyeva, 2021). Asia has also pioneered in green finance regulations and policy support, which is evident from robust membership of the Sustainable Banking Network, and the Network of Central Banks and Supervisors for Greening the Financial System and support to the SDGs (Volz, 2018). The development of the green bond market in the ASEAN region is regulated by the Roadmap for the ASEAN Capital Markets Forum. These policy developments are coherent to achieve green and inclusive recovery during post-COVID-19 period through development of green bond markets. The green bond market remained strong during the COVID-19 pandemic. In 2020, $280 billion of the green bonds have been issued, which led to reach cumulative issuance of $1 trillion of the green bonds since 2007 mainly confined to energy, building, and transport sectors. The green bonds issuance achieved annual addition of $350 billion in 2021 (CBI, 2021a).

3.1 *Development of green bond markets in European Union countries*

In 2016, Luxembourg established the first Luxembourg Green Exchange (LGX) under the Luxembourg Stock Exchange to facilitate green bond market players to raise sustainable finance. Luxembourg issued €63 billion of green bonds in inception year. In 2020, Luxembourg also unveils a sustainability bond framework which line up with the EU Green Bond Principles (GBP) and Green, Social and Sustainable Bonds Principles (GSSB) of the International Capital Markets Association (ICMA). In 2020, Luxembourg issued the first sustainability bond of €1.5 billion. LGX covers about 135 issuers of securities in 33 currencies. In 2020, LGX holds about 890 green, social, and sustainability securities worth above $475 billion (Luxembourg Stock Exchange, 2020).

In the EU countries, the sovereign green bonds received significant attention of the government for the sustainability initiatives. Poland issued the first sovereign green bonds of €750 million in late 2016 to fund green projects. This was followed issuance of French sovereign green bonds of €7 billion in early 2017 with significant over-subscription and drawn additional €1.6 billion in mid-2017. In 2020, Germany launched sovereign green bonds of €6.5 billion with substantially high over-subscription. In late 2020, Sweden launched its first sovereign green bond worth SEK20 billion. Sovereign green bonds issued by 24 European governments stood at $111 billion up to early 2021 (CBI, 2021a). Thus, sovereign green bonds attracted increasing attention in the European countries to finance the climate-compatible green projects. The green municipal bonds also attracted the attention in European countries to finance sustainable and climate-compatible green infrastructure projects. Green municipal bonds were also issued by local governments to fund environmental projects in the EU countries. The City of Gothenburg launched the first green

municipal bond in 2013.

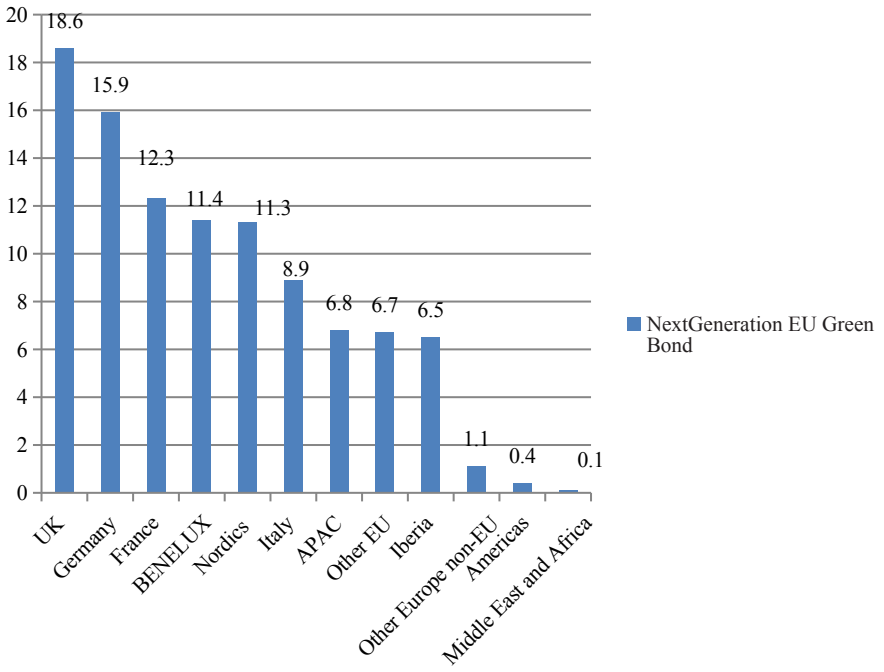

Figure 1. Geographic Location of NextGeneration EU Green Bond

Source: Author's creation based on data accessed from https://ec.europa.eu/commission/presscorner/detail/en/ip_23_1926

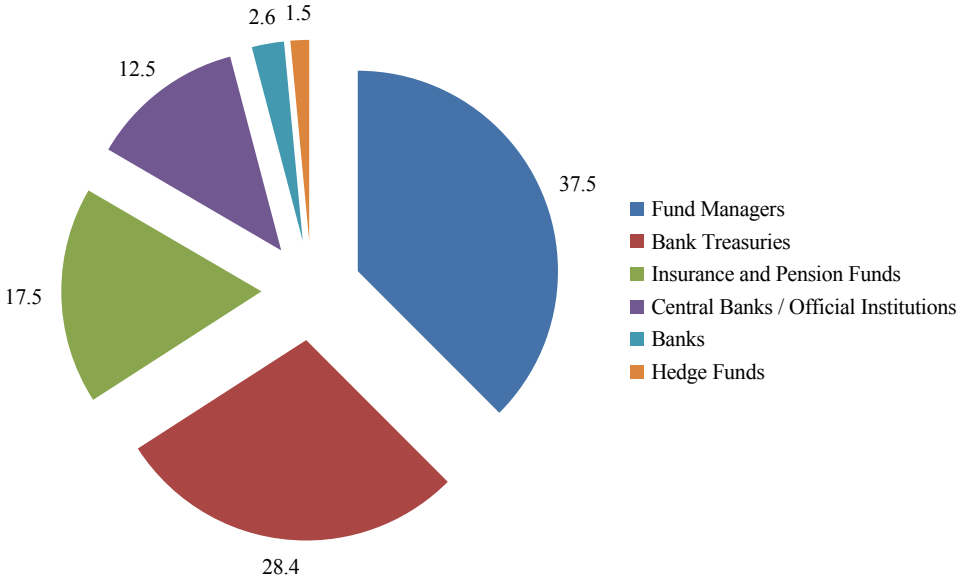

Figure 2. NextGeneration EU Green Bond by Investor's Type

Source: Author's creation based on data accessed from https://ec.europa.eu/commission/presscorner/detail/en/ip_23_1926

