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The impact of Islamic finance on carbon emissions : lessons from OIC countries

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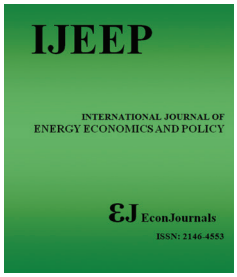

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The Impact of Islamic Finance on Carbon Emissions: Lessons from OIC Countries

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ABSTRACT

Environmental degradation especially the spread of CO_2 emissions per capita in OIC countries has increase very rapidly with one of the factors being sharia bank financing. This study investigates Islamic finance, proxied by Islamic bank financing, and the other common factors influencing emissions per capita in OIC countries. This study analyzed panel data using the Generalized Least Squares (GLS) weighting model and the Fixed Effect Model (FEM). The results of this study indicate that Islamic bank financing, real GDP per capita, and trade openness have a positive and significant effect on CO_2 emissions per capita. Furthermore, urbanization has a negative but it's not significant effect on CO_2 emissions per capita. The findings of this study can serve as the foundation for sustainability policies in government and company regulations, such as the implementation of the concept of green industry and the development of clean and environmentally friendly technologies. Islamic banking in OIC countries can provide sustainable financing, ensuring that the financing provided is not only profit-oriented but also green financing for the community and companies in general.

Keywords: CO_2 Emissions, Environmental Degradation, Islamic Financing, Sustainability
JEL Classifications: Q56, O11, O13, O16, O53

1. INTRODUCTION

In confronting the multifaceted crisis of environmental degradation and global warming, the international community has rallied to prioritize ecological conservation, as evidenced by the increasing political focus on environmental protection, particularly within developed countries (Rosenbaum, 2016). The escalation of greenhouse gases, notably carbon dioxide, is identified as the main driver behind the rise in global temperatures and the resulting climatic alterations (Maulidiyah and Auwalin, 2021). The urgency of these environmental challenges has been met with the formulation of the sustainable development goals (SDGs) at the 70th United Nations General Assembly in 2015, setting forth an ambitious agenda that encapsulates 17 goals targeting various facets of sustainable development, including a pronounced commitment to environmental objectives (Wijayanto and Nurhajati, 2019). In alignment with these goals, corporate entities, including those within the banking sector, are increasingly incorporating green banking initiatives, integrating environmental considerations into their operational ethos to mitigate CO_2 emissions and promote ecological preservation (Indriyani et al., 2019; Yuniarti, 2013).

Previous studies by Omri et al. (2015), Kasman and Duman (2015), and Tang and Tan (2014) identified energy consumption and economic output as key factors affecting air pollution, with additional variables like economic growth, trade openness, foreign investment (Ayobamiji and Kalmaz, 2020), urbanization, agricultural land use (Shaheen and Sheng, 2020), globalization, and population growth (Audi and Auli, 2018). Recent research is now exploring the impact of financial institutions, including Islamic banking, on environmental outcomes such as air pollution (Ayobamiji and Kalmaz, 2020; Zhang and Zhang, 2018; Julia and Kassim, 2019). Within this context, Islamic banking has

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emerged as an ethical and economically significant player. The sector's financing has witnessed a robust expansion, escalating to $1,031 billion by 2021, a 27.28% increase from 2017 (SESRIC, 2022). This substantial growth reflects its increasing popularity in OIC countries, where it not only serves as a financial vehicle for personal asset acquisitions but also powers corporate investments in infrastructure and industrial equipment. Nonetheless, this significant financial movement bears the potential to intensify energy consumption patterns, thus exacerbating the environmental predicament, especially in terms of CO_2 emissions (Zhang and Zhang, 2018).

Moreover, the economic measure of real GDP per capita is tightly bound to energy consumption through industrial activities, transportation, and service consumption. While these activities propel economic advancement, they also aggravate environmental harm, evidenced by the World Meteorological Organization's (WMO) assertion that CO_2 emissions are a predominant factor in the current global warming scenario (WMO, 2023). The Environmental Kuznets Curve (EKC) hypothesis posits an initial increase in pollution with early economic development, followed by a potential reduction as economies mature and enforce strict environmental regulations (Nikensari et al., 2019). The intricacies of international trade present both opportunities and challenges. While it can enhance economic performance and technological prowess, it can also lead to increased production demands and energy consumption, thereby heightening pollution levels (Khoiriyah, 2016; Fatoni, 2020). Similarly, the process of urbanization, with its inherent economic benefits, is also a source of increased energy demands, thus contributing to environmental degradation (Chaolin, 2020; Yazdi and Dariani, 2019).

