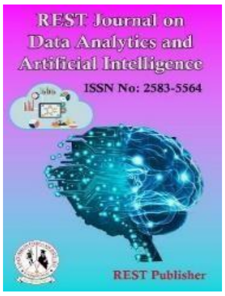
REST Journal on Data Analytics and Artificial Intelligence
Vol: 3(4), December 2024
REST Publisher; ISSN: 2583-5564
Website: http: //restpublisher.com/journals/jdaai/
DOI: https://doi.org/10.46632/jdaai/3/4/1



Green Bonds: A Financial Tool for Sustainable Development and Investment using EDAS method

*** Umme Hani**
College of Administrative and Financial Sciences, Saudi Electronic University, Saudi Arabia.
**Corresponding author: uhani@seu.edu.sa*

Abstract: *Introduction: Green bonds, a key innovation in sustainable finance, have gained prominence over the past decade by providing a mechanism for financing environmentally-friendly projects. Unlike conventional bonds, green bonds incorporate a "use of proceeds" clause, ensuring that funds are directed toward projects that contribute to sustainability goals. This paper examines different aspects of green bonds and other "labelled bonds," including social and sustainability bonds, and positions them within the context of sustainable business models, particularly Business Models for Sustainability (BMfS). Research significance: Green bonds, which include a "use of proceeds" clause, ensure that funds are allocated to environmentally sustainable projects. Despite the growing interest in green bonds, much of the existing literature has focused on financial metrics such as the "green bond premium" rather than exploring broader implications for sustainability. This research addresses that gap by developing a structural model for green bond pricing and proposing policies to enhance their market appeal. Alternative: EcoBond A, Green Future Bond B, Clean Energy Bond C, Sustainable Growth Bond D, Climate Action Bond E, Renewable Resources Bond F. Evaluation Preference: Interest Rate (%), Environmental Impact (1-10), Project Type Score (1-10), Credit Rating Score (1-10). The results indicate that Climate Action Bond E achieved the highest rank, while Green Future Bond B had the lowest rank being attained. Conclusion: "The value of the dataset for Climate Action Bond E, according to the EDAS method, Green Bonds and Sustainable Finance achieves the highest ranking."*

Key words: *Green Bonds, Sustainable Finance, Green Bond Subsidies, Refinancing Projects, Climate-Friendly Activities, Environmental Policy.*