Germany and France issued the green bonds respectively about $40 billion and $32 billion in 2020. Europe remained the leader in issuance of the green bonds in 2020 with a global share of 55% due to 63% of the green bonds issued by non-financial firms and government-backed agencies (CBI, 2021a). The COVID-19 crisis induced the European governments to launch innovative bonds such as social and sustainability bonds to meet large public finances for pandemic and post-pandemic recovery actions. The financial institutions used the green bond markets to augment finance for the green projects and hold significant potential to contribute additional $1 trillion and $1.7 trillion respectively by 2025 and 2035 (CBI, 2021a). Non-financial firms have also raised the green bonds to attract new investors to finance their businesses. Recently, Apple and Google issued bonds of $2.2 billion and $5.75 billion respectively with substantial over-subscription to finance lower carbon emissions activities and renewable energy, energy efficiency, and green projects.

During the first half of 2023, the European Commission targets to raise €80 billion investment finance, of which €39.4 billion were issued till March 2023, with significant contribution of the NextGeneration EU green bonds worth €6 billion issued on March 28 2023 (EC, 2023). The issuance of the NextGeneration EU green bonds received overwhelming response from the investors in green projects and Europe's economic revival from the COVID-19 crisis. Figure 1 demonstrates the geographical distribution of the NextGeneration EU green bond and Figure 2 depicts and the NextGeneration EU green bond by type of investors.

The green bond markets in the European countries attracted institutional investors such as pension funds, investment funds, banks, and insurance firms. The green bond markets' investors consist of both local and international investors. Local investors mainly transact in domestic currency, motivate new investors and develop buoyancy in the domestic market. International investors such as sovereign funds and development banks encourage investors to enter into emerging and developing bond markets. The public entities such as policy makers and financial regulators develop the standards and guideline for the green bonds and perform the key roles in developing the green bond markets in the European countries.

3.2 *Development of green bond markets in ASEAN countries*

Despite the COVID-19 pandemic, ASEAN's sustainable finance market performed significantly in 2020. ASEAN countries issued $12.1 billion of sustainable bonds in 2020 compared to $11.5 billion in 2019 and experienced a growth 5.2%. The green bonds are vital financial instrument in ASEAN countries to raise finances to achieve green and sustainable recovery. The green bonds issuance in ASEAN region surged from $8.8 billion in 2019 to $9.3 billion in 2020 (CBI, 2021b). Figure 3 reveals the size of green bonds market and their issuance in selected ASEAN countries in 2022, while the Figure 4 demonstrates the share of green bonds issuance to total bonds issuance in the ASEAN countries in 2022, whereas Figure 5 displays the average and medium size of green bonds issuance in ASEAN countries in 2022. Figure 6 shows number of green bonds issuers, issuance, instruments, and currencies in the ASEAN countries in 2022, and Figure 7 displays the number of green bonds issuance during 2016-2022 in the ASEAN countries. The issuance of the green bonds has been quite slower but remained positive despite declining trend in the global market in 2020. This reveals a surge in interest from green investors in ASEAN region.

Singapore performed significantly in issuance of the green bonds with regional share of 53% in 2020, followed by Indonesia with a share of 24% mainly due to issuance of its third sovereign green *sukuk*. The share of the Philippines in issuance of the green bonds declined significantly to 9%, while Thailand's share stood at 8% in ASEAN region. Viet Nam issued two green loans worth $257 million with regional share of 3% in 2020 and Malaysia's share was similar to Viet Nam. Indonesia issued the green bonds worth $5 billion, followed by the Philippines ($2.9 billion and Singapore ($2.3 billion) (CBI, 2021b).

In ASEAN region, about 79% of the green bonds have been issued to buildings and energy sectors. Since 2016, 36% of green building projects in the ASEAN region have been developed to finance through green bonds (ACMF, 2018) while Filkova et al. (2018) estimated it at 44%. Both these estimates are considerably higher than the global average of 18% (see Figure 8). The ASEAN countries should further increase investment in green buildings. The development of green buildings can potentially save substantial energy. In the ASEAN member countries, green bonds issuance to finance green buildings is expected to surge (CBI, 2018b). The intended principles for green bonds issuance have been highly lucid to finance green building projects, which can achieve energy efficiency (ICMA, 2018). Green bonds should be leveraged to finance construction of green buildings in ASEAN countries, which can generate

considerable environmental gains.

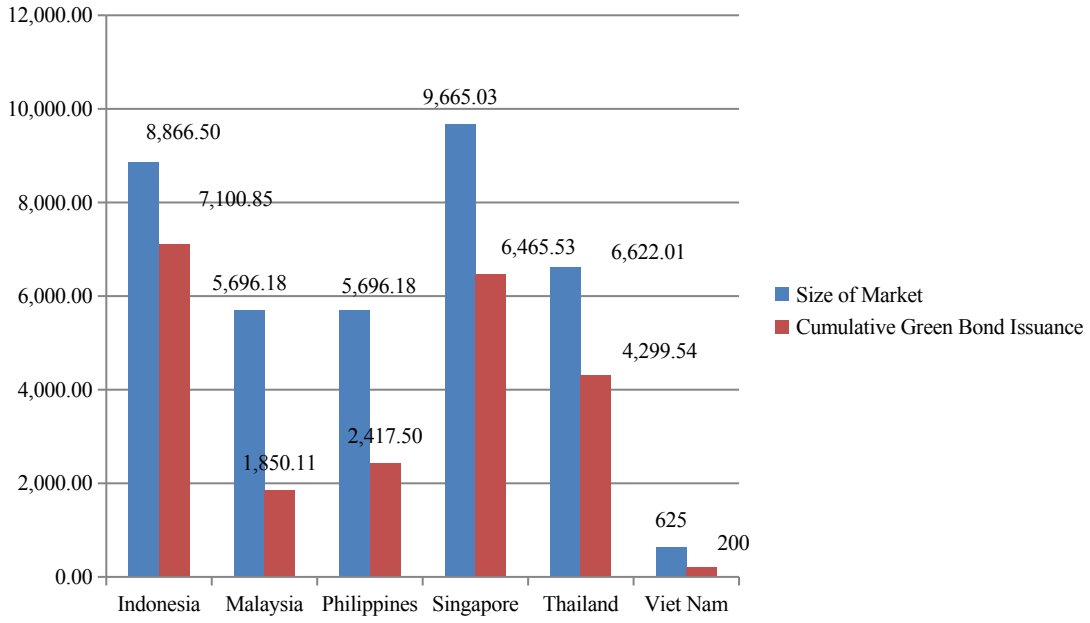

Figure 3. Size of Green Bonds Market and Issuance in Selected ASEAN countries, 2022
Source: Author's creation using AsianBondsOnline computations based on Bloomberg LP data