Currently, banks around the world, particularly Islamic banks in OIC nations, prioritie climate protection efforts in their operations, with a target of 35% of total climate funding by 2025. Climate change risks are examined and handled as a necessity in project implementation as part of one of the banks' strategies worldwide, particularly Islamic banks in OIC nations. The global value chain (GVC) member countries partnership strategy (MCPS) for Guinea, Indonesia, Malaysia, Niger, Nigeria, Senegal, and Saudi Arabia has also included the establishment of a climate change profile-and climate risk analysis. Banks also started establishing a uniform climate change risk management framework in 2020 to handle climate change risks in their operations and bring banks to match clear mitigation actions and adapt them to varied portions of field projects (IsDB, 2022). Several studies, however, have revealed that Sharia banking funding has a detrimental and considerable effect on environmental quality in Indonesia, such as that conducted by Fatoni (2020). In addition, Julia and Kassim (2019) demonstrate in Bangladesh that both conventional and Sharia banking do not qualify as banks that apply environmental sustainability standards. In other hand, the Global Change Data Lab (2022) shows that in 2019 there were nine OIC member countries that entered the top 10 countries with the largest CO_2 per capita producers in the world. The following data on the top 10 countries with the largest CO_2 emissions per capita producers in the world can be seen in Table 1.

Table 1: The largest CO_2 emissions per capita producing countries in the world in 2019

No.	Country	Total (ton per capita)
1	Qatar	36
2	Trinidad and Tobago	26.8
3	Bahrain	25.3
4	Brunei Darussalam	23.9
5	Kuwait	23.5
6	United Arab Emirates	22.6
7	Saudi Arabia	18.3
8	New Caledonia	17.9
9	Australia	16.4
10	Kazakhstan	15.9

Source: Global Change Data Lab (2022)

The red color indicates that this country is an OIC which is among the 10 countries with the largest CO_2 emissions per capita in the world.

Hence, the aim of this study is to identify the state of Islamic banking financing that affects CO_2 emissions in OIC countries and analyze the state of other common factors such as real GDP per capita, trade openness, and urbanization influence CO_2 emissions in OIC countries. As for the expected benefits of this research are the right decision making for the government and companies in the future, the foundation of green banking and green financing policies for sharia banking especially in OIC countries, and descriptions to subsequent researchers regarding various other forms of issues that have not been studied.

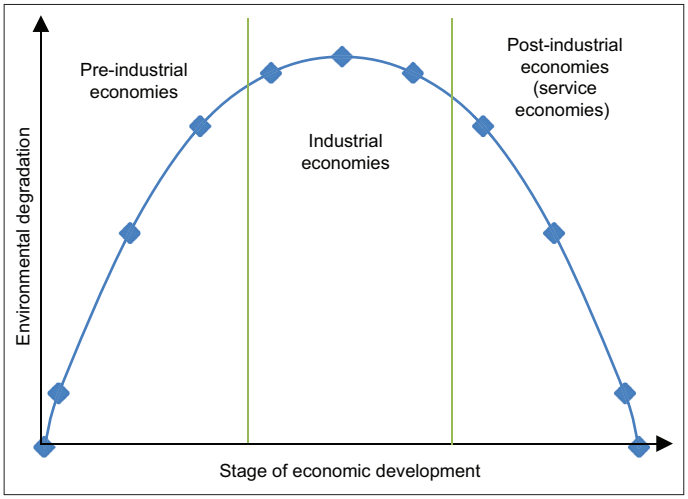
2. LITERATURE REVIEW

2.1. The EKC Hypothesis

The Environmental Kuznets Curve (EKC) embodies the environmental damage hypothesis postulated by Simon Kuznets in 1950 (Agarwal, 2019). Initially characterized as an inverted U-shaped curve, it delineates a correlation between income inequality and economic growth, typically quantified by Gross Domestic Product (GDP). During the initial phases of economic expansion, there is an uptick in inequality, but as economic growth progresses, inequality tends to diminish. Subsequent scholarly investigations elevated the prominence of the EKC, particularly underscored in the World Development Report of 1992 by the World Bank. This report emphasized the notion that unchecked and excessive economic activities could impart detrimental effects on the environment (Nikensari et al., 2019).