1. INTRODUCTION

Green bonds are generally structured similarly to traditional investment-grade bonds, but they differ in one important respect: They contain a "use of proceeds" clause, which ensures that these funds are dedicated exclusively to environmentally sustainable initiatives. [1] This research makes several contributions to the existing body of literature on business models and social impact investments through an exploratory analysis of four Social Impact Bonds (SIBs). To the best of our knowledge, this is the first study to situate the SIB model within the conceptual framework of Business Models for Sustainability (Buffs), with a particular emphasis on sustainable financial business models. [2] A key characteristic of the global green bond market is its "supply-driven" nature, in which the issuance of green bonds is determined mainly by the availability of supply rather than demand. As demand in the market increases, the majority of green bonds are currently issued by companies, primarily motivated by their financial needs and sustainability goals. [3] Although empirical studies on green bonds exist, they primarily focus on assessing the "green bond premium" and its relationship to factors such as bond valuations, issue size, and issuer type (government or non-government). Green bond pricing is unclear. This research seeks to develop a structural model for green bonds, explain how their prices evolve, and propose policies that improve their attractiveness to market participants. [4] Funding for energy and emissions reduction projects is central. Securing sufficient capital from both private and public investors is essential for green initiatives. Since its inception in 2007, green bonds have offered investors a new means of financing sustainable investments, as well as supporting green technologies and environmental protection initiatives. [5] This paper provides practical policy recommendations for designing green bond subsidies based on insights from ASEAN countries. While such subsidies are useful in promoting green bonds, they do not necessarily ensure the achievement of Nationally Determined Contributions (INDCs). The review provides valuable guidance for policymakers seeking to implement policies that effectively promote green bonds. [7] To avoid confounding effects from corporate financing policies, our analysis focuses separately on green bonds not issued for refinancing purposes. Although the results for the full sample are mixed, we observe a more significant and pronounced reduction in emissions excluding green bonds used to refinance existing projects. This indicates an increase in climate-friendly activities spurred by new projects. Although we cannot determine causality because green bonds are a small part of firms' total lending and investment capacities, our findings suggest that green bonds serve as a strong indicator of firms' commitment to climate-related initiatives. Therefore, our evidence does not support the "green washing" argument. In addition, the strong emissions reductions found when refinancing bonds are excluded indicate “add-on,” meaning that green bonds finance new green investments. [8] This article does not address all the barriers to green bond market development in developing countries. As the market evolves, new challenges may arise, and the barriers identified in this paper may become less important. Furthermore, the dearth of academic literature on green bonds made it difficult for the author to ground the study in a strong theoretical framework. Nevertheless, this paper successfully attracts the attention of policy makers and investors in developing countries and lays the groundwork for future research in this area. [9] These findings are highly favorable to green bond issuers, even considering the additional costs associated with obtaining green certification. As a result, green bonds reduce the cost of debt financing for both issuers and society. [10] About two-thirds of green bonds are certified by independent third parties. In my analysis of green bonds by their certification status, I find that the stock market response is significant only for certified green bonds. This suggests that certification serves as an important governance mechanism in the green bond market. Additionally, I examine the impact of green bond issuance on long-term financial performance, focusing specifically on return on assets (ROA) and return on equity (ROE). [11] While some green bond issuers publish post-issuance reports detailing the returns and expected environmental impacts of their projects, each report provides only a limited view of how green bonds contribute to achieving environmental policy objectives. A comprehensive assessment of the impacts of green bonds would be valuable for determining their effectiveness in channeling financial resources toward climate and other sustainability goals. [12] Additionally, there is a strong focus on monetary and regulatory policy instruments to promote green credit. Green bonds and loans are already included in the PBOC's macro-prudential assessments, with the bank extending its medium-term credit facility to include these products. Also, green finance pilot zones have been created and banks in these areas are encouraged to offer green loans. This development will create opportunities for future green asset protection or green insurance schemes and enable capital recycling from these products to further expand the green finance market. [13] Incorporating environmental and social considerations into lending and product design is an important initial step in enabling financial systems to support the region's transition to a green economy. Financing areas such as energy efficiency, renewable energy, and sustainable infrastructure require the development of new concepts and financing instruments tailored to local needs. A comprehensive strategy to introduce green banks, green bonds and appropriate regulatory frameworks is essential. [14] Green bonds are fixed income bonds that have gained considerable popularity in recent years. Although their definitions vary, green bonds are generally considered debt instruments designed to finance green projects such as renewable energy infrastructure and energy efficiency initiatives. Asia and the Pacific regions are increasingly using this tool to link infrastructure projects with financing options. [15]