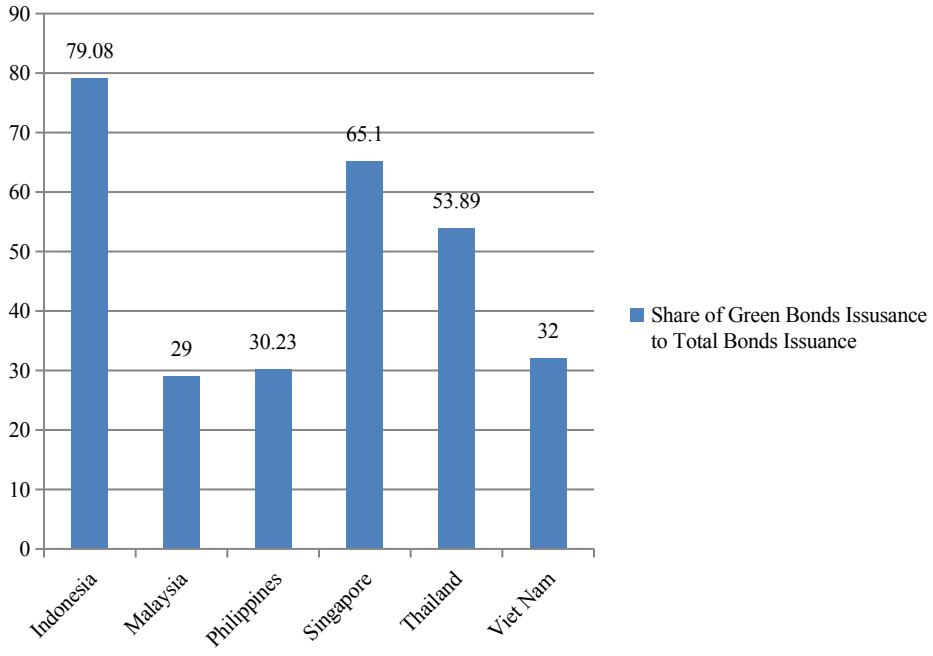

Figure 4. Share of Green Bonds Issuance to Total Bonds Issuance in ASEAN countries, 2022
Source: Author's creation using AsianBondsOnline computations based on Bloomberg LP data

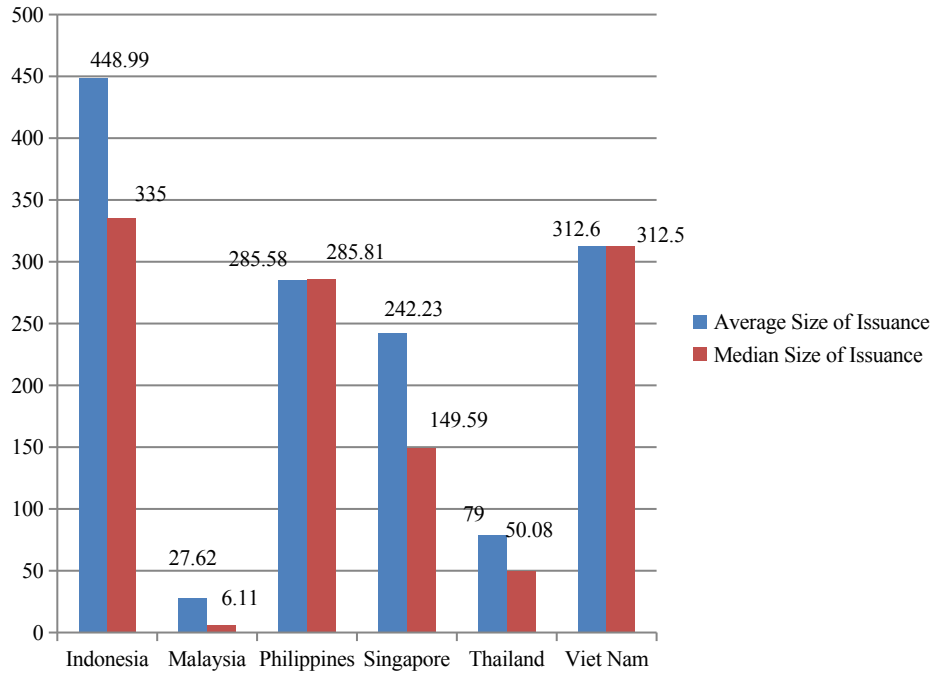

Figure 5. Average and Medium Size of Green Bonds Issuance in ASEAN countries, 2022
Source: Author's creation using AsianBondsOnline computations based on Bloomberg LP data