EKC describes that there is a relationship between economic growth that generates an income for the state and society with environmental damage that usually results in increased CO_2 emissions. This curve shows that the initial phase of economic development leads to environmental damage, but public awareness of the environment will grow along with the massive increase in economic development. Finally, at some point economic development began to reduce CO_2 emissions (Grossman and Krueger, 1995). Therefore, it is very important to be able to apply the Kuznets Environmental Curve hypothesis to the negative turning point of CO_2 as an impact of economic progress. The following EKC are presented in Figure 1.

Graph 1: EKC model



Source: O¨zcan and O¨ztu¨rk (2019)

Figure 1 shows that CO_2 emissions increase at an early stage due to the increase in a country's income from economic development. Usually in this phase, there is a change in a country from agricultural production to the heavy manufacturing industry sector so that more resources are causing environmental damage. Furthermore, air pollution began to decrease due to the industrial sector which began to change to the service sector and the light manufacturing industry. Then, increased economic growth also replaces outdated or old technology to the latest environmentally friendly technologies so that environmental quality gets better.

2.2. Islamic Bank Financing and Green Financing

Islamic Bank operates under Sharia principles, emphasizing ethical finance free from elements like uncertainty (gharar), gambling, usury (riba), and any dealings in prohibited (haram) goods or services (Andrianto and Firmansyah, 2019). It is distinct from conventional banking, notably in its prohibition of interest and its profit-and-loss sharing mechanisms. Beyond commercial transactions, Islamic banks also undertake social functions, managing and disbursing zakat and other charitable funds.

However, Islamic financing has been implicated in contributing to environmental degradation due to unchecked financing practices (Nofianti and Okfalisa, 2017). To mitigate this, green financing has been introduced, integrating environmental and social risk considerations into banking activities, particularly in Islamic finance. This approach fosters the development of green industries and eco-friendly technologies, ultimately benefitting environmental quality.

Green financing differs from broader green banking initiatives, where the latter encompasses an overall commitment to sustainability, often summarized by the 3Ps—Profit, People, Planet. Green financing specifically refers to financing activities aligned with environmental preservation and compliance with environmental regulations, supporting conservation efforts through targeted loans and investments (Yuliawati et al., 2017).

2.3. Islamic Bank Financing and Carbon Emissions

The interplay between Islamic bank financing and air pollution is nuanced, with studies indicating diverse impacts on the environmental impacts. Maulidiyah and Auwalin (2021) advocate for a banking role that incorporates environmental scrutiny into financing decisions, a sentiment echoed by findings that link financial activities to increased CO_2 emissions due to investments in energy-intensive industries (Zhang and Zhang, 2018; Dogan and Turkekul, 2015). However, the relationship is not uniform across the board; research varies, with some indicating that financial development contributes to environmental degradation (Zhang, 2011; Shahbaz and Hooi, 2012), while others suggest a potential reduction in emissions (Tamazian and Rao, 2010). Within the realm of Islamic finance, the evidence is similarly mixed: some studies point to an increase in emissions due to Sharia-compliant financing (Iskandar et al., 2020), others to a negative or insignificant impact (Fatoni, 2020; Al-Silefanee et al., 2022), and critiques highlight the banking sector's struggle with sustainable policy implementation (Julia and Kassim, 2019; Bendriouch et al., 2020). The findings of Maulidiyah and Auwalin (2021) highlight this intricacy, since they indicate a non-significant negative relationship between Islamic banking finance and air quality in Indonesia.

H_1: Islamic bank financing exerts a positive influence on CO_2 emissions per capita.