2. MATERIALS AND METHOD

A case study is conducted to provide key insights into the evaluation criteria and significant options for the S3PRLP. The results obtained from this method indicate that the K3 option would be the most suitable provider in this situation. Additionally, a comparative analysis with existing models is provided to validate the proposed approach. [1] This paper introduces a grayscale extension of the EDAS method that combines gray correlation numbers (GGNs) in kernel and grayscale formats. The structure of the paper is as follows: Section 2 provides an overview of basic concepts and methods, including GGNs, regret theory, and the EDAS method. In Section 3, a new approach for robust multi-attribute decision making (RMADM) using gray correlation numbers (GGNs) is introduced, combining regret theory with the EDAS method. Section 4 provides a numerical example to illustrate the effectiveness and applicability of this approach. [2] An innovative method called EDAS (Estimation Based on Distance from Average Solution) approach was introduced to the inventory classification process. The EDAS method is characterized by its simplicity and high efficiency, as only the calculation of the distance from the mean solution is required. Many researchers have investigated the EDAS method in various ambiguous situations. [3] This paper introduces a development of the EDAS method that incorporates interval gray numbers. With this proposed extension, the EDAS method can be used to address complex real-world decision-making challenges, especially those marked by significant uncertainty. As a result, it can be used in various fields for analysis, modeling and forecasting purposes. [4] The distance-based estimation from average solution (EDAS) method was first introduced by Ghorabaee et al. A new multi-attribute decision-making (MADM) approach designed for inventory ABC classification. This method is very useful in situations where there are conflicting parameters. The preferred alternative is recognized as having the most favorable distances and/or the least unfavorable distances from the mean solution. They later extended the EDAS method for supplier selection, while Pang and Liu developed an algorithm to solve single-valued neutrosophic smooth decision-making problems using the EDAS approach. [5] The EDAS system has been modified for supplier selection. However, there are no references in the existing academic literature regarding the MADM problem using the EDAS method. Consequently, using the EDAS approach in multi-attribute decision making (MADM) provides an interesting research opportunity to rank and determine the best alternative in a single-valued neutrosophic smooth environment. By conducting a comparative analysis of various methods, we make an objective assessment to select a method that demonstrates consistency in its results. [6] However, some methods require transformation of the intuitive fuzzy decision matrix, which may lead to loss of important information. Conversely, some methods focus on entropy measurement of parameters; however, these measures are not adapted to different contexts, suggesting the need to improve these formulas. To overcome this problem, we present new parametric difference measures to calculate criterion weights. [7] Next, the EDAS method is used to rank third-party logistics providers (3PLs). On the other hand, some methods emphasize entropy measurement of parameters; However, these measures are not adapted to different contexts, which indicates the need for improvements in these formulations. Its purpose is to evaluate the performance of third-party logistics (3PL) providers and determine the most suitable choice. [8] This situation may change if the criteria and sub-criteria used for evaluations are changed. The number of wind power plants and wind energy production in Turkey continues to increase. Among our evaluation criteria using the EDAS system, wind energy ranks second in terms of the installed capacity of the generating plant. However, expert opinions and data regarding solar and geothermal energy are inconsistent. [9] This current model can improve our analysis by exploring the use of new biomass materials and solving problems that have persisted for decades. The aim of this study was to elucidate the importance and implications of endogenous variables that may increase severity levels. This research establishes the model as a basic tool to advance to the next level, thereby facilitating a thorough analysis. [11]

3. ANALYSIS AND DISSECTION

TABLE 1. Green Bonds and Sustainable Finance

DATA SET				
	Interest Rate (%)	Environmental Impact (1-10)	Project Type Score (1-10)	Credit Rating Score (1-10)
EcoBond A	3.5	9	8	7
Green Future Bond B	4	8	7	8
Clean Energy Bond C	3.2	7	6	6
Sustainable Growth Bond D	4.3	6	5	9
Climate Action Bond E	3.7	8	9	5
Renewable Resources Bond F	4.1	7	8	6

EcoBond A offers a competitive interest rate of 3.5%, coupled with a strong environmental impact score of 9, indicating its significant contributions to ecological sustainability. Its project type score of 8 and a credit rating score of 7 suggest a well-rounded performance in both environmental goals and financial health. In contrast, Green Future Bond B features a higher interest rate of 4%, with an environmental impact score of 8. It excels in credit rating (8), suggesting a solid investment opportunity, although its project type score (7) is lower than EcoBond A. Clean Energy Bond C presents the lowest interest rate at 3.2%, with a moderate environmental impact score of 7 and a credit rating of 6, reflecting a more cautious investment. Sustainable Growth Bond D has the highest interest rate at 4.3% but a relatively low environmental impact score of 6 and a project type score of 5, indicating potential trade-offs between financial returns and sustainability. Climate Action Bond E offers a 3.7% interest rate, a high project type score of 9, but a lower credit rating of 5, which may raise concerns for potential investors. Lastly, Renewable Resources Bond F has a 4.1% interest rate, a solid environmental impact score of 7, and a project type score of 8, indicating a balanced approach to sustainability and financial performance.