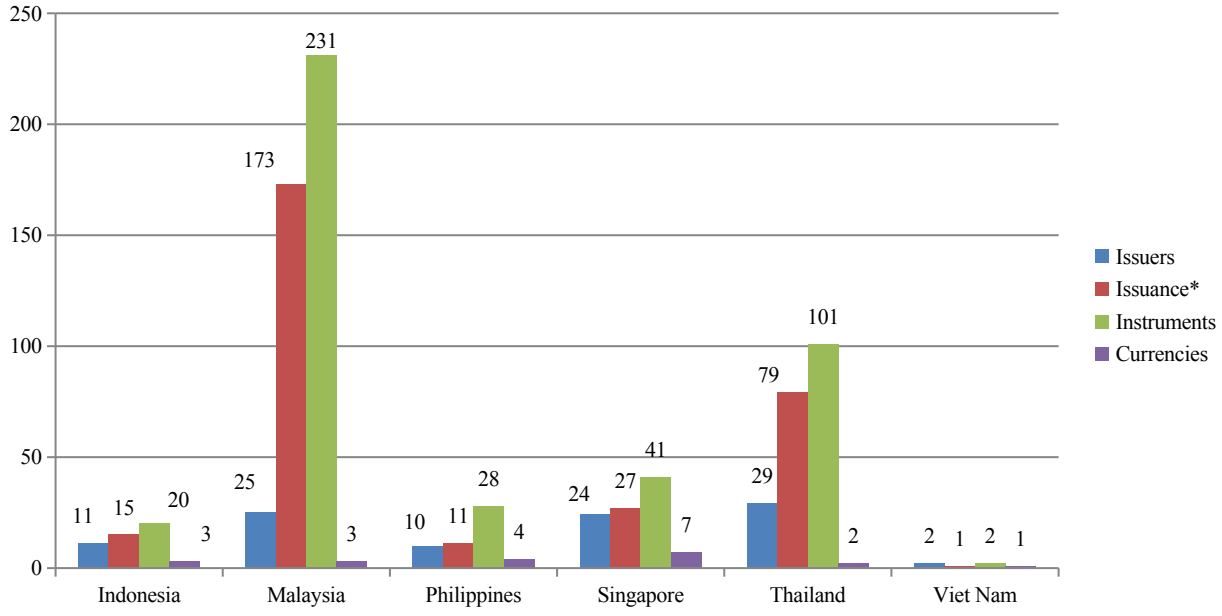

Figure 6. Green Bonds Issuers, Issuance, Instruments, and Currencies in ASEAN countries, 2022 (Numbers)
Source: Author's creation using AsianBondsOnline computations based on Bloomberg LP data
Note: *2016 to June 2022

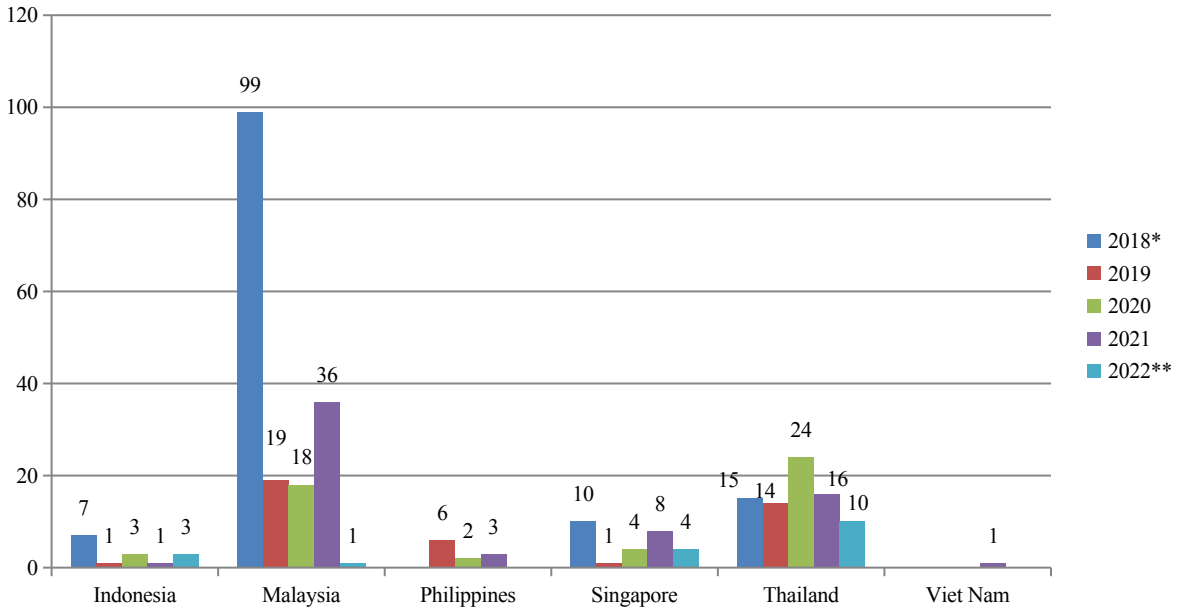

Figure 7. Green Bonds Issuance in selected ASEAN Countries, 2016-2022 (Numbers)
Source: Author's creation using AsianBondsOnline computations based on Bloomberg LP data
Note: *2016- 2018, and **January to June 2022

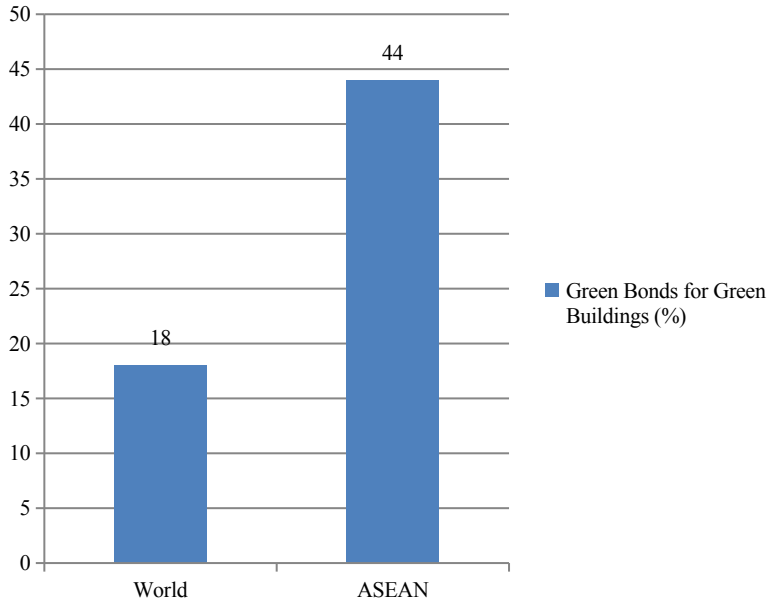

Figure 8. Application of Green Bonds for Green Buildings in the World and ASEAN, 2022 (%)
Source: Author's creation based on Filkova et al. (2018)

Greater issuance of green bonds in the ASEAN region can be attributed to energy efficient building design due to the equatorial climatic conditions (Shi & Zhang, 2011) and the need for climate-compatible built environment (Wan et al., 2011). However, green bonds financing for green building faced major barriers such as inadequate incentives and benefits (Deng & Wu, 2014) to developers than owners of green buildings. There is uncertain savings to the owners (IFC,

2019), which results in their unwillingness to use highly energy-efficient equipments (ACE, 2019). All these issues led to slower switching to green building projects. Despite these barriers, green bonds financing for green buildings is expected to surge considerably in the ASEAN countries such as Malaysia and Singapore (see Figure 9).