2.4. Real GDP and Carbon Emissions

The theory of the Environmental Kuznets Curve (EKC) elucidates the connection between real GDP per capita and air pollution, suggesting that initial economic expansion leads to environmental degradation, which subsequently improves at higher levels of per capita income. Real GDP per capita, a metric adjusting economic prosperity for inflation over time, serves as a widely utilized measure for evaluating economic advancement and comparing economic conditions across nations (Ariyadi, 2016; Prasetyanto, 2016; Fahruddin and Aji, 2021). Empirical investigations on this subject have yielded diverse outcomes: Some studies, such as Pangestu (2017) and Akalpler and Hove (2019), identify a positive association between real GDP per capita and CO_2 emissions, indicating that economic growth in ASEAN and India is linked with increased pollution. Ganda's study (2019) also shows that economic growth has a positive and statistically significant relationship with OECD countries' carbon emissions, greenhouse gases, and sustainability. Apart from that, Irfany et al. (2022) prove a positive relationship between GDP per capita and carbon emissions, especially in OIC countries. In contrast, other studies, such as those by Widyawati et al. (2021) and Lawal and Abubakar (2019), reveal a negative impact, suggesting that higher per capita economic prosperity may be correlated with reduced emissions, as observed in ASEAN countries and Nigeria.

H_2: Real GDP per capita exerts a positive influence on CO_2 emissions per capita.

2.5. International Trade and Carbon Emissions

International trade can impact air pollution through scale, technological, and compositional effects, wherein heightened trade activities may contribute to increased pollution due to

economic growth (scale effect). Conversely, trade can also mitigate pollution by disseminating green technologies (technological effect) and influencing economic structures (composition effect), aligning with the stages of the Environmental Kuznets Curve (EKC) (Fatoni, 2020). Empirical findings on this relationship are inconclusive. Li et al. (2016) and Fang et al. (2018) observed that trade leads to elevated CO_2 emissions, particularly in China, while Fatoni (2020) documented a negative impact on air quality in Indonesia. Wang and Zhang (2020) uncovered a mixed effect on emissions in lower-middle-income countries, Rehman et al. (2021) and Chang et al. (2018) demonstrated that exporting manufactured goods might reduce emissions, underscoring the complexity and context-dependency of the trade-pollution relationship.

H_3: International trade exerts a positive influence on CO_2 emissions per capita.

2.6. Urbanization and Carbon Emissions

Urbanization is associated with both the concentration of population and economic activities in cities, which can lead to both positive developments and negative externalities, including air pollution (Mardiansjah and Rahayu, 2019; Hidayati, 2020). While urban areas are pivotal for economic growth and modernization, they also face challenges such as slum proliferation, social instability, unemployment, poverty, and environmental degradation. The Environmental Kuznets Curve (EKC) argues that while early industrial growth in urban areas may increase environmental impact owing to resource exploitation, a later move to the service sector and increasing environmental consciousness may lessen pollution (Prasetyawati, 2019). Empirical studies on the impact of urbanisation on CO_2 emissions present varied findings: Agung et al. (2017) and Prasetyawati (2019) note a non-significant relationship, while Anwar et al. (2020) and Ali et al. (2019) observe a positive correlation, especially in Far East Asian Countries and Pakistan, while Kristiani and Soetjipto (2019) find a negative correlation in the Western region of Indonesia, suggesting that more advanced stages of development could mitigate the negative.

H_4: Urbanization exerts a positive influence on CO_2 emissions per capita

3. RESEARCH METHODOLOGY

This quantitative study examines the effects of Islamic funding on carbon emissions in a sample of OIC countries. This study's population is made up of data obtained from the 16 OIC nations stated above between 2017 and 2021. Purposive sampling was used, with consideration given to the availability and credibility of data on Islamic funding and carbon emissions. The inclusion criteria for the nations analysed were (1) the availability of accurate data on Islamic finance and carbon emissions during the study period. (2) The OIC represents people from many economic and geographical backgrounds. Bangladesh, Brunei, Indonesia, Jordan, Kuwait, Lebanon, Malaysia, Nigeria, Oman, Pakistan, Palestine, Qatar, Saudi Arabia, Sudan, Turkey, and the United Arab Emirates have all been chosen based on these criteria.