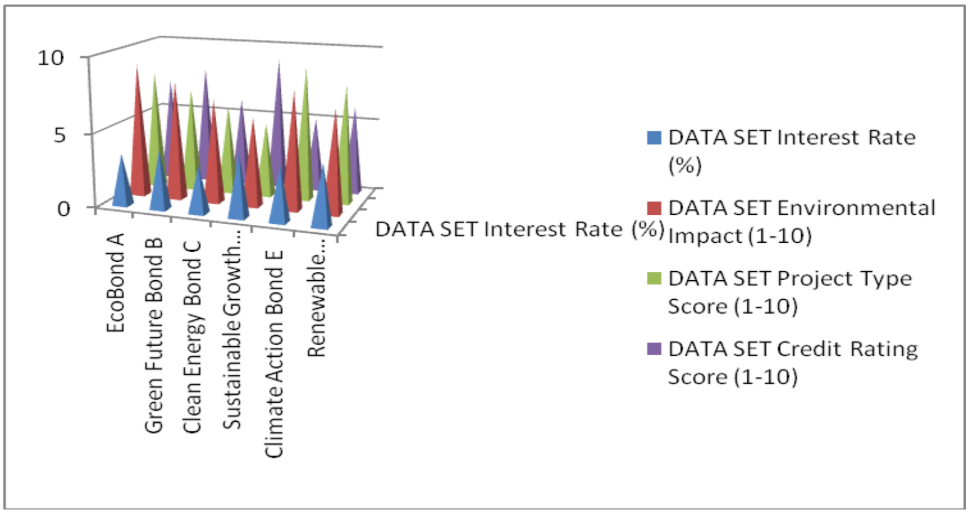


FIGURE 1. Green Bonds and Sustainable Finance

Interest Rate is represented in blue, and among the bonds, Sustainable Growth Bond D stands out with the highest interest rate at 4.3%, while Clean Energy Bond C has the lowest at 3.2%. Environmental Impact, shown in red, reveals that EcoBond A leads with a score of 9, indicating its significant positive effect on the environment. In contrast, Sustainable Growth Bond D receives the lowest score of 6, highlighting a potential trade-off with financial returns. The Project Type Score (green) and Credit Rating Score (purple) are also included, providing insights into the qualitative aspects of the bonds. Climate Action Bond E shows a high project type score of 9 but a lower credit rating score of 5, suggesting that while the bond might focus on ambitious projects, its financial reliability may be less certain. This multidimensional analysis illustrates the complexities of evaluating bonds for investment, balancing both financial performance and sustainability goals.

TABLE 2. Positive Distance from Average (PDA)

Positive Distance from Average (PDA)			
0.00	0.20	0.00	0.00
0.05	0.07	0.02	0.00
0.00	0.00	0.16	0.12
0.13	0.00	0.30	0.00
0.00	0.07	0.00	0.27
0.08	0.00	0.00	0.12

The first row shows predominantly low PDA values, suggesting that the item represented has minimal positive deviation from the average across the measured categories. This could imply a performance that aligns closely with typical expectations, lacking standout features. In the second row, a slight positive PDA in the second and third columns (0.05 and 0.02) indicates marginal improvements over the average, suggesting potential but not significant strengths in those areas. The third row exhibits a notable positive distance in the third column (0.16) and the fourth column (0.12), highlighting a stronger performance in these metrics, which could signify superior qualities or results. Row four stands out with a significant positive distance of 0.30 in the third column, indicating a remarkable advantage in that area. Conversely, rows five and six demonstrate mixed results, with some values indicating a positive distance, while others remain at zero, revealing variability in performance across different criteria.

TABLE 3. Negative Distance from Average (NDA)

Negative Distance from Average (NDA)			
0.07895	0.00000	0.11628	0.02439
0.00000	0.00000	0.00000	0.17073
0.15789	0.06667	0.00000	0.00000
0.00000	0.20000	0.00000	0.31707
0.02632	0.00000	0.25581	0.00000
0.00000	0.06667	0.11628	0.00000

The first row presents a combination of low values, with a notable negative distance of 0.11628 in the third column. This indicates that, while the item performs well overall, it has a significant shortfall in this particular area compared to the average, suggesting room for improvement. In the second row, the presence of a value of 0.17073 in the fourth column indicates a substantial negative deviation, suggesting a weak performance in that metric. The rest of the columns show zero, indicating no deficiencies in those areas. The third row highlights a positive distance of 0.15789 in the first column and a smaller value in the second column, revealing significant weaknesses in the first area but overall balance across the other metrics. Row four shows a striking negative distance in both the second (0.20000) and fourth columns (0.31707), indicating considerable challenges in those areas. In row five, a negative distance of 0.25581 in the third column suggests a severe shortfall, while row six has a smaller negative distance, pointing to less critical weaknesses.