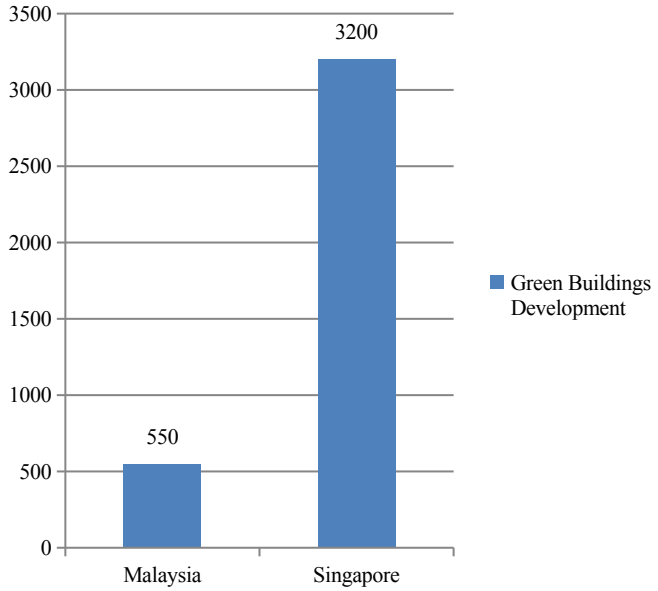

Figure 9. Green Buildings Development in Malaysia and Singapore, 2020 (Numbers)
Source: Author's creation based on data from Government Agencies

The adaptation of green building goals has led Malaysia and Singapore to realize greater energy efficiency in building sector. Malaysia has instituted tax benefits for the Green Building Index rated buildings, which led to environmental sustainability of building sector (Aliagha et al., 2013). Singapore developed the Green Mark program in tune with global green buildings to achieve greater energy efficiency. Green buildings are highly capital-intensive and green bond financing causes slower returns (Yang et al., 2020), which may increase investment risks. Long-term maturity makes green bonds risky for financing green building projects (ADB, 2018). Funders are hesitant to finance green buildings due to inadequate technical capacity in energy efficiency (Woodroof, 2009). Therefore, green bonds are highly suitable to tap long-run domestic and institutional sources to finance green building projects.

Green bonds provide alternative finance to green energy projects. Still, green bonds markets confront significant challenges to realize its full capacity. The developers of green building projects lack technical skills to tap the potential of green bonds markets due to inadequate policy structure. There is need to institute robust policy framework for comparatively developed green bond markets to finance green buildings. The challenge of information asymmetry and costs of green bond issuance acts as a major hindrance to participate green bond markets (Ehlers & Packer, 2017), which entail establishment of robust green bonds standards. ASEAN's green bond investors receive inadequate returns from financing green buildings projects compared to investment by holders of the conventional bonds. Therefore, there is need to establish measures for greater financial incentives from investment in green bond market (Hyun et al., 2020). Green bond markets also confront the challenge of substantial transaction costs (Banga, 2019), which should be addressed by developing stronger regulations and building the technical capacity of all the relevant stakeholders.

The share of energy and transport sectors in use of green bonds stood respectively at 30% and 6%. The climate-compatible projects received 3% of cumulative green bonds' share in ASEAN region compared to about 0.6% of the global average, whereas the industry and information and communication technology sectors received modest share (ACMF, 2018). There has been significant variation in allocation of share of the green bonds by sector and country. Singapore dominates in buildings, while energy received largest allocation of the green bonds in Vietnam, Indonesia,

Malaysia and the Philippines and Thailand attracted equally in energy and transport sectors. The government-backed organizations paid more attention to buildings. The development banks and the sovereign bonds allocated equally to different sectors, while private entities and non-financial corporate firms allocated more green bonds for energy sector, and the financial firms allocated funds to mix-projects.

Since 2016, ASEAN region had a total of 75 issuers with 44 green bonds issuers till late 2020. Indonesia issued its third green Sukuk in local currency. Most of the debut issuers were based in Singapore, who issued 34 new green bonds and loans in 2020. The non-financial firms, financial firms and government-backed organizations issued 13 new bonds in ASEAN region. The private sector dominated the green bond market in ASEAN region with high share of 73% in 2020. The non-financial firms issued 67% of total green bonds in 2020. The financial firms experienced significant decline in the green bonds issuance, which stood at $295.1 million in 2020 from $1.1 billion in 2019 (CBI, 2021b).

3.3 *Development of green bond markets in South Asian countries*

South Asia needs substantial investment of US$2.6 trillion to achieve clean energy targets (USAID, 2022). For instance, India, the largest economy in South Asia region, requires US$363 billion up to 2030 to achieve the capacity targets envisaged for the deployment of renewable energy. The goals of energy efficiency and e-transportation require investment of US$10-35 billion and US$266 billion respectively up to 2023. Bangladesh needs US$34 billion of investment in gas generation till 2040, while Nepal entails investment of US$43 billion to reach net-zero carbon economy by 2030 (World Bank, 2023). However, the traditional financial sources are inadequate to meet these investment requirements. In this context, novel financing is essential to supplement inadequate traditional financing sources. For instance, India's power sector owes US$168 billion to banking and financial institutions, while Nepal's power sector investment stood at US$2 billion, and Bangladesh's investment in installed energy generation stood at US$15 billion in 2022 (USAID, 2022). Not only this, the investment needs of South Asian energy sector have been estimated at multiple-times higher than cumulative investment of last three decades.

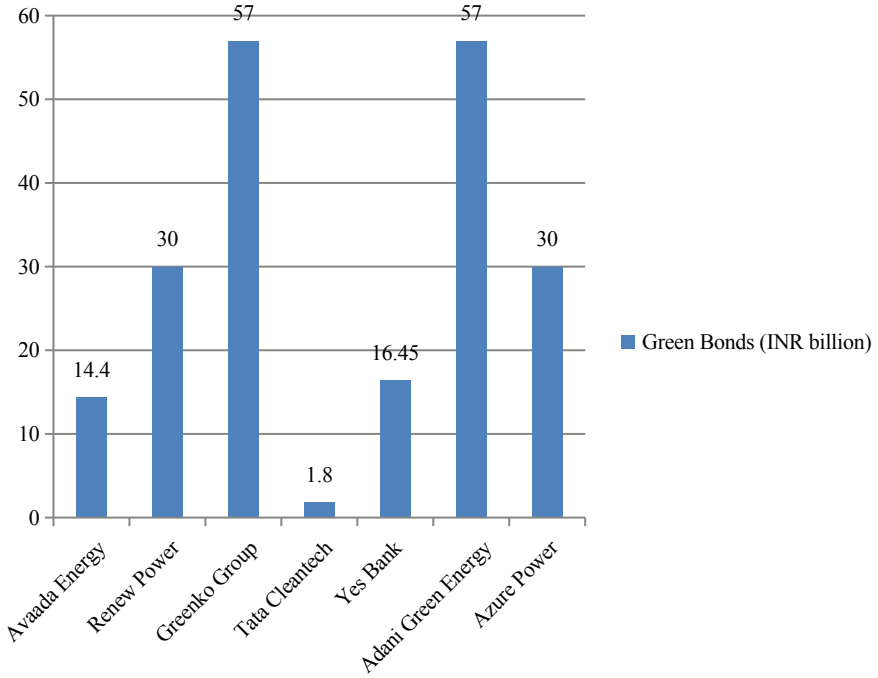

Figure 10. Green Bond Issuances by Major Renewable Energy Developers in India
Source: Author's creation based on data from USAID (2022)