The research analyzed the impact of Islamic financing on carbon emissions. The secondary data collected from various sources were processed using statistical software. Data processing activities, including the creation of tables and analysis, were performed using software tools appropriate for panel data regression. The research model employed to analyze the data is as follows:

$$LnEMIC_{it} = \alpha_1 + \alpha_2 LnSBF_{it} + \alpha_2 LnRGDPC_{it} + \alpha_3 TO_{it} + \alpha_4 LnURBAN_{it} + \varepsilon_{it} \quad (1)$$

Where Eq. (1) describe the effect of various independent variables on dependent variables in this study. The dependent variable of this study is natural logarithm of CO_2 emissions per capita ($LnEMIC_{it}$). Other explanatory variables are $LnSBF_{it}$ is the natural logarithm of sharia banking financing, $LnRGDPC_{it}$ is the natural logarithm of real GDP per capita, TO_{it} is of trade openness, $LnURBAN_{it}$ is the natural logarithm of urbanization, and ε_{it} is the error term. The definition variables considered in this study are detailed in Table 2, and the overall characteristics of the data are summarized in Table 3.

4. RESULTS AND DISCUSSION

4.1. Estimation Results

Initially, the identification of optimal models involves employing a model specification test, as proposed by Bera and Jarque in 1982. This test involves assessing the model's goodness of fit through various tests (Basuki, 2021). Specifically, it incorporates the likelihood ratio test (Chow Test) to compare the Common Effects Model (CEM) against the Fixed Effect Model (FEM), and the Hausman Test to contrast the Random Effects Model (REM) with the Fixed Effect Model (FEM). The Chow test is applied for model selection between the Common Effects Model (CEM) and the Fixed Effect Model (FEM). Examining Table 4 reveals that the cross-section F value is 262.094344 with a probability of 0.0000, signifying significance at the 0.05 (5%) level. Consequently, it is determined that the optimal model is the Fixed Effect Model (FEM). Following the methodology suggested by Baltagi (2005), the Hausman test is utilized to compare and select the superior model between the Random Effects Model (REM) and the Fixed Effect Model (FEM). The results presented in Table 5 indicate that the statistical value of the Hausman test is 30.62112, with a probability of 0.0000, indicating significance at the 0.05 (5%) level. Consequently, it is concluded that the fixed effect model (FEM) is the preferred model.

The normality test is used to test whether the term error softens the normal distribution, the distribution of undistributed intruder variables or the residual regression model, which can be done using a histogram and the Jarque-Bera test (Gujarati, 2004). Output results by looking at the strength of independent inter-variable correlations by looking at the values "r" are in Table 6. It is shown free inter-variable correlations having an independent inter-variable correlation value (r) of <0.8 ($r < 0.8$) so that each variable has a correlation or relationship that is said to be low. Therefore, it can be concluded that in the results of the study there were no multicollinearity problems.

Table 2: Variables' definition

Variable	Definition	Original unit	Unit used	Source
CO_2 Emissions per Capita (EMIC)	Total CO_2 emissions are divided by the population produced from energy and industrial fuels. Whereas land use changes are not counted (Global Change Data Lab 2023).	Tons per capita	kg per capita	Global Change Data Lab
Sharia Bank Financing (SBF)	The value of financing in accordance with sharia from sharia banking that offers sharia financial services (SESRIC, 2023).	Million USD	Million USD	SESRIC
Real GDP per Capita (RGDPC)	Percentage change in GDP per capita to 2015 constant or base prices (SESRIC, 2023).	USD	USD	SESRIC
International Trade (TO)	Percentage of total exports and imports of both goods and services divided by GDP (SESRIC, 2023).	Percent	Percent	SESRIC
Urbanization (URBAN)	Population living in urban areas (SESRIC, 2023).	Number	Number	SESRIC

Table 3: Research data characteristics

Variable	Mean	Minimum	Maximum	Observation
EMIC	10,248.5	450	36,940	80
SBF	36,260.2	72.8	198,130.1	80
RGDPC	15,199.5	1,530.7	60,960.4	80
TO	74.5	19	190.6	80
URBAN	35,654,936	332,655	156,833,203	80

Source: Own estimation (2024)

Heteroscedasticity tests are used with the aim of testing a regression model related to the inequality of variance from error on one observation to another. This can be conducted by the White test (Gujarati, 2004). The test shows a Chi-square (20) probability value of 0.0000. As probability values of 0.0000 < 0.05, it can be concluded that the model has occurred a heteroscedasticity problem in the regression model. Therefore, this study employs a Fixed Effect Model (FEM) model with generalized least square (GLS) weighting. The GLS model gives weighting to variations in research data used so that heteroscedasticity problems can be overcome (Mulyasari, 2016).