TABLE 4. Weight

Weight			
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25

Each of the four categories is treated with the same level of importance, which can be beneficial in analyses where all dimensions are deemed equally vital for a comprehensive assessment. This uniformity allows for a straightforward interpretation of results, as variations in performance can be directly compared without the influence of differing weights. Using this weighting strategy may enhance fairness in evaluating multiple items, especially when no particular area is intended to dominate decision-making processes. However, this approach might overlook scenarios where specific metrics could warrant greater importance based on context or strategic goals. Overall, the consistent weighting of 0.25 across all criteria establishes a foundation for balanced assessment while also highlighting the necessity to consider adjustments in weighting if certain factors become more relevant in future evaluations.

TABLE 5. Weighted PDA SPi

Weighted PDA				SPi
0.00000	0.05000	0.00000	0.00000	0.05000
0.01316	0.01667	0.00581	0.00000	0.03564
0.00000	0.00000	0.04070	0.03049	0.07119
0.03289	0.00000	0.07558	0.00000	0.10848
0.00000	0.01667	0.00000	0.06707	0.08374
0.01974	0.00000	0.00000	0.03049	0.05022

A significant value of 0.05000 appears in the last column under SPi, highlighting the cumulative performance across categories, despite the absence of PDA in the first three columns. This suggests that while the item may not excel in certain metrics, it compensates with strengths in others. The second row exhibits a modest PDA across various metrics, culminating in a total SPi of 0.03564, which indicates a generally favorable performance, albeit limited in scope. The third row stands out with the highest cumulative SPi of 0.07119, suggesting that this item performs particularly well in specific areas, especially with PDA values of 0.04070 and 0.03049 in two categories. The fourth row demonstrates strong performance with an SPi of 0.10848, indicating significant positive contributions in various metrics, reflecting a robust overall capability.

TABLE 6. Weighted NDA SNi

Weighted NDA				SNi
0.01974	0.00000	0.02907	0.00610	0.05490
0.00000	0.00000	0.00000	0.04268	0.04268
0.03947	0.01667	0.00000	0.00000	0.05614
0.00000	0.05000	0.00000	0.07927	0.12927
0.00658	0.00000	0.06395	0.00000	0.07053
0.00000	0.01667	0.02907	0.00000	0.04574

A cumulative SNi of 0.05490 indicates a slight underperformance across the metrics, with the most significant negative distance observed in the fourth column at 0.00610. This suggests that while the item generally performs acceptably, it experiences shortcomings in certain areas that could be improved. The second row shows a total SNi of 0.04268, with values concentrated in the fourth column, reflecting a notable weakness in that area. The absence of PDA in the first three columns indicates that the item does not face significant challenges in those metrics, allowing for some balance in its overall evaluation. The third row reveals a higher cumulative SNi of 0.05614, indicating that the item faces considerable underperformance in various categories, particularly in the first and second columns. Row four stands out with an SNi of 0.12927, revealing significant challenges across multiple metrics, particularly in the fourth column with a distance of 0.07927.

TABLE 7. NSPi

	NSPi	NSPi
EcoBond A	0.46093	0.57527
Green Future Bond B	0.32854	0.66981
Clean Energy Bond C	0.65623	0.56571
Sustainable Growth Bond D	1.00000	0.00000
Climate Action Bond E	0.77197	0.45437
Renewable Resources Bond F	0.46300	0.64619