In South Asia, India becomes the first nation to issue green bonds for financing renewable energy projects and reaching the targets of the Paris Agreement. India targets to achieve net-zero emissions by 2070. India provided novel policy initiative towards green growth to be achieved through sustainable financing. In early 2023, India issued the first green bond worth US$2 billion in clean energy projects with a goal to achieve net-zero carbon emissions (World Bank, 2023). India needs substantial green finance to achieve SDGs and to fill the investment gap to achieve net-zero emissions goals by 2070 and address climate crisis. The issuance of sovereign green bonds is expected to magnetize the private players and the other Indian states to issue local green bonds.

India's march towards green bonds issuance has been magnetized by development of new renewable energy projects worth 450 gigawatts till 2030 with a total financing of US$2 billion and issued US$1 billion in early 2023 (S&P Global Ratings, 2023). In India, more than 70% of green bonds have been raised at low cost from global markets by the developers of renewable energy projects (see Figure 10). The bond coupon rates ranges from 4.5% to 6.5%. In the last about two years, more than 80% of green bonds proceeds were directed to refinance debt of ongoing projects. Greenko group issued more than US$1 billion worth of green bonds in the last two years. Maharashtra state aims to issue green bonds worth US$650 million by 2024 to achieve sustainable energy transition and climate resilience, besides other targets (USAID, 2022). In brief, India's green bond framework targets to foster new investments in energy efficient projects, and climate resilience and natural resource management projects.

4. Policies used to develop green bond markets

The regulators of the green bond market can use different policies to support the development of the green bond market such as provisioning infrastructure, assisting issuance of green bond, expanding new products, and encouraging investment. Broadly, the EU region focused on sustainable finance strategy and establishment of the green exchange, while in the ASEAN region, green standards and use of proceeds have been defined, besides reporting and disclosure strategy for lucid functioning of green bond market. The pertinent operational policies in selected EU economies and the ASEAN countries are briefly discussed in the following paragraphs.

4.1 *Policies used to develop green bond markets in European Union countries*

Recently the EU's GBS has been established to regulate the green bond markets in Europe. The EU Taxonomy on Sustainable Finance advocated a uniform standard for governance of green bond markets in the EU, which led to develop a guide for EU's GBS in early 2020. A Network for Greening the Financial System was established to share the best practices to administer risks and raise finance for climate-compatible green projects. It was termed as a key step to guide the green bond markets in the EU countries. Efforts to institute sustainable finance regulatory guidance to tap sustainable investment have also been initiated (EU, 2022).

In the EU region, Luxembourg launched the LGX to promote green bond market, besides pioneering the Sovereign Sustainability Bond framework and issuance of its first Sovereign Sustainability Bond issued late 2020 and developing an integrated climate finance strategy to bolster sustainable finance market (UNCC, 2022). Germany issued sovereign green bond and developed the Green Federal Securities Framework, besides endorsed sustainability risk framework to alleviate a steady green bond market. In Germany, capital markets consist of financial instruments market and grey capital market. The Federal Financial Supervisory Authority (BaFin) regulates issuance of financial instruments and local trade boards administer the grey capital market. Bundesbank supervise the operational tasks, while BaFin control the transaction of financial instruments. A Sustainable Finance Strategy was developed in 2020 to regulate green or sustainable federal securities. A Core Green Bond Team has been established to supervise operational tasks of green German federal securities. Like Luxembourg, green bond market development is integrated into the Sustainable Finance Strategy. The KfW Bankengruppe facilitates the issuers and investors in the green bond market since 2014. In 2020, Germany entered the green bond market by issuing the first sovereign bonds (OECD, 2023).

4.2 *Policies used to develop green bond markets in ASEAN countries*

In late 2017, the ASEAN's GBS were established in line with the ICMA's GBP. The ASEAN GBS aims to foster

standardized regulation for issuance of the green bonds in ASEAN and embraces the additional features to the GBP such as geographical or economic linkage of the issuers of the green bonds to the ASEAN region, exclusion of fossil fuel projects to shun greenwashing, disclosure of information on various aspects such as project process, use of proceeds and its management, periodic reporting, and voluntary external review. Besides the GBP, the Climate Bonds Initiative instituted the Climate Bond Standards aligned to the Paris Climate Agreement, which is compatible with the standards of the ASEAN region (CBI, 2019c).

Malaysia established the guidelines and standards for issuance of the green bonds, promoted Sukuk Bond Grant Scheme under Sustainable and Responsible Investment (SRI) Sukuk framework, supported the long-run growth of green bond market under SRI roadmap, and developed a scheme of a local verifier (ADB, 2022a). The Philippines also set up the guidelines and standards for issuance of the green bond and innovative green instruments (ADB, 2022b). Singapore established the Green Bond Grant Scheme and Sustainable Bond Grant Scheme along with guidelines on Responsible Financing and Network for Greening the Financial System (Chang, 2019). Similarly, Thailand also developed strong Guidelines for Green, Social, and Sustainability Bond and Sovereign Sustainable Financing Framework, established the waivers for approval and filing of fees and bond registration fees. Like Singapore, Thailand developed a Green, Social and Sustainability Bond and a Sustainable Finance Policy Framework, and encouraged the ESG integration criteria into disclosure and management practices along with instituting a system of local verifiers (ADB, 2022c).