Autocorrelation tests are used with the aim of testing the presence or absence of error term in a certain period with errors in the previous period in a regression model. The autocorrelation test can be known to one of them using the Breusch-Godfrey test. The output shows a Chi-square probability value of 0.0000. Comparison between probability values of 0.0000 < 0.05, it can be concluded that data has occurred an autocorrelation problem in the regression model. In this study the model used is the FEM weighted GLS. The GLS method can suppress autocorrelations that usually arise in the ordinary least square (OLS) formula as a result of errors in estimating variance so that the GLS method can overcome problems in autocorrelation. Estimation of panel data using the fixed effect model (FEM) both LSDV and GLS can ignore the occurrence of autocorrelation so that using this method can overcome the problem of autocorrelation (Gujarati, 2004).

Then the estimated results of the FEM weighted GLS model in Table 4 are as follows:

$$LnEMIC_{it} = 9.884145 + 0.059971\ (LnSBF_{it}) + 0.200452\ (LnRGDPC_{it}) + 0.001408\ (TO_{it}) - 0.242911\ (LnURBAN_{it}) + \varepsilon_{it} \quad (2)$$

It is shown that Islamic finance has a positive impact on carbon emissions, where a 1% increase in Islamic financing leads a 0.059971% rise in CO_2 emissions per capita (at a 5% significance level). In addition, real GDP per capita is positively associated with emissions, suggesting that economic growth in these countries may lead to higher carbon emissions (significant at the 1% level). In terms of trade openness, the results indicate a positive effect on emissions, meaning that more open trade is linked to increased CO_2 emissions, significant at the 1% level. Interestingly, urbanization appears to have a negative impact on carbon emissions, albeit with less certainty, significant at the 10% level, which could point to more carbon-efficient urban development practices in these countries. The model's fit is exceptionally strong, with an Adjusted R-squared of 99.91%, demonstrating that it can explain nearly all the variance in the carbon emissions among the countries studied. This robust fit underline the importance of the variables included in explaining carbon emissions in the OIC context.

5. DISCUSSIONS

Islamic finance exerts a positive and significant influence on per capita CO_2 emissions, as identified by Julia and Kassim (2019). According to SESRIC data (2022), substantial Sharia banking financing is directed towards the industrial sector in various OIC countries, with significant environmental implications. Particularly, financing directed towards heavy industries contributes to increased air pollution and CO_2 emissions. This suggests that Islamic banking has not fully embraced the promotion of green industries aimed at mitigating adverse environmental impacts. The reliance on traditional, energy-intensive industries underscores the need for a transition to more environmentally friendly and sustainable sectors.

Real GDP Per Capita (RGDPC) has positively and significantly effect with per capita CO_2 emissions, supporting the Environmental Kuznets Curve hypothesis proposed by Mitic et al. (2017). SESRIC (2022) highlights that in high-income OIC countries, the primary source of RGDPC is the oil industry, a major contributor to CO_2 emissions. Economic growth in these nations often lacks corresponding environmental protection measures, leading to increased pollution (Noor dan Saputra 2020). The economic structure of OIC countries, dominated by the service sector,

Table 4: Estimated results of dependent variable LnEMIC

Variables	Common effect model (CEM)	Fixed effect model (FEM)	Random effect model (REM)	FEM weighted GLS
Constant	–3.930867***	9.731308***	5.526755***	9.884145***
	(0.0002)	(0.0006)	(0.0010)	(0.0000)
$LnSBF_{it}$	0.002566	0.068831**	0.076235***	0.059971**
	(0.9279)	(0.0148)	(0.0024)	(0.0106)
$LnRGDPC_{it}$	1.277627***	0.277714**	0.658659***	0.200452***
	(0.0000)	(0.0148)	(0.0000)	(0.0081)
TO_{it}	0.000908	0.001431**	0.002287***	0.001408***
	(0.5839)	(0.0372)	(0.0005)	(0.0053)
$LnURBAN_{it}$	0.041336	–0.281033*	–0.242076***	–0.242911*
	(0.3295)	(0.0811)	(0.0014)	(0.0980)
F test	276.9405***	3,309.751***	28.36485***	4,691.420***
	(0.000000)	(0.000000)	(0.000000)	(0.000000)
R-squared	0.936589	0.999047	0.602036	0.999327
Adjusted R-squared	0.933207	0.998745	0.580812	0.999114