Sustainable Growth Bond D has an NSPi value of 1.00000 in the first column, suggesting it either excels in sustainability metrics or may have a unique structure that maximizes its score. However, its NSPi drops to 0.00000 in the second column, indicating a potential failure in sustainability metrics under different criteria or a significant decline in performance. Clean Energy Bond C ranks well with a NSPi of 0.65623 in the first column, indicating strong sustainability performance. However, it drops to 0.56571 in the second column, suggesting some areas for improvement but still maintaining a commendable level. Climate Action Bond E shows a moderate performance with values of 0.77197 and 0.45437, reflecting strong initial sustainability metrics but a notable decrease in the second evaluation, which could signal challenges in maintaining sustainability initiatives over time. Icebound A and Renewable Resources Bond F have balanced scores, with NSPi values around 0.46 to 0.57, indicating consistent but not exceptional sustainability performance. Green Future Bond B shows variability, with a first column NSPi of 0.32854, which may raise concerns about its sustainability strategies, despite a higher second column score of 0.66981.

TABLE 8. ASi

ASi	
EcoBond A	0.51810
Green Future Bond B	0.49917
Clean Energy Bond C	0.61097
Sustainable Growth Bond D	0.50000
Climate Action Bond E	0.61317
Renewable Resources Bond F	0.55460

Clean Energy Bond C leads the rankings with an ASi of 0.61097, indicating a strong alignment with sustainability objectives. This high score suggests that the bond is effectively addressing environmental concerns and is likely appealing to investors focused on sustainable development. Climate Action Bond E closely follows with an ASi of 0.61317, reflecting its robust sustainability efforts. This score indicates that it, too, is performing well in its initiatives, positioning it as a strong contender for environmentally-conscious investors. Renewable Resources Bond F scores 0.55460, demonstrating solid sustainability performance that can attract investors. Its position indicates that while it may not be as strong as the top two bonds, it still offers considerable value in sustainability. EcoBond A and Green Future Bond B have ASi values of 0.51810 and 0.49917, respectively, indicating relatively balanced performance but showing some areas that could benefit from further improvement.

TABLE 9. Rank

Rank	
EcoBond A	4
Green Future Bond B	6
Clean Energy Bond C	2
Sustainable Growth Bond D	5
Climate Action Bond E	1
Renewable Resources Bond F	3

In contrast, Green Future Bond B holds the lowest rank of 6, indicating it may be underperforming relative to the other bonds. This could point to deficiencies in one or more evaluated areas, making it a less desirable investment choice. Clean Energy Bond C ranks second, demonstrating a commendable performance that positions it as a strong contender among its peers. Renewable Resources Bond F follows closely in third place, indicating solid performance, though it may not be as competitive as Clean Energy Bond C. Sustainable Growth Bond D ranks fifth, suggesting it has notable strengths but also some weaknesses that limit its appeal compared to higher-ranked bonds. Lastly, EcoBond A ranks fourth, indicating that while it performs well, it may lack the distinctive advantages found in the top contenders.