In ASEAN region, the Second Party Opinion (SPO) remained the most popular external review. However, SPO's popularity declined from 41% of the green bonds issuance in 2019 to 33% in 2020. Indonesia, Philippines and Malaysia dominate in this type of external review. After a gap of two years, the assurance system returned in the ASEAN region in 2020. The certification has dropped from 7 transactions in 2019 to 5 transactions in 2020. A total of $600 million of ASEAN Certified Climate Bonds were issued in buildings, energy, transport and land use (CBI, 2021b).

4.3 *Policies used to develop green bond markets in South Asian countries*

In South Asia, the traditional financing faced the barriers of long-term investment and slower returns, heavy security deposits, higher cost, greater reliance on grants, and heavy transaction costs. At the same time, the global investors envisaged South Asia as a lucrative destination for green energy investments due to compatible policy and institutional environment (see Table 1).

Robust policies and regulations have been developed and implemented in the EU and ASEAN regions, whereas the development of green bond markets in South Asian countries have been facing numerous barriers, which include issues linked to trade, policy, regulation, fund, and finance. The product reliability is a basic challenge in green bond market development due to self-regulation except India. South Asian countries lack of a common international standard and absence of robust enforcement mechanisms. All this generates reputational and legal threats and diversion of green bonds to suspicious projects, which can weaken the product integrity and lower the investors' confidence. Lack of transparency in information sharing also mars green bond veracity. The low costs of the green bonds facilitate investment in climate-compatible green projects, which are not financed by vanilla bonds. However, green bonds involve additional transaction costs, which jeopardize product integrity. Lack of robust ESG data and strong credit rating also acts as a substantial barrier to green investment. Green bonds development also faced the challenge of globalized market and increasing access to local market.

Table 1. Policy and Institutional Status of Green Bonds Issuance in South Asia

Status	India	Nepal	Bangladesh	Sri Lanka	Bhutan
Policy statement	Yes	Yes	Yes	Yes	Yes
Government initiatives	Yes	Yes	Yes	Yes	Yes
Budget statement	Yes	Yes	Yes	Yes	Yes
Green Bond awareness	Yes	Yes	Yes	Yes	Yes
Green Bond domestic framework	Yes	No	Yes	Yes	No
Sovereign Green Bond framework	Yes	No	No	No	No
Availability of bankable projects	Yes	No	No	No	Yes
Third party support for Green finance*	Yes	Yes	Yes	Yes	Yes
Experience in Green Bond issuance	Yes	No	Yes	Yes	No
Experience in Energy Bond issuance	Yes	Yes	Yes	Yes	No
Experience in Sovereign Green Bond issuance	No	No	No	No	No

Source: Author's compilation from country's sources
Note: *UN/IFC/USAID/Global agency

5. Opportunities and challenges in South Asia

In 2023-2024 Union Budget of the Government of India, a significant shift towards green growth and green financing was made. The green growth and sustainability linked debt instrument was envisaged with a goal to raise $44 billion per annum of finance to reach the SDGs by 2030 and $3 trillion to meet additional financing to achieve net-zero emission target. Other South Asian countries have still not made any significant strides in this direction (ET, 2023).

Robust quantification and governance of green finance is vital for effective allocation of funds and optimal returns. The universal standards and approaches are essential for efficient measurement of the impacts of green finance to bolster the trust of all stakeholders and effective allocation of finances. The application of new technology, strong regulation, mandated disclosure of data, and transparency are necessary for effective impact assessment and promotion of sustainable finance markets at national and regional levels. The multilateral development banks (MDBs) have significant role to promote green finance in developing countries by facilitating public finances to magnetize larger private capital in joint green projects.

MDBs such as the EIB, the World Bank, the International Finance Corporation, the Asian Development Bank, the African Development Bank, the Development Bank of Latin America, Asian Infrastructure Investment Bank, and the Council of Europe Development Bank conform to ICMA Principles and Guidelines to develop green bonds markets. The EIB and World Bank were the pioneers in green bonds issuance up to 2012. Since the upsurge of the COVID-19 crisis, there has been rapid growth in issuance of the sustainability bonds by the MDBs like the World Bank and the Asian Infrastructure Investment Bank (CBI, 2021c). The Asian Development Bank offers technical support via the ASEAN's Catalytic Green Finance Facility for development of green bond markets specifically to Thailand. Similarly, the Inter-American Development Bank helped Chile to issue sovereign green bond. MDBs were the pioneer in green bonds issuance and fostering green bonds market by providing green bond policy frameworks. The green bonds developed by MDBs are mainly focusing on development of renewable energy deployment, improving energy efficiency, fostering green mobility, sustainable natural resource management, waste management and other green projects. The MDBs have

developed the mechanisms for the use-of-proceeds, standards and guidelines for green bonds issuance.

MDBs aim to address the international threats and steer the development action towards reaching the SDGs through cooperation and specific operations to generate substantial effect. The cooperation of development agencies and governments' propinquity help MDBs to immensely influence sound knowledge and skills to address global challenges. MDBs mainly cooperate to explore novel financial instruments and protect financial sustainability of individual government, long-term climate mitigation policies, and development collaboration, leverage private finance, and bolster joint-investment. MDBs can support private investors through novel financing arrangements and instruments to minimize the risks in green projects. MDBs can act as key investors by enhancing the funding ability and increasing the compliance to disclosure regulations for greater private participation in green investments. MDB can also improve the credibility of green investments by showcasing the best practices for future green projects. MDBs can leverage market infrastructure to increase green finance markets through robust impact disclosure and regulatory practices to develop the investors' trust in green projects. The policy support, capacity building, and data and information on best practices can bolster the green finance markets. The Asian Development Bank is pioneer in tapping private funds towards green projects through innovative methods and capacity building. The ASEAN Catalytic Green Finance Facility was launched in early 2019 to leverage public funds and magnetize private funds towards green investments. Examples of the ADB investments in green projects include the Cambodia Solar Park Project, and the Shandong Green Development Fund. The ADB has also supported the inaugural green, social, and sustainability bonds to recover from the COVID-19 pandemic.

However, South Asia confronts the main challenges linked to leverage green bonds markets, which include (i) inadequate knowledge and technical expertise among the relevant players, (ii) lack of uniform description, principles, and benchmark to describe clean projects, (iii) deficient capability of the financial institutions and developers for risk appraisal in green projects, (iv) scarcity of feasible clean projects to unlock green financing and restricting development of green bonds market, (v) trust deficit and doubt among investors regarding potential of green projects, (vi) scarce knowledge of pertinent players in allocation and observance of green bonds principles and standards, (vii) substantial non-payment rates in traditional financial sector, (viii) huge initial risks and large transaction costs, and (ix) inadequate climate data transparency.