Parentheses and prob. indicates the value of the significance level or probability value in each variable. *Significant at 10%, **significant at 5%, ***significant at 1%. Source: Own estimation (2024)

Table 5: Model fitment test result

Test	Hypothesis	Prob.	Details
Chow test	H_0=CEM (prob. >0.05)	0.000	Prob. <0.05
	H_1=FEM (prob. <0.05)		FEM best model
Hausman test	H_0=REM (prob. >0.05)	0.000	Prob. <0.05
	H_1=FEM (prob. <0.05)		FEM best model

Source: Own estimation (2024)

Table 6: Multicollinearity test results by looking at independent inter-variable correlation values (r)

Relationship	Independent Inter-variable			
	SBF	RGDPC	TO	URBAN
SBF	1.000000	0.388610	0.293214	0.156574
RGDPC	0.388610	1.000000	0.738336	–0.599053
TO	0.293214	0.738336	1.000000	–0.563084
URBAN	0.156574	–0.599053	–0.563084	1.000000

Source: Own estimation (2023)

manufacturing, and mining, indicates that economic growth remains closely linked to rising CO_2 emissions, especially from the transportation and industrial sectors.

Trade Openness (TO) shows a positive and significant effect on per capita CO_2 emissions. Studies by Wang and Zhang (2020) found that in low-income countries, international trade can increase air pollution and carbon emissions. Data from SESRIC (2022) and COMCEC (2022) reveal that export and import activities in OIC countries, especially in the non-manufacturing industrial sector, significantly contribute to CO_2 emissions. Major resource-based exports such as oil and gas in high-income OIC countries and the involvement of middle to lower-income countries in manufacturing industries indicate a direct relationship between trade and increased CO_2 emissions.

Urbanization (URBAN) has a negative and non-significant influence on per capita CO_2 emissions. Consistent with research by Prasetyawati (2019), urbanization does not have a strong impact on CO_2 emissions. This supports the ecological modernization theory, stating that technological development and environmentally friendly innovations in OIC cities can contribute to pollution reduction. This innovation takes the form of adequate public transportation so that big cities can have a sustainable process, especially regarding the environment (Putri 2018). Grun et al. (2021) notes that CO_2 emission distribution in OIC cities is uneven, depending on population and the adoption of environmentally friendly technologies. This suggests that urbanization can play a role in reducing CO_2 emissions, especially when accompanied by effective environmental policies and sustainable technological innovations.

6. CONCLUSIONS AND RECOMMENDATION

This study examined the impact of Sharia Banking Financing (SBF), Real GDP Per Capita (RGDPC), Trade Openness (TO), and Urbanization (URBAN) on carbon emissions in 16 OIC countries during the period 2017-2021. Our findings reveal a significant positive impact of SBF and RGDPC on per capita carbon emissions, indicating the environmental implications of Islamic banking practices and economic growth in high-income OIC nations. Additionally, Trade Openness demonstrates a positive association with emissions, emphasizing the role of international trade in contributing to carbon emissions. Surprisingly, Urbanization exhibits a non-significant negative influence on carbon emissions, suggesting that the ecological modernization theory may be applicable in OIC cities. These results underscore the need for sustainable practices in Islamic financing and economic development strategies to mitigate the environmental impact in OIC countries.

For future research, a more detailed exploration of sharia banking financing variables, including consumptive and productive sectors, population dynamics, nominal GDP per capita, industrial quantity, transportation volumes, land use patterns, foreign capital investments, and energy consumption, is advised. Policymakers are urged to enact and enforce environmentally focused regulations, steering sharia banking financing towards eco-friendly sectors. Additionally, sharia banking institutions should adopt sustainability policies, actively promoting and implementing green financing practices. Urban development concepts should prioritize environmental sustainability through supportive regulations and

innovative initiatives, aligning with the principles of ecological modernization to foster positive contributions to the environment.

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