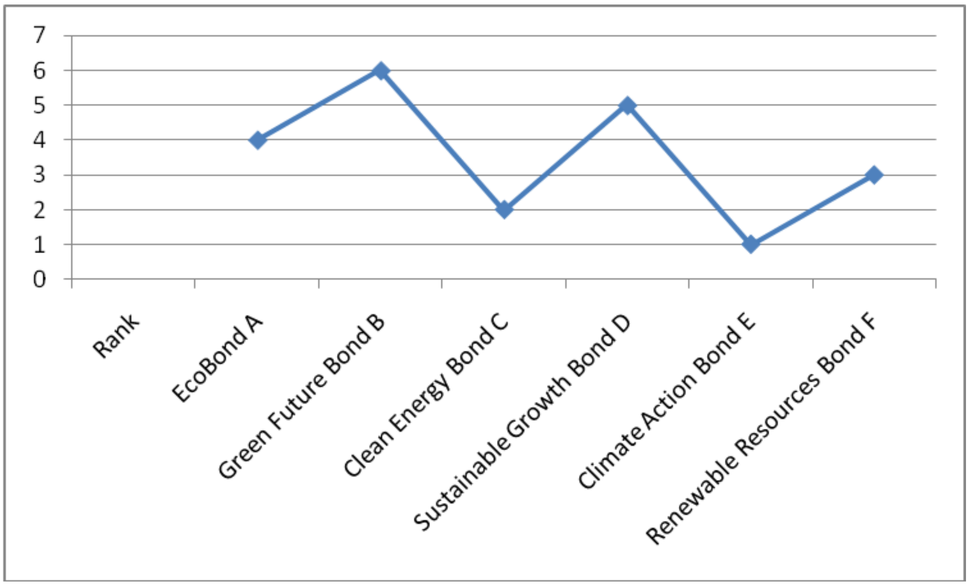


FIGURE 2. Rank

EcoBond A leads the rankings, reflecting its strong performance in the assessed criteria, followed closely by Green Future Bond B. These two bonds seem to have a competitive edge, with EcoBond A consistently maintaining a high rank. Clean Energy Bond C shows a dip in performance compared to the top two, indicating it may not meet the same standards. This trend continues with Sustainable Growth Bond D**,** which has a noticeable decline, suggesting significant challenges that could be affecting its attractiveness to investors. Climate Action Bond E demonstrates a slight recovery, hinting at improvements or stronger aspects in certain metrics, while Renewable Resources Bond F rounds out the rankings with a stable performance.

4. CONCLUSION

These bonds are structured like traditional investment-grade bonds, but include a "use of proceeds" clause to ensure funds are channelled toward environmentally sustainable projects. The green bond market is mainly supply-driven, as issuers are motivated by their financing needs and sustainability goals. Although there is some uncertainty regarding the pricing of green bonds, research indicates that these bonds help issuers to reduce the cost of debt financing, channel funds into green initiatives, and promote environmental protection and clean technologies. Despite the growth of the global green bond market, it still faces challenges, particularly in developing countries. The effectiveness of green bonds in financing sustainable projects relies on government policies such as financial grants, soft loans, and green bond incentives that facilitate the transition to clean technologies. However, without appropriate controls, proceeds from green bonds may be used to finance projects abroad or refinance existing debt, undermining their impact on national sustainability goals. Additionally, significant reductions in emissions imply that green bonds are necessary to finance new climate-friendly initiatives, in addition to refinancing bonds. Issuing green bonds, particularly independent third-party certification, reflects companies' commitment to climate action and promotes transparency. This certification has been linked to positive stock market reactions, underscoring the importance of governance mechanisms in the green bond market. While green bonds play an important role in climate initiatives, further research and development is necessary to overcome market barriers and expand the use of green financial instruments. Comprehensive strategies involving green banks, green bonds and appropriate regulatory frameworks are necessary to finance energy efficiency, renewable energy and sustainable infrastructure projects. As the green bond market continues to grow, it is critical to continually assess its impacts to inform policy decisions and ensure the effective allocation of financial resources to achieve global sustainability and climate objectives.

REFERENCES

[1]. Maltais, Aaron, and Björn Nykvist. "Understanding the role of green bonds in advancing sustainability." *Journal of sustainable finance & investment* (2020): 1-20.

[2]. La Torre, Mario, Annarita Trotta, Helen Chiappini, and Alessandro Rizzello. "Business models for sustainable finance: The case study of social impact bonds." *Sustainability* 11, no. 7 (2019): 1887.

[3]. Barua, Suborna, and Micol Chiesa. "Sustainable financing practices through green bonds: What affects the funding size." *Business Strategy and the Environment* 28, no. 6 (2019): 1131-1147.

[4]. Agliardi, Elettra, and Rossella Agliardi. "Financing environmentally-sustainable projects with green bonds." *Environment and development economics* 24, no. 6 (2019): 608-623.

[5]. Agliardi, Elettra, and Rossella Agliardi. "Financing environmentally-sustainable projects with green bonds." *Environment and development economics* 24, no. 6 (2019): 608-623.

[6]. Azhgaliyeva, Dina, and Brantley Liddle. "Introduction to the special issue: scaling up green finance in Asia." *Journal of Sustainable Finance & Investment* 10, no. 2 (2020): 83-91.

[7]. Fatica, Serena, and Roberto Panzica. "Green bonds as a tool against climate change." *Business Strategy and the Environment* 30, no. 5 (2021): 2688-2701.

[8]. Banga, Josué. "The green bond market: a potential source of climate finance for developing countries." *Journal of Sustainable Finance & Investment* 9, no. 1 (2019): 17-32.