In order to address the challenges of leveraging the green bonds for climate-compatible development projects and clean energy projects, the South Asian countries including India should embrace innovative policy initiatives. The achievement of India's sovereign green bonds should be leveraged to move towards sustainable finance pathways. This entails compatible-policies and institutions to surge local growth of green bonds. The insurance firms and pension organizations should be fostered to invest some proportion of accumulated funds in green bonds. The sovereign bond issuance should be a recurring phenomenon to encourage the private investors and other relevant public entities. India has to integrate sustainable projects to compatible global green bonds frameworks like the International Capital Market Association's and Climate Bonds Standards to foster international and domestic financers for increasing investment to achieve emission targets and sustainable employment generation. In India, the national development banks such as the National Bank for Financing Infrastructure and Development, the National Bank for Agriculture and Rural Development, the Small Industries Development Bank of India, the Export-Import Bank of India, and the National Housing Bank should be leveraged to foster private finance for climate projects due to their stronger technical expertise in domestic markets and green economy. The blended finance should be promoted to reduce investment risks. The technical expertise of public agencies, regulators and banks should be leveraged to lower information asymmetry regarding low-carbon investment. The technical knowledge of the relevant players should be fostered to embrace the government regulations and international standards.

6. Policy implications for South Asia

In developing countries including the South Asia, the green bonds have potential to finance environmental and climate projects offering greater energy efficiency compared to other financial instruments, which entails to address the extant challenges to leverage green bond markets. However, the South Asian investors lack expertise to generate a green bond market due to lack of green bond policy framework. The regional economies are deficient in required data and information of green bond issuance due to disparities in related environmental and climate standards.

Existing conventional bonds are more lucrative than the green bonds. However, emphasis on green energy transition, environmental sustainability and climate mitigation in South Asian countries can significantly pave the way to develop green bond markets, if compatible institutional frameworks are developed in the regional economies.

South Asian governments should execute strong sustainable project development policies to support the shelf of climate-compatible green projects and boost the development of green bond markets. The governments should implement policies, which support steady and controlled pricing for critical services to magnetize new investors in green bond markets. The government support should be extended to green bond issuance for green projects in recognized priority sectors. Most of the green projects require heavy investment in infrastructure involving high risk and heavy capital. Therefore, policies should focus on revenue certainty from the investment in green projects, which can also improve the value of green bond issuance and the appeal of green bond in capital market (OECD, 2015). The classifications of prioritized sectors that achieve the green principle attract the issuers and investors. It can also result in identifying the shelf of eligible green projects to finance by green bond market. Therefore, project developers should be given suitable incentives to raise capital to invest in green projects. A robust system of certification of climate-compatible green projects along with strong green bond framework should be established in South Asian countries to minimize the information asymmetric in green bond market. This can boost market creditability and faith in future investors. The regulators should promote development of green bond market over long-run. The external reviewers should be involved in scientific review of green bonds issuance.

The broad policy options can be delineated from the experiences of development of the green bond markets in the EU region and the ASEAN region to develop strong green bond markets in South Asia. The roadmap to promote the green bond markets in South Asia should focus on the following broad policy issues: primary policies, established instruments, and innovative products and new strategies (Deschryver and de Mariz, 2020). The primary policy options should focus on building and strengthening the infrastructure for development of the green bond markets. In this context, the policies should focus on developing a shelf of climate-compatible green projects to achieve inclusive and sustainable post-COVID-19 recovery and to meet the SDGs. The local bond markets should be bolstered to issue innovative green bonds and the tactical public green bonds to finance the post-COVID-19 recovery in South Asian countries. The compatible EU and ASEAN GBSs should be replicated with suitable modifications to develop the South Asian country-specific green and sustainable bond standards.

The established policies of the EU and ASEAN countries can be applied to leverage green bond market development in South Asian countries (Azhgaliyeva and Kapsalyamova, 2021). However, proper attention should be given to country-specific priorities and fiscal space to future green bond issuance in South Asia. The experiences of the EU and ASEAN countries reveal several remarkable practices for the development of the green bond markets, which can be replicated in South Asian region. In this context, the focus of the South Asian countries should be on public green bond investment in post-COVID-19 recovery. The targets should be to boost credit availability and finances for climate-compatible green projects aligning to inclusive and sustainable recovery. The private stakeholders should be given substantial tax benefits to leveraging their participation in development of new and innovative green bond instruments (OECD, 2015). The associated risks in investing in new bond issuance should also be supported by regulating agencies for greater private participation in development of green bond markets in South Asian countries. The novel schemes for strengthening the green bond markets should be explored and incentivized by the governments. All the precautionary measures should be explored to minimize the unplanned outcomes linked to issuance of innovative green instruments for which the role of public regulating entities is not over-emphasized. The central bank should regulate risk involved in green financing or preferred green investments in climate-compatible green projects.

The COVID-19 pandemic emphasized the significance for resilience to mitigate the impacts of the shocks and inclusive and sustainable recovery. This led to bolster the linkages between social and environmental aspects. The pandemic crisis affected the functioning of the capital markets to achieve social and environmental sustainability can calls for innovative financial products in the green bond market. Based on the experiences of robust development of the green bond markets in the EU and the ASEAN countries, the COVID-19 Recovery Green Bonds (CRGB) are required to be instituted in the South Asian countries to mitigate the pandemic impacts and inclusive and sustainable post-COVID-19 recovery (ADB, 2021b). CRGB should be instituted by the South Asian governments and MDBs such as the ADB to grant the risk assurance. CRGB should hold the identical degree of diligence to define the green bond to evade greenwashing. CRGB should center on stronger inclusive and sustainable recovery from the pandemic crisis. The main

characteristics of the CRGB can embrace a two-phase green bond process, first the zero coupon phase (ZCP), and the second steeped-up coupon stage (SCP). ZCP may cover the initial 5 years of repayments of CRGB and can be pegged at a zero percent coupon rate. ZCP should facilitate CRGB raised on concessional terms to finance the low yielding climate-compatible green projects up to initial 5 years to withstand the pandemic impacts. SCP should cover the extended repayment phase beyond 5 years and up to 15 years for green infrastructure projects. In SCP, the repayment of CRGB can be linked to a market return. The longer repayment period may be offered to ensure sufficient returns to investors and permit better liquidity for the CRGB.

Conflict of interest

The author declares no competing financial interest.

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