[9]. Gianfrate, Gianfranco, and Mattia Peri. "The green advantage: Exploring the convenience of issuing green bonds." *Journal of cleaner production* 219 (2019): 127-135.

[10]. Flammer, Caroline. "Green bonds: effectiveness and implications for public policy." *Environmental and Energy Policy and the Economy* 1, no. 1 (2020): 95-128.

[11]. Tolliver, Clarence, Alexander Ryota Keeley, and Shunsuke Managi. "Green bonds for the Paris agreement and sustainable development goals." *Environmental Research Letters* 14, no. 6 (2019): 064009.

[12]. Durrani, Aziz, Masyitah Rosmin, and Ulrich Volz. "The role of central banks in scaling up sustainable finance–what do monetary authorities in the Asia-Pacific region think?" *Journal of sustainable finance & investment* 10, no. 2 (2020): 92-112.

[13]. Volz, Ulrich. "Fostering green finance for sustainable development in Asia." In *Routledge handbook of banking and finance in Asia*, pp. 488-504. Routledge, 2018.

[14]. Taghizadeh-Hesary, Farhad, Naoyuki Yoshino, and Han Phoumin. "Analyzing the characteristics of green bond markets to facilitate green finance in the post-COVID-19 world." *Sustainability* 13, no. 10 (2021): 5719.

[15]. Mishra, Arunodaya Raj, Pratibha Rani, and Kiran Pandey. "Fermatean fuzzy CRITIC-EDAS approach for the selection of sustainable third-party reverse logistics providers using improved generalized score function." *Journal of ambient intelligence and humanized computing* (2022): 1-17.
[16]. Qian, Lili, Sifeng Liu, and Zhigeng Fang. "Grey risky multi-attribute decision-making method based on regret theory and EDAS." *Grey Systems: Theory and Application* 9, no. 1 (2019): 101-113.
[17]. Liang, Wei-Zhang, Guo-Yan Zhao, and Sui-Zhi Luo. "An integrated EDAS-ELECTRE method with picture fuzzy information for cleaner production evaluation in gold mines." *Ieee Access* 6 (2018): 65747-65759.
[18]. Juodagalvienė, Birutė, Zenonas Turskis, Jonas Šaparauskas, and Audronė Endriukaitytė. "Integrated multi-criteria evaluation of house's plan shape based on the EDAS and SWARA methods." *Engineering Structures and Technologies* 9, no. 3 (2017): 117-125.
[19]. Peng, Xindong, Jingguo Dai, and Huiyong Yuan. "Interval-valued fuzzy soft decision making methods based on MABAC, similarity measure and EDAS." *Fundamenta Informaticae* 152, no. 4 (2017): 373-396.
[20]. Peng, Xindong, and Chong Liu. "Algorithms for neutrosophic soft decision making based on EDAS, new similarity measure and level soft set." *Journal of Intelligent & Fuzzy Systems* 32, no. 1 (2017): 955-968.
[21]. Mishra, Arunodaya Raj, Abbas Mardani, Pratibha Rani, and Edmundas Kazimieras Zavadskas. "A novel EDAS approach on intuitionistic fuzzy set for assessment of health-care waste disposal technology using new parametric divergence measures." *Journal of cleaner Production* 272 (2020): 122807.
[22]. Ecer, Fatih. "Third-party logistics (3PLs) provider selection via Fuzzy AHP and EDAS integrated model." *Technological and Economic Development of Economy* 24, no. 2 (2018): 615-634.
[23]. Karatop, Buket, Buşra Taşkan, Elanur Adar, and Cemalettin Kubat. "Decision analysis related to the renewable energy investments in Turkey based on a Fuzzy AHP-EDAS-Fuzzy FMEA approach." *Computers & Industrial Engineering* 151 (2021): 106958.
[24]. Dhanalakshmi, C. Sowmya, P. Madhu, A. Karthick, Manoj Mathew, and R. Vignesh Kumar. "A comprehensive MCDM-based approach using TOPSIS and EDAS as an auxiliary tool for pyrolysis material selection and its application." *Biomass conversion and biorefinery* (2020): 1-16